Impact of Inpatient Rehabilitation on Quality of Life Among Stroke Patients

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Abstract

Background Despite remarkable progression in the treatment of stroke, the quality of life (QoL) and social-related events caused by stroke have received limited attention in our country. The assessment of QoL is an important part of the evaluation of stroke patients and their management.

Objective To assess the QoL in patients with stroke at the time of admission in the rehabilitation unit and assess the impact of inpatient rehabilitation on change in QoL in these patients.

Materials and methods Adult patients with first arterial stroke of any duration, with presentation as hemiplegia were recruited. The clinical outcome scales and SF-36 parameters for QOL were assessed at both admission and discharge. The scales used were Scandinavian Stroke Scale (SSS), Barthel Index (BI), modified Rankin Scale (mRS). SF-36 scores were assessed after 6 weeks of discharge also.

Results Ten patients with a median age of 36.5 years and a median duration of stroke 75 days were recruited. There was significant improvement in functional scores of BI and SSS scales at the time of discharge. Majority of the components of both physical and mental domains of QOL SF-36 questionnaire showed significant improvement. The QOL scores after 6 weeks of discharge did not show significant change except for the emotional well-being.

Conclusion The QOL in patients with stroke improves with inpatient rehabilitation along with motor and functional scores. Improved functional independence leads to better emotional state after discharge also.

Keywords ► quality of life
► rehabilitation
► stroke

Introduction

Stroke is one of the leading causes of major disability in India.1 The consequences of stroke are physical, social, and psychological and are devastating, since around 90% of survivors have some type of disability. Stroke is a global public health problem as it results in serious disabilities, functional limitations, and compromised quality of life (QoL).2

Even though the emergency treatment and acute care of stroke have improved significantly in recent times, after care and QoL and social-related events caused by stroke have received limited attention in our country. The assessment of

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QoL is an important part of the evaluation of stroke patients and their management. The purpose of this study was to assess the QoL in patients with stroke at the time of admission in the rehabilitation unit and assess the impact of inpatient rehabilitation on the change in the QoL in patients with stroke. We also assessed the change in other clinical outcome scores after inpatient rehabilitation.

Materials and Methods
This was a follow-up study of patients of stroke admitted for rehabilitation in the inpatient ward of the Department of Neurological Rehabilitation of a tertiary care center. The study participants included patients aged 18 years and above admitted in the rehabilitation wards with first arterial stroke of any duration, with clinical presentation as hemiplegia. The patients with recurrent stroke, impaired cognition, global aphasia, impaired comprehension, clinical presentation other than hemiplegia, and patients not willing to give informed consent for the study were excluded. Institute Ethics Committee approval was obtained for the study. The patients were recruited between May 2021 and December 2021.

Study Tools
The outcome measures included in the study was a 36-Item Short Form Health survey (SF-36). This is a self-administered questionnaire measuring the QoL. The questionnaire consists of eight scales with two measures: physical and mental health. The physical health measure includes physical functioning (10 items), role-physical (4 items), bodily pain (2 items), and general health (5 items). The mental health measure is composed of vitality (4 items), social functioning (2 items), role-emotional (3 items), and mental health (5 items). A final item, termed self-reported health transition, is answered by the subject but is not included in the scoring process. Scoring ranges from 0 to 100. Higher scores indicate better health status.

The Hospital Anxiety Depression Scale
The 14-item Hospital Anxiety Depression Scale (HADS) consists of two 7-item subscales assessing depression and anxiety. Responses are rated 0 to 3 in reference to the past week (subscale score range: 0–21). The scores between 0 and 7 are considered as no depression and anxiety while 8 and 16 as mild, 17 and 23 as moderate, and ≥24 as severe.

Barthel Index
Barthel Index (BI) measures the functional abilities of patients. It is a 10-item scale to assess patients’ ability for ADL activities including feeding, bathing, grooming, dressing (both upper and lower half), bladder and bowel care, personal toilet, transfers, stair climbing and mobility. It is a 100-point scale and a higher score suggests more functional independence of the patient.

Scandinavian Stroke Scale
Scandinavian Stroke Scale (SSS) is a 9-item scale. The minimum score is 2 (worst neurological compromise) and the maximum score is 58 (without neurological compromise), with items consciousness, eye movement, arm motor power, hand motor power, leg motor power, orientation, speech, facial palsy, and gait.

Modified Rankin Scale
Modified Rankin Scale (mRS) is a commonly used scale for measuring the degree of disability or dependence in patients who have suffered from stroke or other causes of neurological disability. The scale runs from 0 to 6, measuring from perfect health without symptoms to death.

