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PATTERN OF AND LOCALIZATION OF STROKE IN A TERTIARY HOSPITAL IN NORTH WESTERN NIGERIA: A REVIEW OF 540 PATIENTS

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ABSTRACT

Background: Stroke is a major global health problem. It has been estimated that one out of six persons will have a stroke in their lifetime, and every six seconds someone somewhere dies from stroke, while about six million people die every year from a stroke. In 2010 about 5·9 million stroke-related deaths were reported and about 39.4 million Disability adjusted life years (DALYs) were lost due to ischemic stroke. These ranked stroke as the second most common cause of death and the third most common cause of acquired disability-adjusted life-years (DALYs). This study aimed to determine the pattern of and localization of lesion among patients with stroke In Usmanu Danfodiyo University Teaching Hospital, Sokoto, Northwestern Nigeria. **Material and Method:** Medical files of Consecutive stroke patients presenting at a tertiary public hospital in Sokoto Northwestern Nigeria, over a period of six years (from January 2010 to December 2015) were retrospectively reviewed. All collected data were cross-checked for consistency and statistical analysis was done using SPSS version 20.0 (Chicago IL USA) statistical software package. Means of two groups were compared using student's t-test while proportions were compared using chi-squire with Yates correction where appropriate. Any p-value less than 0.05 was considered statistically significant. **Result**: A total of five hundred and forty (540) stroke patients were included in this study. The ages of the patients ranged from 15years to 99years with stroke occurring highest among people between 50–59years. The mean age was 56.85, SD± 14.40. Among 540 patients 271(50.2%), were males and 269 (49.8%) females, with male to female ratio of 1.01:1, five hundred and five, [505(93.5%)] had hemispheric stroke, out of these, 307 (56.9%) had left hemispheric stroke, 229 (42.4%) had right hemispheric stroke, while 4(0.7%) had Bilateral hemispheric involvement. out of the remaining 35 cases, 31 (5.8%) had Subcortical lesion and 4(0.7%) were brain stem strokes. Most common type of stroke was ischemic 462(85.5%) with hemorrhagic type accounting for the remaining 78(14.5%). **Conclusions:** This study supported previous hospital and community based studies that reported incidence and prevalence of stroke among both blacks and Non-blacks. More importantly, this study found trends toward increasing stroke incidence among relatively young individuals. This is of great public health significance in view of the fact that, strokes in young individuals have significant potential for lifetime burden of disability.

KEYWORDS: cerebral infarction, Ischemic stroke, Localization of lesion, Hemorrhagic stroke.

INTRODUCTION

Stroke is a major global health problem. It has been estimated that one out of six persons will have a stroke in their lifetime, and every six seconds someone somewhere dies from stroke, while about six million people die every year from a stroke(Feigin VL. et al. 2009; Murray CJL. et al 2012). In 2010 about 5·9 million stroke-related deaths were reported and about 39.4 million Disability adjusted life years (DALYs) were lost due to ischemic stroke(Lozano R. 2012;Krishnamurthi RV et al, 2013). These ranked stroke as the second most common cause of death and the third most common cause of acquired disability-adjusted life-years (DALYs)

In the United State of America (USA) alone, studies have shown that about 795,000 people suffer a new or recurrent stroke each year, with about 610,000 of these being the first attacks and 185,000 recurrent attacks (CDC, NCHS. 2015). Stroke costs the United States an estimated $34 billion each year(Mozaffarian D, Benjamin EJ, Go AS, et al. 2015) This total includes the cost of health care services, medications to treat stroke, and missed days of work.

In low and middle income countries, incidence of stroke was estimated to be about 16.9million (11.6 million events of incident ischemic stroke and 5.3 million events of incident hemorrhagic stroke). Between 1990 and 2010, reported incidence of ischemic stroke significantly reduced by 13% (95% CI, 6%–18%) in high-income countries. But no significant change was seen in low- or middle income countries. Infarct the rates rather increased by 22% (95% CI, 5%–30%) (Krishnamurthi

RV et al, 2013), In Africa, stroke accounts for 0.9-4.0% of hospital admissions, and 2.8-25% of total death; Case fatality rate averages about 35% (range 14.9-77%). The community prevalence of stroke varies from as low as 58\100,000 to as high as 400/100,000; with crude annual mortality rate of about 70/100,000/year(OsuntokuN BO, 1977;Osuntokum BO. 1987)

Localization of lesion

Localization is the diagnostic process of identifying from symptoms and signs of the patient where in the nervous system has been affected by a disease process. However, clinical and neuroimaging localization of lesion may be difficult due to factors related to problems with lesion-deficit analyses as follows:

