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IN THE NAME OF ALLAH,
THE MOST GRACIOUS,
THE MOST MERCIFUL

Kingdom of Saudi Arabia
Ministry of Education
Majmaah University

جامعة المجمعة
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About the Journal

Majmaah Journal of Health Sciences

Vision

The Majmaah Journal of Health Sciences shall be an international peer reviewed journal, which intends to serve researchers through prompt publication of significant advances, and to provide a forum for the reporting and discussion of news and issues concerning health sciences.

Mission

To lead the debate on health and to engage, inform, and stimulate the academicians, researchers, and other health professionals in ways that will improve outcomes for patients.

Objectives

To promote research & evidence based practice in health sciences, so that a firm scientific knowledge base is developed, from which more effective practice may be evolved.

To ensure that the results of the research are rapidly disseminated to the practicing clinicians and educators, in a fashion that conveys their significance for knowledge, culture and daily life.

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Editorial

From Editor's Desk…..

At the outset let me express my gratitude to our beloved Rector Dr.Khalid Bin Saad Al Meqrin and Vice Rector for Graduate Studies and Scientific Research Dr. Ahmad Alromaih for the trust endowed upon me.

It's a high time for humanity in the battle against COVID-19 pandemic; the Ministry of Health has initiated mass vaccination campaign and started more than 500 centers in the Kingdom. The ministry reported that the rate of the vaccination appointments has gone up, as the "Sehhaty" app has made it easy for the citizens and residents to book their appointments and know the location of the centers providing the vaccine. The ministry also reassured the public that the vaccines approved in the Kingdom are effective and safe. The editorial team support and encourage everyone to get vaccinated as early as possible and join the fight against COVID-19 pandemic.

MJHS is happy to bring forth its 2nd issue of Vol 9: 2021 on time. The editorial team strives hard to publish all issues on time; as we believe that being punctual helps to establish reputation of MJHS as dependable and consistent. I express my sincere thanks to the international panel of experts and team of associate editors for their efforts to improve the publication process of MJHS office.

Authors who are submitting their research in MJHS are encouraged to enrich their scientific contributions by plagiarism checking and get their manuscripts professionally edited prior to submission; especially the authors for whom English is a second language. However, the language editing does not guarantee publication and any costs incurred are the sole responsibility of the author.

The editorial team would like to thank all authors, reviewers, readers for your continuous support for the success of MJHS.

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Dr.Khalid Mohammed Alabdulwahhab

Editor in Chief

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Original Article :

Medical Internship Students 'Attitude Toward Compatibility Of Medical Teaching With The Saudi Vision 2030 In Saudi Arabia

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Abstract

Background & Aims:

As a roadmap for economic development and national growth, "Vision 2030" was adopted by Saudi Arabia (SA). With three main pillars, a lively culture, a flourishing economy, and an ambitious nation, SA will achieve its "Purpose 2030 vision." There is also a need to ensure the vision is consistent with both medical and health education. Therefore, the purpose of this study is to assess Medical internship students' attitude toward compatibility of medical teaching with the Saudi vision 2030 in SA. Methods: A cross sectional, descriptive research design was used. A sample of 1200 male and female medical internship students in SA was studied using convenience sampling. The data was collected using a questionnaire which consist of two parts. The first part deals with the demographic data of the respondents, while the second one includes the three health goals of vision 2030 and other general goals.

Results:

The majority of the studied intern students provided average score in relation to facilitating access to health services (88.7%), improving the quality and efficiency of health services (76.1%) and the general goal while only (58.8%) provided high score relat-

الملخص

الخلفية و الاهداف :

اعتمدت المملكة العربية السعودية "رؤية ٢٠٣٠» كخارطة طريق للنمو الاقتصادي والتنمية الوطنية. ستحقق المملكة أهداف «رؤية ٢٠٣٠» من خلال ثلاث ركائز رئيسية هي مجتمع نابض بالحياة واقتصاد مزدهر وأمة طموحة. يسعى المحور الأول (تحويل الرعاية الصحية) إلى تحقيق مجتمع حيوي من خلال إعادة هيكلة القطاع الصحي ليصبح نظامًا شاملاً وفعالاً. سيعزز الصحة العامة من خلال تنفيذ نموذج جديد للرعاية يركز على الوقاية وتحسين الوعي الصحي للمجتمع. لذلك هناك حاجة للتأكد من أن جميع مؤسسات التعليم الطبي والصحي يتوافق مناهجها مع الرؤية.

تهدف الدراسة الى تقييم اتجاهات طلاب التدريب الطبي (الامتياز) تجاه توافق التدريس الطبي مع الرؤية السعودية ٢٠٣٠ في المملكة العربية السعودية.

طريقة البحث :

تم استخدام تصميم بحثي مقطعي وصفي. عينة من ١٢٠٠ طالب وطالبة متدرب طبي على مستوي مختلف من جامعات المملكة العربية السعودية. فيما يتعلق بأداة جمع البيانات، تم تطوير استبيان لهذا الغرض من خلال مراجعة المراجع. يتكون الاستبيان من جزأين. يتناول الجزء الأول البيانات الديموغرافية للمشاركين وهي: (الجنس ، العمر ، الجامعة). بينما يتضمن الجزءالثاني الأهداف الصحية الثلاثة لرؤية ٢٠٣٠ والأهداف العامة

النتائج :

١٢٧٠غالبية الطلاب المتدربين الذين خضعوا للدراسة قدموا متوسط درجات فيما يتعلق بتسهيل الوصول إلى الخدمات الصحية (٨٨,٧٪)،

ed to prevention of health risks. That means that the curricula of College of Medicine on all Saudi Arabia still need to modification to be compatible with vision 2030.

Conclusion:

We found that the curricula of Colleges of Medicine across Saudi Arabia still need modification to be compatible with vision 2030. The Colleges of Medicine are requested to increase the participant of the students in the mobile clinics and activate their role toward their community, update the palliative care as the separate curriculum. Moreover, the Colleges of Medicine must increase the interest with curriculum of medical administration

Keywords:

Medical, internship, compatibility, teaching, Saudi vision 2030

وتحسين جودة وكفاءة الخدمات الصحية (٧٦,١٪) والهدف العام بينما (٥٨,٨٪) فقط أعطوا درجة عالية المتعلقة بالوقاية من المخاطر الصحية.

الخلاصة :

مناهج كليات الطب في جميع أنحاء المملكة العربية السعودية لا تزال بحاجة إلى تعديل لتكون متوافقة مع رؤية ٢٠٣٠. توصي الدراسة أن تقوم كليات الطب بزيادة المشاركين من الطلاب في العيادات المتنقلة وتفعيل دورهم تجاه مجتمعهم وتحديث الرعاية التلطيفية كمنهج منفصل، وزيادة الاهتمام بمناهج التعليم الطبي.

Introduction

As a roadmap for the growth of economic and national development, Saudi Arabia adopted 'Vision 2030.' "The 2030 Vision" set out the overall priorities, objectives, and aspirations of the Kingdom for a prosperous and pioneered nation to be a model of the world class. With three main pillars a vibrant culture, a stable economy, and an optimistic country the Saudi Arabia will attain its Vision for 2030 targets [1]

The first theme (Transforming healthcare) is to make a diverse community a comprehensive and efficient infrastructure by reforming the health industry. It will improve public health by introducing a modern care model focused on prevention and greater understanding of society's health. It would also enhance access to health care by offering optimal coverage, equal regional distribution and extensive, extended e-health and digital solutions. It seeks to constantly enhance healthcare quality in line with international standards and best practices, by focusing on recipient perceptions and satisfaction. [2]

To improve public and local access to health services at the right time, there are four components: an increase in overall capacity (number of beds and medical personnel), sufficient regional allocation (distance from the care provider), timely and affordable access to relevant health services. To increase the overall value giv-

en for benefit recipients, the quality and reliability of health care services as well as the protection of health facilities will be enhanced, and adequate financial sustainability coverage will be assured. In the other hand, it encourages safe living to reduce threats from health emergencies and diseasing from communicated and non-communicable disorders by encouraging preventive health care (such as recognition and vaccination). [3]

In order for all of the preceding to be achieved, all health and educational organization must conform to the vision 2030 [4] So, the interest with medical education is the first goal that rely on achieving most of health strategies for vision 2030. Today's agenda is medical education. What students learn how they learn, how they can learn, where they are going to learn, and how the learning is better structured and measured are problems discussed by health practitioners, the public and policymakers in more general. [5]

The interest in medical education in Saudi Arabia and a rapid expansion of medical schools have increased correspondingly, with the number doubling over the last five years to 5% [6]. In the field of medical education and the creation and publication of the structure for the learning outcome were the contributions of the Saudi Deans Committee and the Saudi Society for Medical Education [7].

The aim of medical education is to prepare young doctors to learn knowledge and skills to meet their community's health needs. [8] In Saudi Arabia there are so many obstacles to medical education. A major challenge worldwide is the increasing global demand for health professionals in general and doctors. The mushrooming of medical schools in the country puts immense pressure on the MOHE to have an adequately trained medical education infrastructure and staff. Furthermore, the expansion of the new medical colleges could potentially raise concerns about the amount versus quality of medical training, if not carefully planned [9].

According to the 2030 vision, the development and growth of the Saudi educational system is a new challenge in the medical education field. [10]. the successful implementation of a 2030 vision depends on the effective training of different fields of education [11]. Therefore, the Ministry of Higher Education has adopted different methods of professional development to improve the effective education practices according to the 2030 vision. [12] The assessment of change needed to meet the demands of the 2030 vision is needed in Saudi universities curriculum and this can only be done by understanding what attitudes students have towards the curriculum and their vi-

sion. Considering all this the purpose of the study is to assess Medical internship students' attitude toward compatibility of medical teaching with the Saudi vision 2030.

Material and Methods

A descriptive cross-sectional study design has been used to test the attitude of medical interns to medical teaching compatibility with Saudi 2030. The study was conducted in Saudi Arabia. A sample of 1200 male and female medical internship students in Saudi Arabia. The sample was chosen by a convenience sampling. Regarding the data collection tool, a questionnaire was developed for this purpose through reviewing of literatures. There were two sections of the questionnaire. The first segment addresses the demographics of the respondents: (Gender, age, university). While the second one includes the three health goals of vision 2030 each goal contains six statements and general questions contains of five statements For each statement participants completed a three-point Likert-scale response ranging from "Disagree" =1 to "Agree"= 3 with the statement.

To verify the reliability of the study tool, it was distributed electronically via the internet to a pilot sample of (400) male and female new graduates of faculty of Medicine in different Saudi Universities. The internal consistency reliability of the questionnaire was measured using Cronbach Alpha, the ICR value was 0.72 which shows that the instrument is reliable.

The participants were given online consent form, which was prepared and outlined the goal of the study and advised that all information would only be used for the intent and results of the study reported in addition. The study also provided participants with information online. After the participants decided to replenish the questionnaire, the scientists submitted the questionnaire online. The data collection process was conducted at all medical college in Saudi Arabia. Prior to conducting an actual report, the study obtained in the subject was subject to informed consent. On-line. The study goal and the research measures had been told to participants. Furthermore, the participant told without a justification of his or her right to cancel the study any time. The topic of the study remains confidential and personal. The data was entered and analyzed using IBM SPSS 26. Frequencies and percentages and reported for qualitative variables. Mean ±SD is given for quantitative variables. Pearson Chi-Square and Fisher Exact tests were applied to observe the associations between qualitative variables. A p-value of less than 0.05 was considered as statistically significant.

Results:

The average age of the respondents was 26.45+0.861 years ranged between 25-27 years. Males represented a higher percentage 666 (55.5%) than females 546 (45.5%) with more than half of the studied students 792 (66%) were in the age group of twenty-six years or more, while 408 (34%) only were in the age group of less twenty-six years old.

Medical internship students' attitude toward Facilities and access to health services:

In relation to facilities of access to health services, the table showed that, the majority of the participants represented neutral response (73.6%) related to the curricula we studied help create an creative graduate who is able to expand medical fields ,also in about the study at the college encourages students to make convoys to facilitate health service access to all citizens (86.2%),in addition ,more than half of the participants represented neutral response related to the study achieves the development of the mobile clinic concept among students(53.6%), and the study at the college helps in applying evidence-based medicine and primary care (51.3%),but near than half of the participants (48.7%) were disagree about that. The table also illustrated that, the majority of the participants represented neutral response (64.3%) about College of Medicine encourages building the concept of expanding palliative care among students ,also more than half of the studied students provided neutral response (53.4%) related to the College of Medicine assists in conducting training programs for students to develop their practical abilities in sorting out emergency cases.

Table 1: The distribution of medical internship students' attitude toward Facilities of access to health services:

Facilitate access to health services		% agreement	Mean	SD	Level	Chi-square	
						X^2	P-value
1	The curricula we studied help create an creative graduate who is able to expand medical fields	63.14	1.894	0.503	Average	894.9	<0.001
2	The study at the college encourages students to make convoys to facilitate health service access to all citizens	62.22	1.867	0.347	Average	1539.3	<0.001
3	The study achieves the development of the mobile clinic concept among students	51.31	1.539	0.502	weak	603.6	<0.001
4	The study at the college helps in applying evidence-based medicine and primary care	50.47	1.514	0.502	weak	598.2	<0.001

Facilitate access to health services		% agreement	Mean	SD	Level	Chi-square	
						X^2	P-value
5	The study at the College of Medicine encourages building the concept of expanding palliative care among students	54.75	1.643	0.479	weak	97.470	<0.001
6	he College of Medicine assists in conducting training programs for students to develop their practical abilities in sorting out emergency cases	51.53	1.546	0.510	weak	589.085	<0.001

Medical internship students' attitude toward Methods of Improving the quality and efficiency of health services

Regarding improving the efficiency and quality of health services, the table showed that majority of the studied intern students represented neutral response (82.3%) related to Studying at the College of Medicine helps teach students to make the most of the available resources ,also more than half of the studied intern students represented disagree related to the study at the College of Medicine increases students' awareness to reduce medical costs and burdens (50.7%).In addition to more than half of the studied students were agree related to the study at the College of Medicine encourages the development of interactive training for students (60.5%),also in studying at the College of Medicine helps increase students 'awareness of the culture of patient-centered care (58.2%). Furthermore, less than half of the studied intern students were agree related to studying at the College of Medicine helps support students' concept of governance in the health sector (48.4%). Also, the table showed that majority of the studied intern students represented neural response related to the study at the College of Medicine is working on graduating students capable of dealing with a comprehensive and effective health system (79.0%)

Table 2: The distribution of medical internship students' attitude toward the methods of improving the quality and efficiency of health services:

Improving the quality and efficiency of health service		% of agreement	Mean	SD	Level	Chi-square	
						X^2	P-value
1	Studying at the College of Medicine helps teach students to make the most of the available resources	70.33	2.110	0.406	Average	1318.320	<0.001
2	he study at the College of Medicine increases students' awareness to reduce medical costs and burdens	52.39	1.572	0.634	Weak	366.260	<0.001

Improving the quality and efficiency of health service		% of agreement	Mean	SD	Level	Chi-square	
						X^2	P-value
3	The study at the College of Medicine encourages the development of interactive training for students	85.36	2.561	0.579	High	567.815	<0.001
4	Studying at the College of Medicine helps increase students 'awareness of the culture of patient-centered care	85.00	2.550	0.558	High	559.860	<0.001
5	Studying at the College of Medicine helps support students' concept of governance in the health sector	54.92	1.648	0.701	Weak	237.615	<0.001
6	The study at the College of Medicine is working on graduating students capable of dealing with a comprehensive and effective health system	71.61	2.148	0.434	Average	1165.745	<0.001

Medical internship students' attitude toward the prevention of health risks:

Regarding prevention of health risks, more than half of the studied intern students provided neutral response (56.6%) related to Studying at the College of Medicine promotes preventive health, were agree about the study at the Faculty of Medicine teaches students to deal with infectious diseases (51.1%) and Studying at the College of Medicine helps students control non-communicable diseases (53.8%). Also, the table showed that the majority of the studied intern students represented neutral response (80.8%) related to the study at the College of Medicine teaches students to create complete databases to support preventive measures, (78.3%) about the study at the Faculty of Medicine teaches students to deal with natural disasters and (73.2%) related to Studying at the College of Medicine helps students identify the health needs and priorities of society.

Table 3: Distribution of medical internship student attitude toward prevention of health risks

Promote prevention of health risk		% of agreement	Mean	SD	Level	Chi-square	
						X^2	P-value
1	Studying at the College of Medicine promotes preventive health	79.47	2.384	0.536	High	557.555	<0.001
2	The study at the College of Medicine teaches students to create complete databases to support preventive measures	70.83	2.125	0.420	Average	1246.500	<0.001
3	The study at the Faculty of Medicine teaches students to deal with infectious diseases	82.78	2.483	0.552	High	509.435	<0.001

Promote prevention of health risk		% of agreement	Mean	SD	Level	Chi-square	
						X^2	P-value
4	The study at the Faculty of Medicine teaches students to deal with natural disasters	68.72	2.062	0.462	Average	1100.345	<0.001
5	Studying at the College of Medicine helps students control non-communicable diseases	83.64	2.509	0.555	High	519.755	<0.001
6	Studying at the College of Medicine helps students identify the health needs and priorities of society	74.78	2.243	0.457	Average	963.395	<0.001

medical internship student's attitude toward general goals:

Concerning General goals, the results revealed that, the majority of the studied students (80.8%) were agree and less than half of the studied students (43.4%) represented neutral response about the study helps me to know the standards of patient safety, also (79.8%) were agree that the study helps me to know the standards of patient safety, and (90.8%) agreed the study provides me with information on professional ethics and ethics, in addition, (93.2%) were agree that teaching strategies made them aware of what health insurance is and its goals.

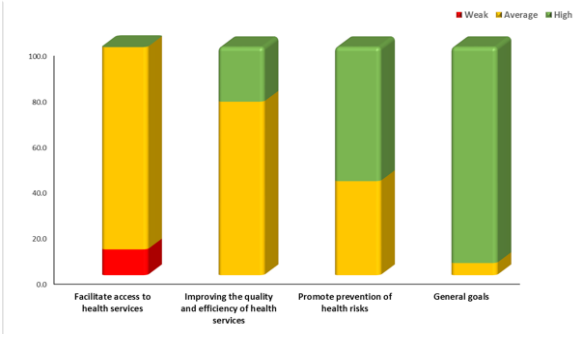
Table 4: Distribution of medical internship student's attitude toward General goals

General goals		% of agreement	Mean	SD	Level	Chi-square	
						X^2	P-value
1	The study helps me to know the standards of patient safety	96.25	2.888	0.339	High	1718.115	<0.001
2	The study provides me with information on health law	93.28	2.798	0.401	High	427.213	<0.001
3	The study provides me with information on professional ethics and ethics	96.61	2.898	0.331	High	1790.105	<0.001
4	he study made me aware of the new health work architecture	51.64	1.549	0.602	weak	420.755	<0.001
5	The study made me aware of what health insurance is and its goals	97.72	2.932	0.252	High	894.413	<0.001

Figure 1 illustrate the overall presentation of student attitude towards the compatibility of medical teaching strategies with Saudi version, it can be seen that the majority of the studied intern students provided average score in relation to facilitating access to health services (88.7%) and improving the quality and efficiency of health servic-

es (76.1%) with mean scores 10.002±1.22, 12.588±1.391, respectively. In addition, more than half of the studied intern students (58.8%) provided high score related to prevention of health risks and most of the studied students (94.7%) provided high score in relation to general goals with mean scores 13.807±1.291,13.065±0.970 respectively.

Figure 1: Overall presentation of student attitude toward compatibility of medical teaching strategies with Saudi version



Discussion:

The interest in medical education in Saudi Arabia has correspondingly increased 13. This interest increased especially after vision 2030. The questions was increased about the compatibility of medical education with this vision. So our study interested to assess the attitudes of the internship students to evaluate any defect and trying to change it.

The current study carried out on 1200 new medical graduates from different Saudi universities .Male represented a higher percentage (55.5%) than females (45.5%) .All participants were new internship students who were chosen to have studied all curricula and practiced practical life to be able to form a point of view towards aligning what they studied with the vision.

The results of this research show that more than half of the students participating in the internal clinic represented neutral responses in relation to the study (53.6 percent), this result represent that the medicine college is not interest in increasing student awareness with the mobile clinic and lack of student participation. Mobile medical clinics are valuable models for health promotion, education, and treatment according to Noah Kojima et al 2017, mobile clinics use fewer providers for broader catchment areas compared to conventional clinical models in limited resource areas, particularly appropriate in areas where health care providers are scarce and where patients have broad geographical distribution. [14]

Moreover, the table illustrated that, the majority of the studied intern students represented high score (64.3%) about College of Medicine encourages building the concept of expanding palliative care among students. This finding has returned to the essential aspect of palliative treatment and these findings have been reinforced by the results of a study evaluating the way palliative care has been administered in the United Kingdom between 2000-2013.

29% of medical schools offered palliative education as a separate course that reflected its significance [15]

More than half of the studied intern students represented disagree related to the study at the College of Medicine increases students' awareness to reduce medical costs and burdens. This result may be since most medical curricula focus on practical, scientific and treating patients more than administrative issues.

On the other hand, the findings of this study suggest that studying at the University of Medicine tends to make students more aware of patient-centered care culture. Frenk J et al 2010 endorsed this finding and reported that recently several medical school curricula have been redesigned to assist students in delivering personalized health care [16] Thomas W et al 2018 reported that 'our University has set up an Education Consultative Patient Advisory Board (EAC), which manages the participatory process and which invites patients from their networks [17]

Regarding prevention of health risks more than half of the studied intern students agree about the study at the Faculty of Medicine teaches students to deal with infectious diseases and studying at control non-communicable diseases. This result supports the nature of the College of Medicine in practical interaction and contact with patients. Therefore, at every level of the study in College of Medicine has a part that achieve this goal.

Almost (80.8%) of participant stated that the College of Medicine teaches students to create complete databases to support preventive measures. These findings indicate that students and graduate practitioners have the requisite knowledge and skills for real life practice as the key goals of medical education. Medical computer science is a central component of medical practice and education in the present and future. Ahmed endorsed this outcome. Another study conducted by Albarrak in 2010 stated that students are prepared to use IT resources to improve learning and practice [18].

Finally, the majority of the studied intern students provided average score in relation to facilitating reach to health services (88.7%), improving the quality and efficiency of health services (76.1%) and the general goal while only (58.8%) provided high score related to prevention of health risks. That means that the curricula of College of Medicine on all Saudi Arabia still need to modification to be compatible with vision 2030.

Based on the previous results, the following recommendations can be made. The Colleges of Medicine must increase the participant of the students in the mobile clinics and activate their role toward their

community, update the palliative care as the separate curriculum. Moreover, the College of Medicine must increase the interest with curriculum of medical administration. Finally, preparation a national project on a level of all Colleges of Medicine in Saudi Arabia to analysis all curriculums and measure separately each curriculum's compatibility to vision 2030 as a first step to national modification.

Limitation:

There is no study that has published literature regarding this issue, therefore having limited references in the discussion part.

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Original Article :

Knowledge And Prescribing Patterns Of Benzodiazepines Among Physicians In A Tertiary Medical City In Riyadh

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Abstract

Background & Aims:

Benzodiazepines is a class of medications that are commonly mis-prescribed worldwide, despite their various side effects. This study aimed to assess the knowledge and identify the prescribing patterns of benzodiazepines among physicians working in King Abdulaziz Medical City.

Methods:

A cross-sectional study was conducted at King Abdulaziz Medical City in Riyadh, Saudi Arabia. Self-administered questionnaires were distributed to 350 physicians from different specialties. The participants were sampled using non-probability convenience sampling. The statistical analysis was done using SPSS version 22.

Results:

223 (74%) of the study participants were in the age group < 30 years, 167 (56%) of study participants were males, and 244 (81%) were residents. The most agreed-upon statements regarding benzodiazepines were "patients who use benzodiazepines for long periods tend to escalate their doses over time" 169 (66%), "good clinical practice requires periodic attempts to wean patients from benzodiazepines" 183 (61%), and "benzodiazepines increase the risk of cognitive impairment and falls in elderly" (59%). Among physicians who

الملخص

الخلفية و الاهداف :

البينزوديابزينات من الأدوية التي ينتشر وصفها بطرق غير مناسبة حول العالم بالرغم من تأثيراتها الجانبية المتنوعة. تهدف هذه الدراسة إلى استكشاف مدى معرفة الأطباء من التخصصات المختلفة بالبينزوديازبينات وطرق وصفهم لها.

طريقة البحث :

دراسة استبيانية مقطعية في مدينة الملك عبدالعزيز الطبية بالرياض، المملكة العربية السعودية. تم توزيع الاستبيانات على ٣٥٠ طبيباً من مختلف التخصصات. تم إجراء التحليل الإحصائي باستخدام برنامج SPSS النسخة ٢٢.

النتائج :

٢٢٣ (٧٤٪) من المشاركين في هذه الدراسة كانوا في الفئة العمرية أقل من ٣٠ عامًا، و١٦٧ (٥٦٪) كانوا من الذكور، و٢٤٤ (٨١٪) من الأطباء المقيمين. كانت أكثر العبارات المتفق عليها بخصوص البنزوديازيبينات: «المرضى الذين يستخدمون البنزوديازيبينات لفترات طويلة يميلون إلى زيادة جرعاتهم بمرور الوقت» ١٦٩ (٦٦٪)، «الممارسة السريرية الجيدة تتطلب محاولات دورية لإيقاف المرضى عن استخدام البنزوديازيبينات» ١٨٣ (٦١٪)، و «البنزوديازيبينات تزيد من خطر ضعف الإدراك والسقوط عند كبار السن» (٥٩٪). من بين الأطباء الذين وصفوا البينزوديازبينات، الأغلبية ١١٤ (٧٨٪) يقومون بوصفها شهرياً، ١٢٥ (٤٢٪) يصفونها للبالغين، ١٣٠ (٧٧٪) يصفونها بنفس المعدل لكل من المرضى الذكور والإناث. يتم وصف البينزوديازبينات في الغالب

prescribed benzodiazepines, they mostly prescribed them monthly 114 (78%), to adults 125 (42%), and for the same rate for both male and female patients 130 (77%). Benzodiazepines were mostly prescribed for anxiety 94 (59%) and panic disorders 78 (49.4%).

Conclusions:

Physicians showed limited knowledge of benzodiazepines. Our recommendation is that training related to benzodiazepine prescription is needed at both undergraduate and postgraduate levels. Further studies regarding prescribing patterns of benzodiazepines is required to establish a better understanding of the prescribing patterns of these medications in Saudi Arabia.

Keywords:

benzodiazepine; clinical practice patterns; knowledge; Saudi Arabia; substance-related Disorders.

للقلق ٩٤ (٥٩٪) واضطرابات الهلع ٧٨ (٤٩,٤٪).

الخلاصة:

أظهر الأطباء المشاركون في هذه الدراسة معرفة محدودة بما يتعلق بالبينزوديازبينات. هناك حاجة للتدريب على وصف البينزوديازبينات في مرحلة الدراسات الجامعية والعليا. هناك حاجة إلى المزيد من الدراسات لفهم طرق وصف الأطباء للبينزوديازبينات في المملكة العربية السعودية.

الكلمات المفتاحية:

بينزوديبازبينات، أنماط الممارسة السريرية، معرفة، المملكة العربية السعودية، إدمان.

Introduction:

Benzodiazepines are psychoactive medications that are used to treat many health issues such as anxiety, depression, and sleep disorders [1]. Benzodiazepines were reported to cause impairment in mental and psychomotor performance [2]. They were also associated with several morbidity outcomes like cognitive decline, confusion, fatigue, weakness, and syncope [1]. Benzodiazepines also have been linked to increased risk of falls, especially in elderlies [3]. In a study among people aged 60 and above in Saudi Arabia, it has been found that the risk of falls was two times higher among participants who used benzodiazepines compared to those who did not [4]. Studies also report that benzodiazepine addiction is high in the elderly, probably due to the high prescription and consumption of benzodiazepine in this age group [5]. In Kuwait, it has been suggested that inappropriate prescription habits, along with sociocultural reasons, may have contributed to increased iatrogenic addiction on benzodiazepines [6].

Despite the serious side effects, warnings, and guidelines, benzodiazepines remain frequently prescribed in many countries around the world. Around 5.2% of adults in the age group 18 to 80 years in the US used benzodiazepines in 2008 [7]. Also, benzodiazepine prescriptions in the US has increased significantly from 1996 to 2013, with an annual percentage change of 2.5% [7]. In a Japanese study, benzodiazepines were commonly prescribed to older patients; the rate of prescription was significantly associated with increased age [8]. In France,

a study that examined 51,216 patients showed that there were persistent high rates of benzodiazepine prescription 9. In Saudi Arabia, benzodiazepines were among the most common inappropriately prescribed medications for elderly patients [10]. During 2008, 55% of benzodiazepine prescriptions in the US were written by primary care physicians, 16% were written by psychiatrists, and 29% were written by other specialists [11]. A Lebanese study published in 2016 observed that the prescription of benzodiazepines for more than one year differs significantly by the prescribing physician, with 52% by cardiologists, 43% by psychiatrists, and 34% by general practitioners and other specialties [12]. In Saudi Arabia, there are limited data addressing the prescribing pattern of benzodiazepines in the country, and most of the available studies have investigated the use of benzodiazepines for psychiatric disorders only [13]. The current literature is still lacking information about benzodiazepine knowledge and attitudes among different specialties, especially in the middle east region, including Saudi Arabia. A better understanding of benzodiazepine prescribing behaviors among physicians may help in developing strategies to develop guidelines to regulate their prescription. The current study aimed to assess the knowledge and prescribing patterns of benzodiazepines among physicians working in different specialties in King Abdulaziz Medical City in Riyadh, Saudi Arabia.

Materials and methods

Study design and settings:

A cross-sectional survey-based study was conducted from June 2019 to August 2019 at King Abdulaziz Medical City in Riyadh, Saudi Arabia, which is a tertiary care medical city administered by National Guard Health Affairs (NGHA). King Abdulaziz Medical City in Riyadh has a capacity of 1501 beds. The medical city includes surgical and medical wards, long-term care and rehabilitation wards, antenatal and postpartum wards, intensive care units, a trauma and emergency department, a neurology department, a psychiatric department, an obstetrics and gynecology department, ambulatory clinics, and dental clinics. It also includes a large pediatric hospital and a cardiac center, and 11 primary care centers that are in various neighborhoods in Riyadh.

Study participants and sample size:

All physicians from different specialties were included in this study. The number of physicians currently working in the hospital is 703. Thus, the optimal sample size was calculated with a margin of error of 5%, a confidence level of 95%, and a population size of 703; it was found to be 249.

However, we administered the questionnaires to 350 physicians to ensure a better response. The participants were sampled using non-probability convenience sampling. informed consent was taken from the participants.

Data collection method

Self-administered questionnaires were distributed to 350 physicians from different specialties in King Abdulaziz Medical City. The questionnaire was specifically designed for this study, and its items were designed and modified after a thorough literature review [8, 12, 14, 15, 16]. The questionnaire was validated by content experts and was piloted to assess its reliability. Items were removed from the final questionnaire if they were showing low Cronbach alpha value if the item was present. The final questionnaire had three sections including the demographic section, knowledge, and practice of benzodiazepine prescription, respectively. The practice section was administered to only those who were currently prescribing benzodiazepines. Most of the knowledge items were taken from a previously published study that aimed to assess the prescription of benzodiazepines by general practitioners and psychiatrists[15]. The study was approved by the ethical committee of King Abdullah International Medical Research Centre. The questionnaires were accompanied by an informed consent form, and the physicians completed the questionnaire voluntarily. All participants were informed in advance of the objectives of the study.

Data management and analysis

The statistical analysis was done using the Statistical package for social science (SPSS) version 22. The questionnaire for this study showed good internal reliability in our sample. The overall Cronbach alpha was 0.68 for the knowledge (12 questions), while it was 0.82 for the practice (12 questions), with a total Cronbach alpha of 0.72 for the 24 questions. The tests of normality using Kolmogorov-Smirnova and Shapiro-Wilk tests for the knowledge variables indicated that the data were normally distributed while the practice items showed non-normal distribution. For measuring the associations, both the mean±SD and the median(Q1-Q3) were reported. The categorical variables were reported as numbers and percentages in a tabular form. The strongly disagree and disagree categories were combined to calculate the percentage of disagreement. While for agreement, the option agree and strongly agree were combined for analysis. For measuring the overall knowledge and the practice, the respective items for the knowledge and the practice were added and a mean score was computed. For measuring the association of mean knowledge and practice scores

with the job level, current specialty, and gender, Man Whitney- U and Kruskal Wallis test were performed. The p-value was set at 0.05 for all the tests applied.

Results

Demographic profile of the participants

A total of 350 questionnaires were distributed among physicians in King Abdulaziz Medical City, of which 300 (85.7%) responded to the survey. 223 (74%) of the study participants were in the age group < 30 years. The mean years of experience were 4±5.3 years. Results showed that 167 (56%) of study participants were males, and 244 (81%) were residents. Most of the participants were from internal medicine 77 (26%) followed by surgery 59 (20%) and pediatrics 38 (13%). Only 36 (12%) of the physicians reported having ever used benzodiazepines themselves. Whereas 41 (14%) reported the use of benzodiazepines by their first-degree family members. (Table 1).

