

## Review Article

# Health-related quality of life of stroke patients before and after intervention: Systematic review

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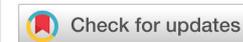
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## Abstract

Stroke, the leading causes of mortality, disability, and has effects on health-related quality of life. The objective of this review is to review the health-related quality of life of patients with stroke. Relevant kinds of literature were searched from Science Direct, Google Scholar, Hinari, Scopus, Web of Science, PubMed, Cochrane Library, and PROSPERO database using inclusion and exclusion criteria. From 864 searched studies, 20 full-text articles were reviewed. Eighty-five percent (n=17) of articles assessed health-related quality of life after the interventions, whereas three (15%) of studies assessed health-related quality of life before the interventions. In 50% (n=10) of studies, physical disability and six (30%) of studies depression occurred as complications of a stroke. Forty percent (n=8), 25% (n=5), 20% (n=4), 20% (n=4), and 10% (n=2) of studies medication therapy, physical exercise, psychological intervention, assistive devices, and surgical procedure were utilized as intervention. The occurrences of stroke complications are determinant for poor health-related quality of life and any of the intervention has a strong and positive impact on health-related quality of life. Any of the interventions and assessments provide important information in deciding and implementing appropriate intervention programs.

## Abbreviations

HRQOL: Health Related Quality of Life; QOL: Quality of Life

## Introduction

World Health Organization defined stroke as “rapidly developing clinical signs of focal (or global) disturbance of cerebral function, lasting quite 24 hours or resulting in death with no apparent cause other than that of vascular origin” [1]. In every 6 people will have a stroke in life; 15 million people suffer a stroke per year, from these 6 million people die [2]. In developed countries, stroke is a cause for death after cancer and heart condition [3]. In the current situation in Sub-Saharan Africa region stroke cases occur with high morbidity and mortality rate that leads to rapid epidemiological transition [2].

Stroke patients exhibit symptoms like mood changes

(depression, apathy), paralysis of an extremity-face, spasticity, loss of memory, contracture pain, and personality changes [1]. Depending on the type and severity, a stroke can leave an individual residual impairment of physical, social, psychological, and cognitive functions [4]. And also features a substantial impact on the psychological well-being of their families [5]. This kind of impacts deteriorate patients perceptions of their position in life concerning their goals, standards, and expectations [6].

Health-Related Quality of Life (HRQOL) is quality of life suffering due to a disease, or health condition, or health care intervention on the individuals' subjective experience in social, psychological, functional, and cognitive processes [7,8]. The concept of HRQOL is essential within the assessment of the multiple impacts of a stroke on the patient's life and evaluation of their health states [5]. HRQOL measures encompass physical,

emotional, social, and subjective feelings of patients and hence, utilized in identifying prioritizing areas, evaluation of the cost-benefit and effectiveness of prophylactic, therapeutic, and rehabilitative interventions [9].

To assess HRQOL, generic and specific measurement tools are developed [10]. Generic HRQOL measurement tools utilized across a wide range of populations and health care interventions, whereas specific HRQOL measurement tools are designed to measure HRQOL only specific subpopulations [11]. Disease-specific HRQOL measurement tools are designed to assess HRQOL of patients with scales and questions that are specific (related) to a disease or health condition [12].

The assessment focuses on the alleviation of symptoms, prevention of deaths, and restoration of patient function. The care of a stroke patient requires measurements of the result, which are critical to assess and evaluate the treatment regimens. Therefore, the objective of this review was to review the HRQOL of patients with stroke.

## Material and methods

### Search strategy

A systematic literature search was conducted from Science Direct, Google Scholar, Hinari, Scopus, Web of Science, PubMed, Cochrane Library, and PROSPERO electronic databases for articles published from January 2000 – July 2020. A manual Google search was utilized to identify some studies and therefore the reference lists of retrieved articles. The entire searches were done July 5-10/2020 using keywords “health-related quality of life”, “quality of life”, “stroke”, “intervention”, “patients” and in combination.

### Study selection

Articles were included within the review if they aimed to assess HRQOL of stroke patients. The inclusion criteria were: publication: peer-reviewed and gray literature, type of study: all, population: stroke patients, time: from 2000 to present, and language: English. Studies that were published only as dissertations, editorials, opinions, abstracts, and letters to editors were excluded.

