Original Article / Orijinal Araştırma

Incidence of Stroke in North West Frontier Province of Pakistan

Pakistan Kuzey Batı Sınır Bölgesinde İnme İnsidansı

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Received: 16-07-2011

Revised: 20-10-2011

Accepted: 30-11-2011

Özet

Bu çalışmanın ana amacı inme insidansı ile ilişkili doğrudan ya da indirekt faktörlerini bulmaktır. Bunun için 300 inme hastasının verileri incelenmiştir. Ortalama yaş 57.3(±15.76 SD) yıldır. Erkeklerin ortalama yaşı 59.11 (± 17.64 SD) yıl, bayanların ise 55.66 (±13.65 SD) yıldır. Araştırma bayan ve erkeklerin yaş ortalaması arasında belirgin istatiksel farkı göstermiştir. Bu çalışma inme insidansı ve diabetes mellitus ve /veya hipertansiyon arasında ilişkiyi gösteren kanıtları sunmaktadır ve aynı zamanda inmenin yaşla yüksek ilişkisini ortaya çıkarmıştır.

Anahtar Kelimeler: İnme, yaş, diabetes mellitus, hipertansiyon

Abstract

The main purpose of the study is to find factors which are directly and indirectly related with the incidence of stroke. For this purpose the data of 300 stroke patients was analyzed. The average age was found to be 57.3(±15.76 SD) years. The average male age is 59.11 (± 17.64 SD) years as compared to 55.66 (±13.65 SD) years in females. The investigation showed significant difference between the average age for males and females. The study provides evidence of association between incidence of stroke and diabetes mellitus or/ and hypertension. Study also revealed that stroke is highly associated with age.

Keywords: Stroke, age, diabetes mellitus, hypertension

INTRODUCTION

Stroke is most commonly caused by a blockage of blood flow to the brain, or some bleeding in the brain due to the bursting of blood vessels. The World Health Organization (WHO) has stated that Stroke is characterized by a neurological deficit of sudden onset accompanied by focal dysfunction and symptoms lasting more than 24 hours that are presumed to be of a non-traumatic vascular origin[1].

Generally Stroke has three major types, i.e.

1-Infarction 2- Hemorrhage 3- Ischemic

Infarction occurs due to formation of blood clot along the wall of a blood vessel (i.e. thrombosis[2] . In most studies cerebral infarction was the most common and accounted for 50% to 80% of cases. Cerebral infarction is more common in developed countries (as high as 80% and up to 60% in developing countries) [2]. Hemorrhage Stroke is very sudden in onset with severe headache, vomiting and rapid deterioration of conscious level over a period of hours. Hemorrhages are mostly due to hypertensive blood, bleeding disorders and other[3]. According to Adnan et al and Whishnant, Hemorrhagic Stroke carries a higher risk of mortality than Ischemic stroke[1,4]. Intracerebral hemorrhage (ICH) was seen in 10% to 30% in stroke patients. Ischemic Stroke is caused by a blockage of a blood vessel in the brain or neck. This stroke can stem from three different conditions: Blood clotting, embolism or abnormal narrowing of blood vessel. Hypertension is one of the most important risk factors for stroke[5]. Skoog et al and Hong et al observed in their studies that this risk increases with increasing blood pressure, while it was also found within normal range of blood pressure [6,7]. Khan et al and Basharat et al reveal that hypertension (HTN) was observed the most common predetermined factor in both cerebral infarction and hemorrhage[8,9]. It is worth noting that in the month of Ramadan, the ratio of hemorrhagic stroke decreased in hypertensive patients ($p>0.05$) while in Diabetic patients, the ratio of Ischemic stroke increased ($p<0.05$) (Selcuk et al 2003)[10]. It is still unclear whether stroke subtype, severity and prognosis are different in diabetic and non-diabetic patients[11]. Sherin found in his study that diabetes mellitus was present in 17% of acute stroke patients and in 24.6% of patients, having cerebral infarction had diabetes mellitus[12]. No case of diabetes mellitus had cerebral hemorrhage in the study. Experts have long hypothesized that familial history of stroke is a common risk factor for stroke. They were of the opinion that if an individual's mother or father had a stroke, that individual would be at increased risk of having a stroke. An estimated 68% of the excess deaths in men with a family history of myocardial infarction (MI) were attributable solely to the interaction of family history with smoking habit and were therefore potentially avoidable[13].

