

Quality of Life Among Stroke Survivors Following a 12-Week Strength Training Program: Four Month Post-Intervention Evaluation

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ABSTRACT

Background: Stroke survivors experience functional disability that negatively affects their quality of life. Quality of life refers to people's perceptions of the culture and value systems where they live, and this includes their goals, expectations, standards and concerns. It is multi-factorial, comprising physical, functional, psychological, emotional, social and environmental domains. Higher QoL is associated with independent daily living, higher education, better socio-economic status and better social support, whereas lower QoL is associated with anxiety, depression and fatigue, and greater functional dependence.

Objective: To assess the quality of life in post-stroke patients who are following a 12-week strength training program, 4 months post intervention.

Methodology: This study was a comparative single-blinded randomized, controlled trial (RCT) using a parallel design. The sample size was 66 stroke survivors from out-patient physiotherapy departments at three Level I hospitals (Chawama, Kanyama and Matero) located in Lusaka Province. Stroke survivors aged 20-65 years and above, right- or left-sided limb hemiparesis, male and females, with

stroke duration of 24 hours to 6 months were included in this study. The ICF core scores were summarised using frequencies and percentages, presented as tables. The Barthel Index Scale's descriptive statistics such as frequencies and percentages were used to summarise all the eight (8) elements. The SIS tool was summarised into eight (8) domains with a set of questions sitting on a 5-point Likert Scale. The Chi-Square Test and Fishers Exact Test (based on the assumptions of each test) were used to compare quality of life using the BI and ICF between the control group to those in the experimental group. The STATA package was used for descriptive statistics such as frequencies and percentages to summarise the categorical variables of this study. The Chi-Square Test and Fishers' Exact Tests (Based on the assumptions of each) were used to compare differences in the distribution of characteristics by the study arms (Experimental vs Control group). The 95% confidence interval was taken as the precision of the effect estimate study.

Results: QoL for ICF at endline was statistically significant for improved sleeping patterns ($p < 0.020$), pelvic movements ($p < 0.016$), and the ability to dress oneself ($p < 0.048$). QoL for SIS and BI at endline was statistically significant for improved mobility at $p < 0.026$ and $p < 0.031$

respectively. In comparison to the baseline, BI score had a p-value <0.024 at endline with GMT and GSD 15.6 (1.3) in the experimental group.

Conclusion: This study concluded that the quality of life of stroke patients greatly improves following 12 weeks of strength training and in particular functional ability, physical and psychological status and the social aspect.

Keywords: Quality of life, Health-related quality of life, Strength training, Stroke patient, Stroke

1. INTRODUCTION

Stroke remains a leading cause of disability in older adults emanating from muscle function deficit [1, 2, 3, 4, 5, 6, 7, 8, 9]. Muscle strength of patients reduces in both the affected and unaffected limbs leading to failure to generate force against a load over a period of time (muscle endurance) and the ability of a muscle to generate force against a load (muscle power) at a given speed [2, 10]. Muscle function comprises of muscle strength, muscle power and muscle contraction velocity [2]. Consequently, muscle weakness is frequently identified as a contributing factor to functional limitations, particularly in gait and sit-up tasks [11]. This is because the ability of an individual to function independently such as standing up, maintaining balance and control, and executing efficient gait speed is dependent on effective lower limbs [2].

Quality of life (QoL) is described as the assessment of the current circumstances of an individual's life [12]. QoL refers to people's perceptions of the culture and value systems where they live, and this includes their goals, expectations, standards and concerns [13, 14, 8, 15]. It indicates a complete sense of health, well-being and life satisfaction [13]. Several authors allude to QoL as a multifactorial construct with physical, functional, psychological, emotional, social and environmental domains [5, 7, 12, 13, 16, 17, 18, 19]. These domains illustrated as a proposed model of

QoL are physical state, material state, functional state, psychological state and social health or social function, education and self-development, self-expression possibilities and leisure, financial-independence, pain and emotional-wellbeing, safety and environment [6, 7, 12, 14, 15, 18, 20, 21, 22, 23]. Among the many effects of stroke on the population is the reduction in quality of life [5, 16]. Higher QoL is associated with independent daily living, higher education, better socioeconomic status and better social support [7, 17] while lower QoL is associated with anxiety, depression and fatigue, and functional dependence. Quality of life is poorer in post-stroke than in healthy individuals [21]. Stroke survivors suffer from functional disability that negatively affects their quality of life [22].

