

Profile of Stroke in a Tertiary Care Hospital in Saudi Arabia with Special Emphasis on Permanent Vegetative State after Stroke

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ABSTRACT

BACKGROUND & AIM: Stroke is a medical emergency that can cause permanent neurological damage, complications, and disability, This study aims to review the profile of stroke in a tertiary care hospital in Saudi Arabia and to detect predictors of Permanent Vegetative State after stroke. **METHODS:** We included patients diagnosed as having Cerebro Vascular stroke admitted to King Fahad Specialist Hospital, Buraida, Saudi Arabia during the period between 1/12/2012 to 1/2/2013 and Patients with Permanent Vegetative State with long stay inside the hospital. **RESULTS:** 81 patients were included, their ages ranged from 20-94 years (61.75±17.20). 45 males(55.6%) and 36 females (44.4%). 57 (70.4%) of patients had cerebral infarction, 20 (24.7%) had hemorrhagic strokes and 4 patients (4.9%) venous sinus thrombosis. Hypertension and Diabetes were the commonest risk factors. 15 patients fulfilled the criteria of Permanent Vegetative State. There was no significant difference between patients with Permanent Vegetative State and other stroke patients except in mean age of stroke onset and level of consciousness on admission. **CONCLUSION:** Profile of stroke, its subtypes, risk factors are similar to international reports , old age and low level of consciousness at the onset were the significant predictors of Permanent Vegetative State after stroke.

Key words: Stroke, risk factors, Permanent Vegetative state, Saudi Arabia

المخلص

المخلص والهدف : تعد الصدمة المخية من حالات الطوارئ التي قد تؤدي الى خلل عصبي دائم , مضاعفات و عجز. تهدف هذه الدراسة الى مراجعة الأنماط الإكلينيكية للصدمة المخية في مستشفى مرجعي بالمملكة العربية السعودية وتحديد العوامل المتنبئة لحدوث حالة الغيبوبة الدائمة ما بعد الصدمة المخية. **المرضى وطرق البحث:** شملت الدراسة المرضى المصابين بصدمة مخية المنومين بمستشفى الملك فهد التخصصي – بريدة-المملكة العربية السعودية خلال الفترة من ٢٠١٢/١٢/١ الى ٢٠١٣/٣/١ والمرضى المصابين بالغيبوبة الدائمة ما بعد الصدمة المخية والمنومين بالمستشفى لفترة طويلة. **النتائج:** ضمت الدراسة ٨١ مريض تتراوح أعمارهم بين ٢٠-٩٤ عام. ٤٥ رجل بنسبة ٥٥,٦% و ٣٦ سيدة بنسبة ٤٤,٤%. ٥٧ حالة(٧٠,٤%) جلطات مخية و٤٥ حالة (٢٤,٧%) نزيف بالمخ و ٤ حالات(٤,٩%) جلطات وريدية مخية. ارتفاع ضغط الدم ومرض السكر كانوا من أكثر عوامل الخطر المرتبطة بالصدمة المخية. خمسة عشر مريضا انطبقت عليهم معايير تشخيص حالة الغيبوبة الدائمة ما بعد الصدمة المخية. التقدم في العمر وانخفاض مستوى الوعي عند دخول المستشفى كانت العوامل المرتبطة بحدوث الغيبوبة الدائمة ما بعد الصدمة المخية. **الاستنتاج:** الأنماط الإكلينيكية للصدمة المخية ,أنواعها والعوامل المسببة لها في هذه الدراسة مشابهة للدراسات العالمية في هذا المجال. التقدم في العمر وانخفاض مستوى الوعي كانوا العاملين الأكثر أهمية للتنبؤ بحدوث غيبوبة دائمة ما بعد الصدمة المخية. **الكلمات الدالة:** الصدمة المخية ,عوامل الخطر ,حالة الغيبوبة الدائمة , المملكة العربية السعودية.

INTRODUCTION

Stroke is the single most common cause of long term disability,with upto 40% of stroke patients not expected to recover independence [1]. Vegetative State (VS) is defined as complete unawareness of the self and the environment; it is accompanied by sleep-wake cycles with either complete or partial preservation of hypothalamic and brainstem autonomic functions [2]. After four weeks in a vegetative state, the patient is classified as in a persistent vegetative state. This diagnosis is classified as a permanent vegetative

state (PVS) after approximately one year of being in a vegetative state [3].