AIMS AND OBJECTIVES

The objectives of the study were as follow:

- **i.** To identify most significant risk factors of acute stroke in target group.
- **ii.** To measure severity of Stroke by gender.
- **iii.** To make suggestions based upon the findings of the study.

RESEARCH DESIGN

Target population means a population about which we draw inferences. For this study, the target population consisted of stroke patients both genders living in Peshawar region. A fraction of population from which we collect data to analyze and draw conclusions about the target population. The data were collected from the three major hospitals of Peshawar, i.e. Post Graduate Medical Institute Lady Reading Hospital, Khyber Teaching Hospital and Post Graduate Medical Institute Hayatabad Medical Complex. The study is comprised of 300 patients of stroke. Since the complete list of patients in Peshawar region was not possible to get. Thus Sequential sampling scheme was used for selection of sampling units and data collection. This technique requires fixation of sample size in advance. The first 300 stroke patients were being examined in Medical Wards of three hospitals subject to fulfilling the criteria.

STATISTICAL ANALYSIS

The collected data have been presented by using cross-sectional tabulations, simple & multiple bar charts and pie charts etc. Tendency of the data was described by using averages & fractiles. The variability was observed by using standard deviation, quartile deviation and co-efficient of variation for overall consistency in the primary data.

Chi-square is a family of distributions commonly used for significance testing. It is a non-parametric test for nominal scale (frequency) data. It is a statistic used in test of significance related to contingency Table frequencies, where it is a probability distribution defined as sum of squares of several independent standard normal variables (i.e. variables with a mean of zero and a variance of 1). The statistic is used to test the hypothesis that there is no association between rows and columns in tabular data. One variable chi-square is also called contingency Table. The test statistic is:

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\frac{(o_{ij}-e_{ij})^2}{e_{ij}}$$

Where i=1,2,3, ... , r , j= 1,2,3,4, ... , c , N = n1 + n2 + n3 + ... + nr and

$$e_{ij} = \frac{n_i c_j}{N}$$

O_{ij} is observed number in cell (i, j) and

e_{ij} represents the expected frequency in cell (i, j).

Mann-Whitney test is one of the most powerful of the nonparametric tests for comparing the population of a continuous variable between two independent groups. It is analogous to the independent t-test, so it can be used when data is ordinal or non-normally distributed.

The statistic to be used is U;

where U is the smaller of U_1 and U_2.

$$U_1 = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1$$

$$U_2 = n_1 n_2 + \frac{n_2(n_2+1)}{2} - R_2$$

R_1 = Sum of rank of 1st sample

If n_1 or n_2 exceed than 8 then U is approximately normally distributed as:

$$Z = \frac{U-\mu_u}{\sigma_u}, \quad \text{Where} \quad \mu_u = \frac{n_1 n_2}{2} \quad \text{and} \quad \sigma_u = \sqrt{\frac{n_1 n_2 (n_1+n_2+1)}{12}}$$

If H_o is true, then distributions are approximately normal.

ANALYSIS

The study is based on a sample of size 300 patients, including control group of 207 (69%) persons having 98 (47.3%) males and 109 (52.7%) females. While 93 (31.0%) persons are uncontrolled group having 46 (49.5%) males and 47 (50.5%) females. The data in Table1 show that the overall average age of the patient is 57.3 (± 15.76 SD) years. While the oldest patient is of 100 years and youngest of 20 years. The Table reveals that 79% of the patients are having ages above 50 years which indicates that frequency distribution of patients with stroke showing a steadily increasing trend with age sketched by Figure 1.