A randomized, controlled trial conducted in Brazil involving 64 participants stated that strengthening exercises facilitate an increase in muscle strength and function, and promotes quality of life without an equal increase in tone and pain [24]. Moreover, strengthening exercises improves quality of life without an equal increase in muscle tone and pain [24, 25, 26]. The purpose of rehabilitation for stroke survivors is to increase the functional level reduced due to disease, and argument quality of life [22]. QoL is a crucial indicator for determining the efficacy of stroke rehabilitation for three decades [18]. Measuring quality of life helps determine the efficacy of the intervention applied [6].

There are a number of tools used to assess quality of life for the general population. [20] evaluated several tools used to assess QoL for reliability and validity such as the ICF, COOP Charts, the McMaster Health Index Questionnaire, the Nottingham Health Profile, the Sickness Impact Profile, the Medical Outcomes Study 20-Item Short-Form Health Survey, Quality of Life Index, the Euro-qol and the Quality of Well-being scale. The study conducted [22] used the Barthel Index, SF36, and the Stroke Specific Quality of Life (SSQOL). Another study

used the PQOLI commonly known as the Post Quality of Life Index [14]. However, the most widely used tool is the World Health Organisation Quality of Life (WHOQOL-BREF) short version [6]. On the other hand, WHO validated the health-Related Quality of Life (HRQOL) questionnaire [9, 27]. Another study used the European Quality of Life Scale-5 Dimensions (EQ-5D-5L) which evaluated mobility, self-care, usual activities, pain/discomfort and anxiety/depression [8]. For this study, we used the ICF core sets, Stroke Impact Scale (SIS), and the Barthel Index scale (BI).

2. MATERIALS & METHODS

2.1 Study design

This study was a comparative single-blinded randomised controlled trial (RCT) using a parallel design. Further description denotes RCT as the most accurate design that determines the relationship between an intervention and desired outcomes, and whether the intervention is cost effective and will improve subjects' quality of life [28, 29]. A parallel design is where participants are randomised to one or more study arms and each arm is assigned to a different intervention for the duration of the study in order to measure outcomes [30, 31, 32].

2.2 Population and sample size

The population comprised patients with stroke in Phase II-Phase IV and the age range of 20-65 years and above, male and female, with stroke duration of 24 hours to 6 months, accessing out-patient physiotherapy services from the selected Level I hospitals in Lusaka. All patients with stroke who suffered only one stroke with right-or left-sided hemiparesis and muscle strength of less than or equal to grade three (\leq G.3) were included. Those with neurological diseases affecting balance and mimicking stroke and uncontrolled high blood pressure were excluded.

This study used a stratified disproportionate random sampling method, and used muscle

strength characteristics of participants because muscle strength is important for determining outcomes [24]. Therefore, Muscle strength was categorized into three levels: 'weak' for participants who lifted less than 2kg, 'moderate' for those who lifted more than 2kg but less than 4 kg, and 'strong' for those who lifted more than 4kg. We used the percentages 5%, 10% and 15% to calculate effect size (f) to find a sample size for the three hospitals, (f) being the sampling fraction. The smaller category was allocated to the higher fraction to allow for oversampling. Hence, we recruited 79 participants in view of drop-outs. Participants who successfully completed the trial were 66.

2.3 Data collection

The ICF Comprehensive Core Sets for Stroke, the Barthel Index Scale, and the Stroke Impact Scale were used to assess various aspects of the patient in relation to stroke. The ICF consists of part 1a; impairments of Body parts, part 1b; impairments of Body structures, part 2; activity limitations and participation restriction, and part 3; environmental factors. The SIS was developed in conjunction with patients and caregivers in order to measure the health-related quality of life (HRQoL) after stroke [33]. The BI was used to assess bowel and bladder function, toilet use, feeding, dressing, and stair case climbing on 3-point Likert Scale. Grooming and bathing used a 2-point scale, and transfers and mobility used a 4-point scale.

