ORIGINAL ARTICLES

PREVALENCE OF COGNITIVE DECLINE IN PATIENTS WITH STROKE

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ABSTRACT

Objective: To determine the prevalence of cognitive decline among the patients of stroke and analyze the associated socio demographic factors.

Study Design: Cross sectional study.

Place and Duration of Study: Tertiary care hospital of Rawalpindi, from May 2018 to Aug 2018.

Methodology: The sample population comprised of n=180 patients of hemorrhagic or ischemic stroke presenting at a tertiary care hospital in Rawalpindi, Pakistan. Cognitive decline was assessed by using the British Columbia Cognitive Complaints Inventory (BC-CCI) four weeks after the acute stroke. Relationship of age, gender, marital status, education, type of stroke, presence of physical impairment and tobacco smoking was assessed with the presence of cognitive decline among the patients of stroke.

Results: Out of 180 patients of stroke screened through British Columbia Cognitive Complaints Inventory, 129 (71.7%) showed the presence of cognitive decline while 51 (28.3%) had no cognitive decline. After applying the logistic regression we found that female gender and presence of physical impairment had significant association with the presence of cognitive decline among the patients of stroke.

Conclusion: This study showed a high prevalence of cognitive decline among the patients of stroke in Pakistan. Routine screening for cognitive decline should be done at the stroke follow up clinic and special attention should be paid to the female patients of stroke and those with physical impairment.

Keywords: British columbia cognitive complaints inventory, Cognitive decline, Stroke.

INTRODUCTION

Non communicable diseases are common cause of hospital admissions in a developing country like Pakistan[1]. Stroke is one of these non communicable diseases which are highly prevalent in both developed and developing countries[2,3]. Stroke have been associated with many mental health problems including depression, anxiety, psychosis and cognitive decline[4,5].

Cognitive ability of an individual may vary with age and other circumstances. Many medical, neurological and psychiatric illnesses pose their effect on the cognition of an individual. Endocrinopathies, liver disease, chronic renal disease, autoimmune diseases and depression are some of the diseases linked with the decrease in cognition of the individual[6-10].

Previous research highlights the presence of cognitive decline among the patients suffering from both hemorrhagic and ischemic stroke. Sun *et al* concluded that post stroke cognitive impairment hits around 20-80% of the patients[5]. Majority of the patients had cognitive decline after the stroke in a study done in the United states[11]. Another large study involving various ethnicities showed the high prevalence of decline indifferent domains of cognition among the patients of stroke[12]. Cognitive decline among the stroke patients, not related to dementia is a widely discussed phenomenon nowadays. Problems related to cognition if persists for a long period can lead to decreased compliance to treatment and compromised quality of life which increases the chance of other complications among the patients who already had a devastating illness like stroke[13].

The mechanism by which stroke causes the cognitive impairment is complex and multidimensional. Stroke leads to vascular cognitive impairment by causing lesions on hippo campus as well as white matter. Small cerebral vessels are

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also affected leading to cerebral micro-bleeds which also contribute to vascular cognitive impairment. Stroke also contributes to the Alzheimer disease etiology. All these factors when combine together lead to the post stroke cognitive impairment[5].

Multiple risk factors have been found associated with the development of cognitive decline after the stroke. Some of these include increasing age, gender, ethnicity, socio-demographic profile, other health related co-morbidities and past history of stroke[12,14].

Local data is insufficient regarding this aspect of stroke and post stroke rehabilitation. Studies are available on functional and other psychological outcomes[15] but no study has so far been conducted to evaluate the presence of cognitive decline among these individuals. This study was planned with the aim to assess the prevalence of cognitive decline among the patients of stroke and analyze the associated socio-demographic factors linked with the presence of cognitive decline among these patients.

METHODOLOGY

This descriptive cross sectional study was conducted at the neurology department of a tertiary care hospital of Rawalpindi, from May to August 2018. Screening was performed on all the patients of first episode of acute stroke confirmed on CT-scan or MRI brain after four weeks of the acute presentation. Sampling method was non probability consecutive sampling. Exclusion criteria were the patients less than 18 years or more than 85 years of age or those who did not consent to or those with a past or current history of any psychiatric illness, dementia or delirium or with a past or current history of substance use. Patients who were pregnant or had past history of stroke, brain tumor or brain damage due to any other medical, neurological or autoimmune illness or had a new stroke in these four weeks or could not read or perform the questionnaire were also excluded.

Ethics approval for the study was obtained from the ethics review board committee of the concerned hospital. Subjects were provided with a detailed description of the study and were inducted into the study after written informed consent. Subjects with confounding variables like presence of chronic mental or neurological illness or substance use were identified by detailed history taking and excluded from the study. The BCC-CI questionnaire was administered to the patients and they were asked to answer the questions according to their condition in last one month. Socio demographic variables were also collected. Variables in the study included age, gender, marital status, education, type of stroke, presence of physical impairment and tobacco smoking. Marital status was classed as married and single or divorced or widowed. Type of stroke was confirmed on the neuro-imaging i.e. CT-scan or MRI brain carried out at the presentation of acute stroke. Presence of physical impairment was assessed by the detailed history taking and physical examination. A history of tobacco smoking was obtained. People answering "yes" to question "do you smoke or have you smoked tobacco products regularly, in other words daily or nearly daily?" were classified as smokers. Education was classed as patients having education of less than 10 years or 10 years and more. The socio demographic data of the full sample of subjects participating in the research was entered in a structured Performa specially designed for this study.

British Columbia Cognitive Complaints Inventory (BC-CCI):

It is a standardized screening tool for measuring the cognitive decline of the individuals. It is 6-item self-rating scale which takes less than 5 minutes to complete. Score greater than 4 by Likert scoring is taken as the cut off score. For assessing the severity of cognitive decline following classes were made

- Normal 0-4
- Mild cognitive decline 5-9
- Moderate cognitive decline 9-14
- Severe cognitive decline 15-18[16]

Characteristics of participants and the distribution of the BC-CCI score were described by using the descriptive statistics. Participants were resulted by categorical compared by presence and absence of cognitive decline. Chi-square was used to determine between-group variances in categorical correlates. Binary logistic regression analysis was done to evaluate the relationship of age, gender, marital status, education, type of stroke, presence of physical impairment and tobacco smoking with the presence of cognitive decline. All statistical analysis was performed using Statistics Package for Social Sciences version 23.0 (SPSS-23.0). Differences between groups were considered significant if *p*-values were less than or equal to 0.05.

RESULTS

A total of 206 patients of stroke were approached to participate in the study. Ten refused participation or were unable to follow up or get contacted after four weeks and 15 were ineligible due to exclusion criteria (05 gave history of psychoactive substance use, 03 had autoimmune disease with positive autoimmune profile, 05 were diagnosed cases of depression and 02 were pregnant). After being consented, an additional 01 did not provide complete data at baseline, leaving 180 participants who had completion of the BCC-CI after four weeks of the acute stroke. Ninety five had ischemic stroke while had 85 had hemorrhagic stroke. Mean age of the patients was 67.5 ± 4.645). Out of 180, one hundred and twenty nine (71.7%) showed the presence of cognitive decline, while fifty one (28.3%) had no cognitive decline. Table-I shows the distribution of the patients with respect to the severity of the cognitive decline. Female gender, marital status, presence of physical impairment and low education had significant association with cognitive decline when chi-square was applied. Female gender and presence of physical impairment were strongly associated with the presence of post stroke cognitive decline when regression analysis was done.

Table-I: Characteristics of the study group and their BCC-CI scores.

Socio Demographic Factors Total, n=180	No Cognitive Decline (BC-CCI 0–4) n (%), 51 (28.3)	Mild Cognitive Decline (BC-CCI 5–9) n (%), 37 (20.5)	Moderate Cognitive Decline (BC-CCI 9–14) n (%), 45 (25)	Severe Cognitive Decline (BC-CCI 14–18) n (%), 47(26.1)	*p*-value
Age					
60 year or less	33 (64.7)	17 (45.9)	29 (64.4)	25 (53.2)	0.226
>60	18 (35.3)	20 (54.1)	16 (35.6)	22 (46.8)	
Gender					
Male	37 (72.5)	12 (32.4)	07 (15.5)	22 (46.8)	<0.001
Female	14 (27.5)	25 (67.6)	38 (84.5)	25 (53.2)	
Type of Stroke					
Ischemic	28 (54.9)	22 (59.4)	17 (37.8)	28 (59.6)	0.127
Hemorrhagic	23 (45.1)	15 (40.6)	28 (62.2)	19 (40.4)	
Marital Status					
Married	21 (41.2)	28 (75.7)	21 (46.7)	26 (55.3)	0.001
Unmarried/widowed	30 (58.2)	09 (24.3)	24 (53.3)	21 (44.7)	
Education					
<10 years	38 (74.5)	23 (62.2)	20 (44.4)	30 (63.8)	0.025
10 years or more	13 (25.5)	14 (37.8)	25 (55.6)	17 (36.2)	
Physical Impairment					
No	44 (86.3)	22 (59.4)	29 (64.4)	27 (57.4)	0.008
Yes	07 (13.7)	15 (40.6)	16 (35.6)	20 (42.6)	
Smoking					
Non Smoker	46 (90.2)	31 (83.8)	40 (88.8)	43 (91.5)	0.708
Smoker	05 (9.8)	06 (16.2)	05 (11.2)	04 (8.5)	

DISCUSSION

This study is unique in a sense that it helps in the understanding of cognitive decline among the patients of stroke who had received a neuronal injury in the brain and had to face multiple physical and psychological issues in the future depending upon the extent of brain damage and the co-morbidities. Using BCC-CCI we found that more than 70% of our sample population showed the presence of cognitive decline. This is similar to the other studies done on stroke patients regarding their cognition in other parts of the world[5,11,12,17]. We used a screening tool so result may show a higher reflection and needs some diagnostic tool to ascertain the problem among the positive individuals. Also longitudinal studies and repeated assessments are required to differentiate cognitive impairment from full blown dementia.

Some of the factors that may affect the cognition of these patients have been reported as vascular damage, lesions in the areas of brain responsible for cognition and enhanced neurodegenerative process[5]. Other co-morbidities and psychological disorders like post stroke depression and anxiety may also contribute in the cognitive decline[10,13].

Cognition of an individual is a multi dimensional phenomenon with physical, neurological and psychological dimensions. Stroke affects all these dimensions in one way or the other. Initially the individual himself is usually unable to comprehend the decline in his cognitive abilities which sometimes causes delay in diagnosis of this aspect of stroke. Good cognitive ability is required for good overall quality of life[13]. Therefore timely screening and treatment of this aspect may improve overall quality of life of a patient after the stroke.

Various studies in the past showed mixed results regarding association of gender with the post stroke cognitive decline[17,18]. Results in our study showed strong association of female gender with the cognitive decline after the stroke. Reason might be other psychological issues which are predominantly found among females. More studies are needed to ascertain this association.

Low education had significant association with cognitive decline in our study when chi-square was applied, however logistic regression did not support this association. Past studies have also supported this association[12,17]. Various surveys in the past demonstrated increasing age as a risk factor for post stroke cognitive decline[12,17]. Reason for lack of association in our study may benarrow range of the age of participants of the study.

Table-II: The correlated factors relating to cognitive decline: the binary logistic regression.

	B	*p*-value	OR (95% CI)
Age (ref. is 60 years or less)	0.399	0.277	1.490 (0.725-3.062)
Gender (ref. is male)	1.934	<0.01	6.920 (3.262-14.683)
Marital status (ref. is married)	-0.506	0.168	0.603 (0.294-1.238)
Type of stroke (ref. is ischemic stroke)	0.000	1.000	1.000 (0.472-2.120)
Smoking (ref. is non smoker)	0.996	0.107	2.707 (0.807-9.075)
Education (ref. is 10 years or above)	-0.612	0.062	0.542 (0.286-1.030)
Physical Impairment (ref. is no physical impairment)	1.413	0.003	4.106 (1.601-10.533)

Presence of physical impairment among the stroke patients was strongly related with high BCC-CI scores in our study. Tatemichi *et al* produced similar results in their study in 1994[11]. Patients with compromised physical status and disability may have more psychological problems and there may be more damage in the brain which may be responsible for both physical damage and cognitive decline.

This study has few limitations as well. Randomized selection of study subjects from the entire stroke patients was not done. Therefore, the results of the present study cannot be generalized. We used the cross-sectional study met-

hod. Therefore, the cause and effect relationships remain unclear and further studies to look to into these associations using longitudinal epidemiological data are suggested. BCC-CI is a self reported screening tool in which there is always a chance of over or under reporting of the symptoms. Severity and control of the co morbid medical illnesses were not included as DM and HTN themselves can add to the cognitive decline. Therefore longitudinal studies involving more sample size and sophisticated study design are suggested to ascertain the association between stroke and cognitive decline and the associated risk factors.

CONCLUSION

This study showed a high prevalence of cognitive decline among the patients of stroke in Pakistan. Routine screening for cognitive decline should be done at the stroke follow up clinic and special attention should be paid to the female patients of stroke and those with physical impairment.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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