

Health related Quality of Life and Prediction of Life Expectancy using Charlson Comorbidity Index in Post Stroke patients

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1 INTRODUCTION

Cerebrovascular accident (CVA) or brain attack or STROKE as we commonly refer to is the sudden death of neurons in a localized area of brain due to inadequate blood supply. The mortality rate due to stroke in India is 22 times that of malaria and 1.4 times that of tuberculosis. It's a major public health challenge not only for neuropharmacology but the society in general.¹ Patients suffering from stroke are usually recipients of a long list of medicines where the therapy continues for a long time, usually lifelong.

Comorbidities are major determinants in the treatment of stroke which is common in patients with hypertension, high blood cholesterol, Diabetes Mellitus, heart disease. Heavy smoking and alcohol consumption are other causes for Stroke.² According to India stroke factsheet updated in 2012, the estimated age-adjusted prevalence rate for stroke ranges between 84/100,000 and 262/100,000 in rural and between 334/100,000 and 424/100,000 in urban areas.³ Recent reports have shown a substantial increase of stroke in younger population.⁴ 50% of stroke is preventable by control of modifiable risk factors and lifestyle changes (aerobic exercise to counteract inactivity, weight loss in obesity, glucose control in diabetics, smoking cessation, and diet).⁵ American Stroke Association (ASA) and the American Heart Association (AHA) have recently published updated guidelines for secondary prevention of stroke.^{6,7}

The management of stroke should be individualized. As proper drug utilization is a concern for various diseases, the same is also important for stroke management. The drug utilization in stroke care is of very much concern in devel-

oping countries, as healthcare infrastructure is inadequate, government has insufficient control on the system of drug supply and also due to free availability of drugs on prescription often illegally. The drug treatment strategy is involved with proper selection of drugs like thrombolytics, anticoagulants, antihypertensives (angiotensin converting enzyme inhibitors, angiotensin II receptor blockers, diuretics), blood lipid lowering agents (statins), antiplatelet drugs (aspirin and clopidogrel), and neuro protectors.⁸

A patient's psychological functioning and psycho-social situation may be severely disrupted by the disease. The degree of disturbance is usually determined by the severity of the stroke and degree of cognitive deficits. Hence, studying QOL in patients is also one of the aims of the study.⁹ Post-stroke cognitive impairment is very common, particularly after recurrent stroke, which affects up to one-third of stroke survivors.^{10,11} These comorbid motor and cognitive impairments can significantly increase the risk of long term functional disability as well as increase the healthcare costs.¹² Most of the patients recover in first 3-6 months after the acute neurological event, with almost 70% of their recovery in first 3 months after a stroke. After 6 months, the recovery can be considered to be almost nil. However, for the hemiplegics, physiotherapy can be a healthy source for gaining the stairway to becoming physically fit.¹³ Thus, along with medications functional recovery also depends upon institution of early rehabilitation, which aims to enhance skill learning which promotes plasticity.^{14,15,16}

The Caregivers of stroke patients provide informal care ranging from physical help to psychosocial support. As a re-

sult, these caregivers may experience high levels of burden, associated with characteristics of the patients and of the caregivers themselves. Family caregivers provide basic personal care, help the patients to perform daily activities, give emotional support, and organize medical and social community service.¹⁷

The quality of life is highly reliant on the patient's mental state. It is very important to have a positive mindset and to comply with the drugs prescribed. Since, many stroke patients become hemiplegic, it is crucial for them to undergo physiotherapy with the highest dedication.

OBJECTIVES:

1. To evaluate the drug utilization pattern of stroke patients in a tertiary care hospital.
2. To study the comorbidities associated with stroke.
3. To study the quality of life of stroke patients.

2 MATERIALS AND METHODS

A prospective cross sectional study was conducted over a period of 2 months, at the Neurology Department at a tertiary care hospital. Permission from the Indian council of medical research & the institutional ethics committee, was ensured. Written consent of the patient was obtained in their vernacular language. Consenting patients were given the questionnaire and informed that their participation is entirely voluntary and that they can drop out of the study at any given point of time. Moreover, confidentiality of the data was maintained.

Inclusion criteria:

1. Patients above 18 years of age
2. Patients attending the Neurology OPD of the hospital and diagnosed with Stroke for the past one month
3. Patients who are willing to give informed consent for the study and agreeing to answer the questions related to their daily life symptoms.

Exclusion criteria:

1. Patients with severe disabilities.
2. Patients which are not able to comprehend questions related to quality of life.

Patients were assessed and diagnosed by a neurologist. The baseline data like demographic details, presenting complaints, past history, diagnosis and details of the drug utilization were noted.

The Charlson Comorbidity Index (CCI)¹⁸ assesses comorbidity level by taking into account both the number and severity of 19 pre-defined comorbid conditions. It provides a weighted score of a client's comorbidities which can be used to predict short- and long- term outcomes such as function, hospital length of stay and mortality rates. The CCI is the most widely used scoring system for comorbidities and

hence it was used in the present study.¹⁹ The CCI is calculated from administrative coding of medical record. Variables given weight of 1 in CCI included myocardial infarct, congestive heart failure, peripheral vascular disease, cerebrovascular disease, dementia, chronic pulmonary disease, connective tissue disease, ulcer disease, mild liver disease, and diabetes. Variables given weight of 2 in CCI included hemiplegia, moderate or severe renal disease, diabetes with end-organ damage, any tumor, leukemia, and lymphoma. Variables given weight of 3 in CCI included moderate or severe liver disease. Variables given weight of 4 in CCI included metastatic solid tumor and advanced immunodeficiency syndrome. Validity was assessed on the basis of modified Rankin score at hospital discharge (good outcome 0 or 1 versus poor ≥ 2 or dead) and 1-year mortality, adjusting for initial stroke severity.^{20,21}

Quality of life was measured using WHOQOL-BREF. The WHOQOL-BREF instrument comprises 26 items which measure the following broad domains- physical health, psychological health, social relationships and environment. Each domain is comprised of multiple questions that are considered together in the derivation of each domain score. In addition to the four domains, the WHOQOL-BREF includes two stand-alone questions to assess rated QOL and Satisfaction with Health. The scores for the domains ranging from 0- 100, 0 being the worst quality of life and 100 being the best.²²

STATISTICAL ANALYSIS:

Data was analyzed using SPSS version 25. Measurement variables were expressed in mean \pm standard deviation, whereas categorical variables were expressed in numbers and percentages(%). Descriptive statistics was used for the assessment of baseline characteristics. Shapiro-Wilk test was used to analyse the compliances of datasets with normal distribution. Student t test was used to compare the values of groups. As data of variables age, gender, comorbidities and quality of life were normally distributed, Pearson correlation coefficient was used for comparison. P values less than 0.05 was considered significant.

3 OBSERVATION AND RESULTS

Socio-demographic and Clinical characteristics:

A prospective cross sectional study was conducted for a period of 2 months from June and July, 2019. A total of 50 stroke patients were included in the study, comprising 37 (74 %) males and 13 (26%) females with the mean age of 54.9 ± 12.35 years. Highest proportion of patients belonged to age group of 41-59 years (23, 46%), followed by 61-80 years (18, 36%) and (9, 18%) between 21-40 years. Majority of the study participants were businessmen (24%) followed by retired individuals and housewives (22%). 42(84%) patients had symptoms of altered mood/ anxiety/depression. During admission, weakness (72%) and myalgia (64%) were the most frequently encountered chief complaints among hospitalized stroke patients. 20 (40%) patients had a history of tobacco/smoking. Hypertension (31, 62%) was the

major co-morbidity among study patients, followed by Diabetes Mellitus in 23 (46%) and Tobacco/ Smoking in 20 (40%) patients. (Table 1)

Table 1. Baseline characteristics of stroke patients

Variables	Frequency (%)
Mean Age	54.9 ±12.35 years
Sex	37 (74 %)
Male Female	13 (26%)
Chief complaints	36 (72%)
Left sided Weakness	32 (64%)
Myalgia	26 (52%)
Facial asymmetry	22 (44%)
Behavioral Abnormalities	12 (24%)
Bowel/Bladder Disturbance	11 (22%)
Difficulty in Swallowing	8 (16%)
Difficulty in Breathing	4 (0.8%)
Other complaints	3 (0.6%)
Fever	1 (0.2%)
Speech difficulties	1 (0.2%)
Unable to speak	1 (0.2%)
Dizziness	
Constipation	
Most common Occupations	12 (24%)
Business	11 (22%)
Housewife	11 (22%)
Retired	3 (0.6%)
Driver	
Pattern of risk factors	31 (62%)
Hypertension	23 (46%)
Diabetes Mellitus	20 (40%)
Tobacco/ Smoking	9 (18%)
Dementia	

