

Comparison of Sub-Types and Severity of Ischemic Stroke among Both Genders

QUDSUM YUSAF¹, ALI QAYYUM², EHSAN UL HAQ³, JAVARIA⁴, AMMAR YASIR⁵, HAFIZ AMMAR QAYYUM⁶

¹Senior Registrar, Neurology Ward Mayo Hospital, Lahore

²Senior Registrar Neurology, Central Park Teaching Hospital Lahore

³Senior Registrar Neurology, Al Sabah Hospital, Kuwait

⁴Clinical Incharge at Rising Sun Institute ARK Campus, Lahore

⁵Medical Officer Neurology, DHQ Hospital, Nankana Sahib

⁶Senior Physiotherapist, Ittefaq Hospital and Bahria Hospital Lahore

Correspond Dr. Ali Qayyum, Email: aliqayyum211@hotmail.com, Phone: 03094361017

ABSTRACT

Background: It has been noted that there is an increased prevalence and serious clinical implications of stroke in women. However, local studies focused on stroke among female gender are still scarce.

Aim: To find frequency of female patients with ischemic stroke and to compare the sub-types of ischemic stroke, mean NIHSS score and mean MRS scores among both genders.

Methodology: This descriptive case series was conducted in indoor and outdoor department of Neurology at Mayo Hospital, Lahore for six months [Feb 6, 2018 till August 6, 2018]. After taking demographics and clinical characteristics of patients, the severity of stroke was taken using National Institute of Health Stroke Scale (NIHSS) at admission in hospital. The functional outcome was measured using Modified Rankin Scale (MRS). Subtype of acute ischemic stroke was assigned using Oxfordshire classification for acute ischemic stroke. All data was taken on a structured proforma and was entered and analyzed using SPSS version 21.

Results: The mean age of cases was 53.58 ± 9.42 years with 73(60.83%) male and 47(39.17%) female cases. Among TACS, there were 15(50%) female cases whereas 9(34.6%) female case were found in PACS and 10(33.3%) female cases were found in LACS. The frequency of gender in all subtypes was statistically same in both groups, p -value > 0.05 . The mean modified Rankin scale in male and female cases was 2.93 ± 1.58 and 4.30 ± 1.50 respectively with significantly higher mean MMR score in females than male cases, p -value < 0.05 .

Conclusion: This study concludes that females make up a considerable percentage of patients with ischemic stroke. Though, no statistically significant difference could be found in terms of subtypes of ischemic stroke, the mean NIHSS score and mean MRS were statistically higher among females compared to male cases.

Keywords: Stroke, subtypes, severity, ischemia, gender difference, NIHSS, MRS

INTRODUCTION

Stroke is a leading cause of mortality as well as morbidity worldwide, with even serious consequences in developing countries due to already burdened health facilities^{1,2}. Specially in elderly population, Stroke is second leading cause of death and the third commonest cause of morbidity³. The estimates of Global Burden of Disease (GBD) 2016 report that females and males both have almost equal risk of stroke with almost 2.6 deaths among women compared to 2.9 among men⁴. In a recent study, prevalence of stroke was upto 7% with 13.4% living with any stroke related complication and uncontrolled comorbidities⁵. Studies also anticipate upto 20% increase in incidence of stroke with about 85.5% mortality in developing world. Moreover, stroke related deaths in developing countries like Pakistan are almost 10 years young^{6,7,8}. Despite of the obvious increase in prevalence of stroke in general and its worse health outcomes among women in specific, very few studies are available locally⁹.

A number of risk factors have been reported to cause stroke, including but not limited to cardiovascular problems, diabetes, hypertension, dyslipidemia, less physical activity and smoking.¹⁰ One of the important non-modifiable risk

factors is gender which can be taken into account in terms of the etiological features of the disease^{11, 12}. Previous literature reports that men are more at risk of stroke due to comparatively more frequency of coronary artery disorders, smoking, as well as vascular diseases¹³.

Among females, the major risk factors of stroke are different from those of men such as, preeclampsia, late menopause, as well as gestational hypertension.¹⁴ Recent literature shows greater interest in understanding and exploring the factors associated with stroke among females.¹⁵ Despite of higher incidence of stroke in men, women suffer more serious consequences due to longer average lifespan¹⁶ which has also been reported in many studies.¹⁷ The life time risk of stroke in male and females of 55 years of age was calculated to be 17% and 21% respectively¹⁸. Moreover, females have more risk of disability and complications due to stroke, but less risk of mortality^{19, 20}.