2.4 STATISTICAL ANALYSIS

Data was imported from Excel into STATA, a Statistical Package with smart data-management facilities, up-to-date statistical techniques, and an excellent system for producing publication-quality graphs [34]. QoL was measured using three (3) measuring tools namely the ICF, Stroke Impact Scale, and the Barthel Index tools. Under the ICF tool, elements or core scores were summarised using frequencies and

percentages and presented as tables. For the BI tool, descriptive statistics such as frequencies and percentages were used to summarise all the eight (8) elements.

We employed the Chi-Square Test and Fisher’s Exact Test—selected according to the assumptions of each method—to compare quality of life indicators from the ICF and BI frameworks between individuals in the control and experimental groups. These comparisons were conducted at both baseline and endline.

Subsequently, the individual elements of the BI tool were aggregated to generate a composite BI quality of life score. This score was then transformed using the natural logarithm to normalize the data. Finally, T-tests were used to compare the log-transformed scores between the control and experimental groups at both baseline and endline.

In a similar manner, questions under the SIS tool were summarized into eight (8)

domains. Each domain had a set of questions sitting on a 5-point Likert Scale. The domain total score was calculated by summing up the scores of each domain. We then computed the median scores for each domain with its respective inter-quartile range by study arm and time point, and this was presented as tables. The Wilcoxon Rank Sum test was then used to compare the medium score for each domain in the control group to the experimental group. This was done both at baseline and endline.

3.RESULT

3.1 Socio-demographic profile

We involved 66 participants with the highest age range of 31.8% (≥ 60 years) distributed between 30-59 years collectively (Table 1). The females were 57.6%, married 60.6%, primary school leavers 53%, more of the employed 60.6%, right hemiplegic 56.1%, vascular attack 97% and in phase II of stroke 71.2%.

Characteristic	Overall total n (%)	Study arm	
		Control n (%)	Experimental n (%)
	66	26 (39.4)	40 (60.6)
Age group			
<30 years	4 (6.1)	0	4 (10.0)
30 - 39 years	11 (16.7)	3 (11.5)	8 (20.0)
40 - 49 years	13 (19.7)	4 (15.4)	9 (22.5)
50 - 59 years	16 (24.2)	6 (23.1)	10 (25.0)
≥ 60 years	21 (31.8)	12 (46.2)	9 (22.5)
Missing	1 (1.5)	1 (3.8)	0
Sex			
Female	38 (57.6)	15 (57.7)	23 (57.5)
Male	28 (42.4)	11 (42.3)	17 (42.5)
Marital status			
Single	3 (4.5)	0	3 (7.5)
Married	40 (60.6)	16 (61.5)	24 (60.0)
Divorced	6 (9.1)	2 (7.7)	4 (10.0)
Widowed	17 (25.8)	8 (30.8)	9 (22.5)
Education			
None	2 (3.0)	0	2 (5.0)
Primary	35 (53.0)	15 (57.7)	20 (50.0)
Secondary	22 (33.3)	8 (30.8)	14 (35.0)
Tertiary	7 (10.6)	3 (11.5)	4 (10.0)
Employment			
Unemployed	26 (39.4)	6 (23.1)	20 (50.0)
Employed	40 (60.6)	20 (76.9)	20 (50.0)
Paretic side category			
Left hemiplegia	29 (43.9)	12 (46.2)	17 (42.5)
Right hemiplegia	37 (56.1)	14 (53.8)	23 (57.5)

Type			
Cerebral vascular attack	64 (97.0)	25 (96.2)	39 (97.5)
Transient ischemic attack	2 (3.0)	1 (3.8)	1 (2.5)
Phase			
phase II	47 (71.2)	16 (61.5)	31 (77.5)
phase III	12 (18.2)	7 (26.9)	5 (12.5)
phase IV	7 (10.6)	3 (11.5)	4 (10.0)
Morbidity conditions			
Hypertension	59 (89.4)	23 (88.5)	36 (90.0)
Hypertension with asthma	2 (3.0)	1 (3.8)	1 (2.5)
Hypertension with diabetes	3 (4.5)	1 (3.8)	2 (5.0)
Hypertension with heart condition and diabetes	1 (1.5)	1 (3.8)	0
None	1 (1.5)	0	1 (2.5)
Name of Health facility			
Chawama level 1	23 (34.8)	8 (30.8)	15 (37.5)
Kanyama level 1	20 (30.3)	8 (30.8)	12 (30.0)
Matero level 1	23 (34.8)	10 (38.5)	13 (32.5)
Systolic blood pressure median (IQR)	146.5 (130.0-167.0)	150.5 (130.0-167.0)	140.0 (127.5-178.0)
Diastolic blood pressure median (IQR)	87.5 (78.0-96.0)	90.0 (80.0-96.0)	85.5 (76.0-96.5)
Pulse median (IQR)	85.0 (80.0-92.0)	84.5 (80.0-90.0)	85.5 (71.5-92.0)