VS was first described in 1940 by Ernst Kretschmer[4] who called it apallic syndrome. The term persistent vegetative state was coined in 1972 to describe a syndrome that seemed to have been made possible by medicine's increased capacities to keep patients' bodies alive[5]. "coma vigil" and "akinetik mutism were other names for VS. Unresponsive Wakefulness State (UWS) is the new name given to Vegetative

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State by Laureys et al in 2010[6], it is more respectful of patients than that of VS and it better reflects the pathophysiology of this condition. The distinctive feature of VS is the dissociation between arousal and awareness. where patients can open their eyelids occasionally and demonstrate sleep-wake cycles, but completely lack cognitive functions[7]. Behavioral assessment remains the "gold standard" for detecting signs of consciousness and, hence, for determining diagnosis[8].

The VS may develop suddenly (as a consequence of traumatic or non-traumatic brain injury, such as hypoxia or anoxia; infection; or haemorrhage) or gradually (in the course of a neurodegenerative disorder, such as Alzheimer's disease)[9,10]. Recovery of consciousness occurs through functional and/or structural changes in the brain, i.e., through neuronal plasticity[10]. The longer the state persists the less likely the recovery, and eventually permanence can be declared. Patients can survive for many years in a vegetative state[11].

This study aims to review the profile of stroke in a tertiary care hospital in Saudi Arabia and to detect predictors of PVS after stroke.

MATERIALS AND METHODS

All the patients included in this study were recruited according to pre-arranged inclusion/exclusion criteria.

Inclusion criteria:

- a) Patients diagnosed as having Cerebro Vascular stroke admitted in King Fahad Specialist Hospital, Buraida, Saudi Arabia during the period between 1/12/2012 to 1/2/2013 and diagnosis confirmed by neuroimaging.
- b) Patients with PVS with long stay in the hospital.
- c) Diagnosis of PVS was done according to The Multi-Society Task Force on PVS diagnostic criteria[1]:
 1. No evidence of awareness of self or environment; no interaction with others.
 2. No evidence of sustained, reproducible, purposeful or voluntary behavioral responses to visual, auditory, tactile or noxious stimuli.
 3. No evidence of language comprehension or expression.
 4. Return of sleep-wake cycles, arousal, even smiling, frowning, yawning.
 5. Sufficient hypothalamic and brainstem autonomic

functions to survive if given medical or nursing care.

6. Bowel and bladder incontinence.
7. Variably preserved cranial nerve and spinal reflexes

Exclusion criteria:

- a) Patients with neurological deficit due to causes other than cerebrovascular stroke.
- b) documented history of prior brain injury.
- c) premorbid history of developmental or neurologic illness resulting in functional disabilities.

The following clinical information was collected from the medical file of each patient: age, sex, past medical history and stroke risk factors, history of prior stroke or dementia. GCS, muscle power and intubation on admission, together with selected lab results, site, size and side of stroke in neuroimaging.

STATISTICAL ANALYSIS

The advanced statistical package for social science [SPSS] for MS windows (version 16.0) was utilized to perform the statistical analysis for the study. Simple descriptive statistical tests (Mean and Standard deviation) were used to describe the numerical values of the sample while qualitative data were presented by frequency distribution. To test the 2-tailed significance of differences in means, Student t-test for independent samples for 2 groups was used. Chi square test was used to determine the relation between two variables. A probability of (P) ≤ 0.05 was accepted as significant.

RESULTS

This study included 81 patients their ages ranged from 20-94 years (61.75 ± 17.20) 61.7% of patients were 60 years or older. 45 males (55.6%) and 36 females (44.4%). Regarding subtypes of stroke; 57 (70.4%) of patients had cerebral infarction, 20 (24.7%) had hemorrhagic strokes and 4 patients (4.9%) venous sinus thrombosis. 15 patients fulfilled the criteria of PVS with duration 1-6 years.

Mean age of onset was 64.62 ± 14.04 for males and 58.17 ± 20.12 for females, this difference was not significant. 8 out of 9 patients with stroke in age group 20-40 were females ($p=0.017$). Regarding risk factors of stroke; 57 patients (70.4%) were hypertensive, 41 (50.6%) diabetic, 16 (19.8%) known cardiac patients either myocardial infarction or AF,

19 patients (23.5%) had previous stroke, 4 patients (4.9%) had AVM, 3 patients (3.7%) were obese with BMI >30 and one female patient 31 years old had Antiphospholipid syndrome. 61 patients (75.6%) had more than one risk factor, number of risk factors was highly significantly correlated with age of the patient ($p < 0.001$).