### Assessment of methodological quality

Before including the selected articles to the review methodological validity assessment was done and during the review by conducting critical appraisal using preferred reporting items for systematic reviews and meta-analysis (PRISMA) flow diagram and guidance set out by the center for reviews and dissemination [13]. Each of the 20 studies was evaluated for each criterion/question and rated it as “Yes” with score 1 if described partly, we scored it as 0.5, then 0 for “No.” Then, the entire score was calculated by summing each score and score less than 75% graded as low quality, 75% to 90% graded to moderate quality, and greater than 90% was graded as high quality.

In this review, three reviewers participated. Two reviewers appraised the full text of each article independently. Any

discrepancies between the two reviewers were resolved through discussion with a third reviewer as an arbiter.

### Data abstraction

The author screened the studies based on the inclusion and exclusion criteria. The following details were extracted from each article using an abstraction form: authors, country, sample size, year, study design, HRQOL measurement tool, intervention types, before or after the intervention, HRQOL status, and complications.

## Result

### Literature search results

The searching was conducted through stepwise procedures. The initial advanced search in all databases yields 864 studies. Finally, 20 studies in which full field the inclusion criteria were reviewed. The figure below briefly describes the flow of study selection employed within the study (Figure 1).

### Methodological quality of included studies

The reporting quality results showed that most studies were of high quality (n=18, 75%), whereas five (20.9%) were of moderate quality and one (4.1%) were of low quality.

### Study characteristics

All selected studies varied in the study design. The sample size ranged from 24-700 (Table 1).

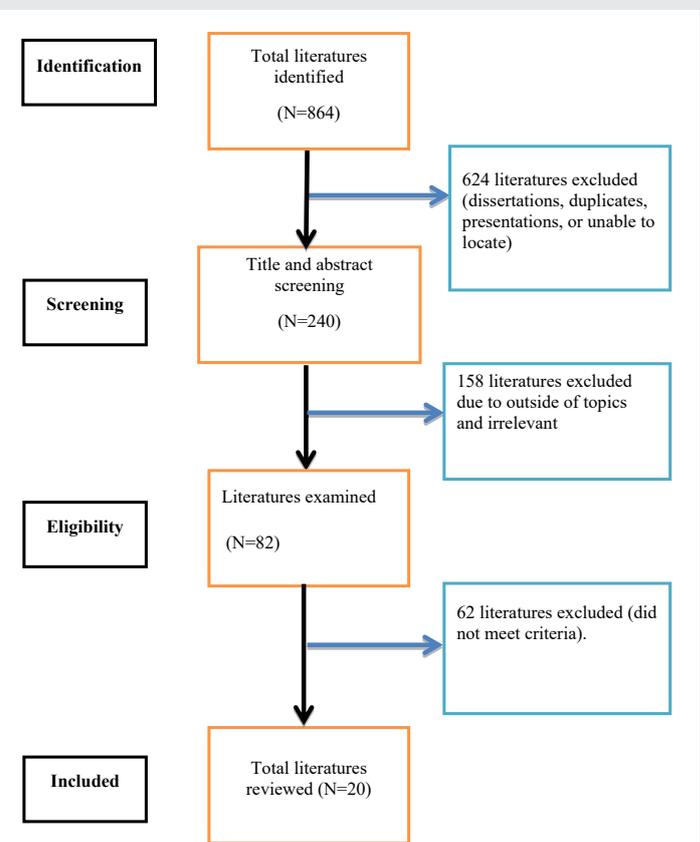


Figure 1: Flow diagram of the study selection.



Table 1: Study characteristics.