Table 1: Demographic profile of the participants (N=300)

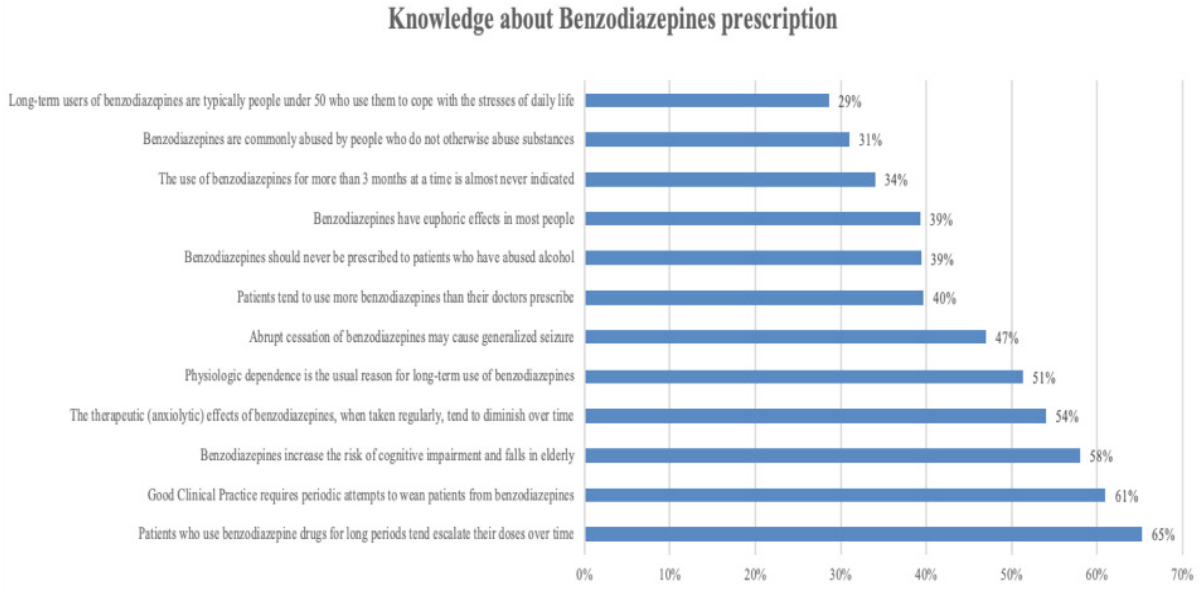
Variables	Categories	Frequency n	Percentage %
Age	< 30 years	223	74%
	> 30 years	77	26%
Gender	Male	167	56%
	Female	133	44%
Years of experience	Mean±SD	4±5.3	
	Median(Q1-Q3)	2(1-18)	
Current level	Residents	244	81%
	Specialists/ consultants	56	19%
Practicing specialty	Internal medicine	77	26%
	Surgery	59	20%
	Pediatrics	38	13%
	Emergency Medicine	33	11%
	Family medicine and GP	26	9%
	Neurology/ psychiatry	38	13%
	All others	29	10%
Have you ever used benzodiazepines yourself?	Yes	36	12%
	No	263	88%
Has anyone of your first-degree relatives ever used benzodiazepines?	Yes	41	14%
	No	158	86%

Knowledge about benzodiazepines

A total of twelve items were asked from the physician related to knowledge about the benzodiazepines. The most agreed-upon statements were "patients who use benzodiazepines for long periods tend to escalate their doses over time" 169 (66%) and "good clinical practice requires periodic

attempts to wean patients from benzodiazepines" 183 (61%). On the other hand, the least agreed-upon statements were "long-term users of benzodiazepines are typically people under 50 who use them to cope with the stresses of daily life" 86 (29%) and "benzodiazepines are commonly abused by people who do not otherwise abuse substances" 93 (31%). (Figure 1).

Figure 1: Descriptive statistics of Knowledge (N=300)



Prescribing patterns of benzodiazepines

Among those who prescribed benzodiazepines, they mostly prescribed them monthly 114 (78%), to adults 125 (42%), and for the same rate for both male and female patients 130 (77%). Moreover, the most prescribed benzodiazepine was Lorazepam (Ativan) 91 (71%). More than half of the physicians 109 (59%) reported that they did not get enough training regarding benzodiazepine prescription. (Table 2).

Table 2: Prescribing patterns of benzodiazepines (N= 300)

Items	Frequency	Percentage
On average, I prescribe benzodiazepines (n=146)		
Daily	11	8%
Weekly	21	14%
Monthly	114	78%
Mostly, I prescribe benzodiazepines for the following age groups (more than one answer can be chosen)		
Infants (n=300)	8	3%
Pediatrics (n=300)	26	9%

Items	Frequency	Percentage
Adolescents (n=300)	14	5%
Adults (n=300)	125	42%
Elderlies (n=300)	38	13%
I usually prescribe benzodiazepines more for (n=168)		
Males	21	13%
Females	17	10%
The same rate for both	130	77%
The benzodiazepine that I most commonly prescribe (n=128)		
Alprazolam (Xanax)	2	2%
Clonazepam (Rivotril)	5	4%
Bromazepam (Lexotanil)	2	2%
Lorazepam (Ativan)	91	71%
Diazepam (Valium)	15	12%
Midazolam (Dormicum)	13	9%
Do you consider your training on benzodiazepine prescribing to be sufficient (n=164)		
Yes	75	41%
No	109	59%

Conditions, reasons, and courses of treatment for benzodiazepines prescription

Among physicians who prescribed benzodiazepines, they mostly prescribed them for clinically significant anxiety 94 (59%) and panic disorders 78 (49.4%). Physicians disagreed with the prescription of benzodiazepines for depression 102 (64%), essential hypertension 133 (84%), or uncomplicated low back pain in the elderly 130 (82%). Moreover, the most likely reason for benzodiazepine prescription in our study was past positive clinical experience 52 (33%). The most agreed-upon course of treatment was 1 week to 1 month 52 (33%); however, 72 (46%) of physicians disagreed on this course. Also, most physicians disagreed on the use of benzodiazepines for periods longer than 3 months 124 (80%) or more than 6 months 130 (82%) (Table 3).

Table 3: Conditions, reasons, and courses of treatment for benzodiazepines prescription (N= 159)

Prescribing practices for	Categories*	Agreement No. (%)	Neutral No. (%)	Disagreement No. (%)
Conditions	For clinically significant anxiety.	94 (59%)	30 (19%)	35 (22%)
	For clinically significant depression.	17 (11%)	40 (25%)	102 (64%)
	For panic disorders.	78 (49.4%)	37 (23.4%)	43 (27.2)
	For a stressful life event.	37 (23%)	46 (29%)	76 (48%)
	For essential hypertension.	4 (2%)	22 (14%)	133 (84%)

Prescribing practices for	Categories*	Agreement No. (%)	Neutral No. (%)	Disagreement No. (%)
Conditions	For uncomplicated low back pain in the elderly.	5 (3%)	24 (15%)	130 (82%)
Reasons	Their effectiveness on different health conditions.	46 (29.3%)	60 (38.2%)	51 (32.5%)
	Their low ability to induce dependence.	27 (17%)	45 (9%)	86 (54%)
	They are unlikely to be abused.	16 (10%)	36 (23%)	105 (67%)
	Their minimal side effects.	34 (22%)	40 (25%)	83 (56%)
	Past positive clinical experience.	52 (33%)	63 (40%)	42 (27%)
	Patients' limited access to mental health services.	33 (21%)	59 (38%)	65 (41%)
	Patients' limited acceptance to mental health services.	35 (22%)	60 (38%)	62 (40%)
	Patients' preference.	18 (12%)	40 (26%)	97 (63%)
Course of treatment	1 week - 1 month.	52 (33%)	32 (21%)	72(46%)
	>1 month to 3 months.	9 (6%)	32 (21%)	113 (73%)
	>3 months to 6 months.	5 (3%)	26 (17%)	124 (80%)
	> 6 months.	4 (3%)	24 (15%)	130 (82%)

Each item in the categories was asked as an individual question*

Association of the profile of the participants with their knowledge and practice

There was a statistically significant association between the physicians' knowledge of benzodiazepines and their age, gender, and specialty. Physicians who were > 30 years (MW= 6892.5, p-value = 0.01), males (MW= 9233.5, p-value = 0.028), and family physicians or general practitioners (KW= 21.566, p-value <0.001) were significantly better in terms of knowledge than those who are <30 years, females, or specializing in other fields. The level of the physicians was not significantly associated with the knowledge. Moreover, no significant association was found between the practice of benzodiazepine prescription and any of the study variables (Table 4).

Table 4: Association of the profile of the participants with the knowledge and practice

		Knowledge		Practice	
		Mean ± SD	Median(Q1-Q2)	Mean ± SD	Median(Q1-Q2)
Age	< 30 years	3.3 ± 0.43	3.33 (3-3.92)	2.44 ± 0.52	2.51(2.11-3.12)
	> 30 years	3.45 ± 0.46	3.5 (3.09-4.08)	2.46 ± 0.55	2.5 (2.22-3.28)
	tests value*	MW=6892.5		MW=2665.5	
	p-value	<0.01		<0.773	
Gender	Male	3.38 ± 0.45	3.45 (3.08-4)	2.44 ± 0.52	2.5 (2.11-3.17)
	Female	3.31 ± 0.41	3.25 (3-4)	2.45 ± 0.51	2.56 (2.11-3.22)
	tests value*	MW=9233.5		MW=3011.5	
	p-value	<0.028		<0.926	

		Knowledge		Practice	
		Mean ± SD	Median(Q1-Q2)	Mean ± SD	Median(Q1-Q2)
Level	Resident	3.33 ± 0.43	3.33 (3-3.92)	2.44 ± 0.52	2.5 (2.11-3.22)
	Specialists/ consultants	3.41 ± 0.49	3.44 (3.09-4.08)	2.5±0.51	2.56 (2.25-3.17)
	tests value*	MW=5950		MW=1903.5	
	p-value	<0.131		<0.496	
Speciality	Internal medicine	3.47 ± 0.4	3.5 (3.17-4.08)	2.48 ± 0.48	2.53 (2.11-3.12)
	Surgery	3.29 ± 0.42	3.25 (3-4)	2.26 ± 0.56	2.22 (1.89-3)
	Paediatrics	3.18 ± 0.48	3.21 (2.83-4.08)	2.57 ± 0.53	2.61 (2.11-3.33)
	Family medicine/ GP	3.49 ± 0.4	3.48 (3.17-4.17)	2.49±0.36	2.5 (2.39-2.89)
	Neurology/ psychiatry	3.36 ± 0.36	3.42 (3.08-3.92)	2.44±0.42	2.49 (2.11-3.22)
	All others	3.17 ± 0.46	3.17 (3-3.92)	2.55±0.73	2.58 (2.17-3.56)
	tests value**	KW= 21.566		KW= 4.693	
	p-value	<0.001		<0.584	

Mann-Whitney U test, **Kruskal Wallis Test*

Discussion:

When assessing the physicians' knowledge about benzodiazepines, most physicians in our study did not answer correctly to statements related to the ability of benzodiazepines to induce dependence and/ or addiction (statements 1-6). The most agreed-upon statement was "Patients who use benzodiazepines for long periods tend to escalate their doses over time" (66%). This finding is like that in another study that was conducted in Spain, in which 77.4% of the physicians believed that this statement is true [15]. Physicians agreement to this statement could be attributed to their beliefs that "The therapeutic (anxiolytic) effects of benzodiazepines, when taken regularly, tend to diminish over time" (54%), or "Physiologic dependence is the usual reason for long-term use of benzodiazepines" (52%), or "Benzodiazepines have euphoric effects in most people" (40%), or "Benzodiazepines are commonly abused by people who do not otherwise abuse substances"(31%). However, these statements are also incorrect. Previous literature has shown that benzodiazepines are rarely associated with dosage escalation when taken for medical indications in prober therapeutic doses [17]. Moreover, their intentional abusers are usually people who abuse other substances 18. They abuse benzodiazepines to enhance the euphoria or diminish the side effects of another drug[18, 19].

In addition, previous research has shown that the proper use of benzodiazepines rarely results in addiction [15, 20], and iatro-

genic addiction on benzodiazepines is a result of inappropriate prescription [5, 21].

Statements related to the side effects of benzodiazepines were answered correctly by most of the physicians (statements 7,8). 58% of the physicians agreed that "Benzodiazepines increase the risk of cognitive impairment and falls in elderly", which is proven by previous studies [2, 22]. 47% of the physicians agreed on the correct statement that "Abrupt cessation of benzodiazepines may cause generalized seizure". Generalized seizures and status epilepticus due to the discontinuation of benzodiazepines were reported in the literature [23].

Similarly, 61% of the physicians answered correctly on the statement that "Good clinical practice requires periodic attempts to wean patients from benzodiazepines". This statement is supported by a literature review published in 2015; it was concluded that benzodiazepines should be prescribed only for limited periods under therapeutic indications [24]. Moreover, the prolonged use of benzodiazepines is linked with a higher possibility of developing various side effects, including physical dependence and cognitive decline [2, 5, 22]. Also, only 29% of physicians agreed with the incorrect statement that "Long-term users of benzodiazepines are typically people under 50 who use them to cope with the stresses of daily life". Similarly, long-term users of benzodiazepines were described by the literature as geriatric patients with medical or psychiatric complaints [25].

In contrast to previous studies [8, 12, 14, 26, 27, 28], 77% of physicians who prescribed benzodiazepines in our study reported that they prescribe them at the same rate for both female and male patients, 13% reported that they prescribe them more for males, and only 10% prescribed them more for females. According to previously published studies, women are more likely to be prescribed benzodiazepines in a range from approximately 1.2 times to 2 times more than men [8, 12, 14, 26, 27, 28]. The reason behind this was suggested to be a higher prevalence of psychological symptoms and anxiety among women [8, 12]. Previous studies also reported that benzodiazepines were also more likely to be prescribed to the elderly [8, 26], which contradicts our study in which physicians prescribed benzodiazepines more to adults. Although prescribing benzodiazepines to adults and in the same ratio for females and males in our study could reflect a true prescribing pattern among our physicians, self-report bias cannot be ruled out.

The benzodiazepines that were most prescribed as answered by the physicians were Lorazepam (71%), Diazepam (12%), and Midazolam (9%). Data from previous studies were not consistent about the most

prescribed benzodiazepines. Alprazolam was the most commonly prescribed benzodiazepines in Lebanon (34.6%) [12] and Pakistan (9%) 28, while lorazepam (51%) followed by clonazepam (20%) and diazepam (14%) was frequently prescribed in a study in the USA 29. This could be due to availability reasons or individualized hospitals' regulations. For example, alprazolam is not available as formulary medication, and it can be given only by anesthesiologists in the hospital in which the study was conducted, which could explain its low prescription rate.

Most of the participants (59%) in this study considered their training on benzodiazepine perception to be insufficient. This is like a previous study in Dakar in which 100% of general practitioners and 62.1% of psychiatrists and neurologists reported that their training was insufficient[30]. In contrast, trainees for psychiatry residency programs in the USA reported that their training on benzodiazepines was adequate, and they felt comfortable prescribing them. 74.6% of those trainees reported having lectures on benzodiazepines as part of their residency training [31]. Physicians in our study feeling that their training is insufficient might be attributed to them belonging to various specialties, some of which may not teach/ train on benzodiazepines because of the lack of need to use them. To the limit of our knowledge, there are no studies that addressed the training of benzodiazepine prescription in Saudi Arabia. Future studies should investigate the quality of training on benzodiazepines in Saudi Arabia and make recommendations on possible areas for improvement.

Prescribing physicians in this study appear to be aware of the proper indications for prescribing benzodiazepines. Most of them agreed on the prescription of these medications for anxiety (59%) and panic disorders (49.4%), which are evidence-based indications [1]. Similarly, the majority disagreed on the prescription of benzodiazepines for non-approved indications like essential hypertension (84%) or low back pain in the elderly (82%) 1. Interestingly, only 11% of the physicians agreed with the prescription of benzodiazepines for clinically significant depression (64%), although they are known to be effective for it[32, 33]. This may be attributed to them having knowledge about the ability of benzodiazepines to induce depressive symptoms and emotional blunting if used in high doses or long periods [34].

Likewise, physicians in this study seemed to be aware of the appropriate duration of benzodiazepine prescription and the risks of prescribing benzodiazepines for long periods [24]. This suggestion is supported by them mostly disagreeing on the prescrip-

tion of benzodiazepines for > 1 month 113 (73%), > 3 months 124 (80%), or > 6 months 130 (82%). However, a large number of physicians disagreed even on the prescription of benzodiazepines even for 1-week – 1-month duration 72 (46%), which could mean that these physicians may be prescribing benzodiazepines for shorter periods. However, previous guidelines recommend that benzodiazepines are recommended to be used in short periods, typically 4-6 weeks [35, 36].

In this study, physicians who were males, >30 years, and family physicians/ general practitioners were found to be significantly better in terms of knowledge than others. This finding contradicts a previous study in which psychiatrists were more knowledgeable about benzodiazepine prescription than general practitioners [15], however, the low number of family physicians and general practitioners in our study (9%) might have influenced this finding. Although no previous studies have discussed the training on benzodiazepine prescription in Saudi Arabia, previous Saudi studies on the prescription of other medications concluded that there is a need for medical education on appropriate prescribing patterns [37,38, 39].

The better knowledge of physicians who were older than 30 years could be explained by the longer training and experience that they have. Gender effect on the knowledge could be attributed to reasons like older physicians – who have a longer experience- being men, or physicians from specialties who frequently prescribe benzodiazepines being men. However, these are only possible explanations and not facts, as we did not do a detailed analysis that associates the gender with age or specialties. In addition, we could not describe the association between physicians' personal experience with benzodiazepines and their knowledge or prescribing patterns due to the low number of physicians that reported using benzodiazepines before (12%) or reported the use of benzodiazepines among their first-degree family members (14%).

Our study has multiple limitations. One of which is being a self-reported questionnaire which subjects the results to self-reported bias; this bias could be eliminated if future studies acquired data about benzodiazepine prescriptions from patients' medical records. Another limitation is that physicians in this study were not evenly distributed in terms of specialties, which resulted from the random distribution of the questionnaire and did not allow for a comparison of the physicians in terms of who prescribed more benzodiazepines. In addition, this study was conducted in one hospital only (King Abdulaziz Medical

City), which is also a limitation.

Conclusions:

In conclusion, physicians in this study showed limited knowledge and practice regarding benzodiazepines. Benzodiazepines were prescribed more to adults and equally for both genders. Lorazepam was the most commonly prescribed benzodiazepine. The most common conditions for prescribing benzodiazepines were anxiety followed by panic disorder. Training related to benzodiazepine prescription is needed at both undergraduate and postgraduate levels. Further studies regarding prescribing patterns of benzodiazepines are required to establish a better understanding of the prescribing patterns of these medications in Saudi Arabia.

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Original Article :

Breast Reconstruction Satisfaction Among Breast Cancer Patients in Saudi Arabia

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Abstract

Background & Aims:

Breast cancer patients represent the largest group of cancer survivors. Breast reconstruction post-mastectomy has significantly increased worldwide. The aim of this study is to know the level of satisfaction about breast reconstruction among breast cancer patients.

Methods:

This cross-sectional study was conducted on women with breast cancer who underwent reconstruction post-mastectomy in a tertiary hospital in Riyadh in the period from January 2013 to August 2018. Satisfaction of patients about reconstruction were collected using (Breast Reconstruction satisfaction questionnaire).

Results:

A total of 53 participants were considered. 58.4% had a university education or above, and only 32.1% had an income of <5000 SR. No more than 7.5% and 11.3% were unsatisfied and strongly unsatisfied with their self-image. 30.2% were strongly unsatisfied about the discussion with a plastic surgeon prior to reconstruction. 81.1% would recommend the type of reconstruction to a friend, and 77.4% agreed that they would choose this type of reconstruction if they had to do it all over again. 79.2% to 88.7% reported no arm concerns at all. 45.3% of patients reported that it took them longer than expected to recover, and 52.8% of patients reported that the surgery was complex. Patients with above

الملخص

الخلفية و الاهداف :

امرضى أورام الثدي يشكلون أكبر فئة ممن يتماثلون للشفاء من بين جميع الأورام. جراحة تجميل الثدي بعد استئصاله أصبحت اكثر شيوعا على مستوى العالم. الهدف من هذه الدراسة هو معرفة مدى رضا مرضى أورام الثدي من جراحة تجميل الثدي بعد خضوعهم لعملية تجميل الثدي.

طريقة البحث :

هذه دراسة مقطعية تم إجراؤها على نساء مشخصين بأورام الثدي وأجروا جراحات تجميل الثدي بعد استئصاله في مدينة طبية بالرياض في الفترة بين يناير ٢٠١٣ و أغسطس ٢٠١٨. تم الحصول على مدى رضا المرضى في هذه الدراسة باستخدام استبيان معد خصيصا لهذا الغرض (استبيان مدى الرضا عن جراحة تجميل الثدي).

النتائج :

احتوت الدراسة على ٥٣ مريضة. ٥٨.٤٪ منهم لديهم تعليم جامعي او أعلى. فقط ٣٢.١٪ من المرضى دخلهم أقل من ٥٠٠٠ ريال سعودي. لا يوجد أكثر من ٧.٥٪ و ١١.٣٪ ممن كانوا غير راضين و غير راضين جدا عن صورتهم الذاتية. ٣٠.٢٪ كانوا غير راضين جدا عن نقاشهم مع جراح التجميل قبل العملية. ٨١.١٪ قالوا انهم سيوصون اصدقائهم بجراحة تجميل الثدي في حال احتاجوها ، و ٧٧.٤٪ اتفقوا انهم سيجرون نفس جراحة تجميل الثدي اذا عاد بهم الزمن. ٧٩.٢٪ - ٨٨.٧٪ قالوا انهم لا يعانون من أية مشاكل في الذراع او الكتف. ٤٥.٣٪ من المرضى ذكروا بأن التعافي من جراحة تجميل الثدي اخذ وقتا اكثر مما كانوا يتوقعونه ، و ٥٢.٨٪ من المرضى ذكروا بأن الجراحة كانت معقدة. المرضى ذوو المستوى التعليمي أعلى من الجامعي اظهروا رضا اكثر ممن دونهم في المستوى التعليمي

university-level education were significantly more satisfied about their recovery (P=0.003). Patients whose income was >20000 SR were more satisfied about their recovery (P=0.029). Patients with higher income were more satisfied about their self-image (P=0.033).

Conclusion:

Majority of patients were generally satisfied with their breast reconstruction. However, recovery subscale showed less satisfaction. Also, a relatively high percentage were not satisfied about the discussion with a plastic surgeon prior to the reconstruction. High income and high educational level patients were generally more satisfied.

Key words:

Breast Reconstruction, Breast Cancer, Self-image

بما يخص التعافي من الجراحة (P=٠,٠٠٣). المرضى ذوو الدخل > ٢٠٠٠٠ ريال سعودي اظهروا رضا اكثر ممن دونهم في الدخل بما يخص التعافي من الجراحة (P=٠,٠٢٩). المرضى ذوو الدخل العالي اظهروا رضا اكثر ممن دونهم بما يخص الصورة الذاتية (P=٠,٠٣٣).

الاستنتاج:

عموما ، غالبية المرضى اظهروا رضا عن جراحة تجميل الثدي بجميع جوانبها ، عدا التعافي من الجراحة. أيضا نسبة كبيرة من المرضى كانوا غير راضين عن نقاش ما قبل جراحة تجميل الثدي مع جراح التجميل. المرضى ذوو التعليم العالي و الدخل العالي اظهروا رضا عن الجراحة اكثر من غيرهم.

الكلمات المفتاحية:

جراحة تجميل الثدي ، ورم الثدي ، الصورة الذاتية

Introduction:

Breast cancer is the most common cancer in women worldwide [1]. 2.1 million people are diagnosed with breast cancer annually 1. Yearly in US, 1 out of 8 women are diagnosed with breast cancer [2]. In 2019, the American Cancer Society stated that the number of patients who were diagnosed with invasive breast cancer was over 268600, and approximately 41760 women died from breast cancer [2]. In Saudi Arabia, incidence rate of breast cancer varies between regions as Riyadh's incidence was 20.5 per 100000, whereas Jazan's was 4.8 per 100000 [4]. Breast cancer constitutes 29% of all newly diagnosed cancers in Saudi women in 2020 [5].

It is well known that the largest group of cancer survivors are breast cancer patients. Breast cancer treatment plan is dependent on tumour characteristics and patient wishes. Surgical options include breast conserving therapy, mastectomy alone or mastectomy with breast reconstruction (BR). BR can be defined as surgical procedures aimed to adjust breast shape. It can be performed immediately after mastectomy or delayed as a separate procedure. BR procedures include implants, autologous tissue (transverse rectus abdominis and latissimus dorsi flaps), or both. Tissue expansion using a temporary expander followed by replacement with a permanent implant is the most common method of reconstruction [2]. In a recent Hungarian study done on breast cancer patients on the day before mastectomy, patients aged 56 – 65 were the most group desiring BR [3]. Above 65 year old breast cancer patients often do not prefer breast reconstruction after mas-

tectomy [3].

Generally, number of patients undergoing BR in Saudi Arabia is not high. In a previous study at 2 centers in Jeddah, the percentage of patients who underwent breast reconstruction was 16.5% 6. Moreover, studies in England and Denmark reported similar rates [7, 8]. Australian study showed lower reconstruction rate 9.4% 9. However, reconstruction rate increased significantly from 24.8% in 2003 to 29.3% in 2007 as an American study in California reported [10]. Also, other studies in the United States stated that BR rate reached 59% [11, 12].

BR decision-making is not an easy process for the patient. First, the patient gets the diagnosis of breast cancer and the option to undergo mastectomy. Second, the patient is given the options for BR by plastic surgeon with clarifying potential benefits and risks for each BR method. Decision is influenced by the stressful circumstance of being just diagnosed with breast cancer. A previous study found that almost half of general surgeons reported that they had breast cancer patients who were treated with mastectomy alone and refused BR despite being advised to consider it [13].

A recent review of studies that investigated breast cancer recurrence after BR showed that BR does not affect oncological consequences of the cancer and its relapse [14]. Moreover, it has good effects on patient's self-esteem, femininity, and sexuality. Thus, it is surprising knowing that a study reported that a large portion of patients (80%) refused BR [15]. Therefore, counselling post-mastectomy breast cancer patients for considering BR becomes important [16]. Lately, BR has been more accepted between mastectomy patients as they experience additional psychosocial suffering due to their life-threatening conditions and distorted body image [16, 17]. The aim of this study is to know the level of satisfaction about breast reconstruction among breast cancer patients.

Methods and Materials:

This is a cross-sectional study that was conducted at King Fahad Medical City (KFMC), Riyadh, Saudi Arabia. It included all breast cancer patients who had unilateral and bilateral mastectomy along with immediate and delayed breast reconstruction from January 2013 to August 2018. The study excluded patients with psychiatric disorders after the surgery.

Since BR is not commonly done and there are only 10-12 patients per year, all patients who fulfil inclusion criteria in the study period and were recorded in the KFMC database were included.

KFMC is one of the largest and fastest growing medical cities in the Middle East with a total capacity of 1200 beds. It has

main, children specialized, women specialized and rehabilitation hospitals. In addition to heart, neuroscience, and obesity centers.

We used a well-validated survey (Breast Reconstruction satisfaction questionnaire, BRECON-31) [18]. This questionnaire has 31 items that evaluate satisfaction of breast reconstruction patients in terms of 8 subscales (Self-image, Arm concerns, Intimacy, Satisfaction, Recovery, Self-conscious, Expectations, Appearance). In our study, some of the questions were omitted as they were socially inconvenient.

The questionnaire was translated to Arabic and then cross translated to English by a professional linguist to ensure the meaning of the questions were conveyed credibly. Data were collected through an electronic questionnaire.

This study was reviewed and approved by the Institutional Review Board at King Fahad Medical City. Participants were informed that participation is completely voluntary and informed consents were taken. The identities of participants were anonymous and confidential. All information obtained in this study were stored in a secure place and kept strictly confidential and anonymous.

Statistical analysis:

Data were analyzed by using Statistical Package for Social Studies (SPSS 23; IBM Corp., New York, NY, USA). Continuous variables were expressed as mean ± standard deviation, and categorical variables were expressed as percentages. One-way ANOVA was used for continuous variables. A p-value <0.05 was considered statistically significant.

Results:

We performed this study to assess the level of satisfaction about BR among breast cancer patients after undergoing the procedure. The total number of the current study participants is 53 women—more than half have a university education or above and live in central Saudi Arabia. More than two-thirds of the respondents have a monthly income of >5000 Saudi Riyals. Demographic characteristics of the patients are shown in [Table 1].

Table 1. Demographic characteristics of the patients.

		Number	Percentage
Educational level	Secondary	22	41.5
Income	University	27	50.9
	Above university	4	7.5
	<5000SR	17	32.1
	5000-10000 SR	21	39.6
	10000 -20000 SR	13	24.5
	>20000 SR	2	3.8
Area	Central	30	56.6
	West	6	11.3
	East	5	9.4
	South	6	11.3
	North	6	11.3

The answers to the BRECON-31 questionnaire subscales are shown in [Table 2]. The results were generally positive, and most patients were "satisfied" or "strongly satisfied" with all subscales except for recovery. For the self-image subscale, most of the patients were either satisfied or strongly satisfied. No more than 7.5% and 11.3% were unsatisfied and strongly unsatisfied, respectively. For the expectations subscale, a relatively high percentage (30.2%) were strongly unsatisfied with the statement "the plastic surgeon told me what I needed to know". All assessed items in the appearance and intimacy subscales were scored as "satisfied" by a percentage ranging from 60.4% to 73.6%, "strongly satisfied" by 9.4% to 15.1%. In terms of general satisfaction with the surgery, 60.4% were "satisfied", 15.1% were "strongly satisfied"; 77.4% agreed that they would choose this type of reconstruction if they had to do it all over again, and more than 80% would recommend this type of breast reconstruction to a friend. The arm concerns subscale showed positive results: 79.2%-88.7% of the respondents reported no troubles in moving the shoulder, no arm(s) pain, no arm(s) swelling, and no shoulder(s) soreness. More than half (52.8%) of the patients reported that the surgery was complex, and 45.3% agreed that it took them longer than expected to recover. [Figure 1] shows a heatmap for different subscales

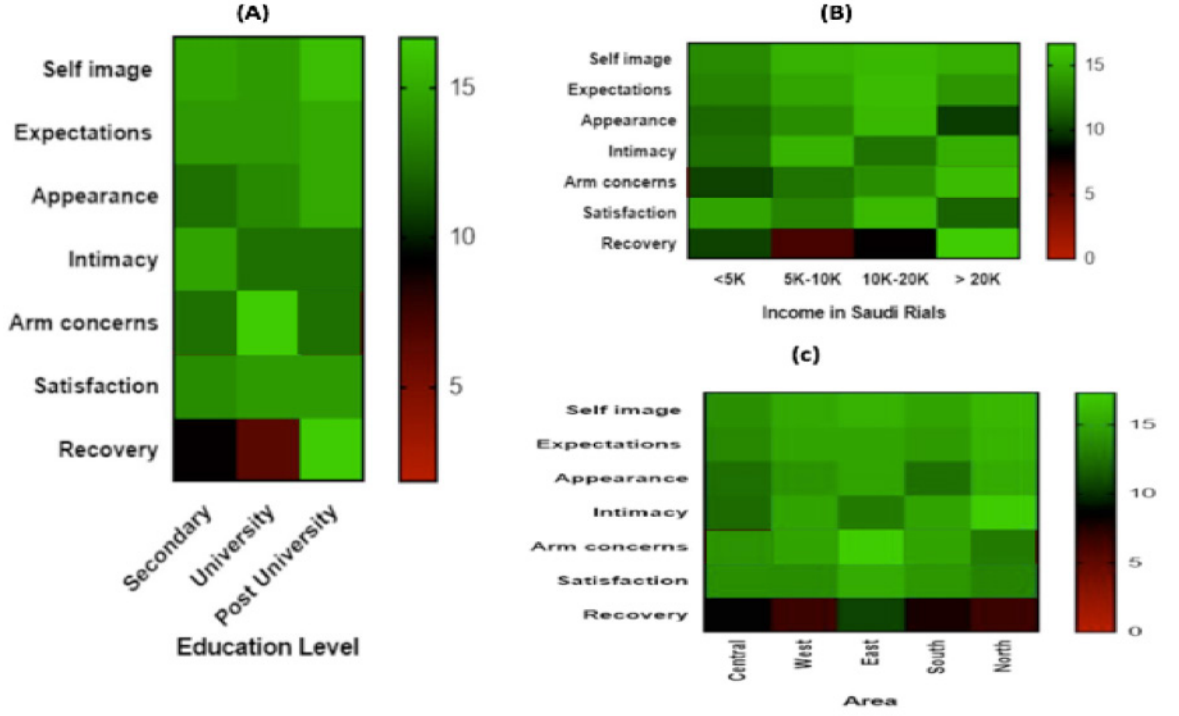
Table 2 Answers to the Breast Reconstruction Satisfaction Questionnaire

		Strongly unsatisfied		Unsatisfied		Satisfied		Strongly satisfied		Not applicable	
Subscale	Item	**n**	**%**	**n**	**%**	**n**	**%**	**N**	**%**	**n**	**%**
Self-image	I feel attractive	4	7.5	6	11.3	38	71.7	4	7.5	1	1.9
	I feel good about myself	4	7.5	4	7.5	39	73.6	6	11.3	0	0
	I feel feminine	4	7.5	4	7.5	40	75.5	5	9.4	0	0
	I feel normal	0	0	5	9.4	33	62.3	15	28.3	0	0
Expectations	What I wanted from the surgery was realistic	4	7.5	9	17.0	34	64.2	6	11.3	0	0
	The plastic surgeon told me what I needed to Know	16	30.2			33	62.3	4	7.5	0	0
Appearance	My reconstructed breast(s) looks better than my original breast(s)	3	5.7	6	11.3	37	69.8	7	13.2	0	0
	My reconstructed breast(s) is the right size for Me	5	9.4	6	11.3	36	67.9	6	11.3	0	0
Intimacy	My husband/partner is comfortable with my new breast(s)	5	9.4	6	11.3	34	64.2	5	9.4	3	5.7
	My husband/partner and I have a stable Relationship	5	9.4			39	73.6	6	11.3	3	5.7
	My husband/partner and I are happy together	5	9.4	4	7.5	33	62.3	8	15.1	3	5.7
	My husband/partner supported me during my breast reconstruction	5	9.4	6	11.3	32	60.4	7	13.2	3	5.7
Satisfaction	I feel satisfied about my reconstructed breast	4	7.5	7	13.2	32	60.4	8	15.1	2	3.8
		Yes		**No**							
		n	%	n	%						
	If I had to do it all over again, I would choose this type of reconstruction	41	77.4	12	22.6						
	I would recommend my type of breast reconstruction to a friend	43	81.1	10	18.9						

Satisfaction	The breast reconstruction turned out the way I thought it would	30	56.6	23	43.4
Arm concerns	I have trouble moving my shoulder	11	20.8	42	79.2
	My arm(s) hurts	11	20.8	42	79.2
	My arm(s) is swollen	6	11.3	47	88.7
	My shoulder(s) is sore	9	17.0	44	83.0
Recovery	It took me longer than expected to recover	24	45.3	29	54.7
	The surgery was a lot to go through	14	26.4	39	73.6
	The surgery was complex	28	52.8	25	47.2

of satisfaction after breast reconstruction based on different demographics. In subscales of satisfaction based on educational level; a significant difference was seen between different educational level groups in recovery subscale. In subscales based on income; there were significant differences between different income groups in the self-image, appearance, and recovery subscales. No difference was seen between different area group The means of the subscales were calculated by educational

Fig. 1. Green is a satisfied patient and red is not satisfied. (A) Subscales of satisfaction based on education level; a significant difference was seen between groups in recovery subscale. (B) Subscales based on income; there were significant difference between groups in the self-image, appearance, and recovery subscales. (C) No difference was seen between different area groups.



level. There was no statistically significant difference in any of the assessed subscales by the educational level groups except for the recovery subscale (P 0.003) where the mean was the highest (2.50) for those with above university-level education as shown in [Table 3].