Key: E= Experimental C= Control

3.2 Quality of life of stroke patients using the ICF at baseline

Comparing the outcomes of the ICF core scores at baseline, only three scores were higher and statistically significantly related

to the quality of life. These were heart condition (E: 72.5%; C:61.5%, p=0.054), the respiratory system (E: 65%; C: 88.5%, p<0.019), and the ability to drink (E: 40%; C: 69.2%, p<0.043) as shown in Table 2a.

Element of ICF	Overall total N=66	Baseline		p-value
		Control N=26	Experimental N=40	
Heart				0.054
No impairment/No problem	45 (68.2)	16(61.5)	29 (72.5)	
Mild impairment- <25% Problem	13 (19.7)	9 (34.6)	4 (10.0)	
Moderate impairment- <50% a problem	7 (10.6)	1 (3.8)	6 (15.0)	
Severe impairment - >50% a problem	1 (1.5)	0	1 (2.5)	
Respiratory system				0.019
No impairment/No problem	49 (74.2)	23(88.5)	26 (65.0)	
Mild impairment- <25% Problem	8 (12.1)	0	8 (20.0)	
Moderate impairment- <50% a problem	4 (6.1)	0	4 (10.0)	
Severe impairment - >50% a problem	4 (6.1)	3 (11.5)	1 (2.5)	
Missing	1 (1.5)	0	1 (2.5)	
Drinking				0.043
No Difficulty - No problem	34 (51.5)	18(69.2)	16 (40.0)	
Mild impairment - <25% problem	17 (25.8)	6 (23.1)	11 (27.5)	
Moderate difficulty - <50% a problem	8 (12.1)	0	8 (20.0)	
Severe difficulty - >50% a problem	3 (4.5)	0	3 (7.5)	
Complete difficulty- > 95% a problem	3 (4.5)	2 (7.7)	1 (2.5)	
Missing	1 (1.5)	0	1 (2.5)	

3.3 Quality of life of stroke patients using the ICF at endline

Comparing the outcomes of the ICF at endline, the experimental arm showed

higher scores with sleeping pattern (E: 92.5%; C:61.5%, p=0.020), pelvic movements (E: 52.5%; C:42.3%, p=0.016) and the ability to dress oneself (E: 42.5%;

C:38.5%, p=0.048). These were statistically significant as illustrated in Table 2b Endline below.

Element of ICF	Overall total N=66	Endline		p-value
		Control N=26	Experimental N=40	
Sleep				0.020
No impairment/No problem	53 (80.3)	16 (61.5)	37 (92.5)	
Mild impairment- <25 Problem	7 (10.6)	5 (19.2)	2 (5.0)	
Moderate impairment- <50 a problem	5 (7.6)	4 (15.4)	1 (2.5)	
Severe impairment - >50 a problem	1 (1.5)	1 (3.8)	0	
Pelvis				0.016
No impairment/No problem	32 (48.5)	11 (42.3)	21 (52.5)	
Mild impairment- <25 Problem	17 (25.8)	4 (15.4)	13 (32.5)	
Moderate impairment- <50 a problem	12 (18.2)	6 (23.1)	6 (15.0)	
Severe impairment - >50 a problem	5 (7.6)	5 (19.2)	0	
Dressing				0.048
No Difficulty - No problem	27 (40.9)	10 (38.5)	17 (42.5)	
Mild impairment - <25 problem	15 (22.7)	3 (11.5)	12 (30.0)	
Moderate difficulty - <50 a problem	10 (15.2)	3 (11.5)	7 (17.5)	
Severe difficulty - >50 a problem	12 (18.2)	8 (30.8)	4 (10.0)	
Complete difficulty- > 95 a problem	2 (3.0)	2 (7.7)	0	

