Prevalence of neuropsychiatric disorders and quality of life in post stroke patients in southern India

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Abstract   **Background:** Stroke is the third commonest cause of death worldwide after coronary heart disease and cancer of all types. Efficacious treatment until recently has centered around management of risk factors and co-morbid conditions to prevent stroke. **Aim and Objectives:** To determine the prevalence of neuropsychiatric disorders and the quality of life after stroke. **Methodology:** Cross-sectional study was performed for six-month duration and diagnosed as stroke and wished to participate were identified and consent was obtained. The prevalence of neuropsychiatric disorders in Trivandrum district by using a neuropsychiatric tool namely Neuropsychiatric Inventory (NPI). Quality of life was asses using Stroke Specific Quality of Life Scale. **Results and Discussion:** 52 patients enrolled, 37 were males (71.15%) and 15 were females (28.84%).The total NPI score of patients ranges from 1 to 39. The total NPI mean score was 8.6 with a standard deviation of 10 and median was 4. Total Neuro vegetative Changes score of patients' ranges from 4 to 6. The total Neuro Vegetative Changes mean score was 5 with a standard deviation of 1 and median was 5. The patients with age group 40-44 and marital status single shows better QOL scores in health and functioning. **Conclusion:** The improvement of QOL after the completion of the treatment, may not be restored optimally, since majority of the patients are above 60. From the study, it is clear that majority of the stroke patients have adequately severe neurological impairment and need assistance to carryout activities of daily living.
Key Words: neuropsychiatric disorder, quality of life.

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INTRODUCTION

Scientific care specified was petite and no attention was focused on differentiating mechanism of stroke until the first half of the 20th century. In prior times patients with stroke were either admitted to an acute care hospital or non-teaching services for maintenance care. The last half of the 20th century initiated with a few clinicians calling attention to the importance of stroke as a clinical problem and providing leadership in efforts to understand the mechanisms of how nearly disorders lead to the occurrence of stroke. These early efforts led to growing concentration of clinicians and recognize the importance of differentiating types and pathophysiologic substrate when possible. Increasingly sophisticated imaging studies have momentously enhanced the ability of the neurologist or others to determine the type and characteristic of stroke. Efficacious treatment until recently has centered around management of risk factors and co-morbid conditions to prevent stroke.[1,2] Stroke is the third commonest cause of death worldwide after coronary heart disease (CHD) and cancer of all types.[3] Present projections are that death due to it will increase exponentially in the next 30 years due to failure to control risk factors. In the early 1990s the prevalence rates were around 600-800 per 100,000 in the Western countries and 1000 per 100,000 in Asia.[4,5] The epidemiological data from Chinese population mortality rate was 44 to 102.6/100,000 for Asian males, compared with only 19.3

for Australian white males.[6] Among the native Japanese, the three consecutive decades following World War II witnessed stroke as the commonest cause of death.[7] But in the recent two decades, there had been a substantial reduction in mortality.[8] Apart from Chinese and Japanese, comprehensive epidemiological data among the other races in Asia is still sparse. A recent study comparing stroke disorders among three Asian races in Singapore revealed that Chinese had higher prevalence when compared to Indians and Malay Singaporeans.[9] In India, several epidemiological studies have been undertaken in different parts of the country since the nineties. Most of these populations based surveys however, were cross-sectional and determined the prevalence rates of stroke in the communities. Several epidemiological studies were conducted in India also. The first community-based study on stroke was carried out in and around the town of Vellore in South India during the period 1979-81, followed by that several population-based surveys on stroke were conducted from different parts of India.[10, 11] During the last decade, the age-adjusted prevalence rate of stroke was between 250-350/100,000.[12] Recent studies showed that the age-adjusted annual incidence rate was 105/100,000 in the urban community of Kolkata and 262/100,000 in a rural community of Bengal. The ratio of cerebral infarct to haemorrhage was 2.21 and hypertension was the most important risk factor.[13,14] So our study mainly aims at to find out the prevalence of neuropsychiatric disorders in Trivandrum district by using a neuropsychiatric tool namely Neuropsychiatric Inventory (NPI) developed by Cummings et al.[15] This instrument permit the detection and quantification of a wider range of neuropsychiatric changes based on information gathered from care givers. Quality of life was asses using Stroke Specific Quality of Life Scale.