Prescription Patterns:

In the present study, total 249 drugs were prescribed in 50 prescriptions i.e. average of 5 drugs/patient. Amongst 50 patients, antiplatelet drugs like aspirin, warfarin and clopidogrel were given to 44(88%) patients. Patients with Hypertension were treated with different class of drugs like Angiotensin receptor blockers (42%), calcium channel blockers (26%), beta blockers (22%), and ACE inhibitors (0.6%). Stroke patients who suffered seizures were prescribed anticonvulsants like Levetiracetam (10%), Phenytoin (0.4%) and valproate (0.4%). Majority of the stroke patients were prescribed antiplatelets (86%) and hypolipidemics (56%). The prescription pattern of various drugs had been shown in Figure 1 and Table 2.

Quality of life and comorbidity indicators :

Quality of life assessment in all patients was done using the WHO-BREF questionnaire. Their raw scores were calculated and converted into their transformed scores. Mean scores of Physical, Psychological, Social and Environmental domains were 46.17± 19.12, 51.42 ±17.66, 64.4± 20.28 and 59.14 ± 16.86 respectively. Physical domain was the most affected domain which deals with ability to perform daily activities and sleep, dependence on medicinal substances and medical aids, fatigue, work, pain and discomfort, followed by psychological domain which deals with emotions, cognition, self-esteem and personal beliefs. Social domain was the least affected which deals with personal relationships. Overall quality of life was significantly affected in

Table 2. Drug prescription in Stroke patients according to their frequency

Drug class	N (%)
Agents acting on blood	26 (52%)
Aspirin	15 (30%)
Warfarin	2 (0.4%)
Clopidogrel	1 (0.2%)
Rivaroxaban	
Hypolipidemic	20 (40%)
Atorvastatin	8 (16%)
Rosuvastatin	
Hypoglycaemics	14 (28%)
Metformin	2 (0.4%)
Glimepiride	1 (0.2%)
Glipizide	1 (0.2%)
Gliclazide	1 (0.2%)
Teneligliptin	6 (12%)
Insulin	
Beta blockers	6 (12%)
Metoprolol	2 (0.4%)
Propranolol	1(0.2%)
Atenolol	1 (0.2%)
Bisoprolol	1(0.2%)
Nebivolol	
Calcium channel blockers	9 (18%)
Amlodipine	4 (0.8%)
Cilnidipine	
Alpha + beta blocker	1 (0.2%)
Carvedilol	

stroke patients (55.28 ± 18.48, p<0.05), indicating moderate quality of life. There was negative correlation between overall quality of life and comorbidities associated, which was statistically significant, indicating that an increase in number of comorbidities associated with stroke leads to decrease in quality of life in stroke patients. (r= - 0.297, p=0.037). Individual Quality of life domains had a negative correlation with age, except social domain, however these correlation were not statistically significant.

The Charlson Comorbidity Index (CCI) score was dichotomized (low comorbidity 0-2 versus high ≥ 3) for analysis. The mean CCI of the patients was 4.82(SD ± 1.8) with an estimated average 10 year survival of 53%. Age had a strong correlation with the comorbidities associated, which was highly significant (r= 0.694, p= 0.001). [Table 3 & 4]

Table 3. Correlation between Quality of life and individual variables

Variables	Quality of life domains			
	Physical	Psychological	Social	Environmental
Age	r= -.185 p= .199	r= -.254 p=.076	r= -.229 p= .109	r= -.031 p= .829
Gender	r= -.186 p= .196	r= -.286 p= .044	r= -.114 p= .431	r= -.172 p= .232
Comorbidities	r= -.311 p= .035*	r= .272 p= .056	r= .222 p= .121	r= .084 p= .563

*Pearson correlation significant at <0.05

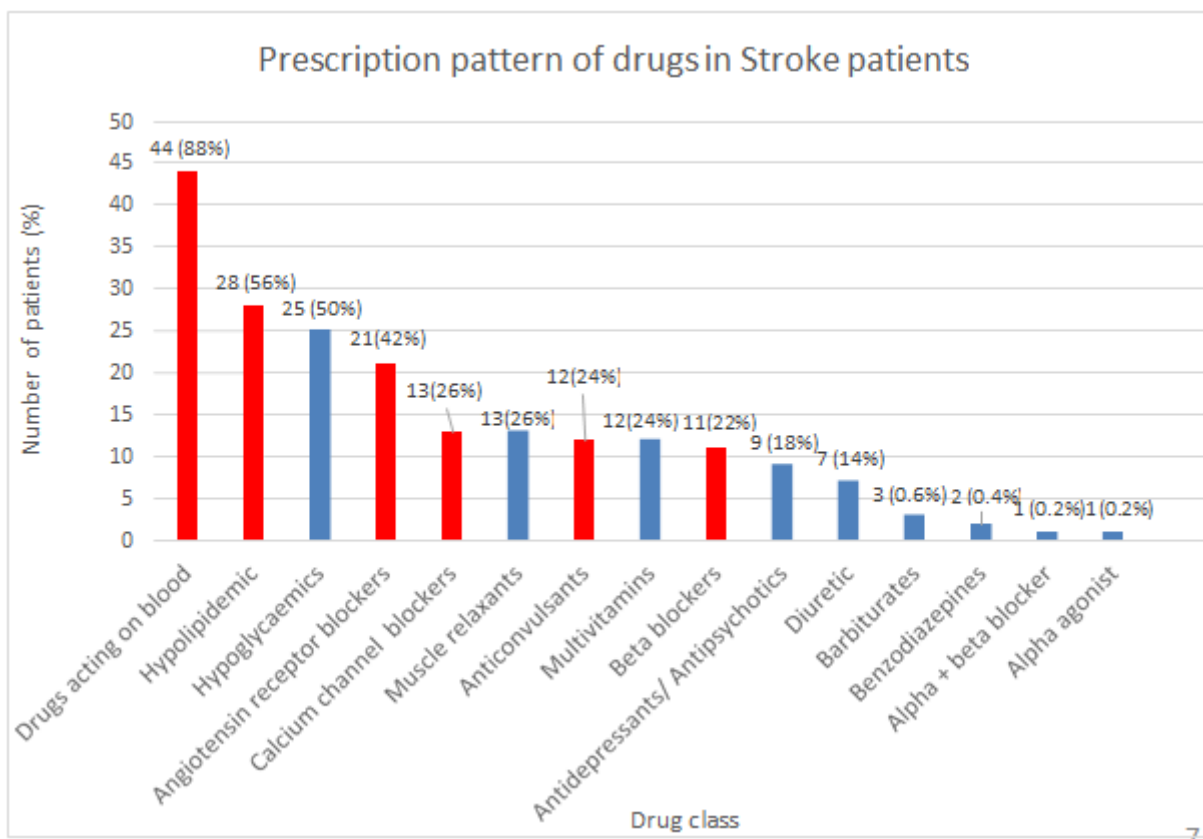


Figure 1. Distribution of prescription pattern of various drugs: (most common drugs of importance in stroke patients have been highlighted in red)

Table 4. Correlation between CCI and individual variables

Variables	Charlson Comorbidity Index score
Age	r= .674 p= 0.001*
Gender	r= .239 p= .095
Overall Quality of life	r= -.297 p= .037*

*Pearson correlationsignificant at <0.05

4 DISCUSSION

The present study highlighted the predominant symptoms, risk factors, drugs use and quality of life in stroke patients. In our study population of 50 patients during a period of 2 months, 74% were males and 26% were females. Study by Eapen et al.²³ also suggests that clinically significant stroke events were more in males than in females. The most common biological clarification for sex differences in stroke is related to sex steroid hormones, notably estrogen, which infers a protective role in females. Estradiol has potent effect on the endothelial cells which promote vasodilatation and increase blood flow, whereas testosterone has opposite effects.²⁴ In our study, the mean age of the patients was 54.9 years. The finding was closely related to a study done by

Preethi et al.²⁵ where the mean age was 56.36 years. Most common age group individuals experiencing stroke were between 41-59 years (23, 46%) followed by 61-80 years (18, 36%) and (9, 18%) between 21-40 year. These findings were in concordance with the study of Sangram V et al.²⁶

Left sided body weakness (72%) was the most frequently seen symptoms associated with stroke which was followed by myalgia and facial asymmetry. Our study identified the most common risk factors associated with the stroke which were hypertension (62%) followed by diabetes (46%) which is almost comparable to various studies.²⁷ Other conditions associated were obesity, history of smoking, alcohol and heart diseases. Thus our study suggests that age, sex, hypertension, diabetes and current smoker/tobacco chewer are more associated with stroke symptoms.

In a study published in the Indo-American Journal of Pharmaceutical Research in the year 2014, the most common drug administered was Aspirin. Around 63% of the patients were given Aspirin in that study. In the same study, it was found that around 62% patients were given hypolipidemic, mainly Atorvastatin. Around 20% of the patients were given antipsychotics. Similar findings were obtained in our study, where antiplatelet drugs were prescribed to 88% patients followed by hypolipidemics (56%). Other drugs prescribed were Hypoglycaemics (50%), Angiotensin receptor blockers (42%), Calcium channel blockers and muscle re-

laxants (26%), Anticonvulsants (24%), Antidepressants and Antipsychotics (18%) and Diuretics (14%).²⁵

In our study, neuroprotective agents have not been used. This suggests that neuroprotective agents cannot be used after the acute stage of the disease which has been warded off. Neuroprotective agents like Citicholine are used in an attempt to save the ischemic neurons from irreversible damage. In humans, the ischemia may be less complete and thus, the time window for administering these agents is longer. However, the increase in age and comorbidities in the patients limits their use.²⁸ Aspirin, which thins the blood and thereby prevents clots, is currently used to reduce the long-term risks of a second stroke in patients who've had an ischemic stroke.²⁹ As Lipoproteins bind cholesterol and can accumulate in blood vessels, high levels of specific lipoproteins, namely, low-density lipoprotein (LDL) and very low-density lipoprotein (VLDL), have been associated with an elevated risk of certain forms of cardiovascular disease, including coronary artery disease, heart attack, and stroke.³⁰ Use of anticonvulsants such as diazepam in stroke patients is to prevent seizure recurrence.³¹

Quality of life and comorbidity scores had some significant correlations. The mean CCI of the patients was 4.82(SD \pm 1.8) with an estimated average 10 year survival of 53%. Age had a significant strong correlation with the comorbidities associated. ($r= 0.694$, $p= 0.001$), suggesting that as the age advances comorbidities increase which predisposes individual to symptoms of stroke. There was negative correlation between overall quality of life and comorbidities associated, which was statistically significant, indicating that an increase in number of comorbidities associated with stroke leads to decrease in quality of life in stroke patients($r= -0.297$, $p=0.037$), with particularly the physical domain being the most affected (46.17 ± 19.12) which was comparable to a study done by Katzan et al. ³² The social domain was the least affected as in our country, the caregivers (relatives as well as friends) of patients are cooperative and provide ultimate support.

According to an article published in The Disability and Health Journal, the physical health domain had a score of 39.48 for the patients. It is common for the physical health domain to be the most affected in stroke patients due to the commonly encountered hemiplegia and the other coexisting morbidities. Although an increase in the domain of physical health of the patients was observed, the improvement was not significant. The psychological domain was also affected according to the study but it was only second to the physical domain. The overall quality of life of the patients was found to be 46.93 for the patients. Individual Quality of life domains had a negative correlation with age, except social domain, however these correlation were not statistically significant.³³

Strengths and Limitations of the study :

This is the first study carried out in our setup and across Western India. The study focusses on the effects of quality of life in stroke patients. Most patients of Stroke had a duration of more than one month and had sufficiently improved from the acute attack. The study had used the novel Charlson Comorbidity Index(CCI) tool to correlate with quality

of life and baseline characteristics.

The limitation of the study is that it is a cross sectional study and hence the quality of life could not be assessed at subsequent occasions. Due to high cost involved and the hospital attached to our institute being a public-private partnership, the sample size was limited to 50 patients. Also CCI only predicts the survival rate. The actual survival depends on various factors which are presently out of the scope of present research. However, future studies could be planned with larger sample size and that could be designed longitudinal in nature.

5 CONCLUSION:

The number of effective and feasible treatments remain limited in stroke. This study showed various drugs prescribed in stroke patients suggesting that the prescription pattern should be based on specificity of conditions and severity of the stroke in order to facilitate rational use and optimal care. The present findings suggest that measures of stroke related QoL captured a major influence on physical domain, suggesting that stroke has a great impact on day to day activities of patients. Proper management reduces the incidence and progression of the disease. Thus, follow up of patients should be taken for medication adherence to prevent relapse aggravated due to underlying comorbidities.

Conflict of interest

The authors declare no conflict of interest for the present study.

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