3.4 Quality of life of stroke patients using the SIS

Table 3 below shows the comparison between the baseline and endline using the Stroke Impact Scale to assess QoL. The quality of life of subjects from the

experimental arm generally improved compared to the control arm. However, all domains from the SIS were not statistically significant except mobility which scored p<0.026 (Men: 69.4, IQR: 50.0-80.6).

Domain of the SIS	Total Median (IQR) N=66	Control Median (IQR) N=26	Experimental Median (IQR) N=40	p-value
Strength score				
Baseline	30.8 (15.4-53.8)	38.5 (15.4-53.8)	30.8 (11.5-50.0)	0.62
Endline	61.5 (38.5-84.6)	61.5 (30.8-84.6)	61.5 (42.3-84.6)	0.54
Memory thinking score				
Baseline	82.1 (64.3-92.9)	85.7 (67.9-92.9)	71.4 (57.1-91.1)	0.21
Endline	92.9 (82.1-100.0)	89.3 (75.0-100.0)	94.6 (83.9-100.0)	0.43
Emotion score				
Baseline	63.9 (55.6-72.2)	63.9 (55.6-75.0)	62.5 (54.2-72.2)	0.35
Endline	66.7 (58.3-75.0)	69.4 (61.1-77.8)	65.3 (56.9-75.0)	0.34
Communication score				
Baseline	96.9 (50.0-100.0)	96.9 (89.1-100.0)	96.9 (43.8-100.0)	0.24
Endline	96.9 (87.5-100.0)	100.0 (92.2-100.0)	96.9 (75.0-100.0)	0.51
ADL/IADL score				
Baseline	42.5 (23.8-57.5)	36.3 (15.0-58.8)	43.8 (28.8-56.3)	0.67
Endline	55.0 (42.5-75.0)	52.5 (37.5-72.5)	55.0 (43.8-76.3)	0.41
Mobility score				
Baseline	40.3 (13.9-58.3)	41.7 (11.1-58.3)	36.1 (16.7-63.9)	0.6
Endline	65.3 (41.7-76.4)	58.3 (33.3-66.7)	69.4 (50.0-80.6)	0.026*
Hand function score				
Baseline	5.0 (0.0-25.0)	7.5 (0.0-22.5)	5.0 (0.0-25.0)	0.93

Endline	25.0 (0.0-50.0)	20.0 (0.0-50.0)	25.0 (5.0-50.0)	0.34
Social participation score				
Baseline	20.3 (6.3-40.6)	25.0 (6.3-53.1)	18.8 (6.3-34.4)	0.57
Endline	35.9 (18.8-62.5)	28.1 (18.8-75.0)	37.5 (25.0-56.3)	0.61
<i>IQR Interquartile range, P values were estimated using the Wilcoxon rank sum test</i>				

3.5 Measuring quality of life of stroke patients using the Barthel Index Scale

A comparison was conducted between the experimental arm and the control arm at baseline and endline using the BI tool. Table 4a shows that the quality of life of subjects from the experimental arm generally improved compared to subjects from the control arm. At baseline, the majority of subjects from both the experimental and the control arms needed help with grooming, feeding and bathing, though all these were not statistically significant.

At endline, a higher proportion of subjects in the experimental arm achieved independence in feeding compared to the control arm (E: 90%; C: 65.4%), although this difference did not reach statistical significance ($p = 0.055$). Independence in mobility was significantly greater among the experimental group (E: 77.5%; C: 46.2%; $p = 0.031$). For bathing, while improvements were observed in both groups, the differences were not statistically significant.