Women have an increased risk of sub-arachnoid hemorrhage as subtype of stroke²¹. The Clinical classification Oxfordshire Community Stroke Project Classification published that the risk of Total Anterior Circulation Stroke (TACS) is greater among females compared to males whereas risk of Posterior Circulation Stroke (PCS) is low in females²². Although some studies show statistically insignificant difference in gender with respect to subtypes of stroke²³.

Received on 07-02-2021

Accepted on 17-05-2021

In China, study reported data from 2005 – 2013 and showed that frequency of stroke among females was 42.9% with high scores for NIHSS (7.75) and more severe attack compared to males (6.35)³ However, this phenomenon maybe due to longer lives of women.²⁴ Studies also report that in victims of stroke the outcomes are comparatively poorer among females as per Modified Rankin Score as 3.99 in women compared to 3.82 in men.²⁵ Despite of considerably high prevalence of stroke among women, as well as higher risk of morbidity and stroke related complications, local data is quite limited. Therefore, it is need of hour to focus on frequency of stroke among females and any potential gender based difference of subtypes and functional outcomes. Gender based difference in prevalence of stroke is an inevitably important aspect due to its potential role in explaining etiology of disease as well as risk factors. Due to extremely limited data available in our local setting, it is urgently needed to explore this area further and in detail. Therefore, this study aims to generate latest statistics on frequency of stroke among females as well as any gender based difference in sub-types and functional outcomes.

This study also aims to suggest stroke related measures for prevention and early detection of disease in Pakistani and global health setups.

MATERIAL AND METHODS

This Descriptive case series was conducted in Indoor and outdoor department of Neurology at Mayo Hospital, Lahore for Six months [Feb 6, 2018 till August 6, 2018]. The calculated sample size was 120 with level of significance of 95% and margin of error 9% and taking expected frequency of ischemic stroke in women as 42.9%.³ Non-probability Consecutive sampling was used to take data from those patients (both males and females) presenting with Ischemic stroke between age of 40-70 years. Any patients presenting with Subarachnoid Hemorrhage or Intracerebral Haemorrhage were excluded from the study.

The Ethical Committee and Review Board of King Edward Medical University (KEMU) Lahore gave the approval for data collection, after which the patients who presented in Neurology OPD with stroke was included for collection of data on a structured proforma. After taking written consent, demographic information and history related to signs and symptoms was taken. Ischemic stroke was diagnosed on CT scan as a hypodense area in vascular territory. National Institute of Health Stroke Scale (NIHSS) was used to measure severity of stroke at time of admission whereas Modified Rankin Scale (MRS) was used to see functional outcome at time of discharge. Oxfordshire Classification for Acute Ischemic Stroke was used to determine subtypes of stroke. NIHSS score, MRS score and subtype of stroke was taken as per operational definitions. Data was entered and analyzed through SPSS version 21.0. Mean and standard deviations were calculated for quantitative variables like age and BMI While frequency and percentages were given for qualitative variables like gender. Data was stratified for age, gender, smoking (5 packs/year) Diabetes mellitus (>200mg/dL) and Hypertension (>140/90). Post stratification chi square test was used to compare the frequency of subtypes of

ischemic stroke and t test was used to compare mean NISS score and mean MRS score. Post stratification chi-square test was used taking p-value ≤ 0.04 as significant.

RESULTS

The mean age of cases was 53.58±9.42 years with minimum and maximum age of 40 and 70 years. A total of 72(60%) cases were 40-55 years old and 48(40%) patients were aged 56–70 years. In this study there were 73(60.83%) male and 47(39.17%) female cases. The mean BMI of cases was 29.42±4.36 with minimum and maximum BMI of 22 and 37. A total of 32(26.7%) cases had TACS, 26(21.7%) cases had PACS, 30(25%) cases ad LACS and 32(26.7%) cases had POCS subtypes. Among TACS findings there were 16(50%) male and 15(50%) female cases, in PACS there were 17(65.4%) male and 9(34.6%) female case, in LACS findings there were 20(66.7%) male 10(33.3%) were female cases and among there were 20(62.5%) male and 12(37.5%) female cases. The frequency of gender in all subtypes was statistically same in both groups, p-value > 0.05. The mean of National institute of health stroke scale was 22.31±12.14 with minimum and maximum National institute of health stroke scale of 2 and 42. The mean modified Rankin scale was 3.47±1.69 with modified Rankin scale range of 5 (1 as minimum and 6 as maximum). When data was stratified for age, gender, smoking, hypertension and diabetes mellitus, we found no significant difference in frequency of subtypes with respect to gender and, other effect modifiers, p-value > 0.05. The mean modified Rankin scale in male and female cases was 2.93 ± 1.58 and 4.30 ±1.50 with significantly higher mean MMR score in females than male cases, p-value < 0.05. When data was stratified for age, gender, smoking, hypertension and diabetes mellitus, we found higher mean National institute of health stroke scale and Modified Rankin scale in females as compared to male cases, p-value < 0.05.