Table 3 Mean of subscales by educational level

Subscale	Educational level	Mean	SD	P-value	Subscale	Educational level	Mean	SD	P-value
Self-image (out of 16)	Secondary	11.77	1.69	0.477	Arm concerns (out of 4)	Secondary	1.05	1.46	0.129
	University	11.48	2.21			University	0.37	0.69	
	Above university	12.75	1.50			Above university	1.00	2.00	
	Total	11.70	1.96			Total	0.70	1.20	
Expectations (out of 8)	Secondary	5.68	1.32	0.894	Satisfaction (out of 7)	Secondary	4.77	1.66	0.871
	University	5.67	1.41			University	5.00	1.47	
	Above university	6.00	0.00			Above university	5.00	1.41	
	Total	5.70	1.31			Total	4.91	1.52	
Appearance (out of 8)	Secondary	5.00	1.60	0.445	Recovery (out of 3)	Secondary	1.36	0.85	0.003*
	University	5.41	1.69			University	0.96	0.81	
	Above university	6.00	0.00			Above university	2.50	0.58	
	Total	5.28	1.60			Total	1.25	0.90	
Intimacy (out of 16)	Secondary	11.77	2.96	0.237					
	University	10.04	4.04						
	Above university	10.00	4.00						
	Total	10.75	3.66						

• *Significant P-value
• P-value was calculated using one-way ANOVA

There were statistically significant (P<0.05) differences in the self-image, appearance, and recovery subscales by the income level groups as shown in [Table 4]; there was no statistically significant difference in any of the subscales between different area groups.

Table 4. Mean of subscale by income

Subscale	Income	Mean	SD	P-value	Subscale	Income	Mean	SD	P-value
Self-image (out of 16)	<5000 SR	10.59	2.43	0.033*	Arm concerns (out of 4)	<5000 SR	1.00	1.54	0.531
	5000-10000 SR	12.10	1.58			5000-10000 SR	0.67	1.15	
	10000 -20000 SR	12.46	1.39			10000 -20000 SR	0.46	0.78	
	>20000 SR	12.00	0.00			>20000 SR	0.00	0.00	
	Total	11.70	1.96			Total	0.70	1.20	

Subscale	Income	Mean	SD	P-value	Subscale	Income	Mean	SD	P-value
Expectations (out of 8)	<5000SR	5.12	1.87	0.092	Satisfaction (out of 7)	<5000 SR	5.06	1.30	0.273
	5000-10000 SR	5.81	0.87			5000-10000 SR	4.52	1.69	
	10000 -20000 SR	6.31	0.75			10000 -20000 SR	5.46	1.27	
	>20000 SR	5.50	0.71			>20000 SR	4.00	2.83	
	Total	5.70	1.31			Total	4.91	1.52	
Appearance (out of 8)	<5000 SR	4.65	1.93	0.030*	Recovery (out of 3)	<5000 R	1.53	0.62	0.029*
	5000-10000 SR	5.33	1.32			5000-10000 SR	0.90	0.83	
	10000 -20000 SR	6.23	0.83			10000 -20000 SR	1.23	1.09	
	>20000 SR	4.00	2.83			>20000 SR	2.50	0.71	
	Total	5.28	1.60			Total	1.25	0.90	
Intimacy (out of 16)	<5000 SR	9.65	4.01	0.102					
	5000-10000 SR	12.19	1.86						
	10000 -20000 SR	9.69	4.89						
	>20000 SR	12.00	0.00						
	Total	10.75	3.66						

* Significant P-value

P-value was calculated using one-way ANOVA

Discussion:

Saudi women with reconstructed breasts post-mastectomy for breast cancer in this study showed good breast reconstruction satisfaction. The literature showed that patient-reported outcomes of BR after mastectomy had no significant differences from mastectomy without reconstruction outcomes [19, 20]. Other studies reported that patient-reported outcomes of BR after mastectomy were better than mastectomy alone [21, 22, 23]. Additionally, one study found worse quality of life, body image, or sexual outcomes in patients who had mastectomy with reconstruction compared with those who had mastectomy only [24].

According to Awan et al 6, one of the most significant possible barriers to BR was the lack of adequate information on the procedure. In our study, 30.2% of the patients were strongly unsatisfied about the statement "the plastic surgeon told me what I needed to know". This might be due to patients' lack of knowledge about the procedure that was worsened by the poor discussion prior to the breast reconstruction. In a study done by Alderman et al., only 33% of breast cancer patients scheduled for mastectomy reported that they had a preoperative discussion about BR with their

surgeons [25]. This might be attributed to the concern of general surgeons that breast reconstruction might mask breast cancer recurrence, as a previously published survey in Saudi Arabia reported 13, although no evidence supports this concern in the literature. A study done by Morrow et al. stated that 78.2% of patients reported that they had discussions about BR with a surgeon during the surgical decision-making process [26].

Patients managed by mastectomy, lumpectomy, axillary lymph node dissection (ALND) are at more risk for developing arm and shoulder pain, lymphedema, limited muscle strength and range of motion [27]. Also, patients undergoing BR are at risk of arm and shoulder impairments [28]. Our findings showed that most women (79.2% – 88.7%) had no arm concerns after breast reconstruction. Although it was noted that arm concerns were more in patients with lower educational attainment (secondary school) and lower income (<5000 SR), neither of them was significant. Alba et al 28 study stated that 34.4% of those who had flap reconstruction and 65.6% of those who had implant-based reconstruction were having swelling. Our study found that only 11.3% were complaining of swelling. Breast reconstruction can provide a satisfactory breast shape. However, this is a difficult operation as a couple of days of hospitalization is required, and recovery to normal physical activity may take a long time. Recovery may not be complete at 3 months for many patients [29]. A high percentage of our patients reported that the surgery was complex, and it took longer than expected to recover. Another study also reported that recovery subscale was having the lowest satisfaction among all subscales [30]. In our study, although recovery subscale had the lowest satisfaction among all subscales, recovery satisfaction was noted to be the highest in patients with higher educational attainment (above university) and higher income (>20000 SR), both were statistically significant.

Breast reconstruction is a common choice after mastectomy for women diagnosed with early stage breast cancer. Purposes for choosing BR were mostly appearance, femininity and emotional concerns [31]. In this regard, our findings showed that 62.3% - 75.5% of patients were satisfied and up to 28.3% were strongly satisfied about their self-image after BR. Moreover, higher income groups, especially 10000 – 20000 SR, showed statistically significant better self-image than those with lower income. Another study also reported high satisfaction in self-image subscale after BR [30].

It has been previously reported that poor and lower income people are less likely to undergo BR [32, 33, 34]. They have lower satis-

faction rates after their procedures [33, 34, 35]. In this regard, our findings were consistent with the literature. Low income group (<5000 SR) had a statistically significant lowest satisfaction in self-image subscale and was among the low satisfaction groups in appearance and recovery subscales. Also, the lowest satisfaction in intimacy, expectations, and arm concerns subscales. A previous study found that patients with higher educational attainments were more likely to desire BR [6]. Other study stated that education factor affects woman's decision and influence her to choose for post-mastectomy reconstruction [36]. Also, a study reported that higher educational attainments were more satisfied and less likely to regret their decision regarding reconstruction [35]. Moreover, in our study, higher educational attainment patients were more satisfied with their BR than lower educational attainment patients in majority of the subscales, except for intimacy and arm concerns, neither of them was significant. Limitations of this study include lack of generalization, as it was done in one center. Although validity of the questionnaire was already proven, here it may need to be tested again as some of the questions were omitted due to being socially inconvenient.

Conclusion:

Majority of patients were generally satisfied with their reconstructed breasts among all subscales. However, recovery subscale showed less satisfaction. Also, a relatively high percentage were not satisfied about the discussion with a surgeon prior to the reconstruction. Income had effects on BR satisfaction as high income groups had significantly better self-image and recovery satisfaction. Also, higher educational level patients were more satisfied across majority of subscales. Unsatisfaction about the pre-breast reconstruction discussion with plastic surgeons, and possible patients' lack of knowledge about the procedure need to be addressed with relevant educational programs and campaigns to educate women regarding the benefits of breast reconstruction. Moreover, recovery post-reconstruction needs to be addressed as well. Multi-center study is needed for confirming our findings.

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Original Article :

Perception, Attitude, And Practice Of Patients With Osteoarthritis In Sudair Area-Saudi Arabia

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الملخص

الخلفية:

يُعرَّف مرض الفصال العظمي وهو المعروف بمرض خشونة المفاصل بأنه اضطراب مفصلي تقدمي تم ربطه بالعديد من العوامل مثل الوراثية والميكانيكية الحيوية والبيئية التي تساهم في التسبب في عواقب جسدية ونفسية واجتماعية. في العديد من البلدان، يمكن أن يتجاوز انتشار مرض الفصال العظمي أكثر من الأمراض الطبية الشائعة. وقد هدفت هذه الدراسة إلى استكشاف ومعرفة الإدراك والموقف والممارسة لدى مرضى الفصال العظمي في منطقة سدير بالمملكة العربية السعودية

طريقة البحث:

تم إجراء دراسة مقطعية شملت مرضى الفصال العظمي في منطقة سدير لتقييم الإدراك والموقف والممارسة. شملت الدراسة على ١٦٥ مشارك وقد تم جمع البيانات على مدى ٦ أشهر من يونيو إلى ديسمبر ٢٠٢٠. تمت دعوة البالغين الذين تزيد أعمارهم عن ١٨ عامًا للمشاركة في الدراسة من خلال استطلاع عبر الاستبيان الإلكتروني وتم الحصول على الموافقة من لجنة أخلاقيات البحث العلمي جامعة المجمعة. تم جمع الردود من المشاركة على الاستبيان الالكتروني ووضعها في جدول بيانات اكسل ومن ثم تم تحليلها عن طريق برنامج الحزمة الإحصائية للعلوم الاجتماعية.

النتائج:

شمل البحث ١٦٥ مشاركا في منطقة سدير. ما يقارب ٨٠ ٪ منهم ينتمون إلى الفئة العمرية ١٨-٥٠ سنة. ٦٠,٦٪ من المشاركين كانوا من الإناث. غالبيتهم يقيمون داخل مدينة المجمعة ٨١,٢٪. بناءً على المعايير فان ٦٧,٣٪ من المرضى يعتبرون من ذوي الإدراك المتوسط . بالنسبة للمواقف، تم

Abstract

Background:

Osteoarthritis is defined as a progressive joint disorder that has been linked to many factors such as genetic, biomechanical, and environmental that contributes to causing physical, psychological, and social consequences. In many countries, prevalence of OA can exceed the prevalence of other common medical diseases. This study aimed to explore the perception, attitude, and practice among patients with osteoarthritis in Sudair region-Saudi Arabia.

Methods:

A cross-sectional study involving patients with osteoarthritis in Sudair was conducted to assess perception, attitude, and practice. The sample size was taken as 165 and data were collected over a period of 6 months from June to December 2020. Adults over the age of 18 were invited in the study and the approval was obtained from research ethics committee of Majmaah University. The responses to the online questionnaires were collected in an Excel spreadsheet and exported to the Statistical Package for the Social Sciences (SPSS) file.

Results:

A total of 53 participants were considered. 58.4% had a university education or above, and only 32.1% had an income of <5000 SR. No more than 7.5% and 11.3% were unsatisfied and strongly unsatisfied with

their self-image. 30.2% were strongly unsatisfied about the discussion with a plastic surgeon prior to reconstruction. 81.1% would recommend the type of reconstruction to a friend, and 77.4% agreed that they would choose this type of reconstruction if they had to do it all over again. 79.2% to 88.7% reported no arm concerns at all. 45.3% of patients reported that it took them longer than expected to recover, and 52.8% of patients reported that the surgery was complex. Patients with above

Results:

The research included 165 participants in Sudair region. Almost 80% of them belonged to the age-group of 18-50 years. 60.6% of participants were females. 81.2%. of them were residing Inside Al Majmaah city. Based on the given criteria,67.3% of patients with moderate perception. For attitude, majority of them 66.1% were classified as negative attitude. 64.2% of patients had moderate practices.

Conclusion:

Overall, perception and practices appear to be moderately pervasive among the majority of patients but on the other hand negative attitude was obviously observed among the participants.

Key words:

Perception, Attitude, Practice, Osteoarthritis, Saudi Arabia

تصنيف ٦٦,١٪ منهم كموقف سلبي وأن ٦٤,٢٪ من المرضى لديهم ممارسة متوسطة.

الخلاصة:

بشكل عام، يبدو أن الإدراك والممارسة منتشرة بشكل معتدل بين غالبية مرضى الفصال العظمي في منطقة سدير بالمملكة العربية السعودية. معظم المشاركين لديم مواقف سالبة عن المرض.

Introduction

Osteoarthritis (OA) is defined as a progressive joint disorder that has been linked to many factors such as genetic, biomechanical, and environmenta[1], that contribute to causing physical, psychological, and social consequences [1]. In many countries, prevalence of OA can exceed the prevalence of other common medical diseases such as diabetes mellitus, hypertension, and ischemic heart disease [2].

OA is characterized by degeneration and damage of articular cartilage [3] and whole joint, including the subchondral bone and synovium [4]. It consists of vary clinical manifestation from mild to severe pain and

stiffness of joints till chronically health problems and long-term disability [5]. OA can be primary or secondary, depending on its etiology.

Multiple risk factors have been linked to OA and can be categorized as non-modifiable (age, gender و and genetics) and modifiable (obesity, previous joint injury, and malalignment) [1]. The disease can occur in various joints and the most affected are the knees, hands, and hips joints [6]. The diagnosis of OA is mainly depending on clinical impression and radiographic findings [1].

Currently, OA management is mainly of two types: the first type is non-surgical intervention includes exercise, physiotherapy, weight loss, pharmacological therapy, and intra-articular injections. The second type is surgical intervention, which is considered when first type fails [7].

More importantly, improving the patients' knowledge is acquired and transmitted by physician with efficiency and practice and blended with measures of wisdom, ethics, and attitude 8. However, no study has been carried out to explore perception, attitude. and practice among patients with osteoarthritis in Sudair region-Saudi Arabia. Furthermore, a study reported that patients could achieve greater satisfaction when they received more information regarding their management [9]. Hence, this review aimed to explore in detail about the perception, attitude and practice among patients with osteoarthritis in Sudair region-Saudi Arabia to enhance their knowledge with improve the community medical services.

Materials and Methods

A cross-sectional study involving the patients with osteoarthritis in Sudair was conducted to assess perception, attitude, and practice. The following regions were included: Majmaah, Hautat Sudair, Tumair, Alghat, Al-Zulfi, and Jalajil. The sample size was taken as 165 and data were collected over a period of 6 months from June to December 2020.Adults over the age of 18 were invited to participate in the study through an online survey. The study proposal was approved by the research ethics committee of Majmaah University. The responses to the online questionnaires were collected in an Excel spreadsheet and exported to the Statistical Package for the Social Sciences (SPSS) file.

The questionnaire contained items about perception, attitude, and practice, based on previous studies and theories. It also included questions on socio-demographic features, such as sex, age, education level, monthly income, occupation. Some questions had answer options of always, mostly, sometimes, and no affect.

Questionnaire scoring

The criteria for the perception, attitude and

practice toward osteoarthritis were drawn from 9 questions (table 2) where 4-point Liker t scale categories were the answer options such as "No" coded as 1, "sometimes" coded as 2, "mostly" coded as 3 and "always" coded as 4. The total score has been calculated by adding all questions related to perception, attitude, and practices, each 3 questions, respectively which generally means that the higher the score, the greater perception, attitude, and practices toward osteoarthritis. By using 50% and 75% to determine the levels of perception, attitude, and practices. Participants were considered as poor/negative, levels by the score range of 3 – 6 points, 7 – 9 were considered as moderate/neutral and 10 – 12 were considered as good/positive levels.

Statistical Analysis

Descriptive statistics are demonstrated using numbers, percentages, minimum, maximum, mean and standard deviation, whenever appropriate. Between comparisons, Mann Whitney U test and Kruskal Wallis test were applied. P-value of <0.05 was considered statistically significant. Normality tests were conducted using Shapiro Wilk, Kolmogorov, and Smirnov tests. Data follows abnormal distribution. Therefore, non-parametric tests were applied between comparisons of variables. Correlation procedures were also conducted to evaluate the linear agreement between perception, attitude and practices score. All statistical analyses were carried out using Statistical Packages for Software Sciences (SPSS) version 21 Armonk, New York, IBM Corporation.

Results

We enrolled 165 Saudi patients who were diagnosed with osteoarthritis to evaluate their perception, attitude, and practices toward the disease. As seen in table 1, nearly all patients (81.2%) were living inside Al Majmaah city with nearly (80%) were in the younger age group (18 – 50 years) and mostly were females (60.6%). With respect to their education, approximately (60%) were college degree with more than a half (55.2%) earned less than 5,000 SAR per month. With regards to occupational status, (43%) were unemployed and (42.4%) were employed. When asked the nature of their work, (30.3%) reported that their work depends on lifting heavy weights or requiring too much movement. Furthermore, more than two third (67.9%) indicated a duration of osteoarthritis of less than 5 years. The prevalence of smokers in this study was (9.7%).

Table 1: Socio demographic characteristics of the patients (n=165)

Study variables	N (%)
Residence location	
Inside Al Majmaah city	134 (81.2%)
Outside Al Majmaah city	31 (18.8%)
Age group	

Study variables	N (%)
18 – 50 years	130 (78.8%)
>50 years	35 (21.2%)
Gender	
Male	65 (39.4%)
Female	100 (60.6%)
Educational level	
High school or below	67 (40.6%)
College degree	98 (59.4%)
Monthly income level (SAR)	
<5,000	91 (55.2%)
5,000 – 10,000	29 (17.6%)
>10,000	45 (27.3%)
Occupational status	
Unemployed	71 (43.0%)
Student	24 (14.5%)
Employed	70 (42.4%)
Does the nature of your work depend on lifting heavy weights or requiring movement too much?	
Yes	50 (30.3%)
No	115 (69.7%)
Duration of osteoarthritis	
<5 years	112 (67.9%)
5 – 10 years	42 (25.5%)
>10 years	11 (06.7%)
Smoking	
Yes	16 (09.7%)
No	149 (90.3%)

Table 2 described the assessment of perception, attitude, and practices toward osteoarthritis. In the assessment of perception, in question 1, it was found that (36.4%) of the patients sometimes believe that osteoarthritis may affect the nature of normal life, (27.3%) rated always and (21.8%) mostly believe. In question 2, (40.6%) stated that osteoarthritis did not affect their mental health; others said they sometimes feeling depressed (25.5%) or mostly depressed (20%). In question 3, (40%) stated that they sometimes had sleep disturbance due to osteoarthritis, (20%) stated mostly and (14.5%) stated always. For attitude, in question 1, (31.5%) were sometimes committed with treatment or treatment plan recommended by the doctor, (27.9%) said they mostly committed and only (10.9%) stated that they had always committed to the treatment plan. In question 2, majority of the patients (66.1%) said that they did not receive information in advance of the possible side effects of medications, intra-articular injections, or joint replacement surgery. In question 3, (38.8%) were sometimes followed healthy diet to maintain weight, (17%) mostly followed while (40%) reported that they did not follow a healthy diet. For practices, in question 1, (35.2%) stated that they sometimes doing exercises to strengthen muscles surrounding joints, (13.9%) said that they mostly doing exercises while (46.7%) said they don't keep doing exercise. In question 2, two-third of the patients stated that they did not use alternative and complementary medicine for the treatment of osteoarthritis and (20.6%) said sometimes. In question 3, most of them (90.3%) stated that they did not use cauterization. The descriptive

Table 2: Assessment of perception, attitude, and practices toward osteoarthritis(n=165)

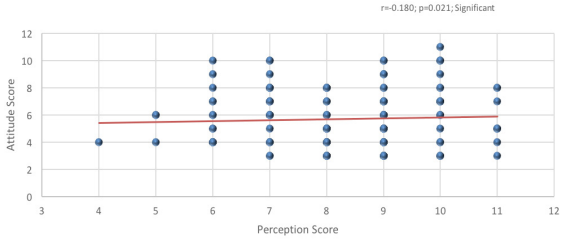
Perception statement	N (%)
Do you think that osteoarthritis may affect the nature of your normal life?	
Always	45 (27.3%)
Mostly	36 (21.8%)
Sometimes	60 (36.4%)
No, it did not affect	24 (14.5%)
Have you ever had a feeling of depression due to osteoarthritis?	
Always	22 (13.3%)
Mostly	34 (20.6%)
Sometimes	42 (25.5%)
No, I did not feel depressed	67 (40.6%)
Have you suffered from sleep disturbance due to osteoarthritis?	
Always	24 (14.5%)
Mostly	33 (20.0%)
Sometimes	66 (40.0%)
No, I didn't suffer sleep disturbance	42 (25.5%)
Attitude statement	
Are you committed using the treatment or the treatment plan?	
Always	18 (10.9%)
Mostly	46 (27.9%)
Sometimes	52 (31.5%)
No, I am not committed	49 (29.7%)
If you use medications, intra-articular injections, or have joint replacement surgery, have you been informed in advance of the possible side effects of the treatment method?	
Always	16 (09.7%)
Mostly	19 (11.5%)
Sometimes	21 (12.7%)
No, I did not	109 (66.1%)
Do you follow a healthy diet to maintain your weight?	
Always	07 (04.2%)
Mostly	28 (17.0%)
Sometimes	64 (38.8%)
I do not follow a diet	66 (40.0%)
Practices	
Do you keep on doing exercises to strengthen muscles surrounding the joints?	
Always	07 (04.2%)
Mostly	23 (13.9%)
Sometimes	58 (35.2%)
I do not keep doing exercise	77 (46.7%)
Do you have used one of the therapeutic methods of complementary and alternative medicine such as herbal remedies or acupuncture or cupping for treatment of osteoarthritis?	
Always	05 (03.0%)
Mostly	16 (09.7%)
Sometimes	34 (20.6%)
No, I did not use alternative and complementary medicine	110(66.7%)
Do you used the method of cauterization for the treatment of osteoarthritis?	
Always	02 (01.2%)
Mostly	05 (03.0%)
Sometimes	09 (05.5%)
I did not use cauterization	149 (90.3%)

statistics of the perception, attitude and practices toward osteoarthritis has been described at table 3. Based on the results, it was observed that the overall mean perception score was 8.32 (SD 1.46) out of 12 points. Based on the given criteria, the proportion of patients with poor, moderate, and good perception were (12.7%), (67.3%) and (20%), respectively. For attitude, the mean score was 5.70 (SD 1.99) with (66.1%) were classified as negative attitude, (28.5%) were in neutral and only (5.5%) were classified as positive attitude level. For practices, the mean score was 9.12 (SD 1.23) with poor, moderate, and good practices were detected among (3.6%), (64.2%) and (32.1%), respectively.

Table 3: Descriptive statistics for the perception, attitude, and practices (n=165)

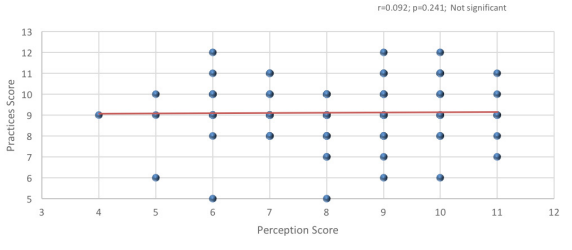
Variables	N (%)
Perception total score (mean ± SD)	8.32 ± 1.46
Level of perception	
Poor	21 (12.7%)
Moderate	111 (67.3%)
Good	33 (20.0%)
Attitude Total score (mean ± SD)	5.70 ± 1.99
Level of attitude	
Negative	109 (66.1%)
Neutral	47 (28.5%)
Positive	09 (05.5%)
Practices total score (mean ± SD)	9.12 ± 1.23
Level of practices	
Poor	06 (03.6%)
Moderate	106 (64.2%)
Good	53 (32.1%)

Figure 1: Correlation between the perception and attitude score



In figure 1, there was an inverse correlation between perception and attitude score (r=-0.180; p=0.021).

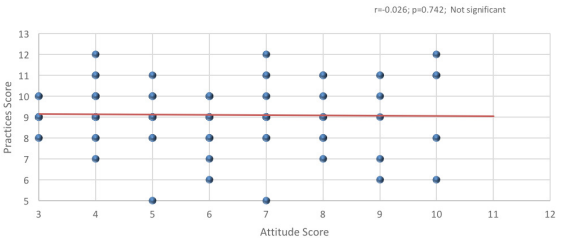
Figure 2: Correlation between the perception and practices score



In figure 2, the correlation between perception and practices score was not statistically significant (r=0.092; p=0.241).

When comparing the perception, attitude, and practices in relation to the socio demographic characteristics of the patients, it was found that those in the older age group (>50 years) showed significantly better attitude than their counterparts (T=-1.871; p=0.027) but in practices, younger age group (18 – 50 years) showed significantly better practices (T=2.356; p=0.014). Furthermore, patients with higher monthly income level (>10,000 SAR) exhibited with better attitude than the other groups (F=5.156; p=0.004) while those unemployed patients observed to have significantly lower practices compared to either students or employed (F=4.602; p=0.040). In addition, patients with less than 5 years' duration of the disease showed significantly higher practices than their counterparts (F=8.278; p=0.004). Other socio demographic characteristics including residence location, gender, educational level, the nature of work and smoking status did not show significant difference when compared to perception, attitude, and practices score (All p>0.05) (Table 4).

Figure 3: Correlation between the attitude and practices score



In figure 3, there was negative correlation between attitude and practices score, however statistical test revealed that it did not reach statistically significant (r=-0.026; p=0.742).

Table 4: Comparison between the mean perception, attitude, and practices score in relation to the socio demographic characteristics of the patients (n=165)

Factor	Perception Score (12) Mean ± SD	Attitude Score (12) Mean ± SD	Practices Score (12) Mean ± SD
Residence [a]			
Inside Al Majmaah City	8.31 ± 1.38	5.67 ± 1.98	9.11 ± 1.29
Outside Al Majmaah	8.32 ± 1.78	5.84 ± 2.07	9.13 ± 0.92
T-test	-0.031	-0.421	-0.069
P-value	0.935	0.777	0.758
Age group [a]			
18 – 50 years	8.28 ± 1.45	5.55 ± 2.02	9.23 ± 1.16
>50 years	8.43 ± 1.50	6.26 ± 1.80	8.69 ± 1.41
T-test	-0.519	-1.871	2.356
P-value	0.654	0.027 **	0.014 **
Gender [a]			
Male	8.55 ± 1.51	5.82 ± 1.96	9.28 ± 1.17
Female	8.16 ± 1.41	5.63 ± 2.01	9.01 ± 1.27
T-test	1.708	0.584	1.364
P-value	0.056	0.445	0.279
Educational level [a]			
High school or below	8.31 ± 1.59	5.63 ± 1.94	9.03 ± 1.36
College degree	8.62 ± 1.37	5.76 ± 2.03	9.18 ± 1.14
T-test	-0.012	-0.406	-0.735
P-value	0.981	0.768	0.571
Monthly income level (SAR)[b]			
<5,000	8.19 ± 1.55	5.90 ± 2.11	9.02 ± 1.29
5,000 – 10,000	8.52 ± 1.24	4.66 ± 1.56	9.34 ± 1.20
>10,000	8.44 ± 1.39	5.98 ± 1.79	9.16 ± 1.13
F-test	0.809	5.156	0.787
P-value	0.386	0.004 **	243
Occupational status [b]			
Unemployed	8.14 ± 1.61	6.04 ± 1.98	8.79 ± 1.44
Student	8.33 ± 1.40	5.79 ± 2.08	9.42 ± 1.18
Employed	8.49 ± 1.30	5.33 ± 1.92	9.34 ± 0.92
F-test	0.991	2.336	4.602
P-value	0.286	0.095	0.040 **
Does the nature of your work depend on lifting heavy weights or requiring movement too much? [a]			
Yes	8.04 ± 1.52	5.78 ± 2.14	9.04 ± 1.14
No	8.43 ± 1.42	5.67 ± 1.93	9.15 ± 1.27
T-test	-1.608	0.327	-0.516
P-value	0.128	0.845	0.357
Duration of osteoarthritis [b]			
<5 years	8.21 ± 1.42	5.69 ± 2.01	9.32 ± 1.16

5 – 10 years	8.64 ± 1.62	5.62 ± 1.96	8.88 ± 1.13
>10 years	8.18 ± 0.98	6.18 ± 1.94	7.91 ± 1.58
F-test	1.436	0.357	8.278
P-value	0.111	0.683	0.004 **

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Smoking [a]			
Yes	8.00 ± 1.79	5.13 ± 1.93	9.25 ± 0.93
No	8.35 ± 1.42	5.77 ± 1.99	9.10 ± 1.26
T-test	-0.911	-1.225	0.460
P-value	0.612	0.236	0.551

a P-value has been calculated using Mann Whitney U test.
b P-value has been calculated using Kruskal Wallis test.
** Significant at p<0.05 level

Discussion

Worldwide, OA is the one of the most common musculoskeletal disorder associated with disability and reduced quality of life resulting in psychological distress and decreased social functioning [10, 11]. According to Wolf et al, patients aged 60 and above were (18.0%) woman and (9.6%) men suffer from symptomatic OA, with (25%) of them unable to perform a routine activity daily living [7].

In our study, persons aged between 18 and 50 years and those with college degree were the main respondents and this could be attributed to the method of data collection using an electronic survey. Obviously, (67.3%) of the participants had a moderate perception about osteoarthritis and third of them mentioned sometimes OA reduced quality of life.

Several studies have evaluated the relationship between OA and depression; this concluded that depression adversely impact the quality of life of patients with OA 12. (40.6%) participants in our study had never felt depressed. OA known to increases the risk of sleep disturbance, and that both pain and sleep problems may lead to functional disability and depression 13. This was found only (40 %) of participants had sometimes sleep disturbance due to osteoarthritis.

Attitude is considered as one of the most important components to improve medical knowledge; it has a positive impact on the value of ethical conduct in raising the application of the component in real life to a peak 8. However, our results showed that the majority of participants' attitude about OA were (66.1%) negative.

A study reported that medical professionals who fail to provide clear information on pharmacological properties of the medications may causes patients not to adhere to drug therapy [14]. In the present study (66.1%) of participants have not been in-

formed in advance of the possible side effects of the treatment method of OA. Good practice is an art that is linked to the progress of knowledge and technology and is executed in an ethical manner [8].

Campbell et al. reported that long-term physiotherapy exercise adherence was affected by a positive attitude to exercise, perceived exercise effectiveness, perceived causes of OA, and perceived symptoms severity [15]. Our results reported that level of practices in majority of participant's were (64.2%) moderate.

Results show correlation between the perception, attitude. and practices score. There was an apparent relationship between the perception, attitude, and practices with socio demographic features; participant with older age group (>50 years) and higher monthly income level (>10,000 SAR) exhibited with better attitude than the other groups, and these findings were consistent with reported data by Gecht [16].

Moreover, younger age group (18 – 50 years) of participant showed significantly better practices than their counterparts. This could be because the older age group may need to take extra precautions and seek medical advice before striving to achieve the recommended levels of physical activity for older people [17].

To the best of our knowledge, this is the first review assessing the perception, attitude, and practices among patients with osteoarthritis in Sudair region-Saudi Arabia. Therefore, it can shed light regarding better perception, attitude and practices understanding and ensuring more fruitful and desirable outcomes among OA patients.

Conclusion

Overall, perception and practices appear to be moderately pervasive among most patients with osteoarthritis in Sudair region-Saudi Arabia. On the other hand, negative attitude was obviously observed among the participants. Further studies are also required to confirm our findings.

Conflict of interest

The authors declare no conflicts of interest.

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Original Article :

Knowledge About Covid-19 During Its Initial Outbreak Among University Students And Staff In Saudi Arabi

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Abstract

Background & Aims:

The widespread COVID-19 and its detrimental impact have prompted governments to exert comprehensive protective measures to mitigate such effects. Recognizing the considerable positive impact of knowledge and awareness on individuals' behaviors, Saudi Arabia was one of the few countries that responded promptly to constrain the spread of the pandemic among its population and invested profoundly in awareness campaigns to educate the public about the virus.

We aim to evaluate the level of knowledge about COVID-19 among the public before the first case was confirmed in Saudi Arabia and investigate associations between the level of knowledge about COVID-19 and selected variables.

Methods:

We conducted a cross-sectional survey (n =737) to measure knowledge about COVID-19 in the early stages of the pandemic. Multiple regression analysis was performed to study the associations between knowledge and participant characteristics.

Results:

Overall, an above-average knowledge level about COVID-19 among participants was observed. Multiple linear regression modeling showed nonsignificant

الملخص

دفع انتشار جائحة كورونا ((COVID-١٩ واثاره السلبية الحكومات إلى اتخاذ تدابير وقائية شاملة للتخفيف من هذه الآثار. إدراكًا للتأثير الإيجابي الكبير للمعرفة والوعي على سلوكيات الأفراد، كانت المملكة العربية السعودية أحد الدول التي استجابت على الفور للحد من انتشار الوباء بين سكانها واستثمرت بشكل كبير في حملات التوعية لتثقيف الجمهور حول الفيروس.

تهدف هذه الدراسة إلى تقييم مستوى المعرفة حول مرض كورونا بين الجمهور قبل تأكيد الحالة الأولى في المملكة العربية السعودية والتحقيق في الارتباط بين مستوى المعرفة حول كورونا وبعض المتغيرات المختارة.

أجرينا مسحًا مقطعيًا على عينة مكنة من ٧٣٧ شخص لقياس المعرفة حول كورونا في المراحل الأولى من الوباء.

بشكل عام، ابرزت النتائج بأن مستوى معرفة كان أعلى من المتوسط بين المشاركين. أظهرت نمذجة الانحدار الخطي ارتباطات غير مهمة بين مقدمي الرعاية صحية ومستوى المعرفة حول مرض كورونا وبين عمر المشارك ومستوى المعرفة عن مرض كورونا. وكان جنس المشارك فقط هو المؤشر الهام على مستوى المعرفة حول مرض كورونا.

تعد التدخلات المبكرة والشاملة لزيادة الوعي بين السكان ضرورية لتوسيع معرفة الناس، الأمر الذي له تأثير مباشر على الالتزام بالإجراءات الموصى بها. ومع ذلك، وبناء على نتائج هذه الدراسة يتضح ان هناك فجوة بين الجنسين في مستوى المعرفة عن مرض كورونا والتي تستوجب التحقق عن سبب هذه الفجوة وفحصها لتوجيه التدخلات والسياسات الصحية المستقبلية.

associations between being a healthcare provider and knowledge about COVID-19 and the participant's age and knowledge of COVID-19. Only the sex of the participant (0.47, $p < 0.01$) was a significant predictor of knowledge about COVID-19.

Conclusion:

In pandemics such as COVID-19, early and comprehensive interventions to raise awareness among the population are necessary to expand people's knowledge, which directly influences adhering to recommended measures. However, there is a gender gap in knowledge about COVID-19 that must be examined to inform future health interventions and policies.

Keywords:

Cross-sectional study; COVID-19; knowledge; behavior; coronavirus

Introduction

The coronavirus disease (COVID-19) is a respiratory infection first detected in Wuhan, China, in December 2019. Since that time, the disease has spread rapidly across more than 150 countries; in mid-March, the World Health Organization (WHO) declared COVID-19 as a pandemic and urged all countries to exert effective preventive actions. By February 2021, the virus infected nearly 110 million individuals and caused more than 2,400,000 deaths worldwide [1].