S.n	Author and year	Study design	Sample size	Country	Year
1	Naess H, et al. [15]	Case control	405	Norway	2006
2	Carod-Artal J [16]	Cohort study	118	Spain	2000
3	Khalid W, et al. [17]	A sequential mix methods approach	700	Pakistan	2016
4	Lindgren I [20]	Prospective population based study	416	Sweden	2007
5	Kahn SR [21]	Review	37 articles	Globally	2000
6	Carod-Artal FJ [25]	Review	87 articles	Western countries	2009
7	Rønning OM [19]	Prospective study	550	Norway	2008
8	Kauhanen M-L, et al. [29]	Cohort study	85	Finland	2000
9	Chandrasekhar D, et al. [27]	Prospective interventional study	128	India	2018
10	Hohmann C [28]	Longitudinal study	255	Germany	2010
11	Van Middelaar T, et al. [30]	Retrospective cohort study	25	Netherlands	2015
12	Abelha FJ [31]	Longitudinal study	63	Portugal	2008
13	Wu D-Y, et al. [32]	Prospective cohort study	120	China	2012
14	Holmgren E [33]	Randomized controlled trial	34	Sweden	2010
15	Rand D, et al. [35]	Study by using Actual accelerometer on each hip for 3 consecutive days at home	40	USA	2010
16	Gosman-Hedström G [36]	Longitudinal randomized trial	249	Sweden	2002
17	Clarke P [37]	A secondary analysis	339	Canada	2002
18	Thomas LH [38]	A cluster randomized controlled feasibility trial	413	England and Wales	2014
19	Kahn SR [22]	Prospective study	43	Montreal	2002
20	Armstrong JR [23]	Review	59 articles	USA	2011

## HRQOL measurement tools

Fifty percent (n=10) of articles included in the review Short-Form (SF-36) was utilized to assess HRQOL stroke patients. Whereas, 20 % ( n=4) of studies Barthel Index and three (15%) of studies Stroke Specific Quality of life (QOL) Scale were used to assess HRQOL of stroke patients (Table 2).

## Assessment of HRQOL before and after intervention

Eighty-five percent (n=17) of reviewed articles assessed HRQOL of stroke patients after the interventions of the disease, whereas three (15%) of studies assessed HRQOL before the interventions done to the complications of the diseases. In the current review, in fifty percent (n=10) of studies physical disability and in six (30%) of studies depression occurred the complications of stroke (Table 3).

## Intervention types and HRQOL Status

From the reviewed articles, 40% (n=8), 25% (n=5), 20% (n=4), 20% (n=4), and 10% (n=2) of studies medication therapy, physical exercise, psychological intervention, assistive devices, and surgical procedure were utilized as an intervention to overcome the complications of a stroke. Fifty percent (n=10) of studies assessed HRQOL improvement in stroke patients, from this physical and psychosocial well-being of stroke patients were identified as predictors of HRQOL (Table 4).

## Discussion

### HRQOL of stroke patients before intervention

The impact of stroke on HRQOL is disastrous without

getting intervention and stroke can complicate multiple domains of life. In the current review, the physical disability problem was assessed in fifty percent of studies (n=10), and in six studies (30%) reviewed articles depression was occur the complications of a stroke. This was similar to Robinson RG (2006) and Gurenlian J (2002) studies revealed that the brain affected by stroke [14]. Also, HRQOL was significantly reduced with the presence of depression and previous stroke were all significantly associated with worse QOL (P = 0.0001) study done by Pinkney JA (2017) [15]. Brain edema, depression, and emotional problem were the common central nervous system complication of stroke.

Naess H, (2006) study revealed that a close association between low HRQOL and depression among older patients with stroke [16]. Similar studies by Carod-Artal J (2000), Khalid W (2016), and Chaves DBR (2013) described that stroke survivors mostly depressed and their HRQOL was profoundly influenced by increased physical functional dependency, neurologic pain, and depression [17-19]. Also, study conducted by Chen Q, et al. (2019) patients with strokes scored significantly lower in all mental dimensions including vitality, social functioning, role limitations due to emotional problems, and mental health (P<.001) [20]. Brain injuries caused by a stroke can also determine writing and verbal language skills. That, in turn, can produce communication difficulties, causing social isolation, which aggravates depression and thus interferes with HRQOL.

