ABSTRACT

OBJECTIVE: To determine the influence of risk factors (modifiable and non-modifiable) in the development of ischemic and hemorrhagic types of stroke.

STUDY DESIGN: A Cross-sectional/observational study

PLACE AND DURATION: Public tertiary Care Hospitals of Rawalpindi city over a period of 6 weeks i.e. 1st June 2017 to 10th July 2017.

METHODOLOGY: This study include all patients of either gender with age >20 years who had stroke verified by CT-Scan and clinical correlation. All patients were assessed through history, clinical examinations and investigations. Modifiable and non-modifiable risk factors included were hypertension, cigarette smoking, diabetes mellitus, family and personal history of stroke, NSAIDs use, Stress, Physical inactivity, History of previous vascular events i.e. myocardial infarction and Stroke.

RESULTS: Total of patients with 52. Mean age of 65.37 years, having 65.37 years. There was female to male predominance i.e. female: male= 5:4. Hypertension was the most common risk factor in stroke (84.6%) followed by stress i.e. 42.3%. The 3rd most common risk marker was cigarette smoking(30.7%).The frequency of naswar addiction, diabetes mellitus and NSAIDs use was equal i.e. 26.9%.Similarly the frequency of history of previous stroke, family history of stroke and sedentary lifestyle was almost same(i.e. 25%).Ischemic heart disease was least common risk factor(9.6%). Most of the patients included in our study belong to middle class about 30%.

CONCLUSION: All most common risk factors leading to stroke are modifiable risk factors.

KEY WORDS: Hemorrhagic Stroke, Ischemic Stroke, Risk Factors, Modifiable Risk Factors, Hypertension, NSAID’s Use, Diabetes, Family History of Stroke.

INTRODUCTION

According to WHO, Stroke is defined as rapidly developing clinical signs of focal(or global) disturbance of cerebral function with symptoms lasting 24 hours or longer or leading to death with no apparent other cause other than of vascular origin.1 Its pathology could be either hemorrhagic or ischemic disturbance of cerebral blood circulation. Stroke was the second leading global cause of death after heart disease in 2013 accounting for 11.8% deaths worldwide. Stroke ranks number five among all causes of death in USA which accounts for 1 out of 20 deaths annually. Approximately in every 40 second someone experience a stroke in USA (American Stroke Association statistics 2017).2 By analyzing these statistics, the stroke is becoming a health problem of the world and a major cause of disability in the adults.3 Globally, according to WHO estimate, the stroke will remain the second most common cause of death after heart disease by the year 2020.4 Stroke incidence varies among the countries and geographically. Its frequency increases drastically with advancing age.5 The major modifiable risk factors for stroke as per literature are hypertension, heart diseases (eg Atrial fibrillation, Congestive cardiac failure, cardiomyopathy), smoking, illicit drug use, oral contraceptives, Hormone replacement therapy, sedentary life style, dyslipidemia, and use of NSAIDs. All these risk factors are easily controllable through creating awareness, and providing prompt treatment. If we identify these modifiable risk factors in our population, the incidence of stroke can be reduced remarkably by controlling these risk factors through proper counseling and management. So with this idea we have conducted study with an objective to determine the
influence of risk factors (modifiable and non-modifiable) in the
development of ischemic and hemorrhagic types of stroke.

METHODOLOGY

This Cross-sectional/observational study was carried out in
public tertiary care centers of Rawalpindi/Islamabad over
a period of six weeks i.e. 1st June 2017 to 10th July 2017. All
patients of either gender above the age of 20, who had
stroke verified by CT-Scan and clinical correlation admitted in
public tertiary care hospitals were included. Patients who had
multiple sclerosis, brain tumor, tuberculosis meningitis and
viral encephalitis were excluded.

The diagnosis of Stroke was ascertained by the presence of
definite focal signs (unilateral or bilateral motor impairment
and sensory impairment, aphasia/dysphasia, hemianopia,
diplopia, forced gaze, dysphagia of acute onset, apraxia
of acute onset, ataxia of acute onset, perception deficit of
acute onset), detailed history of the patient, detailed physical
examination, neurological examination and Ct scan findings
(hyperdense areas in hemorrhagic stroke and hypodense areas
in ischemic stroke).