The broad and accelerated spread of COVID-19 and its detrimental health and economic impact has prompted governments worldwide to adopt comprehensive protective measures such as social distancing, quarantine, isolation, travel restrictions, and enforced personal protective measures[2]. Such policies and interventions have targeted different interventions, including organizational, social, and individual levels [3]. Unlike other health challenges, COVID-19 preventive measures relied heavily on individual behavior. Intrapersonal level factors such as knowledge stand to be one of the most significant levels of influence in predicting people's preventive behaviors. Several studies found a significant association between knowledge and intention to act [4]. More knowledge about the illness etiology, transmission, degree of severity, and treatment prospect is signifi-

cantly associated with higher adherence to protective and control measures. However, promoting healthy behaviors requires prior knowledge about the current level of knowledge people have, types of misinformation roaming between the public, and trust of the main sources of health information [5]. Initiating an extensive public health camping or an educational program without identifying those critical factors can significantly diminish its efficacy and success. Thus, determining people's knowledge of the disease is key.

Saudi Arabia is one of the few countries that reacted promptly to control the spread of the pandemic among its residents. The country began even before any cases were reported and before the WHO declared COVID-19 as a pandemic [6]. Precautionary steps taken by the Saudi government can be categorized into three components: a collaborative effort between 19 governmental and non-governmental agencies to plan, evaluate, and implement preventive measures; restrict travel even for Umrah, and enforced restriction on social gathering and unnecessary movement [7]. Before the first case was detected in Saudi Arabia, the Saudi Ministry of Health (MOH) initiated a massive educational campaign to spread awareness about COVID-19 and promote protective and preventive measures 8.

Given the significant efforts delivered by the Saudi government, it is essential to evaluate the impact of such provisional campaigns. Thus, we aim to understand the level of knowledge people have about COVID-19 at the outset of the outbreak before the first case was detected in Saudi Arabia. The purpose of the study is two folds: First, to assess the level of knowledge about COVID-19 among the public before even the first case was confirmed in Saudi Arabia. Second, to investigate associations between the level of knowledge about COVID-19 and several individual characteristics such as healthcare workers. The findings of this study will serve as a building block for future interventions to be framed and tailored to the targeted population.

Materials and methods

Data Collection

We collected data using a cross-sectional online survey to measure the public's knowledge about COVID-19 in the early stages of the pandemic before the first case was detected in Saudi Arabia. The survey items were guided by the literature and reviewed by experts in the public health field. The online survey was administered to a large sample of participants in February 2020. We targeted faculty, employees, and students of a major multi-branch uni-

versity in Saudi Arabia, the Saudi Electronic University. The university offers graduate and undergraduate degrees to male and female students from different demographics and backgrounds. The inclusion criteria involved participants aged 18 years who are either students, employees, or faculty at SEU. Participants were excluded if they met the following criteria: below 18 years of age, or students were not registered as SEU students at the time of the study. University's employees' and students' emails were retrieved from the university's registrar, and each email was given an identifier number to ensure anonymity and data privacy. To enhance the response rate, multiple invitation emails were sent. First, an invitation email was sent to the pool of participants (all of the University employees and students). The sent email provided detailed information about the study's background, objectives, procedures, the time required to complete the survey, researcher's contact information, privacy and confidently confirmations, consent, and the right to the opt-out statement. Secondly, two reminder emails were sent to ensure participant's involvement and enhance the response rate. At the end of the data collection process, 737 participants have completed the online survey. The Ethical Committee of the Saudi Electronic University approved the study protocol (SEUREC-CHS20106).

Measures

The survey consisted of two sections: demographics and the knowledge construct. Five items examined participant's demographics: age, gender, being a healthcare provider, and participant's college affiliation. Twenty items measured the knowledge construct: six items focused on transmission routes; four items assessed participant knowledge about the severity of the disease; four items asked about general characteristics of the disease; four items inquired about the risk of contracting the disease; two items evaluated participants trust in public health authorities. For each item, three options were provided (Yes, No, and I do not know). Since few participants selected the third option, the two last options were collapsed into one category (NO). One point is granted for each correctly answered question. The knowledge construct was determined by adding all the correctly answered questions. Survey instructions, details, and questions were in Arabic, the mother language for all participants.

Statistical analysis

Descriptive statistics such as participant's demographic frequencies and proportions of correctly answered items were obtained using SPSS (IBM SPSS, version 27, New York, USA). To examine the relationship

between participants' knowledge about COVID-19 and other variables, a multiple linear regression model was developed to determine the association between the level of knowledge among the public and potential factors: being a health care provider, participant's college affiliation, age, and gender. Unstandardized and standardized regression coefficients (β) and their 95% confidence intervals (CIs) quantified the associations between variables and knowledge with a statistical significance level set at $p < .05$ (two-sided). All linear regression assumptions were checked to ensure accurate estimates.

Results

Of the sample (n = 737), most participants were middle-aged (M = 29, SD = 6.9), about two-thirds (62%) were female, almost half (45%) were from the college of health sciences, and about one-fourth (22%) were health care workers (see Table 1).

Participant's level of knowledge about COVID-19, which consisted of 20 items, had a wide range (range 6 – 19) with a high overall average of knowledge (M = 14.1, SD = 1.90). Additionally, the level of knowledge was slightly negatively skewed (skewness = -0.37), indicating more par-

Table 1. Demographic profile of all participants

Characteristics	Number (n=737)	Percentages (%)
Sex		
Male	263	37.8
Female	432	62.2
College affiliation		
Health sciences	315	45.3
Computing and informatics	103	14.8
Administrative and Financial Sciences	170	24.5
Science and Theoretical Studies	69	9.9
Other	38	5.5
Being a health care worker		
Healthcare workers	152	21.9
Non-healthcare workers	543	78.1
Branch		
Riyadh	315	45.9
Dammam	223	29.5
Jeddah	102	13.2
Abha	97	11.4
Age (years)	Mean	SD
	28.7	1.9

ticipants having knowledge scores below 14. A closer inspection of each knowledge item showed that most participants answered some questions incorrectly (see Table 2). For instance, 77% of the participants believed the virus could be transmitted from animals to humans, 44% believed the virus could be transmitted by sex, 83% thought children are at greater risk of the disease that it can be deadly for the younger population, and 65% considered COVID-19 similar to the typical seasonal influenza.

Table 2. Number of participants correctly replying to individual items about knowledge of COVID-19 (N=737)

Item	Correct responses
COVID-19 is contagious and is transmitted from animals to humans	159 (22.9%)
COVID-19 may be transmitted by shipping goods from China	555 (79.9%)
COVID-19 is transmitted by drops or sneezing spray from an infected person	672 (96.7%)
COVID-19 is transmitted by shaking hands or touching the infected person	502 (72.2%)
COVID-19 is transmitted by touching the tools used by the infected person	493 (70.9%)
COVID-19 is transmitted through sex	402 (57.8%)
COVID-19 is dangerous and may lead to death, especially in children	124 (17.8%)
COVID-19 is dangerous and may lead to death, especially in the elderly and those with weak immunity	662 (95.3%)
There is a vaccination against COVID-19	661 (95.1%)
There is a treatment against COVID-19	639 (91.9%)
The cause of COVID-19 is a virus, not bacteria	592 (85.2%)
COVID-19 is similar to SARS that started previously in China	417 (60%)
COVID-19 is similar to MERS that started previously in Saudi Arabia	360 (51.8%)
COVID-19 is similar to the flu	244 (35.1%)
It may take 14 days for the symptoms of COVID-19 to appear in an infected person	433 (62.3%)
A person infected with COVID-19 should be one of the most vulnerable to high temperature	579 (83.3%)
Have you heard of the COVID-19 disease spreading in China now	694 (99%)
The possibility that someone in my area will contract COVID-19 is almost impossible	580 (83.5%)
I trust the numbers and statistics provided by the Ministry of Health	499 (71.8%)
I am confident in the capabilities of the Ministry of Health to limit the spread of COVID-19	509 (73.2%)

Multiple linear regression was modeled with knowledge of COVID-19 as the response variable and age, sex, being a healthcare worker, and affiliated college as the explanatory variables. The designed model showed an appropriate fit ($F(7, 687) = 2.62$, $p < .05$) with ($R2 = 0.026$), indicating that the proposed model explains 2.6% of the knowledge variance. The Durbin-Watson statistic was satisfactory ($d = 1.96$), which indicated the absence of first-order linear auto-correlation in our model.

The regression model showed a positive relationship between being a healthcare provider and knowledge about COVID-19 and a negative association between the participant's age and knowledge of COVID-19 (see Table 3).

Table 3. Multiple regression analysis results: level of knowledge of COVID-19 and participants characteristics

Effect	Estimate	SE	CI 95%		p
			LL	UL	
Constant	13.95	0.39	13.18	14.725	0.00
Age	-0.01	0.01	-0.03	0.02	0.74
Sex	0.47	0.16	0.15	0.79	0.05
Health Care provider	0.22	0.22	-0.23	0.66	0.33
College Computing and informatics	-0.26	0.23	-0.71	0.19	0.26
College Administrative and Financial Sciences	-0.38	0.19	-0.76	0.01	0.05
College Science and Theoretical Studies	0.06	0.27	-0.47	0.61	0.81
College: Other	0.31	0.34	-0.36	0.10	0.37

However, such relationship estimates were not statistically significant ($p > .05$). Only the sex of the participant ($\beta = 0.47$, $p < .05$) was a significant predictor of knowledge of COVID-19, which indicates that females have an approximately half-point increase in their average level of knowledge of COVID-19 compared to males.

Discussion

This study sought to evaluate the level of knowledge about COVID-19 among a large sample before the first case in Saudi Arabia was detected. Additionally, the study assessed the relationship between the level of knowledge about COVID-19 and relevant individual characteristics. The findings showed that the level of knowledge of participants was relatively high. From the 20 questions asking about the level of knowledge, most participants answered about 14 questions correctly. However, the majority of the participants incorrectly answered several specific items. The linear regression model showed a significant relationship between the level of knowledge of COVID-19 and the gender of the participant, with females significantly having higher knowledge compared to males. No significant difference in knowledge was detected between health care providers and the non-healthcare providers among the participants.

Despite the novelty of the diseases, our finding indicated a high level of knowledge about COVID-19 among the study's sample. This above than the average level of knowledge can be attributed to the substantial global and, more importantly, the local effort to educate and raise collective awareness about the disease [9]. In Saudi Arabia, the MOH has acted effectively and promptly in initiating a massive campaign to spread tailored, accurate, and credible information about the nature of the disease, transmission methods, and related preventive measures [10]. This campaign has started early as soon as the WHO announced the

first case of COVID-19 in China. Moreover, the campaign has increasingly gained momentum and was disseminated through different media channels and platforms to ensure the whole population receives the message [11]. Additionally, the MOH has contributed significantly to the comparatively low infection and death rate by increasing health care facilities and capacities to offer explicit treatment protocols [12]. Even though the results showed an above-average level of knowledge about COVID-19, there was a variation in the proportion of correct answers among the knowledge questions. A high proportion of participants answered several questions incorrectly. In particular, most participants showed a lack of understanding of important facts such as how the disease is transmitted and the severity of vulnerable populations. These findings parallel finding for other research. One study indicated the most common misinformation about COVID-19 was the belief that the disease impacts only the elderly, mosquitoes can transmit the virus, and the homemade remedy can potentially cure the disease [13]. Another study showed that participants from the US and the UK perceived children to have a higher mortality rate from COVID-19 than the elderly [14]. Additionally, the study showed a gap in knowledge about COVID-19 between males and females. Acknowledging such disparity in knowledge is essential and identifying the reason behind such a gap is key to developing tailored programs.

The findings of this study reflect the importance of early interventions to raise knowledge among the public and the provision of accurate information to debunk disseminated myths and misconceptions. However, some limitations should be mentioned. First, the study's findings are based on a convenient, albeit large, sample and cannot be generalized to the whole population due to the cross-sectional design. Second, the self-reported levels of knowledge might not accurately evaluate the actual level of knowledge among individuals. Thus, future research can implement additional methods to triangulate assessment tools to obtain reliable and valid knowledge levels. Finally, since the study was conducted before the spread of the COVID-19 in Saudi Arabia, it was not feasible to compare our results to other local studies.

Conclusion:

Despite the mentioned limitations, the study offers valuable information about the level of awareness about COVID-19 among the Saudi population before the outbreak begins in the country. The results can be used as a reference for future research. Additionally, the identified mis-

conception and misinformation can inform future intervention plans and help tailor the proper message for the public to ensure accurate information is disseminated.

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Original Article :

Stress, Anxiety, And Depression Among University Students In Saudi Arabia During Covid 19 Pandemic: A Cross-Sectional Study

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Abstract

Background and Aims:

Since early stages of COVID-19 breakout, the Kingdom of Saudi Arabia has taken preventive measures and initiated legislations to control the transmission of COVID-19 and maintain welling of healthcare system. This study was designed to assess the stress, anxiety and depression during COVID-19 pandemic among universities' students in Saudi Arabia.

Methods:

This is a cross-sectional, involved online based distributed a self-demonstrated validated questionnaire, which was adopted and validated mainly for the purpose of this study. Sample size was calculated utilising Epi Info statistical program.

Results:

384 university students were included in this study, of these (27.71%) have experienced stress, anxiety was observed in (18.78%) of students and 21.85%

الملخص

الخلفية والاهداف:

اتخذت المملكة العربية السعودية عدداً من الإجراءات الوقائية، بالإضافة لسن عدد من التشريعات والقوانين للحد من انتشار كوفيد-١٩ أثناء التزام السكان بهذه الاجراءات لثلاثة أشهر متتالية. تهدف الدراسة الى تقييم الجانب النفسي التوتر والقلق والاكتئاب اثناء انتشار كوفيد-١٩ بين طلاب الجامعات بالمملكة العربية السعودية.

طريقة البحث:

هذه دراسة مقطعية نفذت باستخدام استبيان تم تصميمه لذات الغرض وتم نشره باستخدام وسائل التواصل الاجتماعي وتضمنت ٣٨٤ طالب وطالبة من طلاب وطالبات الجامعات السعودية، تم تحديد حجم العينة بواسطة برنامج ابي انفو الإحصائي وتم جمع البيانات باستخدام استبانة مصممة ومختبرة لذات الغرض، كما تضمنت الدراسة إجراء التحليل الإحصائي وعرض النتائج في شكل جداول ورسومات بيانية.

النتائج:

أظهرت الدراسة التي أجريت على ٣٨٤ طالب وطالبة من جامعات المملكة العربية السعودية، أن ٢٧,٧١٪ من طلاب

have experienced depression during the COVID-19 outbreak. Significantly, students with aged between 18 and 22 years old, and health sciences student were more likely to develop anxious and stress comparing to other students, respectively.

Conclusion:

The university students experienced some types of stress, anxiety and depression during the COVID-19 pandemic. Therefore, Further actions need to be taken to determine the association the psychological problems of this part of the community during and after pandemic.

Keywords:

COVID-19, Pandemic, psychological impact, students, Saudi Universities

الجامعات لديهم توتر، ١٨,٧٨٪ لديهم قلق، و٢١,٨٥٪ لديهم اكتئاب خلال فترة جائحة كوفيد-١٩. الطلاب الذين تتراوح أعمارهم بين ١٨-٢٢ سنة وأيضاً الطلاب العزاب كانوا أكثر قلقاً بينما طلاب المجالات الطبية كانوا الأكثر توتراً.

الخلاصة:

خلصت نتائج الدراسة طلبة الجامعات السعودية يظهر عليهم بعض انواع التوتر والقلق والاكتئاب أثناء جائحة كوفيد-١٩، وتبين للباحثين ضرورة عمل دراسات اضافية لتحديد علاقة هذة المشاكل النفسية ومسبباتها اثناء وبعد الجائحة.

Introduction:

In December 2019, the World Health Organization (WHO) announced that a new coronavirus was identified in China at Wuhan, and known as a novel coronavirus which caused a new type of respiratory infection or severe acute respiratory syndrome SARS-2 [1, 2]. The emerged infection was then named as Coronavirus Disease 2019 (COVID-19) [3], which causes severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [4]. The WHO defined COVID-19 as a worldwide pandemic due to worldwide spread [5]. Then, Kingdom of Saudi Arabia has taken specific regulations and legislations including cities lockdown to control and prevent the transmission of COVID-19. The adherence of the public to home stay supposed to affect their psychological wellbeing [6].

The COVID-19 is not merely affecting physical dimensions but also poses psychological dimension of health [7]. There are many psychological effects have been reported during the pandemic 8. During the beginning period of the COVID-19 outbreak, more than half of the respondents had moderate-to-severe psychological impact, and about one-third had moderate-to-severe anxiety level [9]. Evidences from literature indicate that the COVID-19 outbreak has related to several psychological issues, such as panic disorders, and other neurotic disorders [10]. COVID-19 psychological effects include anxiety, depression, loneliness, stress, fear and, excitement, or a combination of them [11].

During the pandemic of COVID-19, the Ministry of Health in Saudi Arabia stated legislations to mitigate the spread of infection. The regulations include quarantine and curfew [12]. Those who were affected, described it as an unpleasant experience, which leads to separation, isolation and sense of uncertainty [13]. People of all ages are susceptible to the ill effects of social isolation like depression, anxiety, heart diseases [13]. Therefore, this study aimed to assess stress, anxiety and depression during COVID-19 pandemic among universities' students in Saudi Arabia.

Methods:

Study Design: This is a cross-sectional online survey conducted during the period of April to June 2020 upon the period of curfew and lockdown of the Kingdom cities as a preventive measure to control COVID-19 aimed to assess the psychological impact of home stay and cities lockdown during COVID 19 pandemic among universities' students in Saudi Arabia.

Subjects & recruitment: All university students in Saudi Arabia were invited via distributing online questionnaire link, through social media (Facebook, WhatsApp groups and text messages) to participate in the study assessing the psychological impact due to the pandemic. The non-probability sampling technique as convenience sampling.

Sample size: The researchers used EPI IFO STATISTICAL program[14] to calculate sample size, using total number of students at Saudi universities, the confidence interval of 95% with marginal error of 5% and the calculated sample size was 384.

Data Collection tools: The developed online questionnaire consists two parts, which involving 33 items (part1: 12 as demographic information and part 2: 21 for the scale of psychological impact). The first part consists of demographic characteristics of students, including sex, age, university, marital status, educational level, and other COVID-19 questions. The second part consists of twenty-one items evaluated psychological impact of COVID- 19 on university students were assessed by English version of Depression, Anxiety and Stress Scale- 21 items (DASS-21)[15]. The questionnaire was tested among 20 students to ensure its accurate validity and consistency and to ensure that the questions are reliable. The used scale consists of 21 items including three main parts for stress, anxiety and depression.

Data Analysis: Data processing and analysis were carried out using the Statistical Package for the Social Sciences software (version 20.0). The chi-square test and Fisher's exact test were used for the comparison, as appropriate. Outcomes were

presented in tables and figures. A p-value of 0.05 was considered statistically significant for all statistical tests.

Ethical approval:

The permission was obtained by email from the ethical committee of Al Ghad International Colleges, Jeddah Branch, Saudi Arabia (copy of the ethical approval can be provided upon request). Written informed consent was waived, as there was no potential harm intended to the participants.

Results:

Of 384 university students participated in this study; female consists (59.6%) and male (40.4%), further information on demographics information included in Table I. The ages of students ranged between 18 and 22 years old (50.5 %). In addition, the students studied bachelor's degree consist 97.7 % of the whole participants, whilst 2.4 % enrolled in postgraduate degrees.

The results showed that 27.71% of students have experienced stress, 18.78% have anxiety and 21.85% of them have depression, while 31.66% did not show any psychological symptoms. It also reveals that majority of the students (9.1 %) exposed directly for close contacts with COVID-19 infected person, 22.1% of students have not exposed to confirmed cases indirectly. 14.1% did not expose to fomites of suspected COVID-19.

Figure (1) shows the severity for stress,

Table 1: Demographic characteristics of the participants (n = 384)

Variable		Sample (n = 384)	Percentage (%)
Gender	Male	155	40.4
	Female	229	59.6
Age	18 – 22 years	194	50.5
	23 – 27 years	120	31.3
	More than 28 years	70	18.2
Educational status	Bachelors student	375	97.7
	Masters student	3	0.8
	doctorate student	6	1.6
Educational field	Medical field	293	76.3
	Human Sciences	10	2.6
	Administration sciences	26	6.8
	Arts	0	0.0
	Others	55	14.3
Employment status	employed	91	23.7
	unemployed	293	76.3
Marital status	single	300	78.1
	Married	72	18.8
	Divorced	12	3.1
	Widowed	0	0.0

Variable		Sample (n = 384)	Percentage (%)
Household size	One person	13	3.4
	Two persons	17	4.4
	Three to five persons	160	41.7
	More than sex person	194	50.5
Do you smoke?	Yes	285	74.2
	No	99	25.8
Do you have any chronic diseases?	No	335	87.2
	Asthma	19	4.9
	Cancer	0	0.0
	Cardiac diseases	0	0.0
	Diabetes	1	0.3
	Hepatitis	0	0.0
	Hypertension	10	2.6
	Peptic ulcer	6	1.6
	Crohn disease	0	0.0
	Rheumatoid arthritis	0	0.0
	Others	13	3.4

anxiety, and depression. The stress levels distributed from the normal level (66.1%) to extremely severe (1.8%). The anxiety (55.2%) of study subjects represented normal level of anxiety, while (10.4%) have extremely. It shows that more than half (59.9%) have no depression while (4%) have extremely severe depression.

Figure 1: The level of severity for depression, stress and anxiety among university students

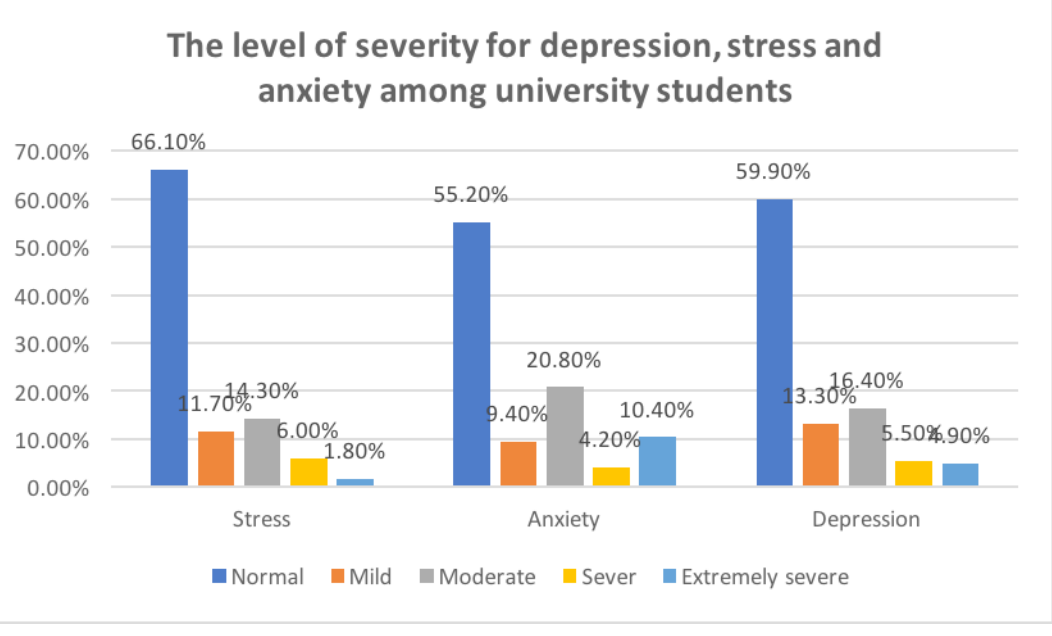

Table (2) shows the comparison between demographic variables and the level of stress, which shows no statistical significance difference between the demographic variables and stress levels, p value is more than 0.05.

Table 2: Comparison of demographic variables, and the level of stress on university students

Variable		Sample (n = 384)		normal		mild		moderate		sever		Extremely sever		p
		F	%	F	%	F	%	F	%	F	%	F	%	
Gender	Male	155	40.36	107	27.86	20	5.21	20	5.21	6	1.56	2	0.52	0.500
	Female	229	59.64	147	38.28	25	6.51	35	9.11	17	4.43	5	1.30	
Age	18 – 22 Years	194	50.52	123	32.03	22	5.73	31	8.07	15	3.91	3	0.78	0.467
	23 – 27 Years	120	31.25	83	21.61	16	4.17	13	3.39	4	1.04	4	1.04	
	More Than 28 Years	70	18.23	48	12.50	7	1.82	11	2.86	4	1.04	0	0.00	
Educational status	Bachelors Student	375	97.66	246	64.06	44	11.46	55	14.32	23	5.99	7	1.82	0.913
	Masters Student	3	0.78	3	0.78	0	0.00	0	0.00	0	0.00	0	0.00	
	Doctorate Student	6	1.56	5	1.30	1	0.26	0	0.00	0	0.00	0	0.00	
Educational field	Medical Field	293	76.30	199	51.82	25	6.51	45	11.72	18	4.69	6	1.56	0.013
	Human Sciences	10	2.60	4	1.04	2	0.52	1	0.26	3	0.78	0	0.00	
	Administration Sciences	26	6.77	17	4.43	6	1.56	2	0.52	1	0.26	0	0.00	
	Others	55	14.32	34	8.85	12	3.13	7	1.82	1	0.26	1	0.26	
Employment status	Employed	91	23.70	58	15.10	14	3.65	12	3.13	5	1.30	2	0.52	0.787
	Unemployed	293	76.30	196	51.04	31	8.07	43	11.20	18	4.69	5	1.30	
Marital status	Single	300	78.13	195	50.78	37	9.64	43	11.20	20	5.21	5	1.30	0.946
	Married	72	18.75	50	13.02	7	1.82	10	2.60	3	0.78	2	0.52	
	Divorced	12	3.13	9	2.34	1	0.26	2	0.52	0	0.00	0	0.00	

Table (3) presents the association between demographic variables and the level of anxiety. There was statistically significant difference between age and anxiety where age group between 18-22 years are significantly anxious, (p = 0.001), there is also statistically significant difference between marital status & anxiety level, where singles are most affected, (p = 0.001).

Table 3: Comparison of demographic variables, and the level of anxiety on university students

Variable		Sample (n = 384)		normal		mild		moderate		sever		Extremely sever		p
		F	%	F	%	F	%	F	%	F	%	F	%	
Gender	Male	155	40.36	94	24.48	10	2.60	26	6.77	7	1.82	18	4.69	0.181
	Female	229	59.64	118	30.73	26	6.77	54	14.06	9	2.34	22	5.73	
Age	18 – 22 Years	194	50.52	108	28.13	9	2.34	42	10.94	9	2.34	26	6.77	0.001
	23 – 27 Years	120	31.25	67	17.45	10	2.60	26	6.77	7	1.82	10	2.60	
	More Than 28 Years	70	18.23	37	9.64	17	4.43	12	3.13	0	0.00	4	1.04	

Variable		Sample (n = 384)		normal		mild		moderate		sever		Extremely sever		p
		F	%	F	%	F	%	F	%	F	%	F	%	
Educational status	Bachelors Student	375	97.66	205	53.39	35	9.11	79	20.57	16	4.17	40	10.42	0.7163
	Masters Student	3	0.78	2	0.52	1	0.26	0	0.00	0	0.00	0	0.00	
	Doctorate Student	6	1.56	5	1.30	0	0.00	1	0.26	0	0.00	0	0.00	
Educational field	Medical Field	293	76.30	162	42.19	23	5.99	60	15.63	13	3.39	35	9.11	0.352
	Human Sciences	10	2.60	4	1.04	1	0.26	2	0.52	1	0.26	2	0.52	
	Administration Sciences	26	6.77	17	4.43	2	0.52	5	1.30	1	0.26	1	0.26	
	Others	55	14.32	29	7.55	10	2.60	13	3.39	1	0.26	2	0.52	
Employment status	Employed	91	23.70	48	12.50	12	3.13	20	5.21	3	0.78	8	2.08	0.631
	Unemployed	293	76.30	164	42.71	24	6.25	60	15.63	13	3.39	32	8.33	
Marital status	Single	300	78.13	163	42.45	19	4.95	68	17.71	14	3.65	36	9.38	0.001
	Married	72	18.75	44	11.46	13	3.39	11	2.86	0	0.00	4	1.04	
	Divorced	12	3.13	5	1.30	4	1.04	1	0.26	2	0.52	0	0.00	

Table (4) reflects the relationships between demographic variables and the level of depression. There was only statistically significant difference between marital status and depression level, ($p = 0.001$).

Table 4: Comparison of demographic variables, and the level of Depression on university students

				Depression										
Variable		Sample (n = 384)		normal		mild		moderate		sever		Extremely sever		p
		F	%	F	%	F	%	F	%	F	%	F	%	
Gender	Male	155	40.36	97	25.26	15	3.91	25	6.51	12	3.13	6	1.56	0.204
	Female	229	59.64	133	34.64	36	9.38	38	9.90	9	2.34	13	3.39	
Age	18 – 22 Years	194	50.52	107	27.86	25	6.51	38	9.90	13	3.39	11	2.86	0.088
	23 – 27 Years	120	31.25	71	18.49	20	5.21	15	3.91	6	1.56	8	2.08	
	More Than 28 Years	70	18.23	52	13.54	6	1.56	10	2.60	2	0.52	0	0.00	
Educational status	Bachelors Student	375	97.66	222	57.81	50	13.02	63	16.41	21	5.47	19	4.95	0.828
	Masters Student	3	0.78	3	0.78	0	0.00	0	0.00	0	0.00	0	0.00	
	Doctorate Student	6	1.56	5	1.30	1	0.26	0	0.00	0	0.00	0	0.00	
Educational field	Medical Field	293	76.30	174	45.31	43	11.20	46	11.98	15	3.91	15	3.91	0.297
	Human Sciences	10	2.60	5	1.30	1	0.26	2	0.52	0	0.00	2	0.52	
	Administration Sciences	26	6.77	16	4.17	0	0.00	6	1.56	2	0.52	2	0.52	
	Others	55	14.32	35	9.11	7	1.82	9	2.34	4	1.04	0	0.00	
Employment status	Employed	91	23.70	64	16.67	10	2.60	9	2.34	5	1.30	3	0.78	0.631
	Unemployed	293	76.30	166	43.23	41	10.68	54	14.06	16	4.17	16	4.17	

				Depression										
Variable		Sample (n = 384)		normal		mild		moderate		sever		Extremely sever		p
		F	%	F	%	F	%	F	%	F	%	F	%	
Marital status	Single	300	78.13	163	42.45	19	4.95	68	17.71	14	3.65	36	9.38	0.001
	Married	72	18.75	44	11.46	13	3.39	11	2.86	0	0.00	4	1.04	
	Divorced	12	3.13	5	1.30	4	1.04	1	0.26	2	0.52	0	0.00	

Discussion:

The psychological impact of COVID-19 pandemic is huge which has negatively affected all countries including Saudi Arabia, and there have been several cases of anxiety and depression. The long-term and short-term psychological effects are reported during pandemics [16, 17].

The study showed that (27.71%) of university students have experienced stress, 18.78% have experienced anxiety and (21.85%) have experienced depression due to COVID-19 outbreak. This psychological effects related to COVID-19 might have been linked to the emergence of new virus and its consequences which may delay their studies and graduation [17]. These findings are similar to other studies where most of published articles reported undesirable psychological effects due to cities lockdown and curfew, afraid of infection, inadequate protected supplies, lack of knowledge, and loss of jobs or finances[18]. The evidences advise that the restricted people significantly reported high levels of anxiety, anger, confusion, and stress [18,19]. Furthermore, it was reported that the prolonged afraid may cause stress which consequently elevate the blood pressure, increase risks for diabetes and worsen high cholesterol levels [20]. Then, this was also reported for other infectious diseases quarantine, since the effect may be extended to be tremendous impact on people mental and psychological wellbeing [21]. In a review of the evidences on the psychological effect of pandemics and quarantine reported that the psychological effect could be long-lasting and short-lasting [18]. The application of unplanned strict quarantine measures in China has kept people in homes and affected their lives, which triggers many psychological problems, such as panic disorder, anxiety and depression[10]. In one study by Bhat et al 2020 shows that majority of the participants (67.5%) believe continuous lockdown could affect the mental health of the people [20]. Hawryluck et al. studied 129 quarantined people during SARS-CoV-1 epidemic in 2003 who found that high prevalence of psychological distress [22].

The students in the age group between 18-22 years and those who are singles were

significantly anxious and medical colleges students were the most affected group by stress, in a study by Zhou et al, 2020 in China, showed that females are the mostly affected by anxiety and depression [19]. Fortunately, the Saudi government has provided psychological health consultation and services through various channels, day and night including hotlines and outpatients [19]. This study suggested to consider the psychological impact on the university students and its associated factors. Similar to finding from this study, it was reported that certain groups are more vulnerable to psychological problems; including younger people, and those with low educational levels [23]. Another study in China by Cao et al 2020 reported that (24.9%) of college students have reported anxiety due to COVID-19 epidemic. However, having an infected relative with COVID-19 was not correlated to experiencing anxiety. The COVID-19-anxiety triggers among Chinese college students include economic factors, change in daily-life, and academic delays. The psychological health of the students is significantly influenced when confronted with community health crises[24]. The findings of our study indicate that the psychological health of young people is very important all times, not only during pandemics of spread of diseases. Attention should be focused on the behaviour changes or initiation of depressive or anxiety symptoms among university students. Genetic and external environmental factors are believed to be involved in the start of depression [19]. Because, many students had anxiety and depression, some did not agree to participate in the current study through online survey. In a local survey in China assessing the psychological effects during COVID-19 epidemic, showed that (35%) of the people experienced psychological problems [10].

For the purpose of this study, researchers were aimed to recruit as much as possible students from different Saudi universities, but, due to limited access through social media, the authors were not able to distribute the online questionnaire to all universities' students in Saudi Arabia, in addition, risk of refuse to participate in this study seems to be high not all students have access to respond to the online questionnaire. Another limitation is the critical time for data collection during curfew and quarantine. Future study must cover larger sample and involves young adults not registered at university. The authors were not able to used randomized sampling, so they used convenience sampling method to include the completed responses received during the period of data collection.

Conclusion

In conclusion, there is an evidence of psychological problems among universities' students in Saudi Arabia during COVID-19 pandemic including stress anxiety and depression. Furthermore, students of age between 18-22 years and those singles were found to be significantly at high risk for developing anxiety, whilst stress was significantly higher among medical field students.

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Original Article :

Assessment Of Clinical Stress Among The Undergraduate Nursing Students Of Taibah University In Geriatric Nursing Course

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Abstract

Background and aims:

Stress is a key factor that impacts the quality of nursing in various medical settings. The set of factors that can cause stress in students enrolled in the different academic disciplines is significantly different from the stressors identified to cause stress in nursing students globally.