Physical disability is a consistent determinant of HRQOL in stroke survivors in almost all studies and survivors after stroke has very poor HRQOL in the long term after stroke



[21]. In the present review physical disabilities, shoulder pain, post-thrombotic syndrome (leg pain, edema, deep venous thrombosis, ulceration, and lack of exercise were the most commonly reported complications. This result in line with a study conducted by Lindgren I (2007) revealed that almost one-third of stroke patients develop a physical problem after stroke onset with moderate to severe pain [22] and highest scores were found in the physical and physical functioning domains, with a value of 0.722 with a study done by Sabogal YR (2016) [23]. Also similar to Kahn SR (2000) stated that deep venous thrombosis and blood clots occur in 20% to 50% of patients within the first 2 years after the acute thrombotic episode [24]. Patients with deep venous thrombosis in whom post-thrombotic syndrome develops had shown that HRQOL worsens with the severity of post-thrombotic syndrome [25].

Pneumonia is another complication to the present review, which causes breathing and swallowing problems. According to Armstrong JR (2011), pneumonia causes the highest attributable mortality of all medical complications following a stroke. In 6% of patients suffering from ischemic stroke and 30% of patients with a hemorrhagic stroke risk to respiratory failure, this leads to intubation [26].

In the current review urinary incontinence also the complications occur after the occurrence of stroke that may

**Table 2:** HRQOL measurement tools (n=20).

S.n	Author	HRQOL measurement tools
1	Naess H, et al. [15]	Short-Form (SF-36)
2	Carod-Artal J [16]	Hamilton Rating Scale, Sickness Impact Profile, Short Form 36, Frenchay Index, Barthel Index, Rankin Scale, and Scandinavian Stroke Scale
3	Khalid W, et al. [17]	Stroke Specific QOL Scale
4	Lindgren I [20]	National Institutes of Health Stroke Scale score and Barthel Index Visual analog scale
5	Kahn SR [21]	VEINES QOL questioners
6	Carod-Artal FJ [25]	Stroke Impact Scale, Stroke-Specific QOL Scale
7	Rønning OM [19]	Short form SF-36
8	Kauhanen M-L, et al. [29]	RAND 36- item health survey, Scandinavian, Stroke Scale, and Barthel index
9	Chandrasekhar D, et al. [27]	Short form SF-36
10	Hohmann C [28]	Short form SF-36 and Barthel index
11	Van Middelaar T, et al. [30]	Short form SF-36
12	Abelha FJ [31]	Short form SF-36 and Lawton Instrumental Activities of ADL Scale
13	Wu D-Y, et al. [32]	SCL-90 and Euro stroke scales (ESS)
14	Holmgren E [33]	Geriatric Depression Scale-15 (GDS-15), Short Form-36 (SF-36)
15	Rand D, et al. [35]	Physical ability Scale for Individuals with Physical Disabilities (PASIPD) and Short Form-36 (SF-36)
16	Gosman-Hedström G [36]	Short Form-36 (SF-36)
17	Clarke P [37]	Activities of daily living scale (ADL)
18	Thomas LH [38]	Incontinence QOL Instrument (IQoL)
19	Kahn SR [22]	VEINES QOL and Short form SF-36
20	Armstrong JR [23]	Clinical Pulmonary Infection Score

**Table 3:** Assessment of HRQOL before and after intervention (n=20).

S.n	Author	HRQOL assessed before /after	Complications
1	Naess H, et al. [15]	After	Depression and physical functioning
2	Carod-Artal J [16]	Before	Depression and disability
3	Khalid W, et al. [17]	After	Depression and other complications
4	Lindgren I [20]	After	Physical functioning (Shoulder pain)
5	Kahn SR [21]	After	Deep venous thrombosis, pain, and leg swelling
6	Carod-Artal FJ [25]	Before	Complications of stroke
7	Rønning OM [19]	After	Physical and emotional problem
8	Kauhanen M-L, et al. [29]	After	Physical functioning problem and depression
9	Chandrasekhar D, et al. [27]	After	Complications of stroke
10	Hohmann C [28]	After	Complications of stroke
11	Van Middelaar T, et al. [30]	After	CNS problem(brain edema)
12	Abelha FJ [31]	After	Stroke complication(artery blockage)
13	Wu D-Y, et al. [32]	After	Mental health, stress and limb movement
14	Holmgren E [33]	After	depression and Physical problem
15	Rand D, et al. [35]	After	Physical disability
16	Gosman-Hedström G [36]	After	Physical disability
17	Clarke P [37]	After	Wellbeing after stroke
18	Thomas LH [38]	After	Urinary incontinence
19	Kahn SR [22]	Before	Post thrombotic syndrome(leg pain ,edema, deep venous thrombosis, ulceration)
20	Armstrong JR [23]	After	Pneumonia

cause loss of sexual function, social isolation, psychosocial well-being, and QOL [27]. A study conducted by Carod-Artal FJ (2009) reported that sexual dissatisfaction and dysfunction are common in both male and female stroke patients with significant impact on sexual functioning and HRQOL [28].