A performa was designed according to aim of the study through
extensive literature search. It contained detailed history
of the patient and clinical examination findings. A detailed
history of demographic profile, previous vascular events i.e.
Myocardial infarction, Stroke, Diabetes mellitus, Hypertension,
cigarette smoking, hyperlipidemia, heart diseases i.e. CCF,
infective endocarditis, estrogen containing drugs, Hormone
replacement therapy, Oral contraceptives, sedentary life style,
polycythemia, sickle cell anemia, family history of stroke, stress,
unhealthy diet, illegal drug use including naswar, Thrombolytic
therapy and anticoagulation was recorded. Then frequency
of risk factors of stroke was assessed. The assessment is
personally conducted by the researcher and all data is added
to the performa carefully and analyzed at the end of study.

OPERATIONAL DEFINITIONS

Hemorrhagic stroke is defined as rupture of a blood vessel
in the brain or near the brain (American Stroke Association)
A stroke caused by lack of blood reaching part of the brain is
called an ischemic stroke (American Stroke Association).
Stage 1 hypertension was defined as systolic BP of 130 or 139
mmhog or diastolic bp of 80-89mmhg and stage 2 hypertension
was defined as systolic bp of 140 or greater than 140 mmhg
diastolic of 90 or greater than 90 mmhg (based on an average
of ≥2 careful readings obtained on ≥2 occasions).

The diagnostic criteria used for labeling someone Diabetic
was FPG =126 or FPG>126mg/dl or HbA1c= 6.5% or >6.5%
or in a patient with classic symptom of hyperglycemia or
hyperglycemic crisis, a random plasma glucose =200 or
>200(American Diabetic Association).

Patient was labeled as hyperglycemic
on fasting lipoprotein basis, if LDL Cholesterol >129 mg/dl and total
Cholesterol=200mg/dl or > 200mg/dl and HDL<40mg/d (NCEP
guidelines). Socioeconomic class of patients was determined
by using BG Prasad scale.

All data was recorded carefully. Mean, number, percentage
of all variables and confidence interval of all parameters was
calculated by using the SPSS version 16.

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Ischemic Stroke N=32 (61.5%)</th>
<th>Hemorrhagic Stroke N= 20 (38.46%)</th>
<th>Total n=52</th>
<th>Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean age</strong></td>
<td>67.5(Standard deviation=(18.89)</td>
<td>63.25(Standard deviation=15.36)</td>
<td>65.37(Standard deviation=2.12)</td>
<td></td>
</tr>
<tr>
<td><strong>Female gender</strong></td>
<td>20(62.5%)</td>
<td>9(45%)</td>
<td>29(55.77%)</td>
<td>51.27 – 59.32</td>
</tr>
<tr>
<td><strong>Male gender</strong></td>
<td>12(37.5%)</td>
<td>11(55%)</td>
<td>23(44.23%)</td>
<td>41.09 – 47.43</td>
</tr>
<tr>
<td><strong>Hypertension</strong></td>
<td>25(78.12%)</td>
<td>19(95%)</td>
<td>44(84.62%)</td>
<td>79.34 – 89.17</td>
</tr>
<tr>
<td><strong>Diabetes</strong></td>
<td>11(34.3%)</td>
<td>3(15%)</td>
<td>14(26.92%)</td>
<td>23.87 – 28.93</td>
</tr>
<tr>
<td><strong>Cigarette smoking</strong></td>
<td>9(28.12%)</td>
<td>7(35%)</td>
<td>16(30.74%)</td>
<td>26.98 – 34.02</td>
</tr>
<tr>
<td><strong>Ischemic heart disease</strong></td>
<td>3(9.375%)</td>
<td>2(10%)</td>
<td>5(9.64%)</td>
<td>8.41 – 10.58</td>
</tr>
<tr>
<td><strong>Previous stroke</strong></td>
<td>9(28.125%)</td>
<td>4(20%)</td>
<td>13(25%)</td>
<td>23.14 – 27.03</td>
</tr>
<tr>
<td><strong>Family H/O stroke</strong></td>
<td>6(18.75%)</td>
<td>7(35%)</td>
<td>13(25%)</td>
<td>23.14 – 27.03</td>
</tr>
<tr>
<td><strong>NSAIIDs use</strong></td>
<td>10(31.25%)</td>
<td>4(20%)</td>
<td>14(26.92%)</td>
<td>23.87 – 28.93</td>
</tr>
<tr>
<td><strong>Stress</strong></td>
<td>15(46.85%)</td>
<td>7(35%)</td>
<td>22(42.31%)</td>
<td>38.73 – 46.12</td>
</tr>
<tr>
<td><strong>Physical inactivity</strong></td>
<td>7(21.875%)</td>
<td>6(30%)</td>
<td>13(25%)</td>
<td>23.14 – 27.03</td>
</tr>
<tr>
<td><strong>Naswar Addiction</strong></td>
<td>9(28.125%)</td>
<td>5(25%)</td>
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</tr>
</tbody>
</table>
RESULTS

