Original Article

Evaluation of Health Related Quality of Life in Sub-acute Stroke Subjects using Stroke Impact Scale - A Descriptive Study

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Abstract

Background: Healthrelated quality of life (HRQoL) is becoming important to measure as it is an indication of an outcome after stroke. Stroke Impact scale can be used as a stroke outcome measure that aims to effectively assess the various domains important in determining HRQoL in sub-acute stroke subjects.

Aim: The purpose of this study was to assess the HRQoL in sub-acute stroke subjects using Stroke Impact Scale (SIS) version 3.0 and to estimate the impact of individual characteristics such as age, duration of stroke, co-morbidities and clinical correlates such as cognitive level, functional level and severity on HRQoL in sub-acute stroke subjects.

Materials & Methodology: A total of fifty subjects after eight to thirty days poststroke onset participated in this study. They were evaluated for eligibility using Mini Mental State Examination (MMSE) and Modified Barthel Index (MBI). After history taking, the severity of stroke was assessed using the National Institute of Health Stroke Scale (NIHSS) and the HRQoL was assessed using SIS questionnaire with eight domains: strength, hand function, mobility, physical and instrumental activities of daily living, memory and thinking, communication, emotion and social participation.

Results: There was poor HRQoL in areas of hand function, mobility, social participation and stroke recovery with the highest areas in memory and communication. SIS domains: Strength, mobility, emotion, communication, participation and recovery negatively correlated with co- morbidity whereas only memory positively correlated with MMSE.

Conclusion: The study emphasizes the impact of and the need to take demographic and personal characteristics including age, duration of stroke and co morbidities into account in the planning of post stroke rehabilitation programs. SIS is an important stroke outcome measure that can be used effectively to assess the various domains important in determining HRQoL in stroke subjects.

Keywords: Health RelatedQuality of life, Stroke Impact Scale, Sub-acute stroke, stroke specific scale.

Introduction

Stroke is the second leading cause of death and a major cause of disability worldwide after heart disease and cancer in developed countries. The aging population is contributing to an increase in stroke incidence. [1] The impact of stroke on a subject is devastating requiring major adjustment in the

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lifestyle & psychology of stroke survivors. [2] As stroke mortality rates decline, individuals are increasingly likely to live with their residual impairments which can pose a considerable impact for survivors' subsequent well-being. Therefore, the quality of life (QoL) post stroke is one of the pivotal topics to be considered beneath the functional outcome. HRQoL related to sub-acute stroke is important healthcare outcomes that have not received sufficient attention in the literature. [3]Maintaining or improving optimal QoL of stroke patients remains a challenge for health professionals in developing countries, including India.Health related quality of life (HRQoL) is important to measure as it is an indicator of therapeutic efficacy. Its measurement reflects an individual's subjective perception of his/her current function and overall health. [4] The concept of HRQoL is a multidimensional approach to quantify the patients' burden of disease which includes but is not limited to the concepts of physical, social, and emotional health.It can potentially provide researchers with a more holistic picture of stroke recovery and can assist in the evaluation of medical intervention as well as rehabilitation. [5] There has been a growing interest in tests that measure the HRQoL of post stroke subjects.The scales used to assess HRQoL should include domains commonly affected by stroke as it would be useful both to evaluate treatment efficacy in patients with different deficits and to assess the impact of various types of stroke on HRQoL.[6]Exploring the relationships of HRQoL to physical impairment and functional limitation would enable one to establish whether these 'objective' tools of assessment of stroke outcome are also relevant to subjects themselves, examine the correlation of outcomes with one another and allow one to focus on specific measures rather than the numerous measures currently used in the hope of capturing stroke outcomes. [7]

To assess HRQoL, several generic and specific HRQoL instruments have been developed. Generic HRQoL instruments like Barthel index and the modified Rankin scale fall short in assessing the entire range of symptoms that stroke patients suffer from whereas specific HRQoL instruments e.g., STREAM, Stroke Impact Scale, SF 36, Stroke-Specific Quality-of-Life (SSQoL) etc. have not demonstrated sensitivity to changes in mild stroke and do not address HRQoL dimensions such as emotion, communication and role function. [8]Consequently, these measures have limited ability to evaluate stroke outcomes over time and therefore it was decided to develop a stroke specific measure that may overcome such problems.[9] The ideal stroke scale should be valid, reliable, predictive of patient outcome and easy to administer in multiple settings by a broad range of health care practitioners.[10] In 1999, the Stroke Impact Scale (SIS) emerged as a tool to measure the important multidimensional consequences of stroke and HRQoL into one self- report questionnaire. [8] The SIS was developed by Duncan et al at the University of Kansas Medical Centre and is a more comprehensive measure of health outcome for stroke populations. It is able to capture the impact of stroke across multiple dimensions from impairment to disability and handicap.Duncan et al showed SIS to have less ceiling and floor effects and to be valid and sensitive to change compared with other commonly used measures such as the Barthel Index and Short Form-36 in stroke populations.[11] The domains of SIS are unidimensional, have good reliability and have a wide range of items that capture the difficulties that most individuals with stroke experience in physical and role functions. The composite physical domain is the most robust.[12]

Multiple factors have been associated with decrease in HRQoL which includes age, gender, physical disability, dependency in activity of daily living (ADL), depression, cognitive impairment, speech disturbances etc. [13] However, the results of various studies are inconclusive due to variability in HRQoL measurements & differences in stroke severity & symptoms.[14]Therefore, it is vital for physiotherapists to have knowledge about the specific areas affecting the HRQoL of post-stroke patients, so that those areas can be targeted for intervention or referral. This information will be helpful in developing more comprehensive interventions in conjunction with those specifically for improvement in physical function.[15]HRQoL has widely been assessed in chronic stroke population but

limited studies are done in sub-acute stage of stroke. We considered it useful to explore this sub-acute phase, as patients receive little to no rehabilitation support when discharged to the community and is beyond the sensitive time-window of recovery. So the purpose of this study was to assess the HRQoL in sub-acute stroke subjects using Stroke Impact Scale and also to estimate the impact of individual characteristics such as age, duration of stroke, co-morbidities, cognitive function (MMSE), functional level (BI), severity of stroke (NIHSS) with the SIS domains on HRQoL in stroke.

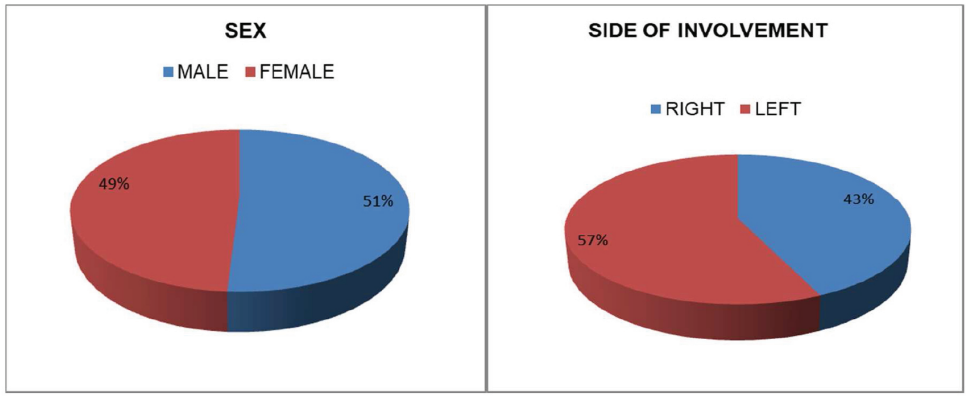
Materials & Method

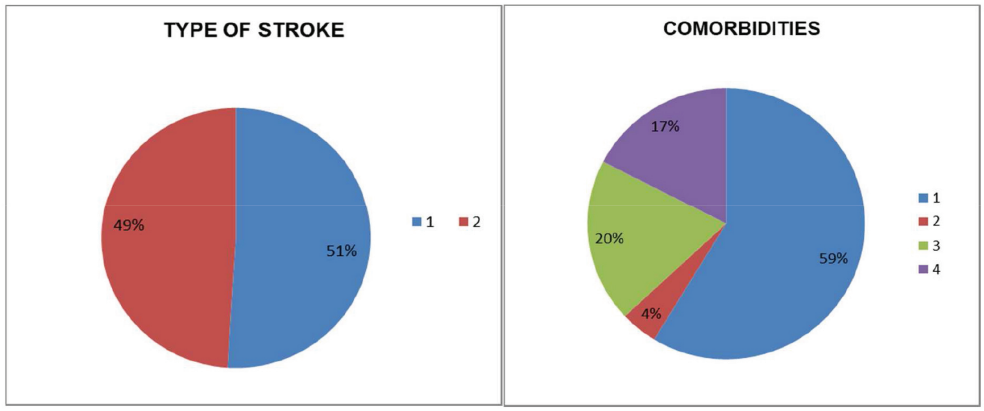
- Study design: Descriptive study.
- Sample size : 50
- Study set up: Central referral hospital & STNM Hospital, Gangtok, Sikkim
- Target population : sub-acute stroke patients
- Study duration : 6 months
- Type of sampling: Convenience sampling

The study was approved by the Institutional Ethical Committee of Sikkim Manipal Institute of Medical Sciences [SMIMS/IEC/2020-MPT1 dated 23.11.2020]. The researchers have chosen the above location to increase the study's generalizability as the population was diverse and these hospitals had high elderly populations which facilitated collaboration.Inclusion criteria were first ever stroke subjects between 8 to 30 days post stroke onset, both genders of 50- 75 years of age, MMSE ≥24 (21 for illiterate subjects) and mild to moderate dependency (Modified Barthel Index of 8-20). Exclusion criteria were aphasia, impaired ability to understand the questionnaires and significant co-morbidities likely to concurrently affect HRQoL (such as class III or IV heart failure, dialysis, pre-existing musculoskeletal disease, active psychiatric disease or dementia). An informed consent was taken from those subjects who fulfilled the eligibility criteria.Baseline characteristics were recorded for all the subjects as shown in table 1. All subjects were subjected to thorough history taking following which clinical neurological examination was performed and measured using the NIHSS.

Table 1. Demographic and clinical data among stroke subjects

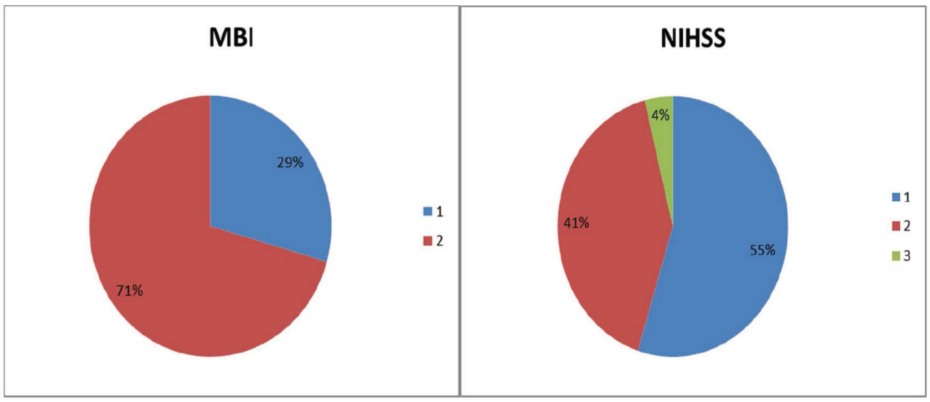
Variable		Number (n= 50)	Percentage (%)
Age (years)	Mean ± SD	60.4 ± 9.38	
Sex	Male	26	51
	Female	24	49
Comorbidities	Hypertension	26	59
	Diabetes Mellitus	2	4
	HTN + DM	9	20
	HTN/ DM + any other	8	17
Side of involvement	Right	21	43
	Left	29	57
Duration of stroke(days)	Mean ± SD	14.98 ± 6.69	
	Range	8- 30	
Type of Stroke	Ischemic	26	51
	Hemorrhagic	24	49
MBI	Mild	15	29
	Moderate	35	71
NIHSS	Mild	27	55
	Moderate	21	41
	Severe	2	4





1- Ischemic
2- Hemorrhagic

1- HTN
2- DM
3- HTN+DM
4- HTN/DM + any other



1- Mild
2- Moderate

1- Mild
2- Moderate
3- Severe

Figure 1: Pie charts for demographic and clinical data

The SIS version 3.0 that included 59 items of self-report assessment to assess HRQoL in 8 domains: strength, hand function, mobility, physical and instrumental activities of daily living (ADL's), memory and thinking, communication, emotion and social participation/ role function. Four of the domains (strength, hand function, ADL's and mobility)arecombined into an overall physical component score. The scores for each domain range from 0-100 and higher scores indicate a better HRQoL. It also includes a question to assess the subject's perceived overall recovery from stroke with 0 indicating no recovery and 100 indicating full recovery. Based on the response of the subjects, the therapist gave a score to the individual domains (self- report). After SIS was administered, the participant was asked to rate their percent recovery on a visual analog scale of 0-100. The total time for the administration of SIS was 30-45 min.

Results

The data were entered and analyzed using descriptive statistics, SPSS statistical package for social science version 16. Mean & standard deviation was calculated for all the domains of SIS. Pearson's correlation coefficient was used for correlation of age, duration of stroke, co-morbidities, cognitive function (MMSE), functional level (BI), severity of stroke (NIHSS) with the SIS domains as the subjects were normally distributed.Level of significance was considered at $p<0.05$. This study was conducted on fifty stroke subjects, 26 (51%) males and 24 (49%) females and their age ranged from 50- 75 years with a mean age of 30.4 ± 5.38 years. The demographic and clinical characteristics of the subjects are shown in table 1. Table 2 shows poorer HRQoL in areas of hand function, mobility, social participation and stroke recovery with the highest areas in memory and communication. Table 3 describes the correlation of sub scores of physical component of the SIS domains with the demographic data and clinical scales. Correlation of other domains of SIS with baseline data is shown in table 4. Strength, mobility, emotion, communication, participation and recovery domains of SIS negatively correlated with co-morbidity whereas only memory domain positively correlated with MMSE.

Table 2. Mean values, standard deviation, standard error of mean, confidence interval and percentile (25%, 75%) of SIS domains

SIS Domains	Number of items	Mean ± SD	SE	95 % of CI	Percentile	
					25%	75%
Strength	4	46.66 ±31.20	4.41	8.86	19	75
Hand Function	5	22.80 ±28.16	3.98	8.00	00	35
Mobility	9	32.96 ±28.O6	3.96	7.97	08	58
ADL'S	10	46.22 ± 17.17	2.42	4.88	32	60
Memory	9	68.92 ± 21.86	3.09	6.21	53	85
Emotional	7	50.50 ± 12.11	1.71	3.44	41	61
Communication	7	87.62 ± 13.21	1.86	3.75	82	100
Participation	8	27.98 ± 17.56	2.48	4.99	15	37
Recovery	11	39.00 ± 26.30	3.72	7.47	10	60

Table 3. Pearson's correlation of Stroke Impact Scale score measures with demographic data and clinical scale

	Strength		Hand function		Mobility		ADL's	
	R	p	r	p	r	p	R	p
Age	-0.04	0.74	0.I4	0.31	0.00	0.97	0.14	.0.30
Duration of Stroke	-0.16	0.26	0.09	0.51	-0.16	0.24	0.00	0.99
Comorbidity	-0.29	0.03	-0.21	0.13	-0.29	0.03	-0.14	0.31
MMSE	0.15	0.29	0.16	0.25	0.07	0.60	0.04	0.77
MBI	-0.07	0.59	-0.11	0.43	-0.00	0.95	0.01	0.91
NIHSS	-0.01	0.92	-0.06	0.66	-0.01	0.92	0.00	0.95

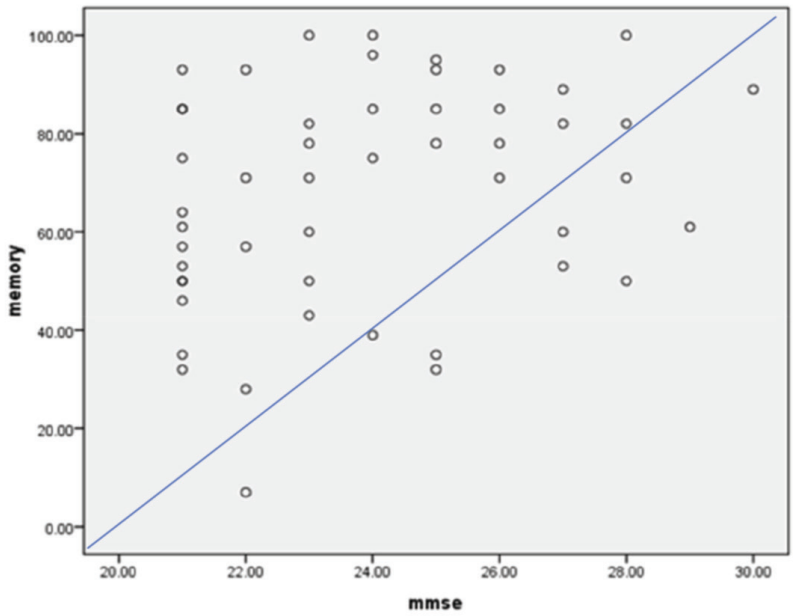


Figure 2: Positive correlation of memory domain of SIS with MMSE

Table 4. Pearson's correlation coefficients of Stroke Impact Scale score measures with demographic data and clinical scale