Firstly, Anatomical landmarks vary from one individual to another and stroke damage is not determined by anatomical or functional changes only. Secondly, some vascular regions are more liable to perturbation than others and that, re-organization may result in alteration of structure-function relationship after cerebral damage. Thirdly, networking effect may cause dysfunction in area where there isn't any identifiable lesion. Lastly, damage may not be detected by current imaging techniques. Therefore, in order to circumvent these challenges newer neuroimaging techniques that find lesion sites associated with a functional impairment have been introduced in late 19th century that includes: MAP-3- Brain Vox's templates for comparing patient groups (Frank et al.' 1997), VBM Voxel based morphometry (Mummery et al 2000), VSLM Voxel based lesion-symtoms Mopping (Bates et al., 2003), VAL Voxel based Analysis of Lesions (Karnarth et al.,2004), AnaCOM AnatomicoClinical Overlapping Maps (Kinkingnehun et al.,2007), PM3 Proportional MAP-3 (Rudrauf et al, 2008).

However, even in this era of technological advancement in neuroimaging and molecular diagnosis, conventional clinical diagnosis should precede the use of these techniques if their maximum diagnostic potential are to be realized, especially in resource limited societies like Nigeria where affordability and availability of these sophisticated diagnostic methods posed a serious challenge. Characteristics of the dysfunction of hemispheric sub-cortical or brain stem functions often provide the roadmap for the determination of where in the nervous system the damage has occurred

MATERIAL AND METHOD

Medical files of Consecutive stroke patients presenting at a tertiary public hospital in Sokoto Northwestern Nigeria, over a period of six years from January 2010 to December 2015 were retrospectively reviewed. All collected data were cross-checked for consistency and statistical analysis was done using SPSS version 20.0 (Chicago IL USA)statistical software package. Means of two groups were compared using student's t-test while proportions were compared using chi-squire with Yates correction where appropriate. Any p-value less than 0.05 was considered statistically significant

RESULT

A total of 540 stroke patients were included in this study. The ages of the patients ranged from 10yrs to 99yrs with stroke occurring highest among people between 50 – 59yrs. The mean age was 56.85, SD± 14.40. Among 540 patients 271(50.2%), were males and 269 (49.8%) females with male to female ratio of 1.007:1 out of 540 patients 505(93.5%) had hemispheric stroke, out of these, 307 (56.9%) had left hemispheric stroke, 229 (42.4%) had right hemispheric stroke, while 4(0.7%) had Bilateral hemispheric involvement. out of the remaining 35 cases, 31 (5.8%) had Subcortical lesion and 4(0.7%) were brain stem strokes. Most common type of stroke was ischemic 462(85.5%) with hemorrhagic type accounting for the remaining 78(14.5%).

Table 1: Showing Age and gender distribution of patients.

Age	**female**	**male**	**NO**	**%**
Mean age, SD	**56.16, (SD± 16.8)**	**57.54, (SD± 12.5)**	**56.85, (SD±14.40)**	
10- 19	6	1	7	1.3
20 - 29	14	2	16	3.0
30 - 39	13	9	22	4.1
40 - 49	42	44	86	15.9
50 - 59	77	107	184	34.1
60 - 69	55	65	120	22.2
70 - 79	40	24	64	11.9
80 - 89	20	19	39	7.2
90 - 99	2	0	2	0.4
Total	269(49.8%)	271(50.2%)	540(100%)	100%

Table 2: Showing Neurological findings in the patients According to side of the lesion

Side	female	male	Total
Left Hemispheric Stroke	151(56.61)	156(57.6)	307(56.9)
Right Hemispheric Stroke	116(43.1)	113(41.7)	229(42.4)
Bi hemispheric Stroke	2(0.7)	2(0.7)	4(0.7)
Total	269(100)	271(100)	540(100)

Table3: Showing Localization of Lesion based on Topography of the neuroaxis

Location	female	Male	Total
Hemispheric	248(92.2)	257(94.8)	505(93.5)
Lacuna Stroke	3(1.1)	-	3(0.60)
Brain stem	2(0.7)	2(0.7)	4(0.7)
Subcortical	16(5.9)	12(4.4)	28(5.2)
Total	269(100)	271(100)	540(100)

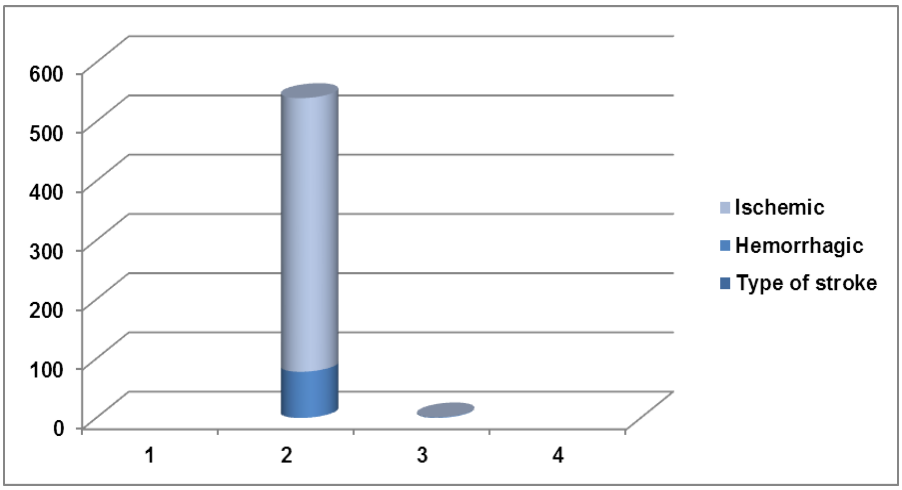

Figure 1: Bar chart: Showing the distribution of stroke based type of lesion

DISCUSSIONS

A total of five hundred and forty (540) patients presented with stroke over the period of the study. Incidence of stroke in this study was maximum in the age group of 50–59years with the mean age of 56.85, SD± 14.40, this is similar to maximum incidence in the age group 51-60 years and of mean age of 58 years reported by Divyant R, and Amit V in a study on clinical profile and risk factor among 140 stroke patients in a tertiary care hospital in Bareilly. Mean age of 56.85 years correlated well with mean age of 54.85 years found by Pinhero et al and 57years reported by Manorenj et al.

Additionally, the mean age of 56.85 years correlate with mean age of 54years earlier reported in North-eastern Nigeria (Nura et al;. 2003; Balarabe et al, 2010) and 55.6 years reported in south-western Nigeria(Osutokun et al;. 1987; this may be due to increase in the incidence of stroke in young adults, partly accounted for by emerging risk factors of stroke such as infections eg HIV infection. In a related development, a population-based stroke epidemiology study by Ramirez et al found an increase in Age-specific Acute Ischemic stroke hospitalization rates among individuals aged 25 to 44 years (16 to 23 per 100 000) and 45 to 64 years (149 to 156 per 100 000). Similarly, Kissela et al (Kissela et al. 2012) observed an increase in the proportion of all strokes among individuals under age 55years from 12.9% in 1993/1994 to 18.6% in 2005.

Recent proposed definition of stroke laid emphasis on the need to consider vascular distribution in the CNS that include the brain, spinal cord, or retinal cell in localization of lesion in stroke. However, even in this era of technological advancement in neuroimaging and molecular diagnosis, conventional clinical diagnosis should precede the use of these diagnostic techniques if their maximum diagnostic potential are to be realized, especially in resource limited societies like Nigeria where affordability and availability of these sophisticated diagnostic methods posed a serious challenge

Characteristics of the dysfunction of hemispheric sub-cortical or brain stem functions often provide the roadmap for the determination of where in the nervous system the damage has occurred. Therefore, in view of the resource limited nature of our environment and in order to ease better understanding of where the lesion is located, we categorized sites of lesion into: Hemispheric-505(93.5%) (a) Left hemispheric, 307 (56.9%) (b) 229 (42.4%) Right hemispheric (c) 4(0.7%), Bilateral 31 (5.8%) had Subcortical lesion 7(1.3%) Brain stem, but it should be noted that, confirmatory evidence of where the lesion is located mostly come from neuroimaging

studies. The results of these studies, using increasingly sophisticated techniques to overcome age-old challenges, are important for identifying "structure-function relationships" and functional specificity in the human brain (Karnath H.O, et al, 2004; Rorden, C, et al, 2004). About 60% of diagnosis of stroke in this study were confirmed by Computed Tumorgraphic scan

Most common type of stroke was ischemic 462(85.5%) with hemorrhagic type accounting for the remaining 78(14.5%). The 14.5% prevalence of hemorrhagic stroke in this study is closely similar to those previously reported in epidemiologic studies among blacks (Broderick JP. et al.1992; Sacco RL. et al. 1984). This prevalence rate is however lower than rate of 10- 15% intracerebral hemorrhage (ICH), 5% subarachnoid hemorrhage (SAH), reported in Caucasian populations. Additionally, our finding is significantly lower than reported prevalence rates from Asian countries where proportion of ICH was higher than in Caucasians with approximately 20-30% being hemorrhagic(Smith E.E. et al. 2009; Aiyar et al. 1999; Rost NS. et al.2008).

This significant disparity between our study and findings reported by other studies around the globe can be attributed to limitations related to retrospective methodology of this study with inherent potential for selection bias. Furthermore, only about 60% of patients included in this study had neuroimaging done, while the remaining 40% were clinically diagnosed. Therefore, a more robust and methologically sound study is needed in this community.

CONCLUSIONS

This study supported previous hospital and community based studies that reported incidence and prevalence of stroke among most populous black country Nigerian. More importantly, this study found trends toward increasing stroke incidence among relatively young individuals. This is of great public health significance in view of the fact that, strokes in younger patients have significant potential for lifetime burden of disability.

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