Study Implementation
Detailed clinical and neurological examination was performed after admission to the rehabilitation ward. The demographic details of the patients were noted and the QoL scores and other outcome scores were filled within one day of admission. All patients were given customized rehabilitation sessions. A rehabilitation session consisted of physical and occupational therapy, speech therapy, and neuro-psychology sessions. Pharmacotherapy and orthoses were prescribed as required by the patients. The patients were reassessed for all scores at the time of discharge from the rehabilitation ward. The patients were followed up for QoL scores over phone or in-person on outpatient basis after 6 weeks of discharge from the rehabilitation ward.

Statistical Analysis
The data collected were entered into EpiInfo and analyzed using R (version 4.0.0-2020-04-24), implemented using user interface of R Studio with appropriate packages. Continuous variables are described with median and interquartile range (IQR), while categorical variables as frequencies and percentages. The primary outcome variable was QOL score, collected at the time of admission and discharge and again at 6 weeks after discharge. All scores were compared between time points using the non-parametric sign test to test the null hypothesis that the median of differences between matched pairs is zero. A p-value of < 0.05 was considered statistically significant.

Results
A total of 13 patients satisfied inclusion criteria, out of whom 3 were lost to follow-up. Thus, 10 patients were included for analysis. There were 8 men and median (IQR) age of patients was 36.5 (52, 26) years. The median (IQR) duration of stroke was 75 (145, 50) days. Nine patients had ischemic stroke, while seven presented with right-sided hemiplegia. Regarding co-morbidities, six patients had hypertension and nine had both diabetes mellitus and hyperlipidemia.

Table 1 shows the comparison of clinical outcome scores and QOL scores at admission and discharge. Table 2 shows the comparison of QOL scores between discharge and 6 weeks follow-up. There was significant improvement in functional scores of the patient on BI and SSS scales at the time of discharge from the rehabilitation. Majority of the components of both physical and mental domains of QOL SF-36 questionnaire showed significant improvement. The QOL
scores after 6 weeks of discharge did not show significant change except for the emotional well-being.

**Discussion**

The purpose of this observational study was to assess the QoL in patients with stroke at the time of presentation in the rehabilitation unit and assess the impact of inpatient rehabilitation on the change in the QoL in patients with stroke. A total of 10 patients were recruited during the study period. Males were more common and all but one were ischemic strokes. There were 7 patients with right hemiplegia. The median duration of symptoms at admission was 75 days, which indicated sub-acute stroke. The effects of plasticity and rehabilitation interventions during this stage can positively change patient outcomes.

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**Table 1** Comparison of clinical outcome scores and SF-36 scores between admission and discharge

<table>
<thead>
<tr>
<th></th>
<th>Admission median (IQR)</th>
<th>Discharge median (IQR)</th>
<th>p-Value&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI&lt;sup&gt;a&lt;/sup&gt;</td>
<td>60 (75, 35)</td>
<td>75 (85, 50)</td>
<td>0.0313</td>
</tr>
<tr>
<td>SSS&lt;sup&gt;a&lt;/sup&gt;</td>
<td>36 (32, 47)</td>
<td>45.5 (38, 50)</td>
<td>0.0156</td>
</tr>
<tr>
<td>mRS&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3 (3, 3)</td>
<td>3 (3, 3)</td>
<td>0.99</td>
</tr>
<tr>
<td>HADS&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>5 (3, 6)</td>
<td>3 (3, 5)</td>
<td>0.0625</td>
</tr>
<tr>
<td>Depression</td>
<td>5 (5, 6)</td>
<td>4.5 (3, 6)</td>
<td>0.063</td>
</tr>
</tbody>
</table>

**SF36**

**Physical component**

- Physical functioning: 25 (15, 30) vs. 37.5 (20, 40), p = 0.02
- Role limitation–physical problems: 20 (0, 20) vs. 30 (10, 30), p = 0.03
- Bodily pain: 55 (45, 67.5) vs. 65 (60, 70), p = 0.004
- General health: 45 (35, 60) vs. 47.5 (35, 65), p = 0.38

**Mental component**

- Energy/fatigue: 40 (30, 45) vs. 47.5 (35, 54), p = 0.03
- Role limitation–emotional problems: 5 (0, 20) vs. 10 (10, 30), p = 0.03
- Social functioning: 43.75 (35, 52.5) vs. 50 (37.5, 62.5), p = 0.13
- Emotional well-being: 48 (40, 60) vs. 50 (40, 70), p = 0.02

Abbreviations: BI, Barthel Index; HADS, Hospital anxiety and depression scale; mRS, modified Rankin scale; SF-36, 36-Item Short Form Health Survey; SSS, Scandinavian stroke scale.