	Emotion		Memory		Communication		Participation		Recovery	
	r	p	r	p	r	P	r	p	r	p
Age	0.00	0.98	-0.22	0.11	0.09	0.51	-0.09	0.50	-0.11	0.41
Duration of Stroke	-0.19	0.17	-0.15	0.27	0.02	0.84	-0.12	0.38	0.02	0.88
Comorbidity	-0.37	0.00	-0.31	0.02	-0.37	0.00	-0.38	0.00	-0.13	0.35
MMSE	0.04	0.77	0.21	0.13	0.17	0.22	0.16	0.26	0.29	0.04
MBI	-0.01	0.94	-0.19	0.17	0.04	0.76	-0.04	0.75	-0.03	0.80
NIHSS	0.12	0.40	0.00	0.95	-0.08	0.55	0.10	0.46	-0.07	0.59

Discussion

HRQoL is an important index of outcome after stroke and may facilitate a broader description of stroke recovery.[8]In this study the HRQoL was assessed using the SIS version 3.0 in 50 stroke subjects with mild- moderate stroke during sub-acute recovery. Using the SIS, a comprehensive analysis investigating the impact of individual characteristics and clinical correlates on HRQoL in subjects with stroke was done. The higher scores in memory and communication in this study can be attributed to rigorous inclusion criteria including screening for cognition and aphasia. Traditionally, motor recovery is regarded to start earlier than language recovery in post stroke patients, and studies have reported that cognitive functions continue to recover after 3 months. [16] The much lower scores in hand function, mobility, participation and recovery are in agreement with Hackett et alwho found that long-term stroke survivors when compared to controls had significantly lower SF-36 scores in physical functioning, role limitations due to physical problems, general health and role limitations due to emotional problems. The above two findings are supported by Deborah et al. [13, 17]

Older patients with stroke are more prone to have major negative impact on stroke morbidity, mortality, and long-term outcomes.[18] However; Pacian et al found that there was no significant correlation between the patients' overall QoL and age.[19] In accordance with a study by Kong et al, the duration of stroke did not correlate with the SIS domains.[20] Other studies also did not observe significant correlation between the time passed since a stroke and overall QoL. [19, 21]Niemi et al also showed that post-stroke patients deteriorated over time. The different results reported in other studies can be due to sample heterogeneity.[22]

The most common co-morbidities of subjects were hypertension, diabetes mellitus and other illness such as cardiac diseases, arthritis that might be expected to impact physical function more than other HRQoL areas. The co-morbidities were negatively correlated with strength, mobility, emotion, communication, participation and recovery domains of SIS. Nichols-Larsen et alfound associations between stroke risk factors including diabetes, hypertension and ischemic heart disease and HRQoL and these associations may be due to the additive effects of the condition itself and emphasize the hypothetical potential of improving HRQoL after stroke by managing the risk factors more effectively after stroke. [8] The cognitive impairment as measured with MMSE scale positively correlated with memory domain of SIS.None of the SIS domains correlated with the functional status of subjects. On the other hand, the physical functioning domain of SIS evaluates independent ADL's which are more demanding physically. The severity of stroke measured by NIHSS did not correlate with any of the domains of SIS. William et alalso found poor associations between NIHSS and SIS-QoL domains. [23] In contrast, different studies found that a higher NIHSS score on admission was an independent predictor of impaired QoL.[24, 25, 26, 27] Our study found poor correlations between the clinical characteristics and remaining domains of the SIS.This lack of association may be attributable to the relatively high functioning of the sample and as the subjects were asked to rate their emotional domain relative to the past week onlyresulted in the poor performance in emotion domain. Also the emotion scores are expected to exhibit more short-term variability than physical scores. In examining the individual domains of the SIS, it is apparent that demographic and clinical variables have disparate impacts in sub acute mild to moderate stroke population.

Conclusion

This study highlights the importance of using the SIS as a comprehensive evaluation tool throughout the sub acute stage of recovery that may facilitate a better understanding of individual needs and thereby, planning for programming during recovery. Also understanding the different variables after stroke will not only provide an opportunity to develop therapeutic interventions but also allow for developing personalized platforms for patient stratification and prognosis. So the SIS is an important stroke outcome measure that can be used

effectively to assess the various domains important in determining HRQoL in stroke subjects.

Limitations& Future Scope

The sample size was small. The subjects were relatively high functioning for the sub-acute stroke population. Questionnaires were self-reported by the patients; therefore, the probability of misunderstanding cannot be ruled out.Future research can be conducted on long term follow-up study of at least 3 months instead of cross sectional study to obtain more detailed and comprehensive result. The study can be done in different geographic regions of the country in heterogeneous group of population.Additional assessment on depression and family functioning will also aid in better understanding of HRQoL in stroke subjects.

Conflict of Interest: None

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