MATERIAL AND METHODS

Cross-sectional study was performed for six-month duration after getting clearance from the Human Ethical Committee (order no: IEC no.07/22/11/MCT). The patients diagnosed as stroke and wished to participate were identified from Neurology Department of hospital and consent was obtained. The patients and caregivers found suitable for inclusion were included and inclusion criteria as follows; 1) patients diagnosed as ischemic stroke using neuro imaging either computerized tomography or Magnetic resonance imaging; 2) those who gave consent voluntarily to participate in the study and; 3) post stroke period ranges up to 1 year. The exclusion criteria included; 1) a history of major psychiatric illness such as depression, bipolar disorder, schizophrenia in the past;2) patients who had previous stroke; 3) patients who had undergone surgery; 4) patients

who have other chronic disabilities(cancer, renal failure or hepatic failure); and 5) patients who are not willing to participate in the study.

Neuropsychiatric tool for prevalence

Thus, in recent years the importance of using neuropsychiatric tools that measure the emotional and the behavioural disturbances commonly observed in brain-damaged patients has been underlined and new kinds of clinical tools have been developed.[16,17] These instruments permit detection and quantification of a wider range of neuropsychiatric changes; they also account for difficulties caused by patients cognitive deficits, based on information gathered from family caregivers. Cummings et al. recently developed the Neuropsychiatric Inventory (NPI),[15] a comprehensive assessment of psychopathology, and validated its use for demented patients of different etiologies. The NPI is an informant-based interview for evaluating behavioural changes following the onset of illness, and it covers a wider range of symptomatology than previous instruments; it also provides a careful profile of neuropsychiatric symptoms and minimizes administration time. The use of specific scales, such as the NPI, might increase the sensitivity of clinical observation and might be useful for better assessing neuropsychiatric symptoms also in stroke survivors.[15,18] The study patients were interviewed using the twelve-subscale version of the Neuropsychiatric Inventory (NPI) for the prevalence.

Stroke Specific Quality of Life Scale to assess the quality of life

Quality of life (QOL) which can be defined as a person's perception of his or her physical and mental health, covers broad domains including physical, psychological, economic, spiritual and social wellbeing. The world health organization defines health as "a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity".[19]QOL has become an accepted outcome measure in clinical research, and advances have been made in assessing the impact of many diseases such as hypertension, leprosy, stroke, tuberculosis and chronic obstructive pulmonary disease.[15]There are many instruments to measure QOL that can identify the ways in which disease affects people. Here we are using Stroke Specific Quality of Life Scale to assess the quality of life of stroke patients which is designed by Williams LS et al.[20] It consists of four main domains and have been validated and translated in various languages. There are several studies carried out on the diagnosis, treatment and prevention strategies of stroke but studies focusing on the relationship between neuropsychiatric disorders and quality of life of patients are rare. This present study was carried out with a purpose to identify hoe stroke affect QOL and how the

treatment modifies this QOL in patients in patients attending neurology department. Quality of life were assessed using Stroke Specific Quality of Life scale.

Statistical Analysis

Collected data entered in Microsoft excel for analyzing data. Data processing tabulation of descriptive statistics, calculation and graphical representation did on statistical software SAS.9.4. Statistical testing performed at 5% level of significance. Non-parametric test of Wilcoxon Rank Sum test used for statistical analysis. Data processing tabulation of descriptive statistics did on statistical software.

RESULTS AND DISCUSSION

Table 1: Neuropsychiatric Inventory (NPI) Symptom status

Neuropsychiatric Inventory Symptom status	Absent n (%)	Present n (%)
Delusions	52 (100.0)	-
Hallucination	52 (100.0)	-
Aggregation/Agitation	36 (69.23)	16 (30.77)
Depression	28 (53.85)	24 (46.15)
Anxiety	38 (73.08)	14 (26.92)
Elation/euphoria	45 (86.54)	7 (13.46)
Apathy	52 (100.0)	-
Disinhibition	52 (100.0)	-
Irritability/Lability	46 (88.46)	6 (11.54)
Abberant Motor Behaviour	45 (86.54)	7 (13.46)
Sleep and Night Time behaviour	47 (90.38)	5 (9.62)
Appetite/Eating change	49 (94.23)	3 (5.77)