Characteristic of the Barthel index	Baseline				Endline			
	Total	Control	Experimental	p-value	Total	Control	Experimental	p-value
	N=66	N=26	N=40		N=66	N=26	N=40	
Bowels				0.17				0.59
Incontinent	6 (9.1)	2 (7.7)	4 (10.0)		2 (3.0)	1 (3.8)	1 (2.5)	
Occasional	9 (13.6)	1 (3.8)	8 (20.0)		4 (6.1)	2 (7.7)	2 (5.0)	
Continent	50 (75.8)	22 (84.6)	28 (70.0)		59 (89.4)	22 (84.6)	37 (92.5)	
Missing	1 (1.5)	1 (3.8)	0 (0.0)		1 (1.5)	1 (3.8)	0 (0.0)	
Bladder				0.13				0.16
Incontinent	9 (13.6)	4 (15.4)	5 (12.5)		2 (3.0)	2 (7.7)	0 (0.0)	
Occasional	10 (15.2)	1 (3.8)	9 (22.5)		4 (6.1)	2 (7.7)	2 (5.0)	
Continent	46 (69.7)	20 (76.9)	26 (65.0)		59 (89.4)	21 (80.8)	38 (95.0)	
Missing	1 (1.5)	1 (3.8)	0 (0.0)		1 (1.5)	1 (3.8)	0 (0.0)	
Grooming				0.076				0.27
Needs help	43 (65.2)	13 (50.0)	30 (75.0)		26 (39.4)	12 (46.2)	14 (35.0)	
Independent	22 (33.3)	12 (46.2)	10 (25.0)		39 (59.1)	13 (50.0)	26 (65.0)	
Missing	1 (1.5)	1 (3.8)	0 (0.0)		1 (1.5)	1 (3.8)	0 (0.0)	
Toilet use				0.46				0.20
Dependent	15 (22.7)	6 (23.1)	9 (22.5)		8 (12.1)	5 (19.2)	3 (7.5)	
Needs help	23 (34.8)	7 (26.9)	16 (40.0)		13 (19.7)	6 (23.1)	7 (17.5)	
Independent	27 (40.9)	12 (46.2)	15 (37.5)		44 (66.7)	14 (53.8)	30 (75.0)	
Missing	1 (1.5)	1 (3.8)	0 (0.0)		1 (1.5)	1 (3.8)	0 (0.0)	
Feeding				0.080				0.055
Unable	7	0 (0.0)	7 (17.5)		2 (3.0)	2 (7.7)	0 (0.0)	

	(10.6)							
Needs help	28 (42.4)	11 (42.3)	17 (42.5)		10 (15.2)	6 (23.1)	4 (10.0)	
Independent	30 (45.5)	14 (53.8)	16 (40.0)		53 (80.3)	17 (65.4)	36 (90.0)	
Missing	1 (1.5)	1 (3.8)	0 (0.0)		1 (1.5)	1 (3.8)	0 (0.0)	
Transfer (bed to chair and back)				0.65				0.26
Unable-no sitting balance	9 (13.6)	4 (15.4)	5 (12.5)		2 (3.0)	1 (3.8)	1 (2.5)	
Major help	18 (27.3)	6 (23.1)	12 (30.0)		8 (12.1)	5 (19.2)	3 (7.5)	
Minor help	20 (30.3)	9 (34.6)	11 (27.5)		15 (22.7)	7 (26.9)	8 (20.0)	
Independent	18 (27.3)	6 (23.1)	12 (30.0)		40 (60.6)	12 (46.2)	28 (70.0)	
Missing	1 (1.5)	1 (3.8)	0 (0.0)		1 (1.5)	1 (3.8)	0 (0.0)	
Mobility				0.39				0.031
Immobile	19 (28.8)	8 (30.8)	11 (27.5)		6 (9.1)	4 (15.4)	2 (5.0)	
Wheelchair independent	7 (10.6)	1 (3.8)	6 (15.0)		3 (4.5)	3 (11.5)	0 (0.0)	
Walks with help	19 (28.8)	9 (34.6)	10 (25.0)		13 (19.7)	6 (23.1)	7 (17.5)	
Independent	20 (30.3)	7 (26.9)	13 (32.5)		43 (65.2)	12 (46.2)	31 (77.5)	
Missing	1 (1.5)	1 (3.8)	0 (0.0)		1 (1.5)	1 (3.8)	0 (0.0)	
Dressing				0.40				0.28
Dependent	25 (37.9)	10 (38.5)	15 (37.5)		15 (22.7)	8 (30.8)	7 (17.5)	
Needs help	33 (50.0)	11 (42.3)	22 (55.0)		30 (45.5)	9 (34.6)	21 (52.5)	
Independent	7 (10.6)	4 (15.4)	3 (7.5)		20 (30.3)	8 (30.8)	12 (30.0)	
Missing	1 (1.5)	1 (3.8)	0 (0.0)		1 (1.5)	1 (3.8)	0 (0.0)	
Stairs				0.44				0.37
Unable	39 (59.1)	13 (50.0)	26 (65.0)		20 (30.3)	10 (38.5)	10 (25.0)	
Needs help	19 (28.8)	9 (34.6)	10 (25.0)		24 (36.4)	8 (30.8)	16 (40.0)	
Independent	7 (10.6)	3 (11.5)	4 (10.0)		21 (31.8)	7 (26.9)	14 (35.0)	
Missing	1 (1.5)	1 (3.8)	0 (0.0)		1 (1.5)	1 (3.8)	0 (0.0)	
Bathing				0.088				0.45
Needs help	45 (68.2)	14 (53.8)	31 (77.5)		30 (45.5)	12 (46.2)	18 (45.0)	
Independent	20 (30.3)	11 (42.3)	9 (22.5)		35 (53.0)	13 (50.0)	22 (55.0)	
Missing	1 (1.5)	1 (3.8)	0 (0.0)		1 (1.5)	1 (3.8)	0 (0.0)	