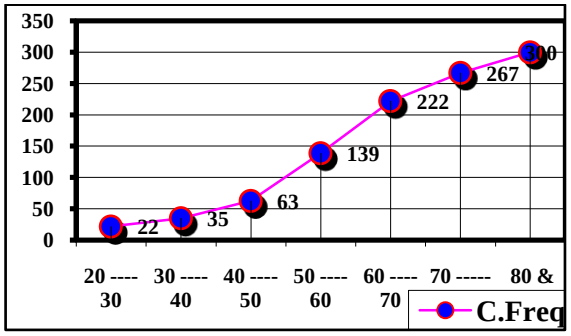

Figure. Cumulative Frequency distribution of Stroke Patients

Table.1: Frequency Distribution of Patients

Age Group	Frequency	% age	Cumulative % age
"20------ 30"	22	7.3	7.3
"30 ------ 40"	13	4.3	11.7
"40 ------ 50"	28	9.3	21.0
"50 ----- 60"	76	25.3	46.3
"60 -----70"	83	27.7	74.0
"70 ------ 80"	45	15.0	89.0
" 80 and more"	33	11.0	100.0
Total	300	100.0	-------

In addition, the average age of the patient in control group is 57.94 (± 15.11 SD) years and 55.88 (±17.13 SD) years in uncontrolled group. Table 2 reveals that 144 (48%) patients in the sampled population are males and 156 (52%) are females. The average male age is 59.11 (± 17.64 SD) years as compared to 55.66 (±13.65 SD) years in females. The maximum age is 100 years in both sexes while minimum age is 20 years and 24 years in males and females respectively.

Table :2 Age Distribution of Patients

Sex	N (%)	Mean	S.D
Male (1)	144(48)	59.11	17.64
Female (2)	156(52)	55.63	13.65

Out of these 300 patients, overall 207 (69%) patients are HTN or/and DM patients contrary to 93 (31%) of the uncontrolled group. Again in control group 98 (47%) are males and 109 (53%) are females. Similarly in uncontrolled group the ratio of prevalence of disease is elaborated.

The percentages and sketches in both Tables 2 and 3 depict that the incidence of stroke in female population is high contrary to males. While the χ^2 value=0.115 (p-value=0.73, insignificant) shows that there is no association between Gender distribution and stroke.

Table 3 Gender wise Frequency Table

Group	Males	Females	Total (%)
Control	98	109	207 (69.0)
Uncontrolled	46	47	93 (31.0)
Total	144	156	300

Control group: HTN or/and DM patients

Uncontrolled: other wise

From statistical analysis it is evident that out of 300 patients 118 (39.35%) are from urban area and 182 (60.7%) are from rural area. In addition, out of 118 patients 48 (40.7%) are male as compared to 70 (59.3%) females in urban region. Similarly in rural area, 96 (52.7%) and 86 (47.3%) patients are males and females respectively, which is indicative of higher prevalence of stroke among females as compared to males. This study also reveals that the stroke prevalence rate is significantly high in females compared to male population in urban area. Similarly 46 (15.3%), 246 (82%) and 8 (2.7%) stroke patients belong to lower, middle and upper class respectively. The incidence of stroke in middle class is positively high. The investigator sketches that, out of 300 patients 178 (59.7%) patients had past history of HTN while 122 (40.3) were nonhypertensive. Similarly, Table 7 shows that the presence of past history of DM is only in 76(25.3%) patients.

The overall family history of stroke is found only in 14 (4.7%) of the sampled population. In women

patients the frequency of stroke is 8 (57.1%) which is higher than of the male patients. The data show that 36 (12%) patients were in habit of smoking while 264 (88%) patients were nonsmokers. Similarly out of 300 patients 86 (28.7%) are using snuff contrary to 214 (71.3%) patients who are not addicted of snuff.

The history of past stroke attack is found in 36 (12%) patients; while a majority of patients 264 (88%) do not have any past history of stroke. Out of 156 women 7 (4.5%) are using contraceptive medicines while the remaining 149 (95.5%) are not using this device.

The study includes some explanatory variables which are continuous. In this fashion the correlation analysis was performed in order to know the strength of the relationships among different covariates under the study. The following Table shows correlation coefficient r for the 3 variables Age, Systolic Blood Pressure and Diastolic Blood Pressure.

Table-4 Correlation Matrix of Age, Systolic Blood Pressure and Diastolic Blood Pressure

	Age	Systolic B.P	Diastolic B.P
Age Significance	1	0.013 0.825	-0.058 0.314
Systolic B.P Significance	---------	1	0.709** 0.00
Diastolic B.P Significance	----------	----------	1

**Corr. is significant at α=0.01 (2-tail test)

It is evident from Table 4 that the correlation between age and systolic B.P is r=0.013 which is insignificant (p=0.825) at α=0.01. Similarly the strength of relation between age and diastolic B.P is not significant. Whereas, the degree of relation between systolic B.P and diastolic B.P is r=0.709 and p-value=0.00 provides strong evidence of significant relation between them.

The Mann Whitney test suggests that there is a significance difference between the average age for males and females who had stroke. Similarly the Mann Whitney test statistic in for area wise comparison shows that there is no significant difference between the average diastolic B.P of stroke patients belonging to urban and rural areas. The average systolic B.P is identical for both areas as well.

DISCUSSION

Stroke is the common cause of morbidity and mortality which most commonly occurs in diabetic and hypertensive patients. The increasing prevalence and incidence of this disease at global level and particularly in Pakistan where a large number of patients are affected by stroke every day have necessitated investigating this disease and its causes.

All stroke patients both genders living in Peshawar region were taken as universe of this study. A sample of 300 stroke patients was taken from three major hospitals of Peshawar, namely LRH, KTH and HMC. The data were computed through designed and pre-tested questionnaire.

Age (A), diastolic BP (L), systolic BP (U), gender (G), region (R), family history of stroke (F), previous stroke onset (P), smoking

(S), socioeconomic status (E) and use of contraceptive medicines (C) were the risk factors for this study.

Out of 300 patients, 144 were males and 156 were females. Where 207 patients, had past history of DM/HTN; 98 males and 109 females; while 93 patients, 46 males and 47 females had no past history of DM/HTN. The overall average age was 57.3 (±15.76SD) years. The oldest patient was of 100 years old and youngest patient was 20 years old. Further more, 237 (79%) were more than 50 years old. The average age of patient was 58 and 56 years in response and explanatory cohort respectively. The investigation showed significant difference between the average age for males and females in the group.

Of 300, 179 patients were found hypertensive and the rest (121) were nonhypertensive. Again one-fourth (76) patients were Diabetic while the remaining (224 patients) were found normal. Moreover, only 14 patients were found who had previous onset of stroke while an overwhelming majority (264 patients) had no past history of stroke onset. Further 36 patients were smokers while 264 were nonsmokers. Furthermore, only 14 patients had a family history of stroke while overwhelming majority (264) had none. Out of 156 female patients, only 7 were using contraceptive medicines while 149 were not using this device. Of the sample, 118 patients belonged to urban area and 182 hailed from rural area. Regarding socio-economic status, less than one-sixth (46) was from lower class, about forty-fifth (246) from middle class and only 8 patients from high class.

Based on this study, following conclusions are offered:

1. Prevalence rate of stroke is highly correlated with age. Its onset is increased in elderly (probably above 55 years).
2. Cerebrovascular disease is more in females contrary to males.
3. Systolic BP (U) and family history of stroke (F) are observed worth significant risk factors in all three fitted models.
4. Contrary to other previous studies, it warrants saying that smoking and snuff are not significant risk factors for stroke in target group. Similarly use of contraceptive medicines is not a significant cause of stroke in DM and/or HTN females.

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