Table 2: Neuropsychiatric Inventory (NPI) score details

Neuropsychiatric Inventory (NPI) Score	n	Mean(SD)	Median	95% CI	(Min, Max)
Total NPI Score	43	8.60 (10.39)	4	(5.41 ,11.80)	(1.00 , 39.00)
Delusions	-	-	-	-	-
Hallucination	-	-	-	-	-
Aggregation/Agitation	17	5.41 (2.50)	6.00	(4.13 , 6.70)	(1.00 , 9.00)
Depression	24	2.71 (1.37)	2.00	(2.13 , 3.29)	(1.00 , 6.00)
Anxiety	14	4.00 (1.11)	4.00	(3.36 , 4.64)	(2..00 , 6.00)
Elation/euphoria	7	8.71 (3.77)	9.00	(5.22 , 12.20)	(2.00 , 12.00)
Apathy	-	-	-	-	-
Disinhibition	-	-	-	-	-
Irritability/Lability	6	7.50 (2.07)	8.50	(5.32 , 9.68)	(4.00 , 9.00)
Aberrant Motor Behavior	7	7.29 (2.29)	8.00	(5.17 , 9.40)	(4.00 , 9.00)
Total Neuro Vegetative Changes score	8	5.00 (1.07)	5.00	(4.11 , 5.89)	(4.00 , 6.00)
Appetite/Eating change	3	5.33 (1.15)	6.00	(2.46, 8.20)	(4.00 , 6.00)
Sleep and Night Time behavior Disorder	5	4.80 (1.10)	4.00	(3.44 , 6.16)	(4.00 , 6.00)

Table 3: Effect of selected variables on overall health of the patients

Socio Demographic Variables		MEAN±SD,MEDIAN	N	KW, Chi- Square	P value
AGE	40-44	(52.11 ±6.39),56	3		0.2804
	45-49	(45.61 ±1.82),45	3		
	50-54	(31.34 ±11.12),37	5		
	55-59	(40.46 ±4.53),41	7	28.6143	
	60-64	(41.29 ±4.06),43	7		
	65-69	(36.88 ±6.05),35	10		
	70-74	(30.90 ±7.59),31	8		
	75-79	(33.51 ±6.47),33	6		
	80-84	(38.61 ±13.71),32	3		
Dietary habits	Vegetarian	(39.79 ±9.70),39	8	Wilcoxon Statistic, Z	0.5598
	Non-vegetarian	(37.10 ±8.49),38	44	0.5832	
Economic Status	BPL	(37.49 ±8.36),38	41	Wilcoxon Statistic, Z	0.9179
	APL	(37.65 ±10.02),40	11	0.1031	
	Illiterate	(33.34 ±10.40),33	5		
	Primary	(35.14 ±6.95),35	18	KW ,Chi-Square	0.0847

Education	High School	(40.64 ±8.57),43	17	8.1950	
	Pre degree	(42.05 ±10.53),41	7		
	Degree or above	(33.97 6.33),31	5		
Marital Status	Married	(36.96 ±7.46),38	31		0.0593
	Widowed	(36.23 ±9.14),34	17	KW ,Chi-Square	
	Single	(52.11 6.39),56	3	7.4333	
Occupation	Unemployed	(35.84 8.48),35	38	Wilcoxon Statistic, Z	0.0375**
	Employed	(41.97 ±7.66),42	14	2.0806	
Residential Area	Rural	(39.02 ±9.03),38	27	Wilcoxon Statistic, Z	0.4332
	Urban	(36.19 ±8.21),38	25	0.7838	

Table 4: Percentage of distribution of sample according to NIHSS

NIHSS	Grade	Count	Percentage
Severe neurological impairement	>=14 (0)	2	4
Adequatly severe neurological impairement	6-13 (1)	41	79
Mild impairement	<=5 (2)	9	17
Total		**52**	**100**
Mean - 8.13	**SD -3.23**	**95% CI-7.24(9.03)**	**Min, Max-2.00,22.0**