Methods:

Nursing students in Geriatric nursing course (140 students) in Taibah University, Kingdom of Saudi Arabia were enrolled. The Student Nurse Stressor-15 Scale (SNS-15) was used to assess the levels of stress experienced by students on older adult clinical placements.

Results:

The study revealed that the perceived stress among

الملخص

الخلفية والأهداف:

الإجهاد هو عامل رئيسي يؤثر على جودة التمريض في مختلف الأوساط الطبية. تختلف مجموعة العوامل التي يمكن أن تسبب الإجهاد لدى الطلاب المسجلين في التخصصات الأكاديمية المختلفة اختلافًا كبيرًا عن الضغوطات التي تم تحديدها للتسبب في إجهاد طلاب التمريض على مستوى العالم.

طريقة البحث:

شارك ١٤٠ طالب وطالبة تمريض في مقرر تمريض رعاية المسنين بكلية التمريض بجامعة طيبة، المملكة العربية السعودية. تم استخدام مقياس ضغوطات طالب التمريض Stressor-١٥ (SNS-١٥) لتقييم مستويات الإجهاد التي يعاني منها الطلاب عند القيام بالتمريض السريري لكبار السن.

النتائج:

كشفت الدراسة أن الإجهاد المتصور بين طلاب التمريض بسبب العبء الاكاديمي للمقرر (٣,٢١ ± ١,٢٩٪) ≅، عبء العمل في موقع التدريب (٣,٢١ ± ١,٢٦٪)، < أيام غياب التدريب

the nursing students patterns due to academic workload (3.21 ± 1.29%), placement workload (3.21 ± 1.26%), < missing on placement days (3.41 ± 1.39%), < staffing level (3.42 ± 1.18%), < clinical skills (3.51 ± 1.24%), < number of workdays per week (3.56 ± 1.37%) and < treatment by staff (3.66 ± 1.17). Surprisingly, a significant number of students (20%) was found to be stressed out due to canteen facility (3.06 ±1.36%) which is the highest level of stress observed categorically.

Conclusion:

Based on obtained results, it can be concluded as age of students goes beyond 30, the level stress of placement increases significantly. the level of stress experienced in nursing students cannot be assigned to their gender.

Key words:

Stress-levels, older-age, nurse student, placement, academic-stress

للمقرر (٣,٤١ ± ١,٣٩٪) < ، مستويات طاقم التمريض (٣,٤٢ ± ١,١٨٪)، < المهارات السريرية (٣,٥١ ± ١,٢٤٪)، < عدد أيام العمل في الأسبوع (٣,٥٦ ± ١,٣٧٪) < و معاملة الموظفين (٣,٦٦ ± ١,١٧). ومن المدهش أن عدداً كبيراً من الطلاب (٢٠ في المائة) كان السبب في توترهم بسبب مرفق المقصف (٣,٠٦ ±١,٣٦٪) وهو أعلى مستوى من الإجهاد لوحظ بشكل كبير.

الخلاصة:

بناءً على النتائج التي تم الحصول عليها، يمكن استنتاج أنه مع تجاوز عمر الطلاب ٣٠ عامًا، يزداد مستوى الإجهاد في موقع التدريب بشكل كبير. لا يمكن تحديد مستوى الإجهاد الذي يعاني منه طلاب التمريض حسب جنسهم.

الكلمات المفتاحية:

مستويات الإجهاد، كبار السن، طلاب التمريض، موقع التدريب، الإجهاد الأكاديمي

Introduction

Resilience, stress, and psychological well-being in nursing students are generally taken as critical quality indicators of a vibrant clinical setting [1]. Practically, stress can be summarized as a set of compromised behaviours, including learning, attitudes, caring and responding skills, required to be established between a nurse and patient [2]. Thus, the term 'stress' is lack of consensus over its exact meaning and definition. According to Selye, within scientific landscape, stress is a kind of body's response to threats that stimulates the body for a 'fight-or-flight' while responding the encountered threats [3]. Consequently, stressed individuals experience a set of reactions that transformed in either physiological or psychological, or sometimes both. Regrettably, the nursing students and trainee experience a high level of stress as compared to the students of other disciplines [4]. Therefore, it must be endorsed that nursing educators supposed to be aware with the trends of stress pervasiveness among naïve nursing undergraduates and about the negative impacts develop in their future careers as nursing professionals.

Among various healthcare disciplines, nursing students have been reported to be

stressful, globally due to their professional ethics, duties to learn, and provide adequate care to acutely ill patients [5, 6, 7]. Under often challenging situations such as shortage of staff and resource and a parallel fear of making mistakes [8, 9]. The stress experienced at work is generally termed as 'occupational stress' [10], that can lead a myriad of negative impacts on physical and psychological well-being ultimately resulting in extremely poor learning process for students [3, 11]. Besides these, upon qualification the occupational stress can also affect the fitness to work efficiently including necessary communication and work effort, which ultimately reduced the promising health-care environment [12]. Moreover, due to continuous duties with overloaded work pressure, the working nursing staff tend develop severe health problems (physical and metal) and even die [7].

In general, to a large extent, the quality indicators in nursing profession depend on patient and nurse ratios. The increasing size of older aged population for a country can be a challenge to manage its health and nursing liabilities. Strictly, the discharge of liabilities from the concerned health staff affected negatively as the number of patients per nurse increased. In this context, The United Nations (UN), 2015, reflected the fact that a significantly large size of world's population would turn beyond 65 years and continue to grow further next decades.

This increased older population has critical implications for the nursing profession, which already faces a chronic shortage of nurses in older adult nursing. Nevertheless, it can be argued that the augmentation of skilled and competent nursing human resource is the hallmark of high-quality health care while dealing with complexed health issues associated with of huge older population of locality (Institute of Medicine, 2008). Furthermore, older patients with complexed health issues are expect with delayed recovery rate and hence deserve intensive care units enriched with skilled nursing staff. Thus, the implications of population ageing can be a direct pressure in a health system (Nursing Homes Ireland, 2015). This has resulted in demoralization of coming nursing graduates to pursue aged adult nursing as their career choice during graduation.

Even Though it is under investigation that how to underscore a precise set of stress developing sources in the health caring staff who nurse the older adults regardless severity of patient illness. In this context, a little amount of literature is available, globally. The problem turns further serious when it comes to address via an Arabic instrument that can assess the level of stress among Arabic speaking populations.

To our best knowledge, there is no existing Arabic instrument that can specifically assesses stress amongst these populations. Therefore, the researcher has conceived the novel idea to investigate stress experiences of student nurses dedicated specifically to care of the older adults, so that a set of approaches can be designed to attract the young practitioners in nursing profession. To date, a plethora of studies have demonstrated the level perceived stress in diverse nursing students and the patterns of lowering their professional fitness while dealing with a wide range of age group patients. However, the researchers found that there is a room to specify the stress level in nursing students that deal with specifically older aged patients. Therefore, the purpose of the present study was to determine the level of stress perceived by student nurses during their older adult clinical placements and to determine whether stress is based on age or gender.

Methods

Design of study

The current study was carried based on a cross-sectional descriptive research design which involved 140 nursing students enrolled in Geriatric nursing course in TU, KSA.

Setting

The study was conducted at the college of nursing in Taibah University. It is the Government University in Al-Madinah, Saudi Arabia. Data were collected from both male and female section.

Participants

A non-probable, convenience sampling technique was used in this study to make a pool of total 140 samples including 60 males and 80 females undergraduate nursing students enrolled in Geriatric Nursing course in their second semester of the nursing program. Indeed, the college offers the two programs, regular and bridging. A total of 175 students of both of programs were included in this study. Out of 175, total 140 nursing students responded the questionnaire which indicated 80% response rate in the study.

Instrument

The Student Nurse Stressor-15 Scale (SNS-15) allowed by the original author was employed as instrument to assess the levels of stress experienced by students on older adult clinical placements [13]. In brief, the SNS-15 was based on a series of 15 psycho- and physiologically relevant questions and their replies reflected the intensity of stress in nursing students for older adult nursing. The response of a participant nursing student was assigned one of the numerical from a five-point Likert-type scale (psychometric scale), demonstrated as 1, 2, 3, 4 and 5 to indicate

the intensity of stress as highly stressed, stressed, neutral, moderately stressed, and not stressed, respectively. The factor that gained the highest score indicates habitual way in which the person deals with stress.

Data collection

Approval of ethics committee to carry out the study was obtained from the authority of College of Nursing, TU, KSA approval number (TUCN-REC)-2019-3.

The study instrument in hard copy format was distributed among the participating students during the class time. The distributed hard study instruments contained all the aims and their necessary explanations covered by this study. An informed consent demonstrating their volunteered participation in intended study was obtained from each student. There was no provision to collect their identities such as names and affiliations etc. to protect their personnel interests. The confidentiality of participant's response was maintained according to internal policies and research ethics of the institute. The questionnaires were stored in a secure file cabinet that was only accessible by authorized researchers.

Data analysis

The data were analyzed, by one-way analysis of variance (ANOVA) with t test. Cross-sectional descriptive statistical analysis was used to describe the research sample and the items of the questionnaires.

Results

The data in Table 1 demonstrate comparison of participants response to stressors based on gender, no significant difference in stress level among the students enrolled in Geriatric nursing course in TU, KSA during their older adult clinical placements. Furthermore, significant difference between averaged scores of nursing students of both genders was found well beyond vis-à-vis the variables taken for this study. At the same time, the p values obtained from all the factors of the study were found to be greater than 0.05, except the facility (p= 0.002). Thus, it is well obvious, the significance level for the null hypothesis was considered as 5%.

Table 1: Comparison of participants response to stressors based on gender.

Question No	Factors	Gender	Mean	Std. Deviation	t value	p value
Q1	Preceptor relationships	Female	3.75	1.196	-1.487	.140
		Male	4.08	1.394		
Q2	Treatment by staff	Female	3.60	1.026	-.565	.573
		Male	3.72	1.329		
Q3	Clinical skills	Female	3.54	1.067	.246	.806
		Male	3.48	1.432		

Question No	Factors	Gender	Mean	Std. Deviation	t value	p value
Q4	Medications	Female	3.40	1.143	-.156	.877
		Male	3.43	1.332		
Q5	Being prepared	Female	3.40	1.289	.074	.941
		Male	3.38	1.354		
Q6	Placement workload	Female	3.24	1.150	.248	.805
		Male	3.18	1.372		
Q7	Academic workload	Female	3.11	1.232	-.915	.362
		Male	3.32	1.359		
Q8	Resources e.g., equipment	Female	3.01	1.131	-1.173	.243
		Male	3.27	1.364		
Q9	Staffing levels	Female	3.33	1.003	-.920	.360
		Male	3.52	1.359		
Q10	Coordinator relationships	Female	3.76	1.139	.211	.834
		Male	3.72	1.367		
Q11	Patient/client relationships	Female	3.85	1.104	1.637	.104
		Male	3.52	1.255		
Q12	Number of work days per week	Female	3.50	1.293	-.493	.623
		Male	3.62	1.451		
Q13	Facilities e.g., canteen	Female	2.70	1.326	-3.129	.002
		Male	3.43	1.407		
Q14	Missing days on placement	Female	3.20	1.444	-1.822	.071
		Male	3.63	1.353		
Q15	Length of journey to placement	Female	3.44	1.210	-.054	.957
		Male	3.45	1.455		

N = 140. Missing data included 35 participants who did not finish the questionnaires completely.

There is no significant difference among age groups on stress level of students enrolled in Geriatric nursing course in Taibah University during their older adult clinical placements.

Statistical analysis by ANOVA was performed to estimate the distribution of age using F test, the two age groups: 25 years old (58.6%), and above 25 years (41.4%) were considered to carry out the present study Fig 1. The statistical analysis of the data in Table 2 demonstrates very aptly that average scores along with standard deviation (±SD) were found out of the acceptance limit of the acceptance. Besides these, based on the average scores and SDs, the F and p values were computed as shown in Table 2.

Figure 1:

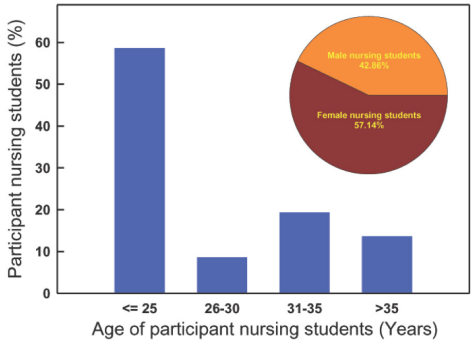

Table 2: comparison of stressors between and within groups

Question No	Stressors	Groups	Sum of Squares	SD	Mean Square	F value	Significance
Q1	Preceptor relationships	Between Groups	7.648	3	2.549	1.550	.205
		Within Group	223.745	136	1.645	-	-
		Total	231.393	139	-	-	-
Q2	Treatment by staff	Between Groups	11.573	3	3.858	2.976	.034
		Within Group	176.277	136	1.296		
		Total	187.850	139	-	-	-
Q3	Clinical skills	Between Groups	11.635	3	3.878	2.746	.052
		Within Group	199.336	136	1.466	-	-
		Total	210.971	139	-	-	-
Q4	Medications	Between Groups	4.185	3	1.395	.931	.428
		Within Group	203.787	136	1.498	-	-
		Total	207.971	139	-	-	-
Q5	Being pre-pared	Between Groups	6.934	3	2.311	1.352	.260
		Within Group	232.458	136	1.709	-	-
		Total	239.393	139	-	-	-
Q6	Placement workload	Between Groups	3.216	3	1.072	.687	.562
		Within Group	212.355	136	1.561	-	-
		Total	215.571	139	-	-	-
Q7	Academic workload	Between Groups	2.227	3	.742	.443	.723
		Within Group	228.173	136	1.678	-	-
		Total	230.400	139	-	-	-
Q8	Resources e.g., equip-ment	Between Groups	3.672	3	1.224	.796	.498
		Within Group	209.263	136	1.539	-	-
		Total	212.936	139	-	-	-
Q9	Staffing levels	Between Groups	12.319	3	4.106	3.147	.027
		Within Group	177.473	136	1.305	-	-
		Total	189.793	139	-	-	-
Q10	Clinical Placement Coordinator relationships	Between Groups	5.884	3	1.961	1.289	.281
		Within Group	206.859	136	1.521	-	-
		Total	212.743	139	-	-	-
Q11	. Patient/client relationships	Between Groups	.043	3	.014	.010	.999
		Within Group	192.950	136	1.419	-	-
		Total	192.993	139	-	-	-
Q12	Number of work days per week	Between Groups	5.140	3	1.713	.926	.430
		Within Group	251.510	136	1.849	-	-
		Total	256.650	139	-	-	-
Q13	Facilities e.g., canteen	Between Groups	8.325	3	2.775	1.421	.239
		Within Group	265.647	136	1.953	-	-
		Total	273.971	139	-	-	--

Question No	Stressors	Groups	Sum of Squares	SD	Mean Square	F value	Significance
Q14	Missing days on placement	Between Groups	35.240	3	11.747	6.549	.000
		Within Group	243.932	136	1.794	-	-
		Total	279.171	139	-	-	-
Q15	Length of journey to placement	Between Groups	.808	3	.269	.153	.928
		Within Group	239.734	136	1.763	-	-
		Total	240.543	139	-	-	-

Nevertheless, it can be concluded that there is significant difference between stress level with respect to treatment by staff (0.034), staffing levels (0.027) and missing days on placements ($p < 0.000$). Besides these, based on factor-wise analysis, it can be argued that nursing students < 35 years suffer with problems with treatment provided to the patients by staff and at staffing level, whereas the students between age group 31-35 were found to face difficulty when they miss the placement days. Beyond these, the 5% significance level was accepted for all the remaining factors.

The level of stress was determined by employing frequency distribution technique. Our results suggested that the preceptor's relationship did not cause any type of stress as 51% of the students agreed with the statement. The study reflected that the perceived stress among the nursing students patterns due to academic workload (3.21 ± 1.29%), ≅ placement workload (3.21 ± 1.26%), < missing on placement days (3.41 ± 1.39%), < staffing level (3.42 ± 1.18%), < clinical skills (3.51 ± 1.24%), < number of work days per week (3.56 ± 1.37%) and < treatment by staff (3.66 ± 1.17). Surprisingly, a significant number of students (20%) was found to be stressed out due to absence of canteen facility (3.06 ±1.36%) which is the highest level of stress observed categorically.

Besides, the obtained results were further analyzed to find whether the factors were co-related with each other. In correlation analyses, it was found that clinical skills and medications showed high correlation (0.717), whereas treatment by staff corelates with (I) staffing level (0.688), (ii) clinical skills (0.664), and (iii) clinical placement coordinator relationships (0.612). All the factors show either high (0.5 or above) or low (< 0.5 - >0.3) except facilities i.e., canteen. Canteen facility is only co related to resources (0.558) whereas with rest its co relation is less than 0.2.

Discussion

Precisely, overall observations of this systematic study suggested that the occupational stress does not impact all the fac-

ulties of nursing profession equally. The disruptive trends with fluctuating levels of stress were observed in nursing students regardless their age and gender.

The statistical analysis of data indicated that there is no affiliation of gender of Geriatric nursing course students with the levels of stress they experienced while their older adult clinical placements. At the same time, the factor that caused a more frequent stress development among the nursing students was identified as their academic load instead of their nursing course.

[14] has also advocated the coarse work and exam anxiety can be speculated the most prominent source of stress development in nursing students which may resulted in compromised work management [14].

Besides, the second most critical factor of stress origin in nursing students was found to be the clinical skills and staffing levels category. However, the level of stress obtained in both, male and female students did not reflect any obvious difference.

Overall, our findings are consistent with several studies that have put fore a constructive and supporting view to validate our results theoretically [15, 16, 17].

After ruling out the gender-based stress development intensity, we analyzed categorized age groups of nursing students regardless their genders. On the other end, an increase in age of nursing student can appear as the most potential factor in order instigate the stress and career insecurity. Critically, with the age above 31 years, the level of stress of placement begins to develop and increases with age. Although earlier studies suggested that there is a huge scope to manage the instigation of stress by providing the counselling to the students aged over 30 years adequately. For instance, the hesitation which limits a student's discussion with the immediate mentor or teacher in fact plays a crucial role in pushing that student into stress and insecurity [1].

Under such conditions, a healthy and frank dialogue exchanging forum between students and teachers is greatly appreciated. Similarly, [18] have also highlighted that the empathetic behavior can contribute significantly to a strong student-teacher relationship [18].

Thus, it can be articulated that this study proved that only relationship among preceptor's is not the only factor that responsible alone for stress. The discussion from this study will help the management to understand the sources of stress and develop further management strategies to reduce these stressors.

Strengths and limitations of the study

The study was carried out on a significant large sample of male and female nursing

students of a wide range of age (25 to < 35 years) enrolled for older adult nursing course.

This study encompasses a convenience yet strategic sampling and data augmentation procedure from nursing students of both genders belonging to a wide range of age, TU, KSA. The factors considered to explore in this study likely rely on possible practical situation that can cause stress in generalized nursing culture for a wide clinical setting.

Besides, the design of current study is fundamentally cross-sectional that enabled us to evaluate the stress intensity trends across the collected data at a specific point of time.

Thus, it can be argued that the study does warranty with the trends, magnitude and recurrence of stress that may originate over the time. The time span between the situations such as (i) the most stressful experience (ii) and the point of time when data was collected can be speculated to affect the level of stress perceived.

Nevertheless, incorporation of longitudinal design is an appealing demand for future research to handle broad spectrum of factors related to nursing training and education over a wide sample to enhance applicability in general clinical settings.

Conclusion

This is first of its kind studies that has evaluated the level of stress in nursing student dedicated for the older adult clinical placements. The level of stress experienced in nursing students cannot be assigned to their gender. Beyond this, most stress augmenting factor for both male and female students is the academic load. The clinical skills and staffing levels category were the second most reported source of stress. Based on obtained results, it can be concluded as age of students goes beyond 30, the level stress of placement increases significantly.

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Original Article :

Estimation Of Awareness Of Surgical Site Infections And Their Risk Factors Among Physicians In Surgical Departments In The Hail Region, Kingdom Of Saudi Arabia, 2019–2020

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Abstract

Background and Aims:

Surgical site infections (SSIs) are acquired as a result of complications during or after surgery, and they involve the skin and deeper tissues or organs. SSIs are considered a cause of substantial morbidity and mortality worldwide, as they are a frequent and worrisome part of postoperative recovery. SSIs account for 2% of surgical complications, which is more than 20% of health-care-associated infections. This study aimed to assess the levels of knowledge regarding surgical wound infection among physicians in surgical departments in the Hail region of Saudi Arabia.

Method:

This was a hospital-based cross-sectional study including all surgical consultants, specialists, residents, and medical interns affiliated with the Department of Surgery at all major hospitals in the city of Hail. A valid questionnaire was developed to assess the level of knowledge about SSIs among physicians in the city of Hail. The questionnaire was distributed randomly among the included sample. Data were analyzed on a computer using SPSS version 22.

الملخص

الخلفية والأهداف:

التهابات الموقع الجراحي تحصل نتيجة لمضاعفات أثناء الجراحة أو بعدها، تتضمن الجلد والأنسجة العميقة أو الأعضاء. تعتبر التهابات موضع الجراحة سبب» مهم «في أرتفاع معدل الأمراض والوفيات حول العالم. كما أنها جزء متكرر ومقلق من التعافي بعد الجراحة. تشكل التهابات موضع الجراحة ٢٪ من مضاعفات الجراحة، وهو أكثر من ٢٠٪ من الإصابات المرتبطة بالرعاية الصحية. تهدف هذه الدراسة إلى تقييم «الإتجاهات « ومستويات المعرفة وتقنيات تقييم المخاطر فيما يتعلق بعدوى الجرح الجراحي بين الأطباء في أقسام الجراحة في منطقة حائل بالمملكة العربية السعودية.

طريقة البحث:

كانت هذه دراسة مستعرضة في المستشفى تشمل جميع الاستشاريين، الجراحيين، المتخصصين، المقيمين والمتدربين الطبيين التابعين لقسم الجراحة في جميع المستشفيات الرئيسية في مدينة حائل. تم تطوير إستبيان صالح لتقييم مستوى المعرفة حول التهابات موضع الجراحه ومخاطر عدوى الجروح بين الأطباء في مدينة حائل. وزع الإستبيان عشوائياً على عينة الدراسة. تم تحليل البيانات على جهاز كمبيوتر باستخدام SPSS إصدار ٢٢.

النتائج:

تراوحت مستويات المعرفة بين ضعيف و جيد وتشير النتيجة الإجمالية بشكل مدهش إلى أن المشاركين لديهم معرفة "كافية".

Results:

The levels of knowledge ranged between poor and good, and the total score surprisingly indicates that the participants have fair knowledge.

Conclusions:

The overall knowledge about SSIs was fair but insufficient. Therefore, it is recommended that the WHO recommendations be implemented during the preoperative period. The authors emphasize the importance of more training programs for health care professionals. Generally, it is expected to improve knowledge and practices to maintain patient safety after surgeries.

Key words:

awareness, preventive, infections, surgery, surgical site infection.

الخلاصة:

كانت المعرفة العامة حول العدوى في موقع الجراحة عادلة ولكنها غير كافية. لذلك، يوصى بتنفيذ توصيات منظمة الصحة العالمية خلال فترة ما قبل العملية. يؤكد المؤلفون على أهمية المزيد من البرامج التدريبية للعاملين في مجال الرعاية الصحية.

عموما، من المتوقع أن يكون من المفيد تحسين المعرفة والممارسات للحفاظ على سلامة المرضى بعد العمليات الجراحية.

الكلمات المفتاحية:

وعي، وقائي ، عدوى ، جراحة ، عدوى موقع جراحي.

Introduction

According to the Centers for Disease Control and Prevention [1], surgical site infections (SSIs) are acquired by patients during or after surgery and involve the skin; in severe instances, the infection might spread to deeper tissues and organs [2]. SSIs are considered to be a substantial cause of morbidity and mortality worldwide [3]. SSIs are a frequent and worrisome part of postoperative recovery and account for 2% of surgical complications, which is more than 20% of health-care-associated infections (HCAIs) [4].

A study conducted in 2017 argued that SSIs are a preventable complication, as it is estimated that approximately half of SSIs could be prevented by adhering to proper postoperative hygiene, which includes proper sterilization techniques of the operative field [5]. Hand hygiene, use of antibiotics, avoidance of shaving, limiting traffic, controlling crowdedness, employing personal protective equipment (e.g., masks, gowns, hair covers, and gloves), and other strategies reported by multiple studies [3, 6]. Prevention of SSIs is particularly cost-effective as the total number of surgical procedures performed is increasing worldwide [3]. According to a study in 2017, applying preventive measures in a health institute is cost-effective and can reduce bad and devastating outcomes [7].

Accurate measurement can be a challenge in patient safety, but the CDC's National

Healthcare Safety Network has developed standards for SSI measurement, which are also used by the National Surgical Quality Improvement Program (NSQIP) [1].

In 2019, a study conducted in Jeddah city reported that 6.7% of physicians had good knowledge of SSIs, while 30.2% had poor knowledge [8]. Therefore, the present study aimed to estimate the level of awareness of SSIs among physicians in surgical departments in the Hail Region of the Kingdom of Saudi Arabia.

Materials

Study Design and Participants

This hospital-based cross-sectional study was conducted at the Departments of Surgery at Hail General Hospital, King Khalid Hospital, Maternity and Children Hospital, and King Salman Specialist Hospital in Hail city from October 7 to 27, 2019. All surgical consultants, specialists, residents, and medical interns who were doing the internship in surgery departments were invited to participate in the study after gaining a written consent. The participants were divided into four groups:

Group 1: 11 interns.

Group 2: 18 residents.

Group 3: 50 specialists.

Group 4: 18 consultants.

All groups were working at the hospitals at the time of the present study. A questionnaire was distributed to all of the included departments by the departments' coordinators and secretaries.

A 20-item multiple-choice questionnaire was developed by reviewing the previous literature and consulting with a group of certified surgeons. These steps allowed for the identification of the important factors and knowledge that must be followed to reduce SSIs. These also facilitated the development of a valid questionnaire to properly assess the levels of knowledge about SSIs and risks of wound infection among physicians in the city of Hail. The questionnaire was distributed randomly among the included sample.

After recruitment, the participants were asked to specify their position. Then, the questionnaire was distributed among the participants, and they were asked to answer the questions according to their knowledge about SSIs and the risks of wound infections. Then, the level of knowledge was assessed for all participants.

Method

Statistical Analysis

Data were analyzed on a computer using SPSS version 22.

Ethical Approval

The study was approved by the University of Hail College of Medicine Ethical Committee, approval number: HREC 00114/

CM-UOH.04/20.

Results

With respect to the distribution of the participants by age, the group between 31 and 40 years of age had the highest representation (32%), and the group of those 50 years of age and older had the lowest (16.5%). Males had the highest representation (78.4%), and females comprised 21.6% of the sample. Table 1 shows which position (i.e., specialist) had the highest representation (51.5%), with interns comprising only 11.3% of the sample.

Table 1: Characteristics of participants

Variable		Frequency	Percentage
Position	Intern	11	11.3%
	Resident	18	18.6%
	Specialist	50	51.5%
	Consultant	18	18.6%
	Total	97	100%

The respondents were categorized as having good knowledge (> 80% correct answers or a ≥ 77 total score), fair knowledge (50% correct answers or a ≥ 48 total score), or poor knowledge (< 50% correct answers or a < 48 total score). The statistical analysis results using SPSS version 22.0 are demonstrated in Figure 1 and Table 2, which showed that the level of knowledge was between poor and good, and the total score was fair.

Table 3 presents the means and standard deviations (SDs) by job position. A total

Figure 1.

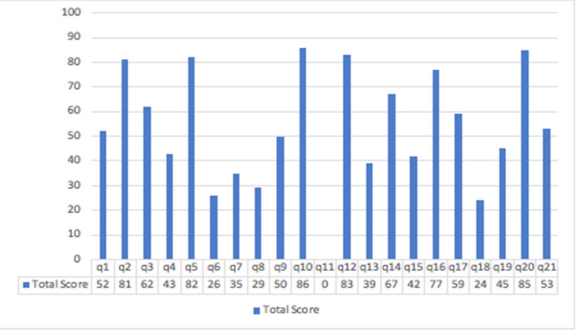

Table 2: Statistical analysis of questionnaire result

Question	Total score	SD	Level of knowledge
The United States Centers for Disease Control and Prevention (CDC) has developed criteria that define SSI as an	52	0.50	Fair knowledge
SSIs are classified into incisional SSIs, which can be superficial, deep or organ/space SSIs. Superficial SSI means	81	0.37	Good knowledge
Which is true about SSI classification	62	0.48	Fair knowledge
One of the most common isolated organisms in SSI	43	0.50	Fair knowledge
The best time for administrating prophylactic antibiotics	82	0.36	Good knowledge
Chances of developing SSI	26	0.45	Poor knowledge
All the following pre-operative antibiotics are commonly used except	35	0.48	Poor knowledge
Which statement is correct about wound classification	29	0.46	Poor knowledge
Which one of these risk factors is LEAST associated with SSI	50	0.50	Fair knowledge
Complications of SSI include which of the following	86	0.32	Good knowledge

The CDCb recommendations for the prevention of SSI include which of the following	0	0.00	Poor knowledge
Infected wounds can exhibit which one of these presentations	83	0.35	Good knowledge
Prophylactic antibiotics are discontinued after surgery within	39	0.49	Poor knowledge
Regarding hair removal for surgical patients, when is the best time	67	0.46	Fair knowledge
Regarding hair removal for surgical patients, it's best done by	42	0.50	Poor knowledge
Which one of these factors impairs wound healing	77	0.41	Good knowledge
In assessing nutritional status for a surgical patient, which statement is correct	59	0.49	Fair knowledge
Based on World Health Organization, the fourth step in hand hygiene technique is	24	0.43	Poor knowledge
The first step in surgical scrubbing is	45	0.50	Poor knowledge
The purpose of pre-operative skin cleansing is	85	0.33	Good knowledge
Total Average	53.35	0.42	Fair knowledge

Table 3: Statistics characteristics of job position

Position	Mean	Std. deviation
Intern	9.09	2.02
Resident	11.33	3.07
Specialist	11.44	2.74
Consultant	10.61	1.94
Total	11.00	2.68

of 97 doctors were included in this study. Among these respondents, 50 (51%) were specialists, 18 (18%) were residents, 18 (18%) were consultants, and 11 (11%) were interns. It was shown that 52 (54%) of doctors knew the correct definition of an SSI according to the criteria developed by the CDC; this was considered to be indicative of a fair level of knowledge. Further, 43 of the physicians had a poor level of knowledge, as only 44% knew about the most common organism associated with SSIs.

Regarding physicians' knowledge about the most common preoperative antibiotics and the best time for administrating prophylactic antibiotics, 82 (85%) knew these factors (good level of knowledge). More than half of the doctors (52%) knew the risk factors of SSI (fair level of knowledge). The physicians did not have any knowledge regarding the most effective method to prevent SSIs (0%), but 42 (43%) doctors knew the best method to remove hair from surgical patients (poor level of knowledge). A total of 24 (25%) doctors knew the proper hand hygiene techniques, including surgical scrubbing, and their purpose (poor level of knowledge).

It was found that 81 (83.5%) physicians knew the classification and definition of superficial SSIs (good level of knowledge). Less than half provided a correct answer to a question on the chances of

developing SSIs (26.8%) (poor level of knowledge). Only 35 (36.1%) answered a question about the antibiotics used in the preoperative stage correctly (poor level of knowledge). Most of the respondents, or 86 (88.7%), had a good level of knowledge regarding the complications of SSIs, and 83 (85.6%) had a good level of knowledge about the presentation of infected wounds. However, only 39 (40.2%) knew the appropriate time to discontinue a prophylactic antibiotic (poor level of knowledge).

A total of 67 (69.1%) of the respondents answered correctly about the best time to remove the body hair before the operation (fair level of knowledge). More than half (77, or 79.4%) had a good level of knowledge about the factors that impair wound healing, and 59 (60.8%) knew how to assess the nutritional status of a surgical patient (fair level of knowledge). Less than half (45, or 46.4%) correctly answered a question about the first step in surgical scrubbing (poor level of knowledge), but 85 (87.6%) knew the purpose of preoperative skin cleansing (good level of knowledge). A score of 55% (53.5) was the mean level of knowledge and risk assessment of wound infection among physicians in the surgical departments in the Hail region (fair level of knowledge).

The study correlates the experience and qualifications with the total knowledge. Surprisingly, the total knowledge for the consultant was 53%, the specialist was 57.2%, the resident was 56.6%, and interns was 45%.

Discussion

The focus on SSI prevention is growing worldwide, and this process requires appropriate strategies since SSIs cause serious morbidity and mortality [9, 10]. SSIs are associated with common risk factors mentioned in various studies, such as old age (>55), diabetes mellitus, and immunocompromised status [11, 12]. SSIs account for approximately 2–20% of surgical procedures, depending on the procedure, and they can cause a significant economic burden and heavy demand on health care resources [7, 12, 13].

In the present study, the authors examined and analyzed the total knowledge scores among doctors regarding SSIs information and practice. The present work found that most of the doctors had a fair level of knowledge regarding the definition of SSIs, as 54% knew the correct definition of an SSI according to the CDC. This was similar to another study conducted in Jeddah in 2019, Saudi Arabia, which showed that 55.5% of respondents knew the definition [8].

The present study showed that most doctors had a good level of knowledge regard-

ing the classification of SSIs and the difference between each type (83.5%). Knowing the appropriate classification is crucial to respond and treat SSIs appropriately. There are two defined systems worldwide regarding wound assessment: the ASEPSIS scoring system and the Southampton Wound Assessment Scale, both of which help with assessment, grading, and identifying any complications, such as SSIs, postoperatively [11].

In the present study, most of the region's doctors were shown to have a fair level of knowledge about the most common type of SSIs, as 63.9% of the respondents knew that superficial incisional SSIs accounted for more than half of all SSIs. A lower percentage (58.8%) was reported in a study in a neighboring city, according to which only 9.3% of doctors knew that deep incisional SSIs were more common than superficial incisional and organ/space SSIs [8]. It was also revealed that 44% of the doctors had fair knowledge regarding the most common organisms causing SSIs, which are Staphylococcus aureus and Escherichia coli. The most common group of microorganisms to cause an SSI is gram-positive cocci, mainly Staphylococcus aureus [12]. The incidence of SSIs in Nigeria was 38% [13], while India reported a lower incidence of 12% 14. This was 15 times higher in non-developed countries than in developed countries. Moreover, a previous study conducted in India in 2016 reported that the perception of health care staff about SSIs was good enough (94%) [11]. However, the practices were inadequate (47%) [15]. Further, an international survey sponsored by the WHO demonstrated that the prevalence of nosocomial infections ranged from three to 21%, and wound infection percentages were surprisingly 5–34% [12].

The present study reported that 85% of the doctors had a good level of knowledge regarding the best time for administering prophylactic antibiotics, which was within 60 minutes before surgery. This number was higher than that of a study conducted in Jeddah in 2019, which showed that 78.2% of doctors had this knowledge[8]. Further, in this study, it was found that only 26.8% of doctors knew about the incidence of SSIs, which was 1–3%. This was similar to the previous study conducted in Jeddah, for which 25.2% of doctors knew the same fact [8].

The present study found that most of the doctors (88.7%) had good knowledge regarding the complications of surgical site infection, while only 11 of the respondents had no understanding of such complications. This was similar to the findings of a study conducted in 2019, which showed that 84.0% of the doctors knew about the complications of SSIs [8].

Regarding the question about the CDC recommendations for the prevention of SSI, none of the doctors were able to answer this correctly (0%). However, a more positive response rate was observed in a study conducted in Ethiopia among doctors and nurses to assess their knowledge of infection control practices and associated factors toward infection prevention (84.7%) [16]. Nevertheless, the present study results indicated that most of the doctors had a good level of knowledge regarding the presentation of infected wounds. The majority of doctors answered that infected wounds could exhibit purulent pus (85.6%), which was similar to the previous study in Jeddah that reported a rate of 89.1% [8].

In the present study, 40.2% of respondents chose the correct time to discontinue prophylactic antibiotics as per the WHO SSI prevention guidelines [17]. Six of the respondents were consultants, 24 were specialists, seven were residents, and two were interns. According to an international survey, this reflected a poor knowledge that could be associated with a fear of malpractice lawsuits and the rising number of defensive medical practices [18]. In a Korean study conducted in 2020, it was reported that 15 out of 1,895 patients had had antibiotics appropriately discontinued [19]. Also, in a 2005 study done in the United States, it was concluded that merely 40.7% of patients discontinued antibiotics at the recommended time [10].

The World Health Organization (WHO) has recommended clipping as a hair removal technique only if necessary [20], and only 43.3% of participants in the present study answered this question correctly. Further, only 4.1% of them correctly answered the preferred timing of hair removal. There was no correct answer associated with the CDC guidelines that recommended clipping be done shortly before incision. However, the NICE guidelines recommend that the removal—if needed—should be on the day of surgery [21].

Participants had a good level of knowledge (79.3%) that steroid use was associated with SSIs, but in another study, 83.2% of respondents had this knowledge [8]. Further, in a King Abdulaziz University Hospital study, 69.7% of the doctors answered that serum albumin was the most commonly used marker to assess nutritional status for a surgical patient [8]. However, in the present study, 60.8% of the respondents in all groups, and just half of the consultants, answered this question correctly.

In the present research, less than half of the doctors (46.39%) knew that the first step in surgical scrubbing was the removal of any watches and rings from their hands, which indicated a poor level of knowledge. How-

ever, in another study in Jedda, most doctors knew about this first step (69.7%) [8]. Moreover, the fourth step in hand hygiene was correctly stated by a relatively small number of doctors (24\97), which reflected an even lower level of knowledge in the surgical scrubbing process. In comparison, another study showed similar results (20.4%) [8].

Finally, the doctors in the present study showed a good level of knowledge regarding the purpose of preoperative skin cleaning (87.6%), which was similar to the finding in the study at KAUH (80.7%) [8].

Conclusion

The present study has clarified that the overall knowledge about SSIs among doctors was fair but insufficient. Therefore, it is recommended that the WHO recommendations be implemented during the preoperative period to ensure high-quality care for every patient, thereby eliminating the risk of relapsing and unnecessary readmissions. It is also highly recommended that more training programs be initiated for health care professionals. Medical professionals need to improve their knowledge and evidence-based practices to maintain the patient experience at a higher level of safety after surgery.

Conflict of Interest

The authors declare that they have no competing interests.

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Review article :

Review On Clinical And Molecular Genetics Of Autosomal Recessive Intellectual Disability

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Abstract

Intellectual disability (ID) is a relatively common phenotype with multiple etiologies. Recent progress in the genetics of ID greatly expanded our understanding of the biological defects underlying this clinical entity. While most published cohort genetic studies on ID revealed the important contribution of de novo (germline or postzygotic) variants, we focused in this study of autosomal recessive ID (ARID), that account for most of the molecular bases in ID cases in inbred populations. We discussed the current state of ARID from a clinical, molecular and genetics standpoints.

Keywords:

Autosomal Recessive, Intellectual Disability, ARID, Positional Mapping, Whole-exome Sequencing.

الملخص

الإعاقة الذهنية أو التأخير العقلي هو خلل طبي شائع نسبيًا مع عدة أسباب له. و قد أدى التقدم الأخير في علم الوراثة السريرية إلى توسيع فهمنا للبيولوجية الكامنة وراء هذاالخلل الطبي. حيث كشفت معظم الدراسات الجينية و الوراثية المتعلقه بداراسات التأخير العقلي على أن أحد أكبر الأسباب المؤدية الي التأخير العقلي هو الطفرات و التغيرات الوراثية التي تحدث في الشخص المصاب و لا تكون في الغالب مورثة من أحد الأبوين أو تنتنقل بالصفحة السائدة. في هذا البحث نقوم بالتركيز على النوع الآخر من الطفرات الوراثية التي تنتقل بالصفحة المتنحية من الناحية السريرية و الجزيئية

INTRODUCTION

Genetic defects are the predominant cause of Autosomal Recessive Intellectual Disability (ARID). There are two large defined groups of genetic causes of ARID, syndromic and non-syndromic. In syndromic disorders, the involvement of the neurological system is complicated by the involvement of additional systems. However, in non-syndromic disorders usually the involvement is isolated i.e., only cognitive impairment. There are more than 800 syndromes with ARID manifestation are listed in the Online Mendelian Inheritance in Man Database (https://www.omim.org/), including rare syndromes with known underlying genetic defects. Common genetic

syndromes frequently encountered in the clinical setting not essentially autosomal recessive include Down syndrome, Fragile X syndrome, Tuberos Sclerosis, Rett syndrome, and Angelman syndrome, with a wide range of phenotypes including neuropsychiatric symptoms, intellectual disabilities, autism spectrum disorder, epilepsy, and structural brain abnormalities.

Non-syndromic intellectual disability (ID) comprises patients with isolated involvement of the neurodevelopment. Some of these disorders are idiopathic, with no identified genetic cause. Most of the ARID disorders have very strong evidence of heritability, whether through recurrence of similar cases in multiplex families, shared genetic defects found in a large cohort of patients, or the application of twin studies to understand the impact of genetics and environmental influences supporting the hypothesis of an unidentified genetic cause.

ARID disorders are caused by abnormalities in brain development due to germline diseases that cause DNA variations and include certain psychiatric disorders as well[1,2]. Affecting an estimated 15% of the population, Neuro Developmental Disorders (NDD) and in part ARID are a major economic and clinical burden (National Institute of Mental Health Statistics). Clinically, ARID are characterized by a wide range of neurobehavioral signs and symptoms, such as mood disorders, (including major depressive disorder and bipolar affective disorder) schizophrenia; autism spectrum disorder (ASD); and attention-deficit hyperactive disorder (ADHD). Diagnostic criteria display significant overlap, making clinical variation difficult to distinguish. Around 30–43% of NDDs are thought to have an underlying genetic defect [1, 2] however, the pathophysiology of the development of psychiatric disorders as part of ARID remain unknown and involve complex interactions among genes and environmental factors. The genes reported as more frequent in ARID include VPS13B, ASPM, POLG, MUT, GLDC, CEP290, SMPD1, SPG11, LAMA2 and GALT, however, other studies in ARID[3,4,5,6,7,8] failed to identify particular disorders more common and recurrent as cause of ARID. Most likely population specific, for example ADAT3 is considered as one of the most common causes of ARID in Saudi Arabia, other disorders like Cohen syndrome OMIM # 216550 Mental retardation, autosomal recessive 15 OMIM # 614202 Spastic paraplegia 50, autosomal recessive # 612936 are reported more frequently in different studies [8]. Recent advancement in genetic studies, biological functions analysis and the role of altered genes in ARID provide opportunities to discover the etiologies

and risk factors of the medical, clinical and psychiatric features of ARID.

Almost all types of gene alteration are linked to ID, including chromosomal structural aberrations and single gene defects with all modes of inheritance (autosomal recessive, autosomal dominant, X-linked and mitochondrial) (Figure 1). De-novo and somatic DNA variations and a combination of common single-nucleotide polymorphisms (SNP) predispose higher risk of developing ID and sometimes can present as ARID.

Advancement in molecular testing and diagnostic technologies have helped to reveal underlying biological defects, yielding insights into the role of altered genes and the interactions among multiple pathways that allow for better focus on drug development and enable personalized medical care. This article focuses on one mode of inheritance i.e.; autosomal recessive that can cause ID and neurodevelopmental disorders (NDD).

ARID IN CHROMOSOMAL AND STRUCTURAL ABERRATIONS

In 1956, the human diploid chromosome number was established as 46 9, and between 1960s and 1970s banding techniques were introduced that allowed the identification of chromosomal abnormalities. Karyotype testing was first used to identify chromosomal aberrations in patients with ID. Down Syndrome, or Trisomy 21, is the most recognizable example of chromosomal aneuploidy, accompanied by 19% prevalence of Autism Spectrum Disorder (ASD) [10]. Copy Number Variants (CNV) inherited as autosomal dominant or de-novo and rarely results from homozygous loss of both copies of the two alleles and run in the family in as autosomal recessive mode of inheritance. However, CNV considered as one of the major causes of ASD, molecular testing for CNV is first-tier genetic testing for cases with ASD or non-specific ASD; diagnostic yield in such cases reaches as far as up to 10% regardless the mode of inheritance. Furthermore, CNV contribute to many causes of other NDD which could present as ARID and by unmasking of a recessive allele that would normally not be expressed.

Table 1: list of signs and symptoms of Inborn Errors of Metabolism that trigger further

- Microcephaly
- Dermatologic changes (skin rash)
- Cyclic vomiting
- Developmental regression
- Seizures, hypotonia, dystonia
- Gastrointestinal dysfunction
- Lethargy
- Neurodegeneration
- Failure to thrive
- Hyperammonemia
- Lactic acidosis
- Homocystinuria
- Acid/base disturbances
- Anemia
- Elevated liver enzyme
- Elevated creatine kinase

- Flagged results in newborn screening
- Abnormal acylcarnitine profile
- Abnormal organic acids in urine

ARID

Known syndromic disorders are believed to comprise around 10–15% cases of NDD. However, the total number of autosomal recessive genes causing NDDs is unknown, in one review study the percentage of ARID among all NDD is around 57% [11].

Ethnicity could be an attribute factor relating ARID to particular causes. For example, 3.6% of cases were attributable to ARID in patients of European ancestry where consanguineous marriages are less than 5% compared to 31% of cases in countries with high rates of consanguinity. Several studies reported hit high rates of ARID among NDDs cases i.e.; 30-40% [12, 13, 14]. Populations with many consanguineous marriages having an estimated 81% of patients with ARID, carry causative point mutations in autosomal recessive diseases, and 8% of patients in X-linked disorders. Whereas, fragile X syndrome accounts for only 1% in non-consanguineous offsprings[3]. The differences in the numbers could be attributed to ethnicity and consanguinity when compared, to an estimated 10% of all diagnosable ID cases were in an outbred population 8. In ARID, not all variants are homozygous. Atudy about the rate of compound heterozygous in German population revealed as leading cause to of ARID as high as 14%.

NDDs due to de novo variant is estimated as 1:213. However, autosomal recessive NDDs in offspring of marriages is estimated to be four to eight times higher than de-novo variants, and first cousin marriages is around two times higher than the de-novo variants making it as 1:147 [6, 15].

Based on SysID database https://sysid.cmbi.umcn.nl/ around 702 genes are linked to ARID (last accessed in August 2010). However, by calculating ion the size and the known genes of chromosome X lading to NDDs and comparing this number with the size of the autosomes, the estimated number of genes would be 2500 – 3000 8. Furthermore, approximately, half of ARID are not yet identified, and of the cases of ID not diagnosed yet, and suspected to be ARID are15–20% [8, 16].

Some of ARID classification can be based on the underlying pathology as they might share as ciliopathies or based on single clinical presentation like microcephaly or can be included under clinically well studied group of disorders, like inborn errors of metabolism, and the molecular defect like disorders affecting tRNA modification.

Large family structure and consanguinity helps in identification of novel single genes or variants in ARID disorders. For

example, the well-known gene ADAT3, related to intellectual disability, has been described in many individuals from Saudi families with the homozygous founder variant c.382G>A p. (Val128Met). These individuals often have cognitive impairment, microcephaly, epilepsy, nonspecific brain abnormalities, and dysmorphic facial features (Figure 2). ADAT3-related intellectual disability is now a recognizable cause of ID in Saudi Arabia [17,18]. Another founder variant, in C12orf57 in the methionine ATG–starting codon of the gene (c.1A>G: p. Met1?), causes Temtamy syndrome, a form of ID. It is characterized by epilepsy, causes ocular involvement, and dysgenesis of the corpus callosum, discovered after studies done in multiplex families [19] (Figure 3A). Studying consanguineous families has expanded the knowledge of tRNA modification in ARID disorders. For example, WDR4 has been identified as distinct form of primordial dwarfism (OMIM #618346) associated with microcephaly, agenesis of the corpus callosum, simplified gyration, and severe encephalopathy with seizures (Figure 3B). The disease-causing variant in WDR4 that impairs tRNA m (7)G46 methylation was identified by studying two consanguineous families and comparing the human variant with the corresponding ortholog yeast variant. The disease-causing variant significantly reduces the m(7)G46 methylation of specific tRNA species, providing a potential mechanism for the primordial dwarfism associated with low level of m(7)G46 modification causes a growth-deficiency phenotype in yeast 20. Another form of ARID- and tRNA-related disorders most commonly derives from defects in RNA pseudouridylation. Pseudouridine synthases are encoded by 13 genes in humans, and several genes linked to ARID. Defects in PUS1, PUS3, and PUS7 impact the post-transcriptional modification of tRNA.

while, the impact of PUS7 was discovered by studying two consanguineous families [21,22]. CTU2-related DREAM-PL (dysmorphic facies, renal agenesis, ambiguous genitalia, microcephaly, polydactyly, and lissencephaly) (Figure 3C), was recently described as impacting the post-transcriptional modification of tRNA and was found in a multiethnic groups [23]. Finally, truncating disease-causing variants in ALKBH8 leads to ARID by impacting tRNA post-transcriptional modification. This is an expansive list of genes related to ARID syndromes and with variants linked to tRNA modification defects.

Other presentations, like microcephaly or autosomal recessive primary microcephaly (MCPH), are another common form of ARID. Microcephaly is classified into congenital, progressive, non-syndromic,

and microcephaly with normal brain architecture. The majority (60%) of causes of microcephaly are genetic, with established disease phenotypes in humans; 24% are found in known MCPH genes and around 15% are in novel or candidate genes [24]. Primary cilia are essential for the normal development of neurons and cortical migration. Ciliopathies, another group of ARID, results in variation in genes encoding defective proteins and abnormal function of cilia, constellation of features, including intellectual disability, skeletal, cerebral, renal, and liver dysfunction. Bardet–Biedl syndromes account for 30% of all cases with ciliopathies followed by Meckel syndrome, Joubert syndrome, and short-rib thoracic dysplasia in the Saudi population.[25].

Inborn error of metabolism is another example of disorder that can presents as ID disorder and mostly inherited as an autosomal recessive disorder. Metabolic disorders can affect the central nervous system (CNS) and may presents at any age. Clinical presentation can resemble neuropsychiatric syndromes, depression or psychosis can be the presenting symptoms and can leads to significant morbidity and mortality. Metabolic disruption can lead to chronic or acute illness of the CNS, in-

Figure 1: Distribution of NDDs by mode of inheritance. Unidentified are patient with NDDs clinical manifestation. However, with unknown underlying mode of inheritance.

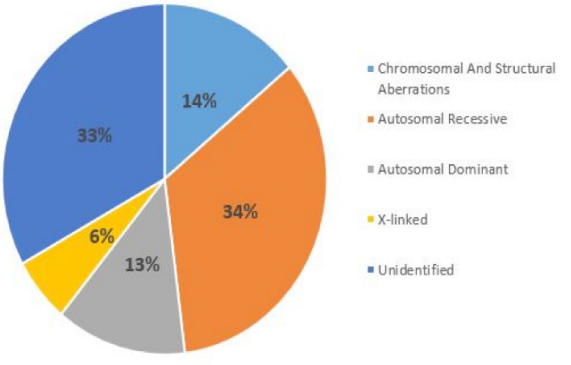


Figure 2: Different patients with ADAT3 related intellectual disability showing dysmorphic features (Prominent and high forehead, up-slanted palpebral fissures, epicanthus, hypertelorism, telecanthus, depressed nasal bridge and short nose).

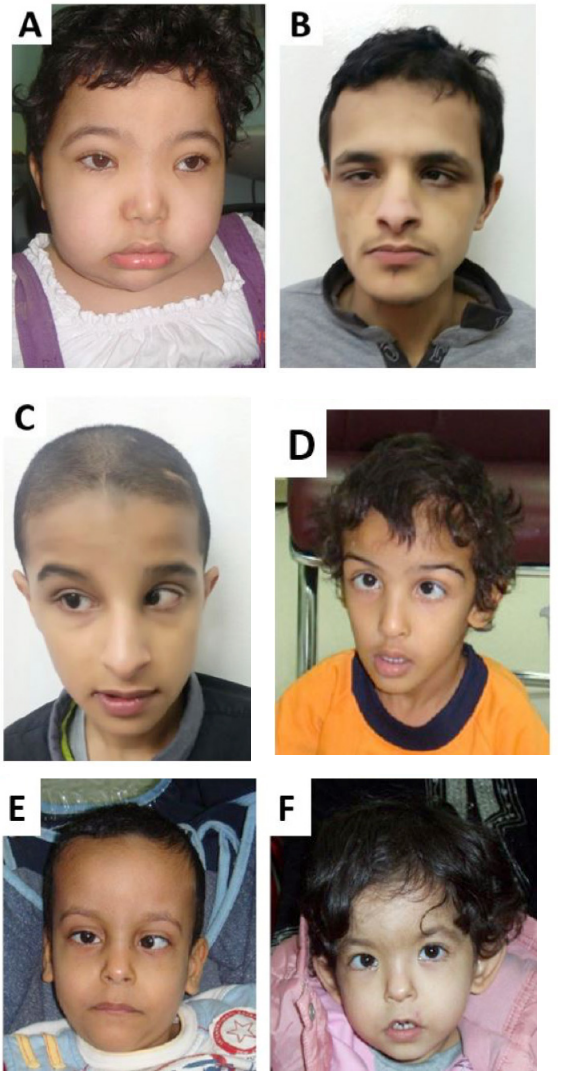


Figure 3: A: Temtamy syndrome, showing ocular involvement and dysgenesis of the corpus callosum. B: Primordial dwarfism showing small head size and agenesis of the corpus callosum with simplified gyration. C: CTU2-related DREAM-PL showing dysmorphic facies and ambiguous genitalia.

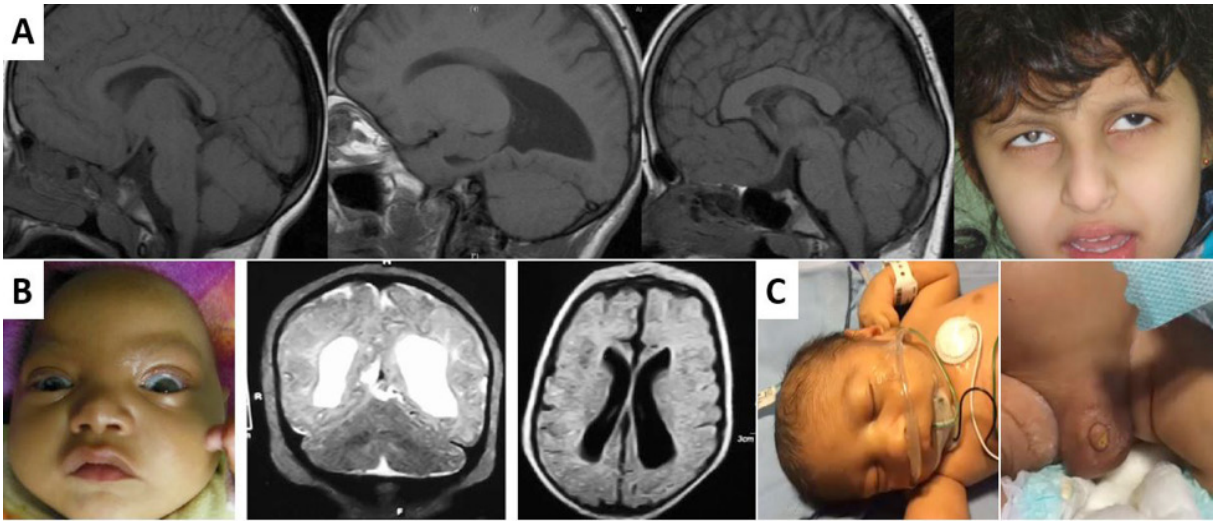
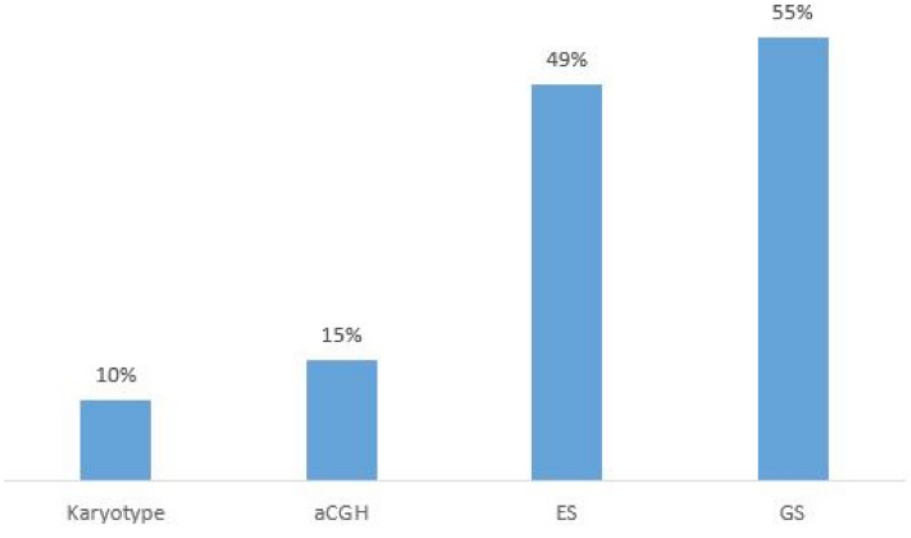


Figure 4: Average hit rate of molecular testing on NDDs based on testing method. aCGH: array-based comparative genomic hybridization, ES: exome sequencing, GS: genome sequencing.



cluding maple syrup urine disease, urea cycle disorders, phenylketonuria, acute intermittent porphyria, Wilson's disease, and disorders of homocysteine metabolism. Metabolic disruption can also affect neurodevelopmental processes. Examples include many disorders present in the early stage of life such as neuronal ceroid lipofuscinosis, alpha mannosidosis, metachromatic leukodystrophy,adrenoleukodystrophy, Niemann–Pick type C, and GM2 gangliosidosis [26]. An important consideration for metabolic disorders is availability of treatment, an estimated 1 in 20 psychiatric disorders result from treatable metabolic disorders [27]. The estimated percentage of

metabolic disorders results in ARID is 1% provided that all investigations are done, and this number is based on cases detected by newborn screening [28].

Clinical signs and symptoms that should prompt further metabolic investigation and workup in any patients presenting with neuropsychiatric disorder include microcephaly, acid/base disturbances, anemia, dermatologic changes, cyclic vomiting, developmental regression, seizures, hypotonia, dystonia, gastrointestinal dysfunction, hyperammonemia, lactic acidosis, lethargy, neurodegeneration, and failure to thrive (Table 1).

MITOCHONDRIAL DEFECTS (MD) AND ARID

ARID are common presentation in MD. The nuclear coding gene POLG1 encodes the mitochondrial DNA polymerase which replicates and repairs mtDNA. Damage to POLG1 can result in neurological or hepatic dysfunction, as affected individuals will have depleted mtDNA content in tissues. POLG1-related disorder can manifest in the heterozygous or homozygous state and hence can cause disorders in the autosomal recessive or autosomal dominant modes of inheritance. Autosomal-recessive disorders causing variation in POLG1 lead to many distinct neurologic features, including developmental delay, generalized anxiety, and obsessive–compulsive spectrum disorder. Both dementia and depression have been described, usually beginning with gradual declines in visual, attention, and abstraction capabilities [29]. Autosomal dominant–related POLG1 clinical presentation could include idiopathic Parkinsons, male infertility, and progressive external ophthalmoplegia [29].

Diagnostic evaluation of individuals with suspected mitochondrial disorder related to ARID or mtDNA requires multisystem evaluation, including brain imaging, cardiac, and ophthalmologic evaluation, alongside audiology and clinical genetic testing. Blood testing should include liver enzymes, creatine kinase, ammonia, lactate and acylcarnitine profile, urinalysis for organic acids, and CSF lactate, pyruvate, and CSF amino acids analysis.

TREATMENT

Early identification of disorders can prevent disease sequalae. Several ARID disorders result from defects in enzyme pathway metabolism or inborn error of metabolism. In one study around 3% of treatable inborn error of metabolism were missed despite the biochemical marker of ARID, elaborate about the importance of genetic testing in such cases when treatment is available [8].

CONSLUSION

ID is a common phenotype with multiple etiologies. However, in population with high rate of consanguineous marriages the autosomal recessive disorders account for most cases with ID, understanding the major causes is first step toward providing management, intervention and eventually prevention of the disorder.

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Review article :

Stroke In Ksa; Epidemiology And Clinical Delineation

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Abstract

Many countries are struggling to improve their existing health care services and in creating and maintaining balance in cost, quality, and access to health care. Kingdom of Saudi Arabia (KSA), is a large country that occupies a total land area of 2250000 km2, and population exceeds 32 million, is struggling like many other nations to improve its existing health care facilities countrywide to control the escalating costs and to provide quality care to its citizens. Stroke is considered one of the most common type of cerebrovascular disease that occurs in adults and leads to permanent disability and high mortality rate globally. It is one of the most common cause of death in developing countries. Stroke became a major problem and a significant cause of morbidity and mortality in KSA. Data available on incidence, prevalence, and socio-demographic parameters of stroke in KSA is still deficient as compared to the developed countries; due to the lack of appropriate findings being conducted/reported in the kingdom. Also, since very few specialized research medical institutes exist in KSA, there is lack of comprehensive studies on medical facilities and practices for this clinical service. This review article focuses on various aspects of stroke in KSA from the studies that have been published recently covering different issues of stroke in different regions of the kingdom which might be very help-

الملخص

على الصعيد العالمي، تكافح العديد من البلدان لتحسين خدمات الرعاية الصحية الحالية لديها وفي خلق التوازن في التكلفة والجودة والحصول على الرعاية الصحية والحفاظ على هذا التوازن. المملكة العربية السعودية، بصفتها دولة كبيرة تحتل مساحة إجمالية قدرها ٢٢٥٠٠٠٠ كيلومتر مربع ويزيد عدد سكانها عن ٣٢ مليون نسمة، تكافح مثل العديد من الدول الأخرى لتحسين وإعادة تكوين مرافق الرعاية الصحية الحالية في جميع أنحاء البلاد للسيطرة على التكاليف المتصاعدة وتقديم رعاية جيدة لمواطنيها. تعتبر السكتة الدماغية من أكثر أنواع أمراض الأوعية الدموية الدماغية شيوعًا والتي تحدث عند البالغين وتؤدي إلى إعاقة دائمة وارتفاع معدل الوفيات على مستوى العالم. كما أنه أحد أكثر أسباب الوفاة شيوعًا في البلدان النامية. أصبحت السكتة الدماغية مشكلة رئيسية وسببًا مهمًا للوفيات في المملكة العربية السعودية. لا تزال المعطيات المتوفرة حول حدوث السكتة الدماغية وانتشارها والمعايير الاجتماعية والديموغرافية للسكتة الدماغية في المملكة العربية السعودية ناقصة للغاية مقارنة بالدول المتقدمة؛ على الأرجح بسبب عدم وجود نتائج مناسبة يتم إجراؤها أو الإبلاغ عنها في المملكة. أيضاً نظرًا لوجود عدد قليل جدًا من المعاهد الطبية البحثية المتخصصة في المملكة العربية السعودية؛ هناك نقص في الدراسات الشاملة حول المرافق والممارسات الطبية لهذه الخدمة السريرية الخاصة. تركز مقالة المراجعة هذه على جوانب مختلفة من السكتة الدماغية في المملكة العربية السعودية من الدراسات التي تم نشرها مؤخرًا والتي تغطي قضايا مختلفة من السكتة الدماغية في مناطق مختلفة من المملكة والتي قد تكون مفيدة جدًا لمقدمي الرعاية الصحية لإعداد ووضع استراتيجيات الوقاية الأولية والتوزيع السليم للموارد الصحية

ful for the health care providers to set up and make primary prevention strategies and proper allocation of health resources in order to improve stroke care.

Key Words:
Cerebrovascular diseases, Kingdom of Saudi Arabia, Stroke.

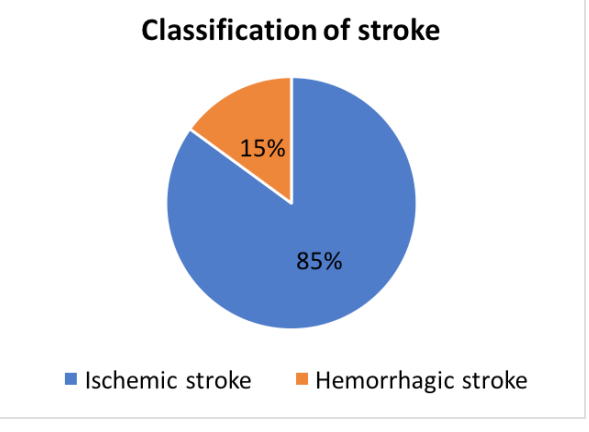
لتحسين رعاية السكتة الدماغية في المملكة العربية السعودية.

الكلمات المفتاحية:
أمراض الأوعية الدموية الدماغية، المملكة العربية السعودية، السكتة الدماغية.

INTRODUCTION

Stroke is an event that occurs when blood supply to the brain is either interrupted or severely reduced, resulting in deprivation of oxygen and nutrients to the brain tissue1. Stroke can be classified into two types; ischemic and hemorrhagic strokes. Ischemic stroke represents 85% of stroke cases, which occurs due to blockage of the brain arteries, leading to brain damage and loss of cognitive function. The remaining 15% of stroke cases are hemorrhagic strokes, which results from blood escaping from the arteries into the nearby brain tissue, causing a permanent damage there, see figure -1. Hemorrhagic stroke causes more damage than ischemic strokes[2].

Figure -1: Stroke types



Cardio-embolic stroke represents 14% to 30% of all ischemic strokes, which occurs in the presence of a cardiac emboli that circulate into the brain arteries, leading to occlusion of the brain blood vessels and damaging the brain tissue, which requires immediate intervention. Heart disease like atrial-fibrillation is the main cause of cardio-embolic strokes, and its prevalence is strongly increasing with age. Other risk factors for cardio-embolic stroke include; diabetes mellitus, hyperlipidemia, hypertension, cardiac disease, and sedentary lifestyle [3]. Risk of ischemic stroke is five times higher in people with atrial-fibrillation than in those without atrial-fibrillation. Anti-thrombotic drugs are prescribed for ischemic stroke prevention [4]

Globally cerebrovascular diseases are the sixth major cause of permanent disease burden. It is expected to shift to the fourth place by 2020 [5]. Stroke is one of the primary reasons of irreversible neurological destruction and functional impairment globally [6]. There is no standard drug or therapy available to improve recovery after stroke

events. Stroke can leave a psychological, cognitive, physical, and social function disturbances, which depends on the type and severity of the stroke event [7, 8]. World Health Organization estimated that every year around 15 million people all over the world will be affected with stroke, among which 5 million will die, and 5 million will suffer from ongoing disabilities [9, 10].

Stroke is an important cause of morbidity and mortality globally [11]. Stroke is one of the most common cause of death in adult life after cancer and ischemic heart disease[12]. Globally about 65% of stroke deaths are reported in the developing countries, and almost 40% of these stroke deaths are reported in individuals younger than seventy years old. The global incidence of stroke will broaden as the number of people older than 65 years is expected to increase by 2025, reaching 10% of the total population [13].

It is important to keep monitoring the burden of stroke on a global scale and to compare it with different countries and regions over time, including projections and trends relevant to other major illnesses. This will help in filling the gap in estimating the disease burden across the countries. Since the epidemiology of stroke is rapidly changing, on-going population-based studies serves as best source for planning and organizing stroke care and services [14].

The Middle East area confronts a double burden of stroke, because of the declining rates of contagious diseases and rising rates of non-contagious diseases [15]. The burden of stroke in low- and middle-income countries are now increasing, and affecting the morbidity, incidence, mortality, disability adjusted life, and economic impact [16].

The incidence and prevalence of stroke in KSA is lower than the western countries. This might be due to the high proportion of the young population in this county [17]. As per to our knowledge, no studies have been recently conducted on the incidence and prevalence of this disease in KSA. Previous findings and published studies related to stroke in KSA are assume and taken into consideration for designing future stroke studies in KSA.

The goal of this review article is to analyze and assess variety of aspects of stroke in KSA, including its types, outcome, risk factors, comparing the results with those studies have been reported before, and epidemiological data (incidence and prevalence, including; Saudis and non-Saudis, gender difference, young and non-young patients, age standardized rates, mortality, and global burden) in KSA.

After reviewing the published reports of stroke in KSA, it was concluded that the data on incidence and prevalence, risk factors, clinical patterns, and outcome of

stroke in KSA were underreported. This review will provide a background for designing future stroke studies in KSA, the outcome of this study will be helpful in strategic planning of stroke management in KSA.

METHODS:

This review article was undertaken to identify the epidemiology and clinical delineation of stroke in Saudi Arabia. Google schooler was used as search strategy to establish the prevalence, risk factors, clinical patterns, and outcome of stroke in Saudi Arabia, through the available published literature on PubMed and Web of Science websites. Key words in the title, and synonyms and terms of the keywords were used in the search of literature. Articles found in the reference lists were considered when their titles were relevant. Limits on year of publication were applied to exclude old studies, of more than 20 years old.

Incidence and prevalence of various stroke types in KSA:

Every year more than 15 million population all over the world is affected by either new or recurrent stroke events. The highest burden of this disease is reported in low- or middle-income regions, due to lack of basic health care infrastructure, less specialized healthcare units and rehabilitation services [18]. The incidence of stroke and its prevalence in KSA is low if compared to western countries, because of the high proportion of young population in this county [18]. Al-Rajeh et al., reported that the crude incidence rate for first incidence of stroke in KSA was 29.8 per 100,000 population per annum. The same study also reported that ischemic strokes were predominated by 69%, while hemorrhagic strokes were rare 1.4% 10. A research study was carried out by Al-Rajeh et al., on a large-scale in hospitals that treated the National Guard community of Saudi Arabia, informed that the incidence rate of strokes was 43.8 per 100,000 per annum (10). Al-Amri et al., reported that annual cases of stroke in KSA are 57.64 per 100,000 population [19].

El-Sayed et al., reported that the most common stroke subtypes were ischemic strokes, which were 79% of the total cases, and 46% of it were with lacunar infarcts, followed by intracerebral hemorrhages which were 18.8%, and 2.2% of it were Sub-Arachnoid hemorrhages in KSA [10]. AL-RAWI et al., reported that among 950 patients admitted in a tertiary hospital in Duhok city in KSA, 84.5% (803) were ischemic strokes while 15.5% (147) were haemorrhagic strokes 20. Yaqub et al., reported that among 200 local Saudi stroke patients, cerebral infarction cases were 87%, cerebral hemorrhages were 6.5%, subarachnoid hemorrhages were 4.5%, and

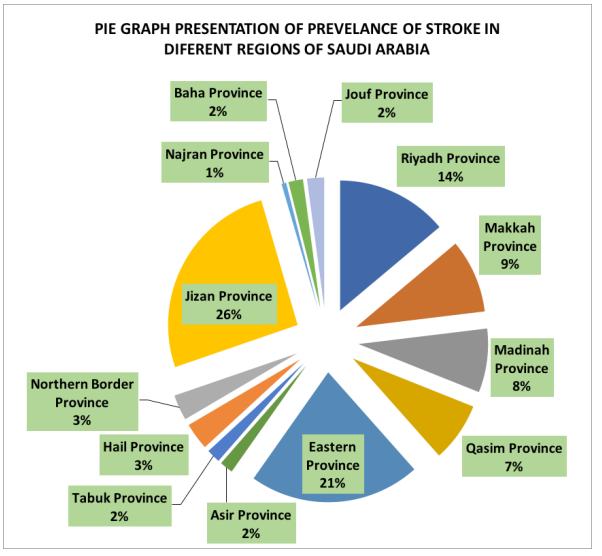
the least were venous infarctions which were 2% [10].

The most commonly affected artery was the middle cerebral artery, which represents 52% of the arterial infarcts, lacunar infarcts were observed in 21% of the total cases with arterial infarcts, elevated blood pressure was noticed in 41% of the cases with arterial infarcts, and 62% with cerebral hemorrhages [10]. Also, two more local studies, Al-Rajeh et al., and Emam et al., established that the occurrence of ischemic stroke was higher when compared to other types of strokes [21, 22]. A recent study published by Al-Hazmi et al., established that the incidence of ischemic strokes is highest 85.26% among all other stroke subtypes, whereas occurrence of hemorrhagic and embolic strokes holds equal proportion 7.37% in KSA [23].

Saudi Arabia and World data:

Al-Ahmari et al., provided apparent information about stroke prevalence [24]. It was revealed that prevalence of strokes is low in KSA when compared with those recorded in the western and Asian countries. This could be due to the predominance of the younger age groups in this region. The prevalence of stroke in various region of KSA have also been reported as illustrated in pie figure -2. The major risk factors for stroke includes old age [10, 25], male gender 26, cigarette smoking [27], dyslipidemia, high blood glucose level, and cardiac diseases [28].

Figure -2: Stroke prevalence in Saudi provinces (Al-Ahmari, 2016).



Major risk factors of stroke:

Stroke has numerous risk factors, which are either modifiable or non-modifiable [29]. The most common modifiable risk factors are; alcohol consumption, cigarette smoking, elevated blood pressure, dyslipidemia, high blood glucose level, and cardiac diseases, whereas; sex, age, positive family history, and race are among non-modifiable risk factors [29, 30]. The modifiable risk factors can be prevented by adopting healthy lifestyle, regular use of medications of modifiable risk factors, alteration in individual's behavior such as giving up on alcohol and smoking, and maintaining healthy level of body mass index [31]. Stroke can be prevented by controlling the modifiable risk factors [32].

A latest local study by Al-Hazzani et al.,

reported that hypertension was the most frequently identified risk factor for stroke among Saudi stroke patients, followed by dyslipidaemia, cigarette smoking, and old age 27. Maqbul et al., reported that among young Saudi individuals; obesity, high fatty meals, and cigarette smoking are the most common risk factors for stroke [33]. Al-Rajeh et al., reported that the main risk factors for stroke in Saudi population are; hypertension 38%, diabetes 37%, heart disease 27% (including: atrial fibrillation, valvular disease, cardiomyopathy, ischemic heart disease), cigarette smoking 19%, and family history of stroke 14% 17. El-Sayed et al., conducted on national level reported some of the general risk factors of stroke, including; diabetes along with hypertension 40.4%, elevated blood pressure 24.9%, diabetes 11.6%, atrial fibrillation 5.8%, heart diseases 5.5%, prior stroke or transient ischemic attack 2.1% for each, and smoking 1.8% [10]. A study done by Awada et al., reported that elevated blood pressure (52%) was the main underlying cause of stroke in KSA, followed by hyperglycemia and heart diseases. Also, atherosclerosis 36%, elevated blood pressure and diabetic arteriopathy 24%, and cardiac embolisms 19% set up to be the most common reasons for cerebral infarction [10].

It is become an evident, that the main predisposing factors for stroke in KSA are; elevated blood pressure, hyperglycemia, heart disease, and cigarette smoking. It was observed that people suffering from both hyperglycemia and high blood pressure have a higher threat for stroke [34]. The most effective modifiable risk factors in prevention of stroke are; smoking cessation, controlling blood pressure, use of anti-thrombotic drugs in atrial fibrillation, and controlling diabetes [35].

Influence of age:

In KSA the occurrence of stroke relates to age until the seventh decade [10]. Recent studies estimated that stroke happen more in the age between 61-70, and less common in the age between 20-40 [10, 26]. Studies by Asirvatham et al., and Al-Eithan et al., from KSA showed that stroke happen in age between 61-70 more than the age between 30-40 [10, 25]. One of the stroke studies by Al-Sulaiman et al., in Saudi children have been done in Al-Khobar, a city in KSA, reported that 20,895 of the Saudi children had stroke. The prevalence of stroke in children was 29.7 for each 100,000 in the pediatric section. Ischemic strokes represent 90%, while hemorrhagic strokes represent 10% in Saudi children [36, 37].

Gender differences:

A small number of data have been available and published in KSA regarding the gender differences of stroke, representing that it affects male population more than

female population [10]. Al-Jadid et al., reported that men are more susceptible of getting stroke than women [26]. A large-scale study carried out by Al-Rajeh et al., on 500 local Saudi individuals with stroke also reported the same, that among them 31.6% were females and 68.4% of stroke patients were males [10].

Saudis and non-Saudis:

KSA has a total population of about 32 million, among which 63% are local Saudis, and the remaining 37% are foreign expatriates [38]. A local study by Al-Rajeh et al., was conducted on 372 subjects, including 262 Saudi locals and 110 non-Saudis to study the types and etiologies of stroke among local and expatriates. According to this study men to women ratio were 2.2:1, and Saudi to non-Saudi ratio were 8.2:1. The incidence of stroke expanded with age until the seventh decade in local Saudis, and it was declined after the sixth in non-Saudi individuals. The incidence of different stroke types in Saudis were; 61% ischemic, 17% hemorrhagic, and 22% were unspecified. On the other hand, ischemic 46%, hemorrhagic 47%, and unspecified 7% were recorded in non-Saudi individuals. Intracerebral bleeding was more common than subarachnoid bleeding and was experienced more frequent in local Saudis than expatriates. Subarachnoid bleeding was three times more typical in expatriates than in locals 21. Al-Rubeaan et al., reported that ischemic stroke among Saudis with pre-existing type 1 and type 2 diabetes was similar to non-Saudis [39].

Post stroke complications:

Baig et al., reported that among 492 patients of stroke admitted in a tertiary care hospital of Eastern province of KSA, almost 9.6% patients developed post-stroke epilepsy [40]. Ibrahim et al., reported a study conducted in King Khalid University in KSA, concluded that dysphagia is highly prevalent among stroke patients [41]. Khayyat et al., carried out a study in tertiary care hospital of Jeddah in KSA, involving 278 patients. The most common post stroke complications were; stress ulcers 17%, pneumonia 14% and venous thromboembolism 3%. Abnormal troponin levels were also observed in 34% of the patients [42]. Al-Busaidi et al., reported that among 60 stroke patients, 17% of the patients developed post stroke depression. Al-Busaidi et al., reported that among 76 stroke patients, 18.4% patients developed mild to moderate anxiety and 23.7% patients developed moderate to severe depression post stroke event [43]. Ullah et al., reported that among 60 stroke patients, 63.3% patients developed musculoskeletal pain, 21.6% developed depression, 18.3% developed urinary tract infections, and 7% developed stroke progression post stroke event [44].

Mortality rate in KSA:

The mortality rate of stroke is higher in developing countries as compared to developed countries. Al-Hazzani et al., reported that mortality rate due to stroke in developed countries is 3-11% and 7-15% in developing countries. Various factors affect the mortality rate of a country such as age (increasing age increases the chances of stroke deaths), gender, and availability of specialized stroke units in hospital. It was also reported that the mortality rate of stroke in Middle East region is found to be 8 to 28%. This study reported that the mortality rate in KSA due to stroke was 27% [28].

Current critical care of stroke in KSA:

KSA lags behind other developed countries of the world in combating and managing stroke care. Majority of the stroke patients (95%) were treated in non-specialized stroke hospitals, where they receive non-reperfusion supportive care for both non-large vessel occlusion and large vessel occlusion, and only 5% of stroke patients were treated in specialized stroke units, where they receive international standard treatment IV-tPA (intravenous tissue plasminogen activator) [45]. This difference in health care services is mainly due to improper allocation of resources and lack of organization of care. This situation has provoked the Ministry of Health in KSA to established specialized stroke care units in hospitals to improve stroke care, and to provide standard treatment to all stroke patients [45]. Hence by improving the current infrastructure, adopting the international standard guidelines, developing advanced specialized stroke units will not only help KSA to combat stroke more effectively, but also decrease the overall morbidity and mortality associated with stroke.

CONCLUSION

Stroke has become one of the most critical cause of morbidity and mortality in KSA, and its incidence is increasing due to different risk factors. The increasing cases of stroke has provoked Saudi government to take and establish strategies to combat stroke. In this regard, Ministry of Health in KSA has introduced stroke care development program to provide advanced stroke care and treatment. This model predicts that stroke care development program is associated with improved patient outcomes and lower overall costs compared with the current stroke care program. Also, KSA health system adopted and introduced latest technologies such as the use of telemedicine, which will reduce the overall stroke burden and will prevent post-stroke complications. This review is a compilation of recently published studies in KSA covering different aspects of stroke on different regions, which might be

very helpful for the health care providers of this region to set up and make primary prevention strategies and proper allocation of health resources in this area.

CONFLICT OF INTEREST

There is no conflict of interest.

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Review article :

Hepcidin; Structure, Functions And Role In Hematological Disorders

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Abstract

Hepcidin is an essential iron regulatory protein encoded by human antimicrobial peptide gene. Structurally, hepcidin has three parts; the main structural framework, disulphide linkages and N-terminal region. Ferroportin, that allows the entry of iron into the blood, is degraded by hepcidin and inhibits this process. Transferrin receptor 1 and 2 play an important role along with hemochromatosis protein in sensing iron and increasing hepcidin expression. The role of hepcidin is instrumental in iron deficiency anemia. Iron-refractory iron deficiency anemia an autosomal recessive is associated with TMPRSS6 mutation that leads to increased concentration of serum hepcidin despite iron deficiency. In anemia of chronic disorder, hepcidin blocks the entry of iron from macrophages and duodenal enterocytes into blood, thus inhibiting the growth of microorganisms. In β-thalassemia major it has two effects; inhibitory and stimulatory. The inhibitory response is due to ineffective erythropoiesis and stimulatory response is due to multiple transfusions. In hereditary hemochromatosis type II hepcidin production is low due to gene mutation that leads to iron overload.

This narrative review is compiled after relevant lit-

الملخص

الهيبسدين هو بروتين أساسي منظم للحديد يتم تكوينه بواسطة جين الببتيد البشري المضاد للميكروبات. من الناحية الهيكلية (التركيب)، يتكون الهيبسيدين من ثلاثة أجزاء؛ الإطار الهيكلي الرئيسي وروابط ثاني كبريتيد والمنطقة الطرفية المسمى ب « N». يسمح الفيروبورتن بدخول الحديد إلى الدم. يقوم الهيبسيدين بتكسير الفيروبورتن ويمنع دخول الحديد الى الدم. يلعب مستقبل الترانسفيرين ١ ومستقبل الترانسفيرين ٢ دورًا مهمًا مع بروتين ترسب الأصبغة الدموية (hemochromatosis) في استشعار الحديد وزيادة عرض الهيبسيدين.

يلعب دور الهيبسيدين دورًا فعالًا في علاج فقر الدم الناجم عن نقص الحديد. فقر الدم الناجم عن نقص الحديد المقاوم (Iron-refractory iron deficiency anemia) وهو مرض وراثي متنحي مرتبط بطفرة في جين «TMPRSS٦» التي تؤدي إلى زيادة تركيز الهيبسيدين في الدم على الرغم من نقص الحديد. في مرض فقر الدم الناجم عن الامراض المزمنة، يمنع الهيبسيدين دخول الحديد من الخلايا البلعمية وخلايا المعوية في الاثني عشرية إلى الدم، مما يثبط نمو الكائنات الحية الدقيقة. في الثلاسيميا (انيميا حوض البحر المتوسط) نوع بيتا الكبرى لدى الهيبسيدين تأثيران؛ هما التثبيط والتحفيز. ويرجع التثبيط إلى عدم فعالية عملية تكون خلايا الدم والتحفيزي ينتج عن عمليات نقل الدم المتعددة. في داء ترسب الأصبغة الدموية الوراثي من النوع الثاني يكون إنتاج الهيبسيدين منخفضًا بسبب الطفرة الجينية التي تؤدي إلى زيادة الحديد.

تم تجميع هذه المقالة المراجعة بعد البحث في الأدبيات ذات

erature search from electronic databases. The key words used for searching relevant literature include iron, iron deficiency, iron deficiency anemia, iron metabolism, hepcidin, transferrin, causes of iron deficiency anemia and laboratory diagnosis of iron deficiency anemia. Reference hematology books were also consulted.

Key-words:
Hepcidin, iron deficiency anemia, iron, ferroportin

الصلة من قواعد البيانات الإلكترونية. تشمل الكلمات الرئيسية المستخدمة للبحث في الأدبيات ذات الصلة الحديد ونقص الحديد وفقر الدم الناجم عن نقص الحديد واستقلاب الحديد والهيبسيدين والترانسفيرين وأسباب فقر الدم الناجم عن نقص الحديد والتشخيص المختبري لفقر الدم الناتج عن نقص الحديد. كما تم الرجوع إلى الكتب المرجعية لأمراض الدم.

Introduction

Hepcidin is one of the most important regulator of iron metabolism.[1] It has a molecular weight of approximately 28 Da. It is encoded by human antimicrobial peptide (HAMP) gene,[2] located on the long arm of chromosome 19 at position 13.1(19q13.1).[3] It was identified as a cysteine rich amino acid compound in human plasma and urine. This molecule was earlier known as liv-er-expressed antimicrobial peptide-1 (LEAP-1). Hepcidin was named on the basis of its site of synthesis and function i.e., liver (hep) and (cidin) anti-microbial.[4] Hepcidin acts against gram negative bacteria as well as has anti-fungal activity.[5] Hepcidin has emerged as an important di-agnostic tool of iron deficiency anemia, chronic disorders and iron overload. [6]

Types of hepcidin

There are 3 types of hepcidin i.e., hepcidin 20, 22 and 25. Hepcidin 20 and 22 are the truncated hepcidin having smaller number of amino acids. Their function has not been elucidated yet.[7] Ac-tive form of hepcidin is a 25 amino acid compound. Hepcidin 25 has been extensively studied and its functions are well understood. Primary structural framework of all three forms of hep-cidin is identical, the difference lies in the N–terminal region of the molecule.

Structure of hepcidin

Structure of hepcidin has been studied using nuclear magnetic resonance (NMR) technique. Hepcidin molecule is peptide in nature, comprised of three parts; a structural framework, disul-phide linkages and a N-terminal region.

• *Structural framework*

Cysteine is the main tightly folded cationic amino acid present in the hepcidin molecule. It contains 8 cysteine residues that form the central core. The central core is a hairpin like struc-ture with a β – sheet.[8] β–hairpin consists of two anti-parallel strands. β–sheet is a pleated twisted structure that consists of β–strands connected laterally through hydrogen bonds. β–strand

is an extended polypeptide chain which contains 3 to 10 amino acids. These amino acids form hydrogen bonds with other β–strands in the same β–sheet structure.

• *Disulphide linkage in cysteine residues*

Cysteine residues are linked together through disulphide bonds. Several studies have been conducted to assess the connectivity of these disulphide bonds. Cysteine residues connected to the disulphide bonds are present in a ladder–like arrangement. They are connected as fol-lows: Cys7 to Cys23, Cys10 to Cys13, Cys11 to Cys19, and Cys14 to Cys23. Apart from these, there is another disulphide bond present between Cys 13 and Cys 14.9 A recent study showed that the connectivity between the disulphide bonds reported in the previous studies are incorrect. It showed two linkages; Cys7 to Cys23 and Cys11 to Cys19 are similar to the previous studies. However, there is no disulphide bond located between Cys 13 and Cys 14. The rest of the two connections exist between Cys10 and Cys13 and Cys14 and Cys22.[10]

• *N-terminal region*

Hepcidin has a flexible N-terminal region. It is an important structural and functional part of hepcidin. This region is different in all three types of hepcidin. Number of amino acids in N-terminal region of hepcidin 25 ranges from 60 to 84. In hepcidin 20, N-terminal region com-prises of 65 to 84 amino acids while in hepcidin 22 the number of amino acids is 63 to 84.[11]

Flexible N-terminal region of hepcidin is instrumental in the functions of hepcidin. N-terminal region binds hepcidin to ferroportin which is a receptor present on macrophages, duodenal cells and placenta that allows the entry of iron in blood. Nemeth (2006) reported that partial loss of N-terminal region leads to partial loss of activity of hepcidin while com-plete absence leads to complete loss of this function.[12]

Conformational changes of hepcidin

Hepcidin undergoes conformational changes at different temperatures. At lower and higher temperatures, the structural change occurs mainly around β–sheet hairpin structure. N-terminal region of hepcidin is flexible to temperature changes. However, effects of these temperature de-pendent conformational changes on the function of hepcidin are still unclear.[8, 10]

Synthesis of hepcidin

Hepcidin is synthesized in hepatocytes. It is primarily encoded as an 84 amino acid prepropep-tide (preprohepcidin). It contains an N-terminal region composed of 24 amino acids. N-terminal region contains a signaling peptide present in the endoplasmic reticulum responsible for the syn-thesis of hepcidin.[13] Hepcidin is synthesized in two steps by preprohepcidin. In the first

step, the 84 amino acid, prepropeptide is cleaved at N-terminal region signaling peptide to produce 35 amino acid prohepcidin. In the second step this prohepcidin is further cleaved by furin to pro-duce 25 amino acid hepcidin.[14]

Furin is a prehormone (prehepcidin) peptidase present in hepatocytes which converts propep-tide (prehepcidin) to 25 amino acid mature hepcidin by acting at the cleavage site. It belongs to the family of proprotein convertases (PC). It was assumed that PC7, a member of proprotein convertase is responsible for the activation of hepcidin.[15] However, it has been shown that PC7 has no such role and is only responsible for shedding transferrin receptor 1.16 Proteolytic cleav-age of prohepcidin to hepcidin is also not regulated by iron-transferrin complex.[13] Only furin activates hepcidin by cleaving the proprotein which cannot degrade ferroportin. [16, 17]

Hepcidin expression and activation

Hepcidin is expressed by several mechanisms. Under physiological conditions, hepcidin is ex-pressed by signal transducer and translocation (SMAD) pathway present in the hepatocytes (SMAD stands for sma and mad related proteins). This protein is so named because it is the human homolog of Drosophila melanogaster Mad (Mothers against decapentaplegic) protein found in Drosophila and the related Caenorhabditis elegans gene Sma (so called because ani-mals carrying Sma mutations have a small body size).[18] SMAD pathway induces hepcidin ex-pression. This pathway is activated by bone morphogenic protein-6 (BMP-6) and its co-receptor hemojuvelin (HJV). BMP-6 is a growth factor that belongs to the transforming growth factor-beta (TGF-β) superfamily that induces growth of bones and cartilages. HJV is a glyco-sylphosphatidyl inisotol-linked (GPI-linked) membrane protein. It is expressed in liver and acts as a co-receptor of BMP-6 to induce hepcidin expression.[19] BMP-6 combines with HJV and phosphorylates SMADs to form SMAD-1/-5/-8-SMAD-4 complex. This complex translocates to the nucleus and induces the transcription of HAMP gene which in turn stimulates hepcidin production.[20]

Hepcidin expression is also induced by interleukin-6 (IL-6). IL-6 mediates hepcidin expression by acting on signal transducer and translocation 3 (STAT 3) pathways.[21] This pathway is acti-vated in anemia of chronic disorders and various inflammatory conditions. STAT 3 is present in hepatocytes. In response to inflammatory conditions, IL-6 is released that binds with its receptor glycoprotein 130(gp130).[22] This activates Janus kinases 2 (JAK2) which stimulates STAT 3 i.e. a transcription fac-

tor. STAT 3 protein translocates into the nucleus and induces hepcidin expres-sion.[23]

Inhibition of hepcidin

Hepcidin expression is suppressed by several factors that include SMAD 7 protein, growth dif-ferentiation factor 15(GDF15), twisted gastrulation factor 1(TWSG1), erythropoietin, hypoxia inducible factor (HIF) and matriptase. SMAD7 inhibits SMAD protein that mediates a negative feedback loop to both TGF-β and BMP signaling.[24]

GDF 15 belongs to the family of transforming growth factors and is released by late and apop-totic erythroblasts. It is released in conditions associated with ineffective erythropoiesis e.g. β-thalassemia major.[25] TWSG1 protein is secreted by erythroid precursors, in conjunction with GDF15, it causes suppression of hepcidin.[26] HIF also stops hepcidin expression during hypox-ic state.[27]

Matriptase {also known as transmembrane protease serine 6 (TMPRSS6)} is a serine protease which inhibits expression of hepcidin by acting on HJV/BMP-6 thus inhibiting SMAD path-way.[28] Matriptase maintains iron homeostasis. It is also known as iron sensor in iron deficiency anemia.[29]

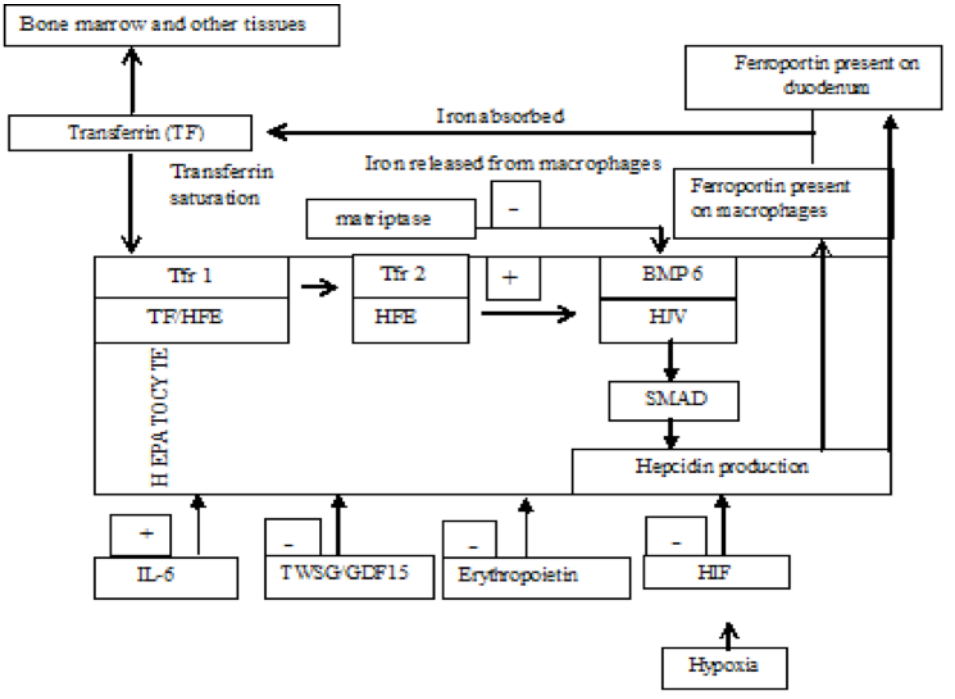
Functions of hepcidin

Iron regulation

Homeostasis of body iron is the most important function of hepcidin.[30] Ferroportin, in associa-tion with hepcidin, takes part in the regulation of iron absorption. Ferroportin is the only iron exporter in mammals. Iron is absorbed from enterocytes through ferroportin into blood. Trans-ferrin transports iron to bone marrow and other tissues by attaching to transferrin receptor 1(Tfr1) present on the plasma membrane of the cells of these tissues.[31] Haemochromatosis (HFE) protein is a membrane protein present on hepatocytes. Its gene is present on chromosome number 6. It is an iron sensor that inhibits excessive iron absorption. It binds with Tfr1 during low or normal plasma iron levels. As iron is absorbed, it attaches with transferrin and forms iron-transferrin complex which competes with HFE for binding with Tfr1.[32] Unbound HFE binds with transferrin receptor 2(Tfr2) which activates BMP-HJV complex causing activation of SMAD pathway. SMAD pathway increases hepcidin expression in the liver.[20] The pathway through which HFE activates HJV/BMP bonding is known as Erk pathway. However, accord-ing to a study Tfr2 alone can activate hepcidin release.[33, 34] Ferroportin is not only found on du-odenal enterocytes, it is also present on macrophages and placenta. It shows that hepcidin not only inhibits iron absorption from duodenal enterocytes, but also inhibits its release of iron from macrophages and

its passage through the placenta.[35] Regulation of iron is shown with the help of ray diagram in figure 1.

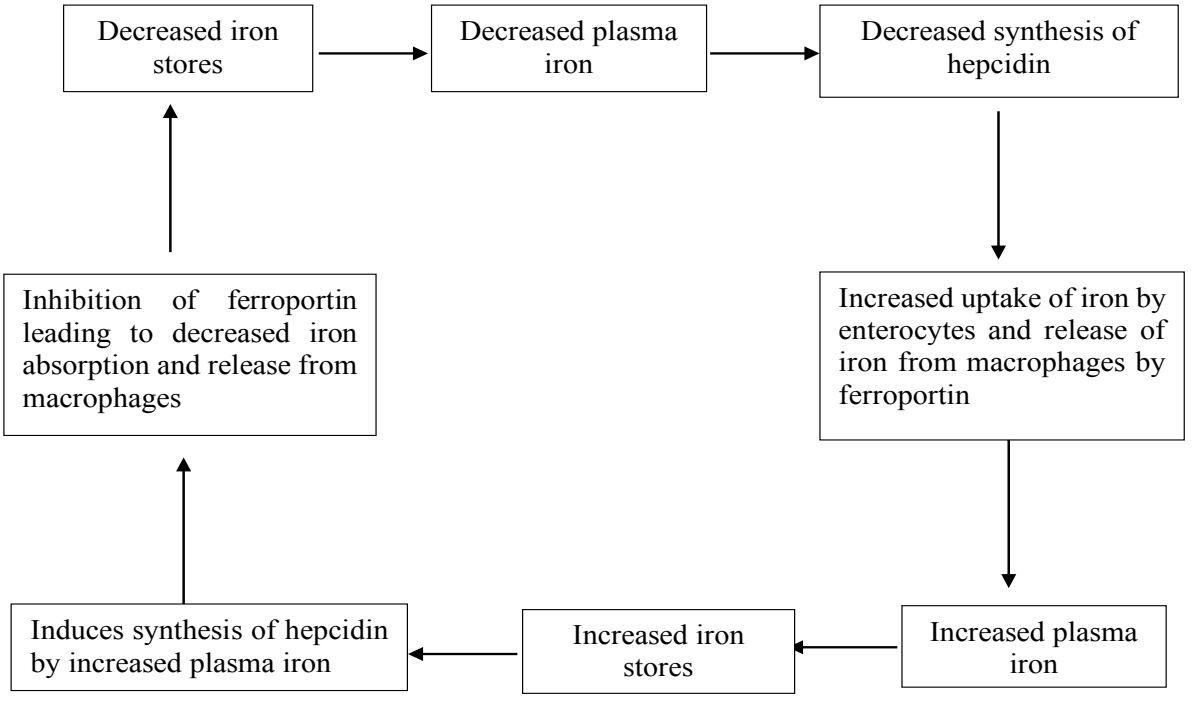
Figure 1: Diagrammatic representation of iron regulation



Degradation of ferroportin by hepcidin

Hepcidin blocks the entry of iron in the blood by degrading ferroportin. Ferroportin after endo-cytosis is degraded in the lysosomes through a number of steps.[36] Process of hepcidin induced ferroportin entrance within the cell starts with the binding of hepcidin to ferroportin. This bind-ing leads to the attachment of cytosolic Janus kinase 2 (Jak2) to ferroportin.[37] Jak 2 autophos-pharylates and results in the phosphorylation of ferroportin. This phosphorylation is an im-portant step.[38] After phosphorylation this hepcidin-ferroportin complex is then internalized within the cell.[39] Ferroportins entrance into the cell for degradation is known as internalization. Af-ter it's internalization ubiquitin which is a regulatory protein, attaches with ferroportin. This pro-cess is known as ubiquitination. Binding of ferroportin to ubiquitin is necessary for the recogni-tion of ferroportin which is a set of cytosolic proteins known as endosomal sorting complex re-quired for transport (ESCRT) proteins. ESCRT proteins enclose ferroportin in small vesicles and endosomes called as multivesicular bodies.[40] These multivesicular bodies attach with lyso-somes resulting in the degradation of ferroportin. Regulation of iron by hepcidin through ferro-portin is summarized in figure 2.

Figure 2: Regulation of iron by hepcidin



Antimicrobial activity of hepcidin

Hepcidin also has anti-microbial activity and act against Escherichia coli, Staphylococcus aure-us, Staphylococcus epidermidis and group B Streptococcus.[5]Candida albicans, Aspergillus fumigatus and Aspergillus niger are also inhibited by hepcidin.[4]

Mechanism by which hepcidin acts against microorganisms

When microorganisms invade the body, they utilize circulating plasma iron. Invasion of these microorganism leads to activation of the immune system and synthesis of IL-6 which acts on STAT 3 pathway which increases hepcidin expression.[21]As hepcidin production is increased, it acts on ferroportin present on enterocytes and macrophages and blocks the entry of iron into plasma causing hypoferremia. Thus, iron is not available for the growth of microorganisms.[41]

Association of hepcidin with hematological disorders

Hepcidin has strong association with some hematological disorders that include iron deficiency anemia, iron-refractory iron deficiency anemia, anemia of inflammation, β-thalassemia, heredi-tary hemochromatosis and myelodysplastic syndromes. Hepcidin levels, association with some disorders and mechanism of its synthesis or inhibition is shown in table 1. Mechanisms through which hepcidin plays its role in these disorders is briefly discussed below.

Iron deficiency anemia (IDA)

Hepcidin has a strong association with iron

Table 1: Hepcidin, serum iron and mechanism of increased synthesis or inhibition of hepcidin

Clinical condition	Hepcidin levels	Serum iron	Mechanism
Iron deficiency anemia	Decreased	Decreased	Hepcidin suppression
Beta thalassemia (intermedia and major)		Normal or increased	Hepcidin suppression due to erythroferrone sequestering BMPs that attenuates the hepcidin signaling in response to iron
Congenital dyserythropoietic anemias		Increased	Hepcidin suppression
Sideroblastic anemia		Increased	Hepcidin suppression
Hereditary hemochromatosis		Increased	Hepcidin suppression
Iron refractory iron deficiency anemia	Increased or normal	Decreased	Lack of hepcidin inhibition due to mutations of TMPRSS6 gene
Hepcidin producing adenomas	Increased	Decreased	Autonomous production of hepcidin
Anemia of chronic disease (inflammation)		Decreased	Cytokine induced hyperproduction of hepcidin

deficiency anemia. Decreased concentration of iron leads to decreased hepcidin concentration which enhances iron absorption.[1]. Matriptase (TMPRSS6) suppresses the synthesis of hepcidin.[28] Low iron concentration stimulates the syn-thesis of hypoxia inducible factor-1α (HIF-1 α) and factor-2α (HIF-2α).[42] HIF is a transcription factor which responds to decreased iron content in the cells as well as hypoxia. HIF-1α and 2α activate matriptase. Matriptase cleaves membrane-bound HJV to soluble HJV. Soluble HJV cannot bind with BMP. HJV and BMP are necessary to activate the SMAD pathway. Inhibition of SMAD suppresses the hepcidin expression.[29] Hence, decreased production of hepcidin leads to increased iron absorption.