<sup>a</sup>Non-parametric sign test to test that the median of differences between matched pairs is zero.

**Note:** Bold-faced p-values are significant at p < 0.05.

**Table 2** Comparison of QOL (SF-36) scores between discharge and 6 weeks follow-up

<table>
<thead>
<tr>
<th></th>
<th>Discharge Median (IQR)</th>
<th>6 weeks follow-up Median (IQR)</th>
<th>p-Value&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical component</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical functioning</td>
<td>37.5 (20, 40)</td>
<td>40 (20, 40)</td>
<td>0.99</td>
</tr>
<tr>
<td>Role limitation–physical problems</td>
<td>30 (10, 30)</td>
<td>30 (10, 30)</td>
<td>0.25</td>
</tr>
<tr>
<td>Bodily pain</td>
<td>65 (60, 70)</td>
<td>67.5 (60, 75)</td>
<td>0.37</td>
</tr>
<tr>
<td>General health</td>
<td>47.5 (35, 65)</td>
<td>50 (35, 65)</td>
<td>0.50</td>
</tr>
<tr>
<td>Mental component</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy/fatigue</td>
<td>47.5 (35, 54)</td>
<td>52.5 (40, 55)</td>
<td>0.63</td>
</tr>
<tr>
<td>Role limitation–emotional problems</td>
<td>10 (10, 30)</td>
<td>17.5 (10, 35)</td>
<td>0.12</td>
</tr>
<tr>
<td>Social functioning</td>
<td>50 (37.5, 62.5)</td>
<td>56.3 (37.5 65)</td>
<td>0.25</td>
</tr>
<tr>
<td>Emotional well-being</td>
<td>50 (40, 70)</td>
<td>55 (50, 80)</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Abbreviation: SF-36, 36-Item Short Form Health Survey.

<sup>a</sup>Non-parametric sign test to test that the median of differences between matched pairs is zero.
The change in clinical outcome measures between admission and discharge is statistically significant for BI and SSS scores. This can be considered to be the mixed effect of natural progression of recovery (plasticity) and in-patient rehabilitation program. At the time of discharge, in SF-36, physical components of physical functioning, role limitation, bodily pain improved significantly. The scores of general health under physical component improved but not significantly. The scores of mental components of fatigue, role limitation-emotional and emotional well-being improved significantly. The social functioning scores under mental component were better but not significantly. This is in contrast to a study by Tramonti et al where the authors found that while functional status improved significantly after rehabilitation, individualized evaluation of QOL was less affected. The authors also found that psychological distress was associated with negative outcomes. Our study findings did not show noteworthy psychological issues as the median scores of anxiety and depression were low. A follow-up of QOL after 6 weeks of discharge showed significant improvement in emotional well-being that showed a positive impact of inpatient rehabilitation. The other scores of QOL did not show significant improvement.

A number of studies have shown a significantly lower QOL scores in stroke survivors as compared to healthy controls. It has been reported that the degree of neurological functional impairment is a strong predictor of health-related QOL. Another study also showed that the worse the disability, the lower the health related QOL. In a study on chronic stroke patients, the authors found that 30% of survivors had depression that affected their health-related QOL negatively and also majority continued to face limitations in their physical activities.

Due to very small sample size in our study, the association of different functional and clinical scales with QOL scores was not analyzed. However, data from one study supported the evidence that different measures of QOL and functional status were not strongly associated with one another. The authors proposed that psychological issues, coping mechanisms, and social support could be significantly related to specific outcome measures. The factors that influence the QOL and are strongly correlated it are functional independence, and the persistence of hemiplegia and depression.

It is imperative to gain a better understanding of the determinants of QOL after stroke to target stroke care. Functional independence in walking and activities of daily living with inputs from physiotherapy, occupational therapy along with psychological counseling and cognitive retraining may lead to significant gains in QOL in patients with stroke.

Strengths and Limitations

The study was done with a very small sample size and over a short span of time. Long-term follow-up was not done. However, appropriate validated scales were applied to assess the various outcome measures.

Conclusion

The QOL in patients with stroke improves with inpatient rehabilitation along with motor and functional scores. Improved functional independence leads to better emotional state after discharge also.

Authors’ Contributions

M.K., D.S., A.G., and N.B.P. contributed to study design and concept, data collection, literature review, and discussion. P.H.P. contributed to study design and concept, data collection, statistical analysis, literature review, and discussion.

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None.

Conflict of Interest
None declared.

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