A total of 52 patients were included in study. Most (n=32, 61.5%) had ischemic stroke while hemorrhagic stroke was found in 38.46% (n=20) of patients. There was female predominance with female: male ratio of 5:4. Majority of patients were elderly (mean age = 65.35 year), in ischemic stroke and 67.5 year in hemorrhagic stroke. Hypertension was most common risk factor in both types of stroke (n=44, 84.6%). The frequency of hypertension in ischemic stroke is 78.12% (n=25) and in hemorrhagic stroke is (n=19, 95%). 2\textsuperscript{nd} most common risk factor was stress (n=22, 42.31%). Stress was more common in ischemic stroke patients (n=15, 46.85%) than in hemorrhagic stroke patients (n=7, 35%). 3\textsuperscript{rd} most common risk marker reported in stroke patients was cigarette smoking (n=16, 30.7%). It was more common in hemorrhagic stroke patients (n=7, 35%) than in ischemic stroke patients (n=9, 28%). The frequency of diabetes mellitus, NSAIDs use and naswar addiction was (n=14, 26.9%) same in stroke patients. The frequency of diabetes mellitus (n=11, 34.3%), naswar addiction (n=14, 26.9%) and NASID abuse (n=10, 31.25%) was more common in ischemic stroke. History of previous stroke was noticed in 25% (n=13) cases. Among these cases of re-stroke, the 28% (n=9) had ischemic stroke as compared to 20% (n=4) patients who had hemorrhagic stroke. Family history of stroke (overall n=13, 25%) was present in 18% (n=6) patients of ischemic stroke and 35% (n=7) cases of hemorrhagic stroke. Ischemic heart disease was least common risk factor (n=5, 9.6%). In ischemic stroke and hemorrhagic stroke only 03 (9.37%) and 02 (10%) patients had history of myocardial infarction (Table-I).

Table-II, give the frequency distribution of commonest risk factors among both genders. Among all 52 patients, the mean age in females was 64.89 years and in males 67 years. Ischemic stroke was more common in women (n=20, 68.9%) whereas the frequency of hemorrhagic stroke was high in males (n=11, 47%). Hypertension ranks top most among risk factors in females (n=25, 86.2%), and male (n=19, 82.6%). Stress was found to be 2\textsuperscript{nd} commonest factor among female (n=16, 55%) as compared to male patients (n=6, 26%). The 3\textsuperscript{rd} commonest risk factor in female was diabetes mellitus (n=10, 34.4%) as compared to NSAIDs abuse (n=7, 30.4%) among male. Cigarette smoking and Naswar addiction, another important risk factors was found to be be was higher in males (n=12, 52.7% and n=7, 30.4% respectively) as compared to females (n=4, 13.7%). Re-stroke prevalence was slightly more in males (n=6, 26%), than females (n=7, 24%). Similarly, the family history of stroke was observed in 26% (n=6) among male as compared to 24% (n=7) female. History of sedentary lifestyle and Ischemic heart disease was greater in men (n=6, 26%, n=4, 17.3% respectively) than among women (n=7, 24.4% and n=1, 3.4% respectively).

