Background and Purpose—Data regarding psychosocial problems and quality of life (QoL) among stroke survivors from developing countries are scarce. The purpose of this study is to examine QoL, anxiety, depression, and functional independence of stroke survivors and the relationship of these variables with stroke characteristics.

Methods—This was a prospective hospital-based study. Patients were interviewed after ≥1 month post stroke. World Health Organization QoL-BREF was used to assess QoL. Anxiety and depression measures were recorded using the Hospital Anxiety Depression Scale, and functional independence was evaluated using the Functional Independence Measure. Demography, stroke severity (measured by the National Institute of Health Stroke Scale), and stroke outcome (measured by the modified Rankin scale) were also documented. Univariate and multivariate analysis were completed using SPSS Statistics version 17.0 (SPSS, Inc, Chicago, Ill).

Results—One hundred sixty-two patients participated (men = 113, 69.8%); mean age was 54.3 ± 12.9 years (range, 21–88 years). The mean duration of follow-up was 18.3 ± 24.9 months (range, 1–180 months), and the mean National Institute of Health Stroke Scale score was 2.1 ± 2.1 (range, 0–10). Presence of anxiety (odds ratio [OR] 0.20, CI 0.80–0.51, \( P = 0.001 \)), depression (OR 0.22, CI 0.10 to 0.47, \( P < 0.0001 \)), and functional dependence in Functional Independence Measure (OR 3.56, CI 1.70 to 7.42, \( P = 0.001 \)) were predictors of impaired QoL in the multivariate logistic regression analysis. Anxiety was seen in 39 patients (24%), and 60 patients (37%) had depression. Poor outcome predicted depression in logistic regression model (OR 4.40, CI 1.80 to 10.76, \( P = 0.001 \)). Functionally dependent patients were more likely to be older (OR 0.94, CI 0.92 to 0.97, \( P = 0.001 \)) and had severe stroke (OR 0.69, CI 0.53 to 0.88, \( P = 0.004 \)).

Conclusion—Presence of anxiety, depression, and functional dependence were associated with impaired QoL. There was low prevalence of anxiety and depression. Older age and stroke severity resulted in increased functional dependence.

Key Words: Psychosocial ■ stroke ■ quality of life ■ developing countries

The World Health Organization (WHO) predicts that disability-adjusted life years lost to stroke will rise from 38 million in 1990 to 51 million in 2020.1 Disability caused by stroke has a massive impact on the patient, with social consequences and physical consequences of stroke being equally devastating.2

Stroke survivors are often greatly challenged by post-stroke depression, which can lengthen rehabilitation and recovery time considerably. Apart from having a deep impact on the survivors themselves, post-stroke depression also affects family and friends.3–7 Many stroke survivors experience feelings of hopelessness, helplessness, anxiety, and dehumanization.8–14 After a stroke, quality of life (QoL) is reported to decrease by more than 40% compared with pre-stroke QoL.15 This reduction is pronounced, even when no or minimal physical impairment is present.16

According to recent reports from India, the incidence and 30-day case fatality rates of stroke are higher than those in developed countries.17,18 Several studies have been performed in developed countries exploring psychosocial problems and QoL among stroke survivors. However, there are no data available from India and other developing countries regarding these matters, despite stroke being one of the most common causes of disability and handicap in those communities. In India, a majority of stroke patients are cared for by relatives in the joint family. Stroke patients receive family support from carers during their process of recovery. Therefore, the psychosocial problems in Indian stroke patients could differ from those experienced by patients in other developed countries.

The objective of this project was to study QoL, functional dependence, anxiety, and depression experienced by stroke survivors, and to study the relationship of these measures with various stroke characteristics.

Materials and Methods

Study Site

This study was conducted in the Stroke and Neurology Clinics of Christian Medical College & Hospital, Ludhiana, Punjab, India, an
800-bed, private-sector hospital catering not only to the medical needs of the Punjabi people, but also to patients from neighboring states. Other facilities, including a medical college hospital, a state-government-run hospital, and approximately 30 private smaller hospitals, provide services to patients with stroke in the city of Ludhiana. There are 10 neurologists for the city’s 4 million people.