Iron-refractory iron deficiency anemia (IRIDA)

Iron-refractory iron deficiency anemia is an autosomal recessive disorder characterized by ane-mia, hypochromia, severe microcytosis, markedly reduced transferrin saturation and normal or increased hepcidin levels. Contrary to iron deficiency anemia, serum ferritin level remains nor-mal or increased. [43] In IRIDA, patient does not respond to oral iron therapy and is incompletely responsive to parenteral iron. [44] This genetic disorder is associated with TMPRSS6 mutations that leads to increased concentration of serum hepcidin despite iron deficiency suggesting the inhibitory role of matriptase in the synthesis of hepcidin. [45]

β – thalassemia major

This inherited defect leads to decreased production or complete absence of β-globin chain of hemoglobin molecule.[46] Ineffective erythropoiesis is a cardinal feature of β-thalassemia major. [47] Regular blood transfusions are necessary for survival. The bitter consequence is the regular cycle of blood transfusions that leads to iron overload as the body lacks an effective excretory sys-tem for iron.[48]

In β-thalassemia major hepcidin concentration is regulated by two mechanisms, i.e. inhibitory effect by ineffective erythropoiesis and the stimulatory effect by blood transfusion.[19, 25] Blood transfusions excessively increase the iron levels resulting in increased production of hepcidin.[49] During the intervals between blood transfusion ineffective erythropoiesis occurs, which is asso-ciated with decreased hepcidin production. [50]

β-thalassemia intermedia and congenital dyserythropoietic anemias are also characterized by in-effective erythropoiesis that causes decreased production of hepcidin. As a result, hepcidin con-tributes towards iron overload in both these conditions.[26, 50, 51] These are also known as iron loading anemias. It is also evident that patients with β-thalassemia major and β-thalassemia in-termedia on iron chelation therapy did not show any statistically significant correlation between the levels of serum ferritin and hepcidin.[50]

Anemia of chronic disorders or inflammation

Tuberculosis, chronic urinary tract infections, meningitis, osteomyelitis, rheumatoid arthritis, systemic lupus erythematosus, severe trauma and malignant conditions (lymphoma, myeloma etc) are commonly associated with as anemia of chronic disorders (ACD). ACD is also referred as anemia of inflammation. ACD is characterized by normocytic normochromic red cells, de-creased serum iron levels and increased hepcidin levels. [52, 53] Interleukin-6 (IL-6), secreted by inflammatory cells, is increased in conditions associated with ACD that plays a major role in the hepcidin secretion and iron regulation.[45] Plasma iron level decreases in ACD despite large iron stores as hepcidin inhibits the release of iron from macrophages and also inhibits iron absorp-tion by degrading ferroportin. The diminished absorption of iron and increased retention in the macrophages provides a protective mechanism from microorganisms that can rapidly grow in the presence of excessive iron. [54] In addition to the suppressed erythropoiesis in ACD, in-creased white cell production and/ or activation is hallmark of ACD. Both the low serum iron levels (hypoferremia) and trending white cell produc-

tion reduces the erythropoietic activity. ACD is also accompanied by increased macrophage activation that leads to erythrophagocytosis and shorten life span of red cells. [55]

Hereditary hemochromatosis

Hereditary hemochromatosis (HH) is a group of inherited disorders characterized by mutations in HFE, HAMP, Tfr2 or ferroportin genes which lead to iron overload. There are 4 types of HH, each type is characterized by a defect in one of the genes that leads to decreased production of hepcidin. [56] Although there are four types of HH, hepcidin is associated with only three types as described below:

HH Type I: It is an autosomal recessive disorder; also known as classical hereditary hemo-chromatosis and is characterized by a mutation in HFE gene. The mutant gene causes decreased production of HFE protein.[57] Mutation in HFE gene results in altered Erk pathway resulting in inappropriate decreased hepcidin production that leads to iron over load.

HH Type II: It is an autosomal recessive variant known as juvenile hemochromatosis. It is fur-ther divided into two subtypes type IIa and IIb. In type IIa, HJV gene is mutated while in type IIb there is mutation in HAMP gene (hepcidin gene). Both these mutations cause low hepcidin production.[58, 59]

HH Type III: Also known as hereditary hemochromatosis, it is an autosomal recessive disor-der, characterized by mutation in Tfr2 gene causing absence of Tfr2. As a result, hepcidin pro-duction decreases leaving ferroportin unopposed; this increases the absorption and release of iron into the blood. [12, 57]

Summary:

Availability of iron for the developing erythroblasts and to avoid its overload is a well-regulated mechanism. Hepcidin regulates the iron homeostasis by degrading ferroportin. Excessive hep-cidin production results in reduced levels of iron while diminished availability of hepcidin leads to iron overload. In iron overload, hepcidin is suppressed due to erythroferrone sequestering BMPs that attenuates the hepcidin signaling in response to iron. In IRIDA, lack of inhibition of hepcidin due to mutations in TMPRSS6 gene leads to decreased serum iron.

Key point box:

• Hepcidin is an essential iron regulatory protein.

• Low hepcidin concentration in iron deficiency anemia leads to increased iron absorption.

• In iron-refractory iron deficiency anemia (IRIDA) increased concentration of serum

hepcidin are found despite iron deficiency.
• In anemia of chronic disorder, hepcidin blocks the entry of iron from macrophages and duodenal enterocytes into blood, thus inhibiting the growth of microorganisms.

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Case Report :

Impact Of Covid 19 Infection On Rare Combination Of Subaortic Membrane And Patent Ductus Arteriosus In Adult Female

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Abstract

Background:

Variable presentations manifesting outflow obstruction may lead to non-significant symptoms or produce symptoms linked to the degree of the left ventricular outflow tract obstruction. A patent ductus arteriosus is also an infrequent non-cyanotic congenital heart disease, which usually occurs as an isolated lesion, but in association with subaortic membrane, the prevalence is even lower. This combination affects the presentation, symptoms and management approach. Careful evaluation is important as the management strategy is based on the evaluation.

Case presentation:

This is a case report, discussing a female patient in her middle-ages with subaortic membrane along with patent ductus arteriosus as a rare presentation. The electrocardiogram showed left ventricular hypertrophy and strain pattern. The chest X-ray revealed cardiac enlargement with enlarged aorta. The echocardiography indicated a dilated left ventricle with mild left ventricular systolic dysfunction, a sub-aortic membrane with high gradient and moderate aortic regurgitation. There was also a PDA with a left to right

الملخص

الخلفية:

يؤدي الدرجات المختلفة للغشاء تحت الأبهري إلى أعراض غير مهمة أو ينتج عنه أعراض مرتبطة بدرجة انسداد مجرى تدفق البطين الأيسر. القناة الشريانية السالكة هي أيضًا مرض قلبي خلقي نادر الحدوث، والذي يحدث عادةً كمرض منفصل، ولكن اقترانه مع الغشاء تحت الأبهري، يكون نادر الحدوث. سيؤثر على الكيفية التي سيبرز بها المريض لأول مره وكذلك الأعراض ونهج المعالجة. التقييم الدقيق مهم لأن استراتيجية العلاج تعتمد بشكل كبير على هذا التقييم

عرض الحالة:

هذا تقرير حالة ، يناقش مريضة متوسطة العمر لها غشاء تحت الأبهري بالإضافة إلى القناة الشريانية السالكة كعرض تقديمي نادر. أظهر مخطط كهربية القلب تضخم البطين الأيسر ونمط الإجهاد ، وكشفت الأشعة السينية للصدر عن تضخم القلب مع تضخم الشريان الأورطي. أشار تخطيط صدى القلب إلى اتساع البطين الأيسر مع ضعف خفيف في وظيفة البطين الأيسر الانقباضي ، وغشاء تحت الأبهر بضغط عالي وارتجاع اورطي متوسط. كان هناك أيضًا القناه الشريانية السالكة مع تدفق الدم من اليسار إلى اليمين. أشار تصوير الأوعية التاجية إلى أن الشرايين التاجية طبيعية وكشفت قياسات ضغط قسطرة القلب اليمنى عن ارتفاع ضغط الدم الرئوي.

أصيبت المريضة بفيروس كورونا ١٩ مما أدى إلى تدهور حالتها الطبية وتغيير طريقه العلاج المخطط لها

shunt. The coronary angiogram indicated normal coronaries, and a large PDA. The right heart catheter pressure measurements revealed pulmonary hypertension. The patient infected with COVID-19 that had resulted in deterioration of her medical status and the planned management.

Conclusions:

The combined lesion presents a challenging clinical presentation and diagnosis. Cardiac catheterization might be helpful. Management strategy might need modification. Exposure to COVID 19 infection compose a risk to such patient and influence the management strategy.

Keywords:

Ductus Arteriosus, Patent; Discrete Subaortic Stenosis; Heart failure

Case Reports; Hypertension, Pulmonary; Thoracic Surgery; Vascular Closure Devices

الخلاصة:

اقتران مرضي قلب خلقي تمثل عرضًا وتشخيصًا إكلينيكيًا صعبًا. قد تكون القسطرة القلبية مفيدة. تحتاج استراتيجية العلاج إلى تعديل بين جراحي وتداخلي او مزيج بينهما. مرضي القلب الوراثي معرضين لالتهابات فيروس الكورونا، مما قد يغير العلاج المناسب لحالتهم

Introduction

The prevalence of a subaortic membrane is less than 1% of all congenital cardiac defects، with males being affected more than females [1]. Differences in anatomical growth has been proposed as the etiology, but the exact mechanism is still not clear. A patent ductus arteriosus (PDA) represents 15% of all congenital heart diseases[2]. Typically, children remain asymptomatic and may exhibit exercise intolerance or a murmur [3]. A PDA is usually associated with a coarctation of the aorta. However, the association of a PDA with a subaortic membrane (SAM) beyond the neonatal period is exceptionally rare [4]. In this case report, we are presenting a case of a PDA and a SAM in an adult female.

Some congenital heart disease become symptomatic at the age of 10-20 years, but at the age of 44 years, it is rare [5]. Exertional dyspnea, effort angina and syncope are the most prevalent symptoms [5]. The presence of a PDA murmur may dominate the low-pitched ejection systolic murmur in the second and third left intercostal space and the absent ejection click being characteristic of a SAM [2]. An electrocardiogram will indicate previous signs of left ventricular hypertrophy and a strain pattern. A careful echocardiography is the preferred diagnostic imaging tool, but the sensitivity

to identify these defects in adult readers is expected to be lower than a pediatric cardiologist [2]. The challenge increases if read by an echo technician, who are not trained to detect such deviations. The combination will limit the use of a non-surgical intervention, and it may affect the surgical approach and possibly the outcome [1,6]. The current Coronavirus disease (COVID-19) had added a big challenge to such case. Adults with congenital heart disease (ACHD) are prone to higher risk of complications with COVID-19. The type, the anatomic complexity and the patient's physiologic status will determine the clinical course and the management approach. An individualized approach to risk stratification is a mandatory [7].

Case presentation:

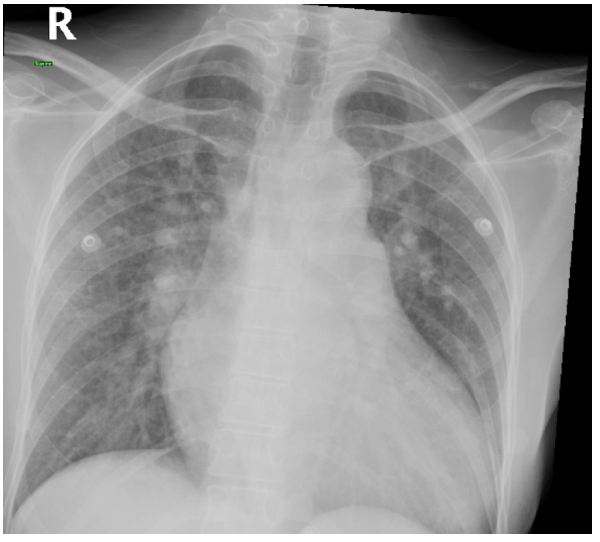
A 44-year-old Saudi female, living in a suburban town in Saudi Arabia, presented with chest pain and dyspnea (New York Heart Association Classification class II). She was referred for evaluation as a Non-ST-Elevation Myocardial Infarction. She has been diagnosed with a congenital heart disease since childhood and was lost to follow-up from that period. The patient was also diagnosed with type 2 diabetes mellitus, which was poorly controlled.

On examination, she was vitally and hemodynamically stable. The patient was underweight, her body mass index (BMI) was 17.6 kg/m2; she appeared pale, but there was no cyanosis, clubbing or jaundice. The examination of the precordium revealed a displaced apex, which was forceful and well sustained. The 1st heart sound was normal in intensity. The 2nd heart sound was faint, and a systolic and diastolic murmur were audible in the right upper parasternal area. The examination of the other systems revealed no abnormalities.

The patient's complete blood count and comprehensive metabolic panel were within normal limits, except for an elevated HbA1C. The electrocardiogram findings were a normal sinus rhythm with left ventricular hypertrophy and strain pattern. The chest X-ray revealed cardiac enlargement with an enlarged cardiothoracic ratio. Increased pulmonary vascularity was noted. The trachea was slightly pushed to the right side, suggesting an enlarged aorta (Figure 1). A computerized tomography of the chest was offered to the patient, but she declined due to the fear of contrast reaction.

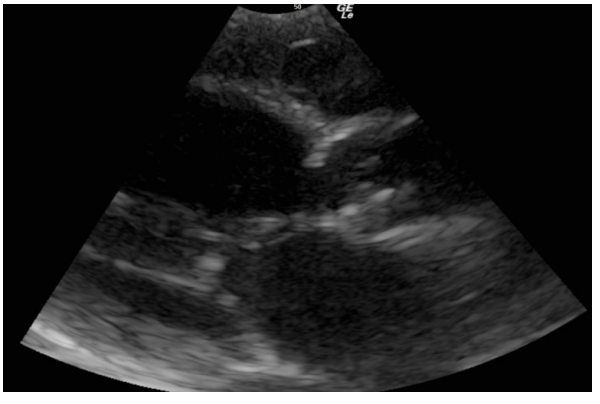
The echocardiography, transthoracic and transesophageal, indicated a dilated left ventricle with an end diastolic dimension of 6 cm, end systolic dimension of 5 cm, with mild left ventricular systolic dysfunction, EF 42%: a sub-aortic membrane with a peak gradient across of 67 mmHg

Figure 1. Chest x-ray showed cardiac enlargement with enlarged cardiothoracic ratio. Increased pulmonary vascularity was noted. Trachea was slightly pushed to the right side suggesting enlarged aorta



and moderate aortic regurgitation (Figure 2). There was also a PDA with a left to right shunt; the size of the PDA was about 1.3 cm, the systolic and diastolic gradient across the PDA were 60 and 10 mmHg respectively.

Figure 2. Transthoracic echo - Parasternal long axis view showing sub-aortic membrane.



The coronary angiogram indicated normal coronaries, and the pullback showed no gradient across the aortic valve, the left ventricular end-diastolic pressure was 5 mmHg, and an aortography showed a large PDA. The right heart catheter pressure measurements were as follows: right atrium=8 mmHg, right ventricle=59/0 (mean 11 mmHg), pulmonary artery=50/20 mmHg (mean 32 mmHg). The patient was discharged and referred to another hospital , experienced in congenital heart disease for an elective PDA closure in 10 days. Unfortunately, she had coronavirus disease (COVID-19) infection and experienced respiratory arrest at her local hospital, where she lived. Extubation was difficult and she required a tracheostomy, and she is still managed medically at this stage. Our patient is considered a High-risk patient as per European Society of Cardiology working group having uncorrected anatomy, heart failure, pulmonary hypertension and moderate valvular heart disease. In the event of COVID-19 infection, early admission even in asymptomatic might be considered combined with joint care of the ACHD team [7, 8].

Discussion:

The simultaneous occurrence of a congenital aortic stenosis and a PDA is rare. It was first reported by a 27-year-old physician. A literature review revealed a few cases with such a combination [2]. Local literature review had highlighted 7 cases in a large tertiary hospital, but all were children and

the oldest was 8 years only 3. The etiology of an isolated sub-aortic stenosis, in combination with a patent ductus arteriosus, is unclear [4, 9].

The presentation of the PDA in adulthood is often associated with congestive heart failure, pulmonary arterial hypertension, atrial fibrillation, recurrent pneumonia and signs of volume overload. Endocarditis, if present, may be silent. We report a case of a PDA in an adult, presenting with chest pain and clinical features of NSTEMI, rather than symptoms related to her underlying congenital heart disease. Primary care physicians should be mindful of clinical situations suggesting a previously undiagnosed PDA [5]. There were a few similar reports in the literature review. Most of the reported cases presented with pulmonary hypertension and heart failure [10].

A PDA increases the pulmonary blood flow with subsequent left ventricular dilation, increased pulmonary vascular resistance and pulmonary hypertension. In our patient, the systolic and diastolic gradient between the aorta and pulmonary artery, with a systolic gradient across the PDA, was approximately 100 mmHg, indicating the absence of significant pulmonary hypertension. Right and left heart catheterization was performed which revealed an aortic pressure of 150/70 mmHg and a pulmonary artery systolic pressure of 50 mmHg. In such a situation, the PDA should be closed first, followed by the re-assessment of the severity of the aortic stenosis$_2$.

A percutaneous transcatheter occlusive device is effective and safely used in both children and adults and may remove the need for surgical ligature [6, 10].

The most favorable surgical method for patients with SAM is debatable. Some surgeons prefer the dissection of the discrete membrane. Another method is to resect the hypertrophied muscle with a routine myomectomy [11]. However, in our case, the diagnosis is complex, and a surgical approach may change from a left posterolateral thoracotomy to a median sternotomy. Unfortunately, COVID infection had a major impact of on the case as being a reason for no intervention which will make it unique as case report form what already published. Ongoing studies are currently underway to determine the effect, outcome and management approach of COVID-19 occurring in congenital heart disease patients [8, 12].

Conclusion:

The association of a PDA with a sub-aortic membrane is exceptionally rare. The possibility of such a presentation, at the adult age, should not be ignored. The combined lesion presents a challenging clinical presentation, and the diagnosis can easily

be missed by echo technicians or readers. Cardiac catheterization data might be helpful. Careful evaluation is important as the management strategy, whether surgical or through a device, will need modification. Such patients are susceptible to current COVID-19 infection, which might influence the management and the prognosis.

Our institution does not require ethical approval for reporting individual cases. Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

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Guidelines for Manuscript Preparation

A. TYPES OF MANUSCRIPTS

I. ORIGINAL MANUSCRIPTS

Manuscripts submitted in this category are expected to be concise, well organized, and clearly written.
The maximum length is 5000 words, including the abstract, references, tables, and figure legends. The maximum length is 5000 words, including the abstract, references, tables, and figure legends.

- The structured abstract must not exceed 250 words.
- The title must not exceed 130 characters.
- A maximum of 4 tables and 4 figures is allowed.
- References should not exceed a maximum of 100.
- The abstract must be organized as follows:
- Background & Aims
- Methods
- Results
- Conclusions
- Do not use abbreviations, footnotes or references in the abstract.
- An electronic word count of the abstract must be included.
- Three to ten key words at the end of the abstract must be provided.

The manuscript must be arranged as follows:

- Title page
- Abstract
- Introduction
- Materials and methods (or Patients and methods)
- Results
- Discussion
- Acknowledgements
- References
- Tables
- Figure legends
- Figures

Acceptance of original manuscripts will be based upon originality and importance of the investigation. These manuscripts are reviewed by the Editors and, in the majority of cases, by two experts in the field. Manuscripts requiring extensive revision will be at a disadvantage for publication and will be rejected. Authors shall be responsible for the quality of language and style and are strongly advised against submitting a manuscript which is not written in grammatically correct English. The Editors reserve the right to reject poorly written manuscripts even if their scientific content is qualitatively suitable for publication. Manuscripts are submitted with the understanding that they are original contributions and do not contain data that have been published elsewhere or are under consideration by another journal.

II. REVIEW ARTICLES

Review articles on selected clinical and basic topics of interest for the readers of the Majmaah Journal of Health Science will be solicited by the Editors. Review articles are expected to be clear, concise and updated.

- The maximum length is 5000 words, excluding the summary, references, tables, and figures.
- References should not exceed a maximum of 150.
- The inclusion of a maximum of 4 high-quality tables and 4 colored figures to summarize critical points is highly desirable.
- Review articles must be accompanied by a title page and a summary.

- Reviews should include at least one Key Point Box, with a maximum of 5 bullet points, that briefly summarizes the content of the review.

Review articles are reviewed by the Editors and may be sent to outside expert reviewers before a final decision for publication is made. Revisions may be required.

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Case reports would be only accepted if they represent an outstanding contribution to the Etiology, pathogenesis or treatment of a specific condition.

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- A title page must be provided.

V. LETTERS TO THE EDITOR

Letters to the Editor will be considered for publication if they are related to articles published in recent issues of Majmaah Journal of Health Science. Occasionally, Letters to the Editor that refer to articles not published in Majmaah Journal of Health Science will be considered.

The length of a Letter to the Editor should not exceed 800 words.

- A maximum of 1 table or 1 figure is allowed.
- References should not exceed a maximum of 10.
- No more than 4 Authors may appear in the author list.

VI. COMMENTARIES

International commentaries will be solicited by the Editors only.

- Commentary articles should not exceed a maximum of 800 words, excluding tables or figures.
- A maximum of 1 table or 1 figure is allowed.
- References should not exceed a maximum of 10.
- A title page must be provided.

B. MANUSCRIPT SUBMISSION

ORGANIZATION OF THE MANUSCRIPT

- The submitted manuscript must be typed double-spaced throughout and numbered (including references, tables and figure legends). Preferably using a "standard" font (we prefer Times/Arial 12).
- For mathematical symbols, Greek letters, and other special characters, use normal text. The references must be in accordance with the Vancouver reference style (see References).
- Approved nomenclature for gene and protein names and symbols should be used, including appropriate use of italics (all gene symbols and loci, should be in italics) and capitalization as it applies for each organism's standard nomenclature format, in text, tables, and figures.
- Full gene names are generally not in italics and Greek symbols are not used. Proteins should not be italicized.
- Improperly prepared manuscripts will not be entered into the peer review process and will be sent back to the author for correction.

TITLE PAGE MUST CONTAIN:

- A title of no more than 130 characters.

- Running title (not to exceed 60 characters)
- Names of the Authors as it should be published (first name, middle initial, last name)
- Affiliations of all authors and their institutions, departments, or organizations (use the following symbols in this order to designate authors' affiliations: *, †, ‡, §, ¶, ||, #, **, ††, ‡‡, §§, ¶¶, || ||, ##).
- Name, address, telephone and fax numbers, and electronic mail address of the corresponding Author.
- Electronic word count.
- Number of figures and tables.
- List of abbreviations in the order of appearance.
- Conflict of interest.
- Financial support.

Animal trials: Manuscripts reporting experiments using animals must include a statement giving assurance that all animals received human care and that study protocols comply with the institution's guidelines. Statistical methods used should be outlined.

Human trials: Manuscripts reporting data from research conducted on humans must include a statement of assurance in the methods section of the manuscript reading that:

1. Informed consent was obtained from each patient included in the study and
2. The study protocol conforms to the ethical guidelines of the 1975 declaration of helsinki as reflected in a priori approval by the institution's human research committee.

Randomized controlled trials: Any paper that is a randomized control trial should adhere to the guidelines that can be found at the following web-site: www.consort-statement.org. The checklist should be printed out and faxed to the Editorial office at the time of submission. The trial registration number must be included on the title page of the manuscript reporting a registered clinical trial. Failure to do so will prevent entry to the peer review process.

Drugs and chemicals: Drugs and chemicals should be used by generic name. If trademarks are mentioned, the manufacturer's name and city should be given. All funding sources supporting the work, either public or private, especially those from pharmaceutical companies, must be provided.

Genetic Sequence data: In papers reporting a novel DNA or amino sequence, verification that the data have been or will be submitted either to Gen-Bank or EMBL is required. Please provide this verification and the accession number in the covering letter.

REFERENCES

References must be in accordance with the Journal of Hepatology reference style. References are ordered as they appear in the text and citation numbers for references are placed between "brackets" ("[ ]") in the text as well as in the reference list.

Authors should be listed surname first, followed by the initials of given names (e.g. Bolognesi M). If there are more than six authors, the names of the first six authors followed by et al. should appear.
Titles of all cited articles are required. Titles of articles cited in reference list should be in upright, not italic text; the first word of the title is capitalized, the title written exactly as it appears in the work cited, ending with a full stop. Journal titles are abbreviated according to common usage, followed by Journal years, semicolon (;) before volume and colon (:) before full page range (see examples below).

All articles in the list of references should be cited in the text and, conversely, all references cited in the text must be included in the list.

Personal communications and unpublished data should be cited directly in the text by the first Author, without being numbered. Please make sure you have the latest, updated version of your reference management software to make sure you have the correct reference format for Majmaah Journal of Health Science.

An example of how references should look within the text:

"HVPG was measured by hepatic vein catheterization using a balloon catheter according to a procedure described elsewhere [14, 15] and used as an index of portal hypertension [16]."

An example of how the reference list should look:

[14] Merkel C, Bolognesi M, Bellon S, Zuin R, Noventa F, Finucci G, et al. Prognostic usefulness of hepatic vein catheterization in patients with cirrhosis and esophageal varices. Gastroenterology 1992;102:973-979.

[15] Groszmann RJ, Wongcharatrawee S. The hepatic venous pressure gradient: anything worth doing should be done right. Hepatology 2004;39:280-282.

FIGURES

A maximum of 4 figures is allowed

(This can be modified if needed by Editorial board).

- Figures will be often, but not always, re-designed by graphic designers. By signing and transferring the Copyright Agreement to MJHS, the author gives permission to the graphic designers to alter the visual aspect of any figures, tables, or graphs. The scientific content of figures will not be altered. Please provide this information with your covering letter.
- All graphics submitted to Majmaah Journal of Health Science should be sent at their actual size, which is 100% of their print dimension and in portrait orientation.
- Two standard widths are used and figures should fit in one (8.5 x 23.5 cm) or two (17.5 x 23.5 cm) columns
- Figures should be supplied in the following preferred file formats: PDF (*.pdf), Power Point (*.ppt), Adobe Illustrator (*.ai, *.eps), Photoshop (*.psd) files in grayscales or in RGB color mode. It is highly recommended that figures not be sent in JPG (*.jpg) format.
- Photographs (scans, immunofluorescences, EM, and histology images) should be submitted as: 1. TIFF (*.tif) with a resolution of at least 300 pixels per inch, or
- Illustrator compatible EPS files with RGB color management (*.eps),
- Photoshop (*.psd) or PDF (*.pdf) files (grayscales or RGB) at the appropriate resolution, which is:

1. 300 dpi for color figures
2. 600 dpi for black and white figures
3. 1200 dpi for line-art figures

- For all photomicrographs, where possible, a scale should appear on the photograph. Photographs of identifiable patients should be accompanied by written permission to publish from patient(s).
- • Furthermore, panel lettering should be in Arial bold 14 pt, capitalized and no full stop (A, B) while lettering in figures (axes, conditions), should be in Arial 8 pt, lower case type with the first letter capitalized and no full stop. No type should be smaller than 6 pt.

TABLES

A maximum of 4 tables is allowed

(This can be modified if needed by Editorial board)

- Tables should be provided as Word files (*.doc) or Illustrator/InDesign (*.ai, *.eps, *.indd) compatible files. No TIFF and JPG files are acceptable for table submission.
- When submitting tables in Microsoft Word table function, no tab, space or colors should be used. Tables should contain a maximum of 10 columns.
- Tables submitted in landscape orientation will not be accepted. Tables should include a title, table legend, and if necessary footnotes.
- Include tables in the submitted manuscript as a separate section.

FIGURE LEGENDS

- Figure legends should be listed one after the other, as part of the text document, separate from the figure files.
- Please do not write a legend below each figure. Each figure legend should have a brief title that describes the entire figure without citing specific panels, followed by a description of each panel, and the symbols used.
- Enough information should be provided in the figure legend text to permit interpretation of figures without reference to the text; but should not contain any details of methods, or exceed 100 words.
- The abbreviated word for figure "Fig." should be typed and bolded, followed by the figure number and a period

(i.e. "Fig. 1."). Every figure legend should have a Title written in bold.
- If a figure contains multiple sections (i.e. A, B, C, D) the letter for these subsections should be in capital letters. Within the figure legend text the capital letters should be surrounded by parenthesis [i.e. (A)(B)(C)(D)].
- Figures should be numbered according to the order of citation.

Supplementary material: Supplementary material, not for review, is acceptable. Supplementary material can be submitted as (*.mov), (*.avi), (*.mpeg), or (*.gif) files. Please note that the size limit for these items is 10 MB per file.

ENGLISH

Authors may be asked to contact professionals regarding the correction of the English content of manuscripts either before or after acceptance. This expense will be the responsibility of the Authors.

C. REVIEW PROCESS

Authors should be aware that manuscripts will be screened upon submission. Only the manuscripts which fully comply with the submission requirements outlined and in which the level of English is of an acceptable standard will enter the peer review process.

First submission

Once successful submission of a manuscript has taken place, an acknowledgement will be sent by e-mail to the Corresponding Author on the manuscript. All subsequent correspondence will be with the designated Corresponding Author. The number of the manuscript should be used by the Authors in all communications with the Editorial Office. All the manuscripts will be reviewed by the Editors and, and in some cases, by other expert reviewers. After review, the corresponding Author will be notified by letter of the decision taken by the Editor(s). This letter will be accompanied in most, but not all, cases by the comments of the reviewers. This letter will be sent via e-mail.

Resubmission of manuscripts

In some cases, Authors will be invited to submit a revised version of the manuscript for further review. This invitation does not imply, in any case, that the revised version will be accepted for publication. In general, revised manuscripts must be received in the Editorial Office within four months of the date of the first decision. Authors should submit the resubmitted manuscript with all changes underlined. The resubmitted manuscript should be accompanied by a cover letter stating that the manuscript has been revised according to the comments made by the Editor and the Reviewers. Figures and tables must be uploaded. Please ensure that a separate point by point response to the reviewers is included with the covering letter. Please do not send revised manuscripts to the Editorial Office via e-mail. Revised manuscripts should mailed to site of Majmaah Journal of Health Sciences at mjhs@mu.edu.sa

PROOFS

Proofs will be made available to the author(s) to be checked. It is the responsibility of the author(s) to make sure that the quality and accuracy of the manuscript, figures, and tables in the proofs is correct. Authors should return their proofs within 48 hours, by fax or e-mail if the corrections are minor, to expedite publication. Further changes or additions to the edited manuscript after these corrections cannot be accepted.

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This form should be printed out and the suitable statement chosen among the listed ones (A-G). It should then be signed by the corresponding author and faxed to the Editorial Office at +41 22 510 24 00. If this form is not received the paper will NOT be published.

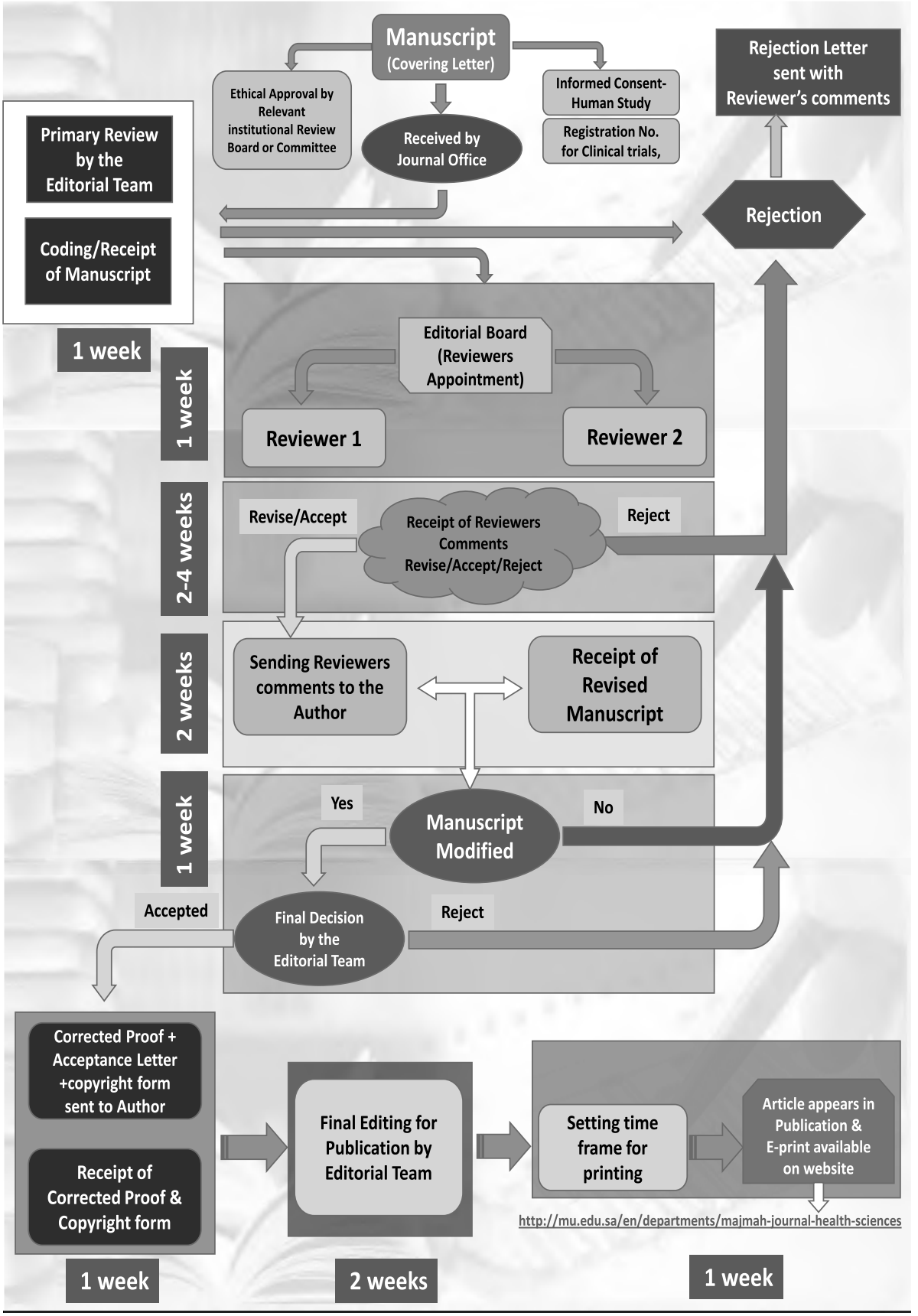
Methodological & Statistical instructions for Authors submitting manuscripts to the Majmaah Journal of Health Science

The manuscripts should include a complete and detailed description of what was done. This includes a description of the design, measurement and collection of data, the study objective and major hypotheses, type and source of subjects, inclusion and exclusion criteria and measures of outcome, number of subjects studied and why this number was chosen. Any deviation from the study protocol should be stated. The baseline characteristics of any compared groups should be described in detail and -if necessary -adjusted for in the analysis of the outcome.

For randomized clinical trials the following should also be clearly documented: treatments, sample size estimation, method of random allocation and measures taken for maintaining its concealment including blinding, numbers treated, followed-up, being withdrawn, dropping out, and having side effects (numbers and type). The statistical methods used should be relevant and clearly stated. Special or complex statistical methods should be explained and referenced.

Complex analyses should be performed with the assistance of a qualified statistician. Unqualified use of such analyses is strongly discouraged. The underlying assumptions of the statistical methods used should be tested to ensure that the assumptions are fulfilled.

For small data sets and if variable distributions are non-normal, distribution free (non-parametric) statistical methods should be used. The actual p values - whether significant or not - should always be presented (not NS). Confidence intervals convey more information than p values and should be presented whenever possible. Continuous variables can always be summarized using the median and range which are therefore preferred. Only in the infrequent case of a Normal distribution are the mean and standard deviation (SD) useful. Complex analyses (including Cox and logistic regression analysis) should be presented in sufficient detail: i.e. variable scoring, regression coefficients, standard errors and any constants. Odds-ratios or relative risks are not sufficient documentation of such analyses. The handling of any missing values in the data should be clearly specified. The number of statistical tests performed should be kept at a minimum to reduce spurious positive results. Explorative (hypothesis generating) analyses without confirmation using independent data are discouraged. Figures showing individual observations e.g. scatter plots are encouraged. Histograms may also be useful. Tables should indicate the number of observations on which each result is being based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