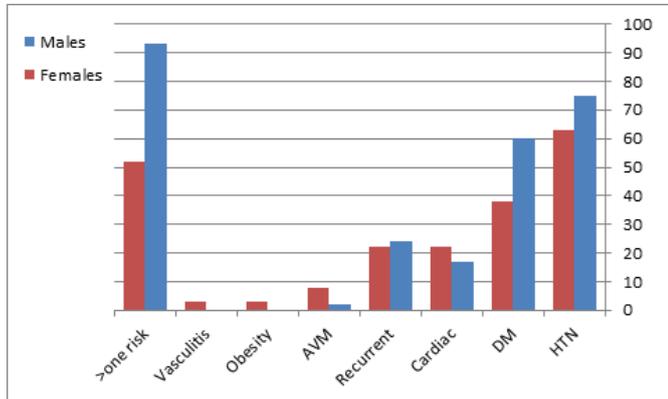


Figure 1: Sex difference in risk factors

Distribution of risk factors by percentage in both males and females are shown in Fig.1., all showed non-significant differences except presence of more than one risk factor which was significantly higher among males ($p < 0.001$).

15 patients were demented before the stroke onset, 14 patients (17.3%) had seizures at the onset, 12 patients (14.8%) were entubated, GCS on admission ranged between 3-15 (12.17 ± 3.25), only 8 patients (9.9%) had GCS < 8. Linear regression between age of onset and GCS on admission is shown in Fig.2.

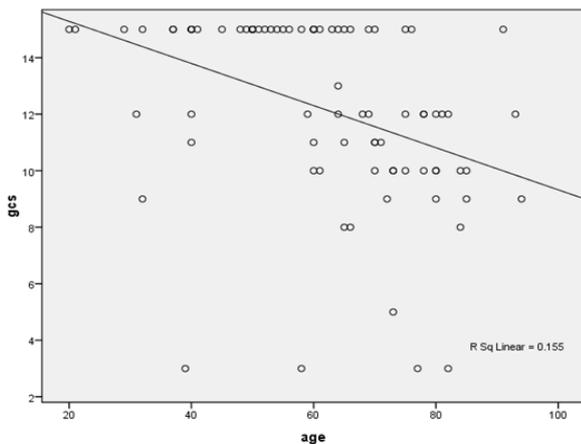


Figure 2: Linear regression between age of the patient and GCS on admission ($p < 0.001$)

Neuroimaging results showed hemispheric lesions (infarction or hemorrhage) in 57 (70.4%), 8 in brain stem (9.9%), 10 in basal ganglia (12.3%) and 2 cerebellar (2.5%). 30 were right sided (37.0%), 27 left sided (33.3%) and 20 (24.7%) bilateral. 37 (45.7%) had small lesions, 21 (25.9%) large and 19 (23.5%) had multiple lesions. In addition to 4 patients with dural sinus thrombosis.

Fifteen (15) patients fulfilled the criteria of diagnosing PVS; 6 males and 9 females. Their mean age was 74.47 ± 10.43 . Demographic, clinical, Radiological and laboratory variables of patients with PVS compared to other stroke patients with their significance are shown in Table.1.

DISCUSSION

This study included 81 patients their ages ranged between 20-94 years (61.75 ± 17.20) 61.7% of patients were 60 years or more. which is in agreement with previous studies found the risk of stroke increases exponentially with age [12] Whereas the majority of stroke patients are elderly.

In our study 9 patients (11.1%) were younger than 40 years old and 21 (25.9%) in the age group 40 -60 years old. this is in agreement with European data which show that up to one third of first-ever strokes occur in patients < 65 years of age, and about 10% of hospitalized stroke patients are aged ≤ 55 years [13]. However our rate is higher than that of Grau et al [14] who found strokes in adults < 45 years of age accounted for about 2% of all first-ever strokes in a community-based Italian study, 6% of all ischemic strokes admitted to hospital. The global tendency of male preponderance was also observed in our series, where males constituted 55.6% of the patients which is in agreement with previous studies [15,16].

There was a significant predominance of females among young stroke patients < 40 years of age. This finding is in agreement with Rasura [17] who assumed that it could be related to higher frequencies of migraine, oral contraceptive use, and hormonal factors in young females.

On the other hand Palm [18] found women were approximately 4 years older when they suffered their first stroke, this can be explained by dilution of our sample by stroke in the young females.

Table 1: Comparison between the demographic, clinical, radiological and laboratory variables between patients with PVS and the rest of stroke patients

Parameters	PVS patients n=15	Other stroke patients n=66	P
Age group-20-<40	0	9(13.6%)	0.032
-40-<60	2(13.3%)	20(30.3%)	
-60+	13(86.7%)	37(56.1%)	
Mean age	74.47±10.43	58.86±17.18	0.001
Sex -Males	6(40%)	39(59.1%)	0.25
-Females	9(60%)	27(40.9%)	
Type of Stroke:			0.518
-Infarction	12(80%)	45(68.2%)	
-Hemorrhage	3(20%)	17(25.8%)	
-Dural sinus thrombosis	0	4(6.1%)	
Risk factors:			
-Hypertension	13(86.7%)	44(66.7%)	0.12
-Diabetes Mellitus	10(66.7%)	31(47%)	0.16
-Cardiac	3(20%)	13(19.7%)	0.97
-Antiphospholipid s.	0	1(1.5%)	0.81
-AVM	0	4(6.1%)	0.43
-Obesity	0	3(4.5%)	0.53
-Recurrent stroke	5(33.3%)	14(21.2%)	0.50
More than one risk factor	13(86.7%)	48(72.2%)	0.49
Mean GCS on admission	8.53±3.13	13.00±2.67	0.001
Ms power=<3	14(93.3%)	42(63.6%)	0.02
Tracheostomy	8(53.3%)	4(6.1%)	0.00
Seizures	4(26.7%)	10(15.2%)	0.28
Dementia	3(20%)	12(18.2%)	0.87
CT site-Lobes			0.29
-Brain stem	2(13.3%)	6(9.1%)	
-Basal ganglia	3(20%)	7(10.6%)	
-Cerebellar	0	2(3%)	
-Venous sinuses	0	4(6.1%)	
CT Side -Right	6(40%)	24(36.4%)	0.62
-Left	4(26.7%)	23(34.8%)	
-Bilateral	5(33.3%)	15(22.7%)	
CT Size - Small	5(33.3%)	32(48.5%)	0.39
-Large	6(40%)	15(22.7%)	
-Multiple	4(26.7%)	15(22.7%)	
WBCs	16.05±4.86	11.31±4.76	0.13
Cholesterol	3.55±1.09	4.27±1.50	0.30
Sodium	135.0±6.16	139.8±4.35	0.12
Albumin	29.96±4.99	28.13±6.53	0.43

Regarding risk factors of stroke; Hypertension, Diabetes were the commonest, followed by Cardiac diseases, previous stroke, AVM and obesity, this is in agreement with many studies[16,19,20,21,22,23]. Regarding subtypes of stroke, 70.4% of patients had cerebral infarction, 24.7% hemorrhagic strokes and 4 patients (4.9%) venous sinus thrombosis. which approach international rates According to recent data released by the American Heart Association, that 87 % of strokes are classified as ischemic[24], While hemorrhagic stroke constitute up to 10–15 % of all strokes[25]. 15 patients were diagnosed as PVS; 6 males and 9 females, their mean age of onset of stroke was 74.47±10.43 which is highly significantly higher than other stroke patients. which is in agreement with Saposnik[26] who concluded that Age and stroke severity are the 2 most important determinants of stroke outcomes.

Also their GCS and muscle power at the onset were significantly lower than the rest of patients, which is in agreement with recent study[27] found GCS score is the predominant initial predictor of early awakening in patients who present in coma after ICH. We couldn't find any significant difference between both groups regarding frequency of risk factors, selected laboratory variables that were linked to prognosis of stroke as WBCs, Albumin and Sodium[28,29,30,31].

Thalamic damage is very common in patients with PVS because of its extremely complex interconnections between the subcortical (i.e. arousal control) and cortical (i.e. awareness) areas, the thalamus is considered a central region for the integration of sensory and cognitive processes required for full consciousness[32]. Lesions in neocortex were also reported in approximately 80% of patients with PVS both in the form of cerebral contusion and ischemia[33]. However, in our study though most of patients had hemispheric lesions, we failed to find any significant difference between PVS patients and the rest of patients in site, side or size of lesions in neuroimaging.

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