**Study Subjects**

We recruited stroke patients who had completed ≥1-month follow-up. The WHO definition of stroke was used: “rapidly developing clinical signs of focal (at times global) disturbance of cerebral function, lasting more than 24 hours or leading to death with no apparent cause other than that of vascular origin.” The diagnosis of stroke was supported in every patient by computed tomography scan and/or magnetic resonance imaging. Patients with a history of psychoactive substance abuse, history of dementia, psychiatric comorbidity, refusal to consent, aphasia, and patients with previous stroke were excluded.

Demographic details including age, sex, marital status, educational status, occupation, and socioeconomic status were collected. Stroke details such as symptoms, type, severity (according to the National Institutes of Health Stroke Scale [NIHSS]), Oxfordshire Community Stroke Project Classification, and outcome (measured by the modified Rankin scale [mRs]) were also compiled by R.S.R., who was not involved in the management of patients. Both J.D.P. and R.S.R. were certified for NIHSS and mRs administration. Outcome was classified as good (mRs 0 to 1) and bad (mRs 2 to 6). Joint family was defined as multiple generations of a family living in a single house.

**Instruments**

The following tools were used to interview the patients:

**WHOQoL-BREF**

QoL can be described as the dynamic interaction between the external conditions of the individual’s life and the internal perception of those conditions. WHOQoL has been defined as “an individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns.”

The domains that the WHOQoL-BREF assesses are physical, psychological, social relationships, and environmental domains. A version of the questionnaire translated into the local language (Hindi) was used. The WHOQoL Hindi version is a reliable and is a valid measure of anxiety and depression. The Cronbach alpha coefficients revealed high levels of internal consistency for the Punjabi version (0.86 for anxiety, and 0.85 for depression).

**Functional Independence Measure**

The Functional Independence Measure (FIM) is an 18-item, 7-level ordinal scale. FIM has 2 dimensions: motor and cognitive. The motor dimension describes physical functioning such as eating, toileting, and transferring, and the cognitive dimension describes communication, social interaction, and cognitive functioning. The FIM assesses areas of dysfunction in activities that commonly occur in individuals with any progressive, reversible or fixed neurological, musculoskeletal, or other disorder. It contains response categories for each item ranging in value from 1 to 7, where 1 indicates complete dependence and 7 indicates complete independence. The scale was originally designed so that the ratings on all 18 items summed into a single score estimating overall burden of care. The scoring assumes equal weights for each item and for each item response. The total score ranges in value from 18 to 126. The FIM has been used previously in Indian patients with brain tumors.

The study protocol was approved by the Institutional Ethics Committee. All participants provided informed consent. The questions were read to illiterate patients by R.S.R. and responses were written down. The questions were self-administered for all other patients.

**Statistics**

Statistical analyses were performed using SPSS Statistics version 17.0 (SPSS Inc, Chicago, Ill). The statistical measures used were frequencies, descriptive statistics, Pearson correlation, and logistic regression analysis. Pearson’s correlation (r) was used to study the univariate relationship of WHOQoL (physical, psychological, social, and environmental domains), HADS, and FIM, with continuous variables such as age, income, stroke severity (NIHSS), and duration of follow-up. Relationships between categorical and continuous variables were assessed by analysis of variance.

Multivariate logistic regression analysis was performed using stepwise forward method to determine the predictors of WHOQoL, HADS, and FIM. Variables of interest were the WHOQoL (physical, psychological, social, and environmental domains), HADS (anxiety and depression), and FIM measures. Controlled variables included age, sex, type of family, income, duration of follow-up, type of stroke, stroke severity (NIHSS), and outcome (mRs). For the logistic regression analysis, we used the median values of continuous variables to divide into 2 groups in WHOQoL (physical, psychological, social, and environmental domains), HADS, and FIM.

**Results**

One hundred sixty-two patients were interviewed over a period of 14 months from November 1, 2008 to February 1, 2010. We initially considered 201 patients for the study. Thirty-nine patients were excluded (refused consent, -5; psychiatric comorbidity, -10; patients with aphasia/dysphasia, -11; and patients with previous stroke, -13). There were no significant differences between patients (n = 162) studied and those who were excluded (n = 39). NIHSS values for included patients were mean 2.16 ± 2.1 (median 1, range 0–10) compared with those of excluded patients: mean 5.05 ± 5.08 (median 3, range 0–17, P = 0.90). mRs values for included patients were 0–1, n = 92; 2–6, n = 70 compared with those of excluded patients, 0–1, n = 19; 2–6, n = 20, P = 0.55.