A total of 61 patients were enrolled for the study, out of that 9 patients were excluded due to failure to give consent (6 patients) and wrong diagnosis as stroke (3 patients). 52 patients who had satisfied the inclusion criteria where enrolled and out of that 37 were males (71.15%) and 15 were females (28.84%). Literature evidence supported that males have high incidence of stroke than females (D.G. Smithard *et al*).[21] Chance of stroke is more for males compared to females due to the risk factors like smoking and alcohol abuse and also estrogen level reduces the chance of stoke in reproductive women.[21]The study were analyzed age of patients (Figure-1) ranges from 42 to 81. The mean age of the patients was 63 ±10.19 and age group of 65 to 69 years has the largest number of patients. The mean age distribution results were approximately similar to study conducted by Monica Åström *et al*[22] and Renee D *et al*.[23] According to Renee D. *et. al*[23] chance for developing stroke four times higher in persons above 60 and age is a risk factor for development of stroke. These findings are similar to the result of present study. Based on the education status, the patients under study are classified into 5 different groups namely; Illiterate, Primary, High school, Pre-degree and Degree and above. 35 patients have got school level education (67.31%) and around 10% patients were illiterate. Majority of the stroke patients comes under high school level education, this may be because of high literacy rate of Kerala. The economic status, 41 patients (78.85%) belongs to Below Poverty Line (BPL) group and 11 (21.15%) belongs to Above Poverty Line (APL) group, this may be because of its a Govt. Medical college where treatment is free of cost and the patients unable to tolerate expense of private hospitals. So, the patients were captivating govt hospital as primary choice. The study also collected occupation data of patients as employed and unemployed group and results shows that most of the patients were unemployed [38 (73%)].This is because of the severity of the disease and also chance for developing stroke is higher in persons above 60.Among the study populations, 31(60%) married, 17(33%) widowed and 3 were single. Unfortunately, investigators did not get one patient marital status detail, so we have taken it as unknown status. The dietary habits were shown in Figure-2. This is in accordance with the study carried out by Shyamal Kumar DAS.et.al.[24]that Hypertension, which is the major risk factor was related to high salt intake and equally important risk factor dyslipidemia may be due to high intake of animal fat and animal protein. Theses finding were similar to the result of collected comorbid condition of post stroke patients in current study (Figure-3). 61% patients had Blood Pressure, 42% of them had Diabetes Mellitus and 55% of them had Dyslipidymia. Also, 25% of patients had Smoking Habit and 10% had Alcohol Habit. These are the high-risk factors for stroke. Also, 25% of patients had Smoking Habit and 10% had Alcohol Habit. We were not able to rule out the alcohol abuse and smoking completely. Among the 52 patients under study, 27 (52%) were from urban area and 25(48%) were from rural area.

Prevalence of Neuropsychiatric Disorders in Post Stroke Patients

In present study prevalence of neuropsychiatric disorders was measured using NPI. Neuropsychiatric disorders include twelve domains of NPI each domain has frequency and severity score and also care giver's distress score. Total score of each domain is the is the product of frequency and severity and care givers distress score is recorded separately. Table-1 gives the total number and percentage of domain present and absent in the sample. Depression was observed in 24 (46.15%) patients, Aggregation 16 (30.77%), Anxiety 14 (26.92%), Elation 7 (13.46%), Aberrant Motor Behavior 7 (13.46%), Sleep