Table-1: Descriptive statistics of age (years), National institute of health stroke scale and Modified Rankin scale

	Age (years)	BMI	NIHSS	Modified Rankin scale
Mean	53.58	29.42	22.31	3.47
S.D	9.42	4.36	12.14	1.69
Range	30.00	15.70	40.00	5.00
Minimum	40.00	22.00	2.00	1.00
Maximum	70.00	37.70	42.00	6.00

NIHS: National institute of health stroke scale

Table-2: Frequency distribution of subtypes and gender

		Frequency	Percent
Subtypes	TACS	32	26.7
	PACS	26	21.7
	LACS	30	25.0
	POCS	32	26.7
Gender	Male	47	39.17
	Female	73	60.83

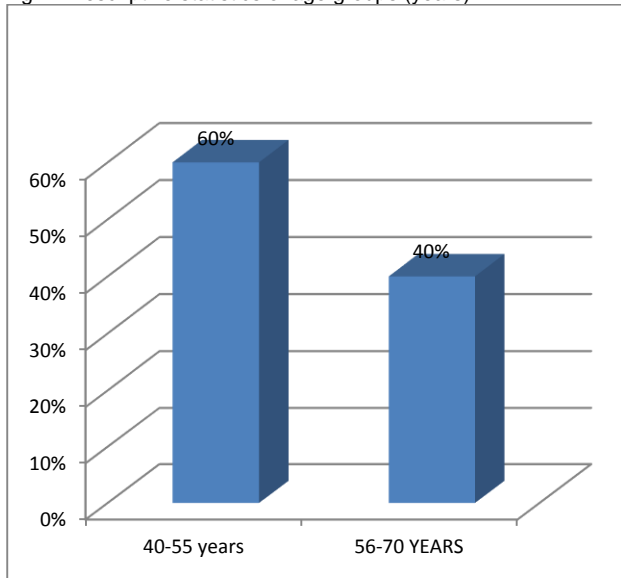
Table 3: Comparison of subtypes in gender

		Subtypes				Total
		TACS	PACS	LACS	POCS	
Gender	Male	16(50.0%)	17(65.4%)	20(66.7%)	20(62.5%)	73(60.8%)
	Female	16(50.0%)	9(34.6%)	10(33.3%)	12(37.5%)	47(39.2%)
Total		32(100.0%)	26(100.0%)	30(100.0%)	32(100.0%)	120(100.0%)

Chi-square= 2.268

p-value= 0.519 (Insignificant)

Fig. 1: Descriptive statistics of age groups (years)



DISCUSSION

Stroke continues to be a leading health concern as well as burden on public health and health resources especially in developing and under developed countries²⁶. There is also substantial evidence that stroke has a dangerously high clinical implications on women compared to men including recurrence, disability and co morbidities. One study conducted in United States shows that every year almost 60,000 more females compared to males have stroke^{27,28}.

Moreover, gender differences have significant contribution in explaining underlying risk factors, etiological findings, and even stroke related outcomes. Studies have attributed these differences to physiology of females vs males and have reported that this may result in failure in recovery in females as well.²⁹ Therefore, in contrast to previous studies, latest literature is now focusing on stroke and its risk factors specifically among women³⁰ Framingham Study results estimates every 1 in 5 females while 1 in 6 males aged 55 years have the risk of stroke in their lifetime¹⁸. Therefore the largest portion at risk among females is the elderly females due to long mean lifespan as published in a US based study. Studies have also published a significant difference in diagnosis, signs, risks related to procedure, treatments, as well as any interventions³¹.