**Demography**

Demographic details are provided in Table 1. The mean age was 54.3 ± 12.9 years (range, 21–88 years), and 113 patients...
(69.8%) were men. A majority of the patients lived in a joint family (n=94, 58%).

**Stroke Characteristics**

Stroke characteristics are provided in Table 1. One hundred twenty-five patients (77.2%) had an ischemic stroke. The mean duration of follow-up was 18.3±24.9 months (median 6.5 months, range 1–180 months). Seventy-two patients (44.4%) had completed >1-year follow-up.

The mean NIHSS score was 2.16±2.1 (median 1, range 0–10). Ninety-two patients (56.7%) had good outcome.

Hypertension, diabetes mellitus, and coronary artery disease were the common stroke risk factors (Table 1).

**WHOQoL**

The mean converted scores for the domains were as follows: physical, 54.1±15.35 (median 57, range 7–89); psychological, 58.1±15.0 (median 58, range 13–96); social, 68.2±20.1 (median 67, range 0–100); and environmental, 68.2±17.5 (median 69, range 6–100). Table 2 shows various significant factors associated with WHOQoL.

In the univariate analysis, presence of anxiety and depression was negatively correlated with QoL in the physical, social, and environmental domains; ie, patients with anxiety...
and depression were more likely to have impaired QoL. FIM score was positively correlated with QoL in all the domains (Table 2); (ie, patients who were functionally dependent were more likely to have impaired QoL). Income was positively correlated with social and environmental domains of QoL (Table 2). Patients with good outcome (mRs 0 to 1) had better QoL in physical domain compared with patients with poor outcome (mRs≥2) (P<0.001, analysis of variance). Other factors such as age, sex, education, occupation, family type, type of stroke, duration of symptoms, and NIHSS score were not significant in the univariate analysis.

**HADS**

Of the 162 patients, 39 patients (24%) had anxiety and 60 patients (37%) had depression. Twenty-one patients (13%) had mild anxiety, 15 patients (9%) had moderate anxiety, 3 patients (1%) had severe anxiety, and 123 patients (75%) had no anxiety. However, 37 patients (23%) had mild depression, 17 patients (11%) had moderate depression, 6 patients (3%) had severe depression, and 102 patients (63%) had no depression.

QoL in all the domains negatively influenced anxiety and depression in univariate analysis (Table 2); (ie, patients with low scores in various domains of QoL were more likely to have anxiety and depression). FIM score and NIHSS score were negatively correlated with depression (ie, patients with low FIM scores and higher NIHSS scores were more likely to be depressed) (Table 2). Other demographic and stroke variables did not influence levels of anxiety and depression.

**FIM**

Mean scores for the 7 domains of FIM were as follows: self care, 5.64±1.24; sphincter control, 6.08±0.89; mobility, 5.84±1.05; locomotion, 5.63±1.24; communication, 5.94±0.92; psychosocial adjustment, 5.75±0.93; and cognitive function, 5.94±0.87. The aggregate mean score was 5.81±0.82, and the median score was 6 in all categories.

All domains of QoL had positive correlation with FIM score (ie, patients with impaired QoL were likely to be functionally dependent) (Table 2). Age had a negative correlation with FIM score (ie, older stroke patients were more likely to be functionally dependent). Subjects with higher NIHSS and mRs scores were less likely to be independent (Table 2). Other demographic variables and stroke factors did not affect FIM score.

**Predictors of QoL, HADS and FIM: Multivariate Logistic Regression Analysis**

Presence of anxiety, depression, and low scores in FIM were the strongest predictors of QoL (Table 3). Other variables such as age, educational qualification, occupation, family, duration, and type of stroke, were not significant.

Poor stroke outcome (mRs ≥2) was the important predictor of depression. Presence of anxiety or depression reciprocally influenced each other in the multivariate logistic regression analysis (Table 3). The other variables were not significant.

Presence of depression, older age, and stroke severity (per NIHSS score) were negatively correlated with functional independence of the stroke patients (Table 3). None of the other demographic and stroke factors affected FIM score.

### Table 3. Factors Predicting WHOQoL, HADS, and FIM in Multivariate Logistic Regression Analysis

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Variables</th>
<th>B</th>
<th>Adjusted Odd Ratio*</th>
<th>95% CI</th>
<th>P Value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHOQoL</td>
<td>Physical domain</td>
<td>Depression</td>
<td>-0.96</td>
<td>0.38</td>
<td>0.18–0.78</td>
</tr>
<tr>
<td></td>
<td>NIHSS</td>
<td>-0.25</td>
<td>0.77</td>
<td>0.64–0.93</td>
<td>0.008</td>
</tr>
<tr>
<td></td>
<td>Psychological domain</td>
<td>Sex</td>
<td>-1.42</td>
<td>0.24</td>
<td>0.59–0.98</td>
</tr>
<tr>
<td></td>
<td>Social domain</td>
<td>Anxiety</td>
<td>-1.50</td>
<td>0.20</td>
<td>0.51–0.80</td>
</tr>
<tr>
<td></td>
<td>FIM</td>
<td>1.20</td>
<td>3.56</td>
<td>1.70–7.42</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Environmental domain</td>
<td>Depression</td>
<td>-1.49</td>
<td>0.22</td>
<td>0.10–0.47</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>1.12</td>
<td>3.09</td>
<td>1.42–6.66</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>Income</td>
<td>1.20</td>
<td>3.32</td>
<td>1.63–6.75</td>
<td>0.001</td>
</tr>
<tr>
<td>HADS</td>
<td>Anxiety</td>
<td>NIHSS</td>
<td>-0.19</td>
<td>0.82</td>
<td>0.67–1.00</td>
</tr>
<tr>
<td></td>
<td>Depression</td>
<td>2.04</td>
<td>7.70</td>
<td>3.34–17.7</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>Depression</td>
<td>Anxiety</td>
<td>2.01</td>
<td>7.50</td>
<td>3.19–17.06</td>
</tr>
<tr>
<td></td>
<td>FIM</td>
<td>-0.88</td>
<td>0.41</td>
<td>0.16–1.01</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>mRs</td>
<td>1.48</td>
<td>4.40</td>
<td>1.80–10.76</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>FIM</td>
<td>Depression</td>
<td>-1.11</td>
<td>0.33</td>
<td>0.13–0.78</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>-0.53</td>
<td>0.94</td>
<td>0.92–0.97</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>NIHSS</td>
<td>-0.37</td>
<td>0.69</td>
<td>0.53–0.88</td>
<td>0.004</td>
</tr>
</tbody>
</table>

B indicates regression coefficient.

*Variables adjusted include, age, sex, income, education, family type, stroke type, duration of follow-up, stroke severity (NIHSS) and outcome (mRs).

†P<0.005 significant.

‡Anxiety and depression were not included in the model.

**Discussion**

We explored the QoL, functional problems, anxiety, and depression experienced by stroke survivors and the relationship of these measures with various stroke characteristics. QoL was influenced by the presence of anxiety, depression, and functional dependence (FIM). In this cohort, 24% of patients had anxiety and 37% of patients had depression. In the multivariate logistic regression analysis, only poor stroke outcome and presence of anxiety predicted depression. Patients who were functionally dependent (FIM) were more likely to be older, have had severe stroke, and have depression.

Stroke survivors were found to have low scores on all 4 domains of the WHOQoL. This finding is in agreement with that of a previous study.36 Even mild to moderate strokes can affect all dimensions of QoL despite a patient achieving full independence in activities of daily living.31 Anxiety, depression, and functional difficulties were correlated with impairment of QoL, which was consistent with previous studies from Spain,32 as well as from Melbourne.33

In developed countries, depression seems to represent a considerable problem in the early post-stroke period,34,35 persisting in one quarter of patients beyond 2 years following stroke.36 Anxiety affected approximately one third of patients in the first few weeks following stroke,34 and after 5 years, approximately one fifth remained anxious.36 The presence of anxiety and depression in our patients was low compared with that in studies conducted in developed countries. This is
likely because most of our survivors had minor strokes and therefore good outcome (79%). Apart from prevalence of minor strokes, the long duration of stroke (mean duration of follow-up was 18 months) would have enabled survivors to adopt certain coping strategies to deal with anxiety and depression. Another crucial point is that unlike in developed countries, most of our survivors went back home rather than to nursing homes or other institutions.

We used FIM because it has the advantage of providing detailed assessment of various functional abilities of the patient and also includes measures of communication and cognition, important components of post-stroke functioning.37,38 As in previous studies,32,39 older age, severe stroke, and presence of depression influenced functional independence in the present study. However, it is important to note that despite anxiety and depression being low and survivors having good outcome in the present study, functional independence was still affected. A likely explanation for this, from a psychological point of view, could be fear of having another attack; this would presumably lead to avoidance of activities that patients used to do with ease.

There are limitations in this study. Most of the patients had mild to moderate stroke and hence the sample was biased toward good outcome. However, despite having good outcome, QoL was still impaired. Convenient sampling method and the cross-sectional design resulted in nonstandard follow-up of patients; this could have contributed to the low prevalence of anxiety and depression. We did not calculate the sample size, and this would have resulted in Type II error. We excluded patients with psychiatric morbidity and patients with previous stroke. It would have been difficult to isolate the influence of stroke on various domains of QoL, anxiety, depression, and functional independence, as these comorbidities can affect QoL. India is a vast country with many regional socio-cultural variations. Our findings could be extrapolated to a north Indian urban population but not to other parts of the country.

Despite the above limitations, this study offers new information on QoL, functional ability, and prevalence of anxiety and depression among stroke survivors in the Indian subcontinent. This is one of the largest studies from the Asia Pacific region. We used standardized QoL, anxiety, depression, and functional dependence measures. In a previous incidence study from Mumbai, they used mRs to study outcome and the cross-sectional design resulted in nonstandard follow-up of patients; this could have contributed to the low prevalence of anxiety and depression. We did not calculate the sample size, and this would have resulted in Type II error. We excluded patients with psychiatric morbidity and patients with previous stroke. It would have been difficult to isolate the influence of stroke on various domains of QoL, anxiety, depression, and functional independence, as these comorbidities can affect QoL. India is a vast country with many regional socio-cultural variations. Our findings could be extrapolated to a north Indian urban population but not to other parts of the country.

Despite the above limitations, this study offers new information on QoL, functional ability, and prevalence of anxiety and depression among stroke survivors in the Indian subcontinent. This is one of the largest studies from the Asia Pacific region. We used standardized QoL, anxiety, depression, and functional dependence measures. In a previous incidence study from Mumbai, they used mRs to study outcome and disability, but they had not studied QoL, anxiety, depression, and FIM.40

**Conclusions**

There were no notable differences in QoL among stroke survivors in the present study as compared with those in studies from other developed countries. Presence of anxiety, depression, and functional dependence (low FIM scores) were associated with impaired QoL. There was low prevalence of anxiety and depression. Older age, stroke severity, and presence of depression resulted in decreased independence. There is a window of opportunity to improve QoL by identifying and treating anxiety and depression in high-risk stroke patients.

**Acknowledgements**

We are thankful to Dr Yashpal Singh, Professor and Head of the Department of Neurology, for giving us his support to conduct this project.

**Sources of Funding**

R.S.R. was supported by intramural neurology research fund.

**Disclosures**

None.

**References**

Psychosocial Problems, Quality of Life, and Functional Independence Among Indian Stroke Survivors
Rinu Susan Raju, Prabhakaran S. Sarma and Jeyaraj D. Pandian

*Stroke*. 2010;41:2932-2937; originally published online October 21, 2010;
doi: 10.1161/STROKEAHA.110.596817

*Stroke* is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2010 American Heart Association, Inc. All rights reserved.
Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://stroke.ahajournals.org/content/41/12/2932

**Permissions**: Requests for permissions to reproduce figures, tables, or portions of articles originally published in *Stroke* can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

**Reprints**: Information about reprints can be found online at: http://www.lww.com/reprints

**Subscriptions**: Information about subscribing to *Stroke* is online at: http://stroke.ahajournals.org/subscriptions/