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Female (N=29, 55.7%)</th>
<th>Male (N=23, 44.23%)</th>
<th>Total and %</th>
<th>Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age</td>
<td>64.89(Standard Deviation=19.2)</td>
<td>67(Standard Deviation=15.61)</td>
<td>65.94(Standard Deviation=1.49)</td>
<td></td>
</tr>
<tr>
<td>Ischemic stroke</td>
<td>20(68.9%)</td>
<td>12(52.17%)</td>
<td>32 (61.5%)</td>
<td>56.72 – 66.12</td>
</tr>
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<td>Hemorrhagic stroke</td>
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<td>Family history of stroke</td>
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</tbody>
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In our study majority (n=16, 30.7%) of patients were from Middle Class (Rs.1904-3172) followed by the lower middle class (Rs.952-1903) with a frequency of 28.8% (n=15). 3\textsuperscript{rd} most common class was found to be upper middle class (Rs.3173-6345) i.e. 23.9% (n=11) cases. In extreme group of socioeconomic classes, only 5.7% (n=3) of patients were from upper class (Rs.6346), and 13.4% from lower class (Rs.<951) as shown in fig-1>
DISCUSSION

The stroke is a vascular disease which has many neurological sequelae leading to disability and social dependence. The hemorrhagic and ischemic etiology stroke are the commonest. The frequency of ischemic stroke was 61.5% and hemorrhagic stroke 38% in our study. Similarly the higher prevalence of ischemic as compared to hemorrhagic stroke was observed reported in Trivandrum stroke registry\textsuperscript{11} but with comparatively high frequency (83.6%) of ischemic stroke and only 16.4% of hemorrhagic stroke. The same findings were also made by Park et al\textsuperscript{12}. This reflects that the ischemic stroke incidence is greater than hemorrhagic stroke incidence which is also observed in our studied population.

The risk of stroke occurrence increases with age because as the age advances the elasticity of vessels get weakens and leading to hypertension\textsuperscript{13} Hence stroke frequency is more in older age group due to underlying vascular disturbance/complications in them.\textsuperscript{14} The mean age of stroke patients in our study was 66, which is comparatively higher (58.5 years) than that reported by Hamzullah.\textsuperscript{15} Almost same age group as in our study i.e. i.e. 65.30 ±12.80 was observed by Athira et al.\textsuperscript{16} The frequency of males were 44% and females 55.7% in our study but in a hospital based study done in Kashmir has reported male predominance (57.7%) than female (47.3%)\textsuperscript{17} where the age group studied was ranges from 45 to 85 years. Another study conducted in Malaysia\textsuperscript{18} shows female predominance (51.8% females and 48.2% males) as reported in our study.

Hypertension as another important modifiable risk factor in etiology of stroke is hypertension. In our study, the hypertension as a risk factor is observed in 95% of male and 78% of females whereas in Athira's study \textsuperscript{16} hypertension as a risk factor was reported in higher frequency in females (84.4%) as compared to male (81.8%). Recent studies done by using ambulatory blood pressure monitoring technique has concluded that the blood pressure is higher in male as compared to female at the similar age group but after menopause, the blood pressure is higher in women in the same age group as in male.\textsuperscript{19} Another modifiable risk factor is cigarette smoking which is observed among 31% of our patients and same findings were also reported in literature.\textsuperscript{7} Regarding diabetes as a modifiable risk factor, 27% of patient had diabetes in our study, with female predominance (34.4%) as compared to male (21.7).

Ischaemic heart disease is also a modifiable risk factor and high prevalence in our patients may be due to non-compliance to treatment, low socioeconomic status and life style patterns of our society. Frequency of NSAID’s use was 27% in our study which is a non-traditional risk factor for stroke observed in our patients and is modifiable. The factors which describe association between stroke and NSAIDs are hypertension and thrombosis as reported by park et al.\textsuperscript{27} By analyzing the results from our study and comparing our observations with national and international literature, it’s evident that the most of the risk factors leading to stroke are modifiable observed in our population and can be controlled amicably by creating awareness, providing diagnostic and treatment facilities.

LIMITATIONS OF STUDY

It's a small scale study conducted over a short period and conducted in four public sector hospitals of Rawalpindi and Islamabad so the findings can’t be applied to whole population.

CONCLUSION

We conclude from our study that all most common risk factors leading to stroke are modifiable risk factors.
CONTRIBUTION OF AUTHORS

Nisar S: Conceived Idea. Designed Methodology, Data Collection.
Asim A: Data Analysis, Literature Search, Manuscript Writing, Proof Reading.

Disclaimer: None.
Conflict of Interest: None.
Source of Funding: None.

REFERENCES