### HRQOL of stroke patients after intervention

An intervention done in stroke care improves HRQOL of patients and clinicians intending to improve clinical practice or the organization of care. Figure 2 describes types of interventions to overcome complications of stroke according to the taxonomy developed by Lamb (2011) [29].

From the reviewed articles, 40% (n=8) of studies medication therapy targeted to specific classes of drugs and drugs for other comorbid conditions can be prescribed to combat complications. The responsible provision of drug therapy for achieving the desired improving HRQOL in patients with stroke had been shown effective by Chandrasekhar D [30] and Hohmann, et al. study [31]. Pharmaceutical care provided by the health professionals improving HRQOL in patients with stroke. Treating depression improving HRQOL outcomes and better prognosis achieved where an early diagnosis was made. According to Kauhanen M-L, et al. (2000) study, treating



**Table 4:** Intervention types and HRQOL status (n=20).

S.n	Author	Intervention types	HRQOL Status
1	Naess H, et al. [15]	Medication	Improve HRQOL regard to physical functioning
2	Carod-Artal J [16]	Physical exercise	Functional status and depression were identified as predictors of QOL.
3	Khalid W, et al. [17]	Psychological intervention at home level	QOL of Stroke survivors was better than compared to those reported from comparative settings
4	Lindgren I [20]	Physical exercise, supportive devices	Shoulder pain restricts patients' daily life after stroke
5	Kahn SR [21]	Comprehensive medication therapy and stocking	Identifying predictors of poor Outcome
6	Carod-Artal FJ [25]	Medical intervention	Physical and psychosocial well-being is greatly affected in stroke survivors
7	Rønning OM [19]	Medication therapy	Improvement in HRQOL from 1 to 6 months after stroke
8	Kauhanen M-L, et al. [29]	Physical and medication therapy	The most important determinants of low QOL seem to be depression and being married
9	Chandrasekhar D, et al. [27]	Pharmaceutical care	Pharmaceutical care improve HRQOL of patients
10	Hohmann C [28]	Pharmaceutical intervention on drug therapy	Intensified education and care of patients after ischemic stroke by dedicated pharmacists based on a concept of pharmaceutical care may maintain HRQOL of patients
11	Van Middelaar T, et al. [30]	Surgical procedure	Mental QOL after surgical decompression for space-occupying MCA infarct is comparable to that in the general population, whereas physical QOL is worse
12	Abelha FJ [31]	Surgery	Patients undergoing surgery have improved self-perception of QOL
13	Wu D-Y, et al. [32]	Psychological intervention	Improve HRQOL of patients
14	Holmgren E [33]	Physical exercise and education	High-intensive functional exercises implemented in real-life situations and education focus on falls and safety aspects to have a better HRQOL
15	Rand D, et al. [35]	Physical activity	Daily physical activity is associated with better HRQL
16	Gosman-Hedström G [36]	Assistive devices and technology	Assistive devices were prescribed at low cost and had a high impact on these elderly people's daily life after stroke
17	Clarke P [37]	social resources and educations	Social resources can help to alleviate the subjective burden of this common neurological condition
18	Thomas LH [38]	Toilet assisting program	The programme has a potential reduction in the odds of specific types of incontinence
19	Kahn SR [22]	Medication, exercise and psychological support	Post thrombotic syndrome has a significant impacts on QOL
20	Armstrong JR [23]	Medication	Improve HRQOL of Patients

depression greatly improve HRQOL of patients with ischemic stroke [32].

From the reviewed articles, 10% (n=2) of studies surgical procedure was utilized as the intervention types to overcome the complications of a stroke. Surgery including pacemaker provision, cataract extraction, and podiatric surgery can help to improve HRQOL. According to van Middelaar T, et al. study, patients who have survived surgical decompression for a space-occupying middle cerebral artery showed a good mental QOL [33]. The effect of carotid endarterectomy on stroke patients demonstrated subtle cognitive changes as revealed by neuropsychological testing [34].