and Night Time behavior 5 (9.62%) and Appetite 3 (5.77%). Other symptoms like Delusions, Hallucination, Apathy were totally absent. The total NPI score of patients ranges from 1 to 39. The total NPI mean score (Table-2) was 8.6 with a standard deviation of 10 and median was 4. Total Neuro vegetative Changes score of patients' ranges from 4 to 6. The total Neuro Vegetative Changes mean score was 5 with a standard deviation of 1 and median was 5. The twelve subscales of NPI used here made it possible to study a variety of abnormal behaviors. A study conducted by Angelelli P et al.[25] among 64 post stroke patients, a wide range of neuropsychiatric symptoms was found in post stroke patients. Highest score was found for depression, this was in accordance with current study but other domains shows variations. They also found that depressed affect was associated with leisions of left frontal lobe. These also observations suggest a link between depression and anterior left cerebral hemisphere leisions.[25] According to Neuropsychiatric Inventory (NPI) Caregiver's Distress Score (Figure-4) the domains of Delusions, Hallucination, Disinhibition and Apathy showed no distress. In Aggregation/Agitation, out of 35, 7 (13.46%) caregivers had minimal distress, 4 (7.69%) had mild distress, 2(3.85%) had moderate distress and 4 (7.69%) moderately severe distress. Out of 24 depression cases, 7 (13.73 %) caregivers had minimal distress, 7 (13.73 %) had mild distress, 10 had no distress. 14 anxiety conditions, 7 (17.95 %) caregivers had minimal distress, 6 (15.38%) had mild distress, 1 (2.56 %) had moderate distress. Elation /Euphoria seen in 7, in that 1 (1.92 %) caregivers had minimal distress, 1 (1.92%) had moderate distress, 4(7.69 %) moderately severe distress. Irritability expressions in 6 cases, 1 (1.92 %) caregivers had minimal distress, 2 (3.85 %) had mild distress, 3(5.77 %) moderately severe distress. Aberrant motor behavior equivalent as Euphoria given that 3 (5.77 %) caregivers had minimal distress, 1(1.92%) had mild distress, 3 (5.77 %) moderately severe distress. Sleep and night time behavior novelty in 5, 1(2.04 %) caregivers had minimal distress, 4 (8.16 %) had mild distress; and appetite in 3,1 (1.92 %) caregivers had minimal distress, 2(3.85 %) had mild distress.

Quality of life
Quality of life was highest for family domain and lowest for health and functioning. Higher scores indicate better functioning. The SS-QOL yields both domain scores and an overall SS-QOL summary score. The domain scores are un weighted averages of the associated items while the summary score is an un weighted average of all four domain scores (Williams et al. 1999).[20] The patients with age group 40-44 and marital status single shows better QOL scores (Table-3) in health and functioning. There

was no significant variable which has an effect on health and functioning of the patient and family health of the patient. The variable education has a significant effect on quality of life of the patients. All other variables are seldom significant in the quality of life of study population. Highest family domain score was found in patients coming under 40-44 age group. Majority of the patients belongs to BPL, this class showed highest score for overall and family domain and lower score for all other domains compared to APL. High school and above class of education showed higher score in all domains of QOL and in overall domain. Higher score for family domain is found, it may be because of the support from the family members. Lowest score for health and functioning was found may be because of the older age, co-morbid conditions or may be of long term duration of stroke. Overall health of the patient comprises all four individual domains, occupation showed significant in overall health. The higher education, marital status younger age had higher score but these are not statistically significant. Out study populations 4% have severe neurological symptoms.41 (79%) patients had adequately severe neurological symptoms. 9 (17%) have mild impairment (Table-4). That means 17% minor stroke patients and may be able to do daily activities.4% need long term caring, they have to depend on care givers for their daily activities. 79% need short term caring. The mean score is 8.13 with stand deviation of 3.23.

CONCLUSION
The present data underline the importance of monitoring stroke survivor's emotional and behavioral alterations, which seems to be long lasting. These neuropsychiatric disorders lead to greater functional impairment and caregiver's distress with respect to patients without neuropsychiatric disorders. More over positive scores were recorded only for features like depression, aggregation, anxiety, elation aberrant motor behavior, sleep and night time behavior and appetite. Other symptoms like delusions, hallucination, apathy are totally absent. More detailed follow up studies in large number of populations helps in proper diagnosis of these disorders and can be treated properly with psychotropic medications and which helps in improving functional recovery. Study showed that the disease has lowered the quality of life of the patients. Although there is a chance for the improvement of QOL after the completion of the treatment, QOL may not be restored optimally, since majority of the patients are above 60. From the study, it is clear that majority of the stroke patients have adequately severe neurological impairment and need assistance to carryout activities of daily living.

LIMITATIONS

Size of the study population available was very low and therefore result and conclusion made in this study may not be applicable for a large sample. Time of the study is too short compared to total treatment period of the disease. Some of the neurological symptoms may mimic neuropsychological symptoms that make neuropsychological assessment difficult. No conflict of interest and no financial support from any agencies.

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