3.5.1 Measuring the mean and standard deviation of the BI

After log transformation of the data (Table 4b), statistically significant differences were observed at endline in the geometric mean of the Barthel Index between the

experimental and control arms ($p < 0.024$). The experimental arm had a geometric mean (GMT) of 15.6 and a geometric standard deviation (GSD) of 1.3, while the control arm recorded a GMT of 12.1 and a GSD of 1.8.

Characteristic	Total GMT (GSD)	Study arm		p-value
		Control (GSD)	Experimental (GSD)	
	N=66	N=26	N=40	
Barthel index score				
Baseline	9.7 (2.0)	10.0 (2.0)	9.4 (2.0)	0.74
Endline	14.1 (1.5)	12.1 (1.8)	15.6 (1.3)	0.024*

GMT Geometric mean, GSD Geometric Standard deviation, and P values were estimated using a T-test for lo-normal score

4. DISCUSSION

4.1 Socio-demographic profile of participants

Our study had more female than male subjects unlike the study [35] that had a majority of male subjects (62.5%) compared to the females (37.5%). Out of the 65 stroke participants, the age range was 20-95 years, and 70.8% were males compared to 29.2% females [22]. Furthermore, our study reported an equal gender distribution among subjects with age range concentrated at 50-59 years as well as 60 years and above which tallies with the report from [35] where the focus age range was 56-60 and 61-65 years. Equally, a cross-sectional study conducted [6] to assess quality of life involving 52 post-stroke patients displayed more males (55.8%), an age range of 50 years and above, with secondary school level (40.4%) and married (80.8%) participants dominating. Instead, our study had a primary school level dominance and most subjects married. A different study involving 101 participants with 52.5% males and 47.5% females, and 32.7% had primary education level [9]. In another study, [8] 424 stroke survivors were enrolled with more (65%) male participants than females, those with primary level of education were 67.7%, those in Phase II stroke accounted for 66%, and 52.6% had left sided hemiparesis. Similarly, the results [23] revealed 44.4% stroke survivors aged between 31-50 years, 67.8% were males, 91.1% were married, 52% right sided hemiplegia and 34.4% reached higher secondary education. Most results from the comparator studies were similar in terms of education level, age range distribution,

paretic side, employment status and marital status which were on the higher side though were similar to results from our study. However, a distinct difference between our study and other studies lay in gender. In our study, most subjects were female whereas all other studies had majority male participants.

4.2 The quality of life after 12 weeks of exercise training

This study aimed to determine how the quality of life of patients with stroke would be after 12 weeks strength training activities at 4 months post intervention from three Level I Hospitals in Lusaka. We used the ICF Core Sets, SIS and the Barthel Index tools as outcome measures to determine the quality of life of stroke patients.