In the current review, 20% (n=4) psychological intervention was utilized to overcome the complications of a stroke. Psychological interventions like cognitive (behavioral) can be administered either individually or in a group. After the psychological intervention, condition of depression, fear, anxiety, and psychological factors declined significantly in the trial group than in the control group, indicates that early psychological intervention can improve the patients' mental health [35].

In the present review, 40% (n=8) of studies physical exercise and 20% (n=4) of studies assistive devices intervention were used to overcome the complications. Holmgren (2010) assessed the effect of exercises and significant improvements were found in favor of the intervention group [36]. Evidence suggested by Chan B (2015) revealed that physical exercises and training conducted during acute rehabilitation of stroke patients improve QOL adjusted by years [37]. Similarly, through physical activity, approximately 70% of all individuals regain their walking ability post-stroke [38].

Environmental or assistive product technology interventions favor for personal indoor and outdoor mobility, facilitating transportation services, and facilitating health services and systems were important for elderly patient's HRQOL improvements [39].

Knowledge interventions through different routes like written material, videos, lectures, or others could help improving adherence to other interventions. A cross-sectional study done by Clarke P (2002) reported that social support and educational resources moderated the impact of poor functional status [40].

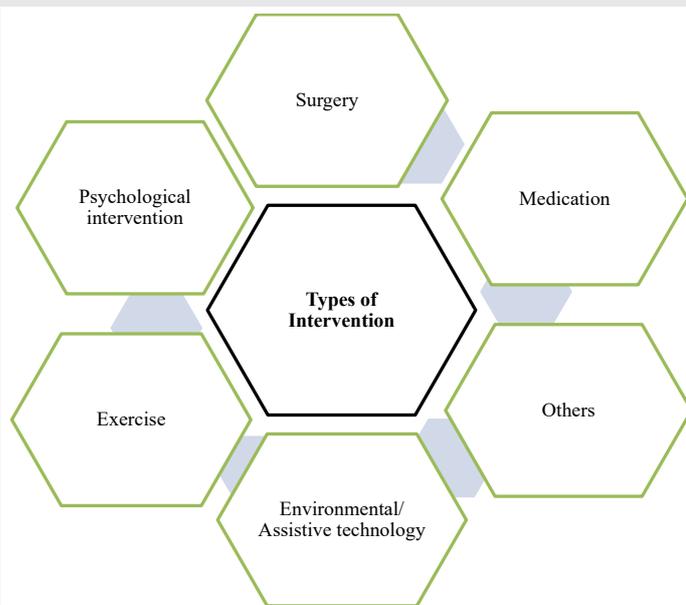


Figure 2: Types of interventions for stroke patients.

The toileting assistance intervention had benefit individuals who are functionally or cognitively impaired and who rely on a caregiver to assist them to maintain continence [41]. Individuals who use bladder-protection pads, behavioral interventions, and bladder training assist to manage incontinence improve HRQOL of the patients [42].

### Limitations of this review

Numerous tools are available to measure HRQOL of stroke patients and every of the reviewed articles uses the distinct tool. This diversity of domains within the assessment of HRQOL makes comparison troublesome and it's unclear to conclude that interventions have a sound improvement in HRQOL.

### Conclusions

This review covered wide range of HRQOL measurement tools that has been conducted in patients with stroke. There is no existing measurement tools comprehensively covers all relevant domains or addresses fully the issues of obtaining and combining HRQOL assessment in stroke patients.

The incidence of complications like depression, disability, seizure, and different complications was the determinant of poor HRQOL. Generally, physical functions and psychosocial well-being are greatly affected when the incidence of a stroke.

Inpatient interventional program contains a sturdy and positive impact on HRQOL. Interventions like medication, physical, psychological interventions, and environmental helpful technology have shown effectiveness in HRQOL patients with stroke. The investigation of relevant factors with health-related quality and assessments of individual HRQOL provides necessary data for clinicians and decision-makers to choose upon acceptable treatments and allocation of resources.

### Data availability

The datasets are available from the corresponding author upon reasonable request.

## Acknowledgments

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