In this study there were 73(60.83%) male and 47(39.17%) female cases. A total of 32 (26.7%) cases had TACS, 26(21.7%) cases had PACS, 30(25%) cases ad LACS and 32(26.7%) cases had POCS subtypes. Among TACS

findings there were 16(50%) male and 15(50%) female cases, in PACS there were 17(65.4%) male and 9(34.6%) female case, in LACS findings there were 20(66.7%) male 10(33.3%) were female cases and among there were 20(62.5%) male and 12(37.5%) female cases. The frequency of gender in all subtypes was statistically same in both groups, p-value > 0.05. One recent study was done in Uzbekistan between 2014-16, in which 148 patients of ischemic stroke were recruited consecutively from department of neurology. The results suggested that more women compared to men had risk of severe stroke; 15.1% compared to 11.7% respectively and the difference in prevalence was statistically significant as well P < 0.05. The dependency after the stroke was also more frequent among females when followed up at 3rd and 12th month, though this gender based difference diminished when stratification was done for types of stroke, causes and severity of stroke. It was, therefore, concluded in this study that older females with Ischemic stroke showed more severe stroke as well as serious outcomes at 3rd and 12th month respectively³². Another study in China also had similar conclusion that old females become a major portion of stroke patients and need to prevent the risk by lifestyle modification and controlling modifiable risk factors³³.

One other study conducted by Santalucia et al. evaluated the gender based difference for the disease severity, clinical symptoms, as well as functional outcomes. They reported that among total 1272 patients, 1152 had ischemic stroke whereas 120 had haemorrhagic stroke. Moreover, 567 females and 705 males were stroke patient. Age wise, females had significantly old in age 75.2±13.7 years vs. 71.5±12.5 years with statistically significant difference P < 0.001. Also, the stroke by NIHSS was statistically significant compared to males; 10±8 vs 8±7 and P < 0.001. Women had significant association with bad functional outcome as defined by MRS score and in terms of mortality as well. As far as risk factors were concerned, atrial fibrillation was more common in women compared to men i.e. 29% versus 21% with statistically significant association (P=0.003)³⁴. In current study the mean modified Rankin scale in male and female cases was 2.93±1.58 and 4.30±1.50 with significantly higher mean MMR score in females than male cases, p-value < 0.05.

One local study in 2012 assessed gender related differences in 231 patients of stroke taken consecutively. They compared stroke related similar factors such as NIHSS scores as well as functional outcomes. Among total 231 patients, there were 135 males and 76 females with a ratio of 1.84. The average ages were 62.3 ±13.56 years for males and 61.15 ±11.60years for females. Moreover, females had more chances of dependency pre-stroke, P=.524, and had greater risk of severity in strokes, P=.142,

as well as longer hospital stay, $P=.942$. The rate of in hospital mortality was also higher among females (6.7%) compared to males (5%) ($P=.524$). The MRS score was also poorer for females at time of discharge; 8.5 % among females compared to 5% in males ($P=.775$). Some of the findings, though higher among females in terms of frequency, were statistically insignificant as well³⁵. All these results were similar to our study.

Another prospective study used multiple logistic regression for prediction of risk factors of stroke. Among 1136 recruited patients, there were 494(46%) women who were comparatively older compared to men 76.02 ± 12.93 years vs. 72.68 ± 13.27 years respectively. The average NIHSS was also higher among females; 9.4 ± 6.94 vs. 7.6 ± 6.28 ($p= 0.0018$) and so was average MRSS at 3rd month with statistically significant p -value = 0.003, 2.5 ± 2.05 vs. 2.1 ± 2.02 ³⁶. We also found higher scores of these domains in females.

One study in 2011 was done on 1379 females and 1155 males with average ages of 74.3 & 68.8 years respectively. The mortality rate at 30th day (17.2% compared to 13.1%) as well as disability (59.9% compared to 46.2%) was also higher in females compared to males. Women were also associated with poor outcomes as well as bad prognosis and longer stay at hospitals³⁷.

All these studies reported similar results as our study, that not only the prevalence of stroke is alarmingly high among females³⁸ but also female gender is associated with poor NIHSS scores, poor MRS score and bad clinical outcomes.¹² It is therefore suggested that prevalence and risk factors of stroke should be specifically studied in females to understand the etiology of disease better and try to prevent the worse outcomes in future.

CONCLUSION

It is concluded that frequency of females in patient with ischemic stroke cannot be ignored, though there was no difference in frequency of sub-types of ischemic stroke but the mean NIHSS score and mean MRS was statistically higher females as compared to male cases having ischemic stroke.

Contribution of authors: QY: Idea Conception, Design, Theoretical Formulation, Analytical Calculation, Conceived the Original Data, Manuscript Writing, AQ: Theoretical Formulation, Analytical Calculation, Manuscript writing, EH: Analytical Calculation, Idea, Conception, Design J: Literature Search, Plagiarism Removal, Analytical Calculation, AY: Design, Literature Search, Plagiarism Removal, HAQ: Literature Search, Plagiarism Removal, Final Write Up

Conflict of Interest: There is no conflict of interest

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