4.2.1 Using the ICF to assess the level of quality of life

Using the ICF tool revealed that sleeping pattern, pelvic movements and the ability to dress oneself contributed more to the quality of life. Accordingly, [12] quality of life is the assessment of the current circumstances of an individual's life. In addition, social effects of stroke ranging from anxiety, depression, irritability and behavioural changes are long term effects that affect stroke survivors' quality of life and often lead to functional disability [36]. Furthermore [37], confirmed that assessing QoL in stroke survivors is multi-dimensional with domains such as physical (motor deficit, spasticity, ataxia, dysarthria, dysphagia, pain, sleep disorders and fatigue), functional (mobility, hygiene and basic activities), mental (mood, memory,

satisfaction and self-perception), and social (work, social activities and social role). This supports the results from our study in which sleeping pattern, pelvic movements, the ability to dress oneself and mobility of limbs highly contributed to quality of life of stroke patients. A prospective cohort study on 391 participants with acute stroke was conducted in which 85% were above 60-year-old males and females [11]. The health-related quality of life significantly and progressively increased where rehabilitation care had been implemented. This study correlates because body functions and structures, as well as activity limitation and functional restrictions improved after rehabilitation care services. In a quasi-experimental study conducted using the ICF Core sets on 52 post-stroke patients, results showed improved body function, activity and participation levels [38]. Mobility showed significance at $p=0.004$, language $p=0.001$, social role $p=0.001$, family role $p=0.047$ while work and productivity improved to $p=0.037$.

4.2.2 Using Stroke Impact Scale (SIS) to assess the level of quality of life

The Stroke Impact Scale (SIS) assessed the impact of stroke on the health and life, and how impairments and disability impacted the quality of life of the patient. The SIS assessed physical problems, memory and thinking, communication and understanding, managing activities of the day, mobility at home and in the community, and the use of the affected hand. The positive significantly contributing score to quality of life after strength training of patients with a stroke under the experimental arm was mobility that led to increased walking speed. [39] Used the SIS to assess validity and reliability of this tool in assessing QOL that included 45 participants from three rehabilitation hospitals of Lazio Region. Results showed good internal consistency (Cronbach's alpha 0.86-0.98) and test-retest reliability ($r>0.70$, $p<0.000$) except for Emotion and Social participation scales. This implies that the

SIS is a valuable tool that identifies predictors of QOL in post stroke patients and authenticates interventions to improve stroke recovery. A mini-review was instituted in Nigeria to determine the quality of life of stroke survivors and its determinants [13, 40]. The study highlighted that the stroke impact scale is commonly used to assess stroke survivors' QoL. In the study, physical, social, and emotional domains of QoL were all affected just like participants in our study though, moderately.

[41] Conducted a prospective study to assess the psychometric properties of the SIS from a community-based rehabilitation program. A total of 108 post-stroke patients completed the program at 6 months and 12 months follow-up, using both the SIS and the EQ-5D-5L. Results showed that there was a weak to moderate correlation ($r=0.23-0.593$) for SIS cognition, memory and thinking, and communication, and a high correlation ($r=0.71-0.76$) for SIS physical domain at baseline, 6 and 12 months. This suggests that physical functioning is a cardinal contributor to QOL in the first-year post stroke. Equally in our study, strength, memory and thinking, communication, ADL/IADL, emotions and mobility improved greatly at endline and had high mean scores though only mobility displayed a statistical significance. A study comprising 130 post stroke patients who received intervention for 3-4 weeks were assessed using the SIS to measure QOL after stroke [42]. The Stroke Impact Scale (SIS) is a comprehensive tool for assessing health-related quality of life (QOL) in stroke patients. It is recognized for its reliability, validity, and sensitivity in measuring both functional outcomes and QOL. The study found that personal factors did not significantly influence overall QOL, except for participation in activities of daily living (ADLs). Therefore, the SIS emerged as the key predictor of final QOL.

A study conducted [43] involved 175 stroke patients with an average age of 63 years old with an equal number of right and left

paretic sides. This study revealed high QOL in communication, memory and thinking, and emotion but had lower scores in muscle strength. In addition, physical factors were significant in activities of daily living $p < 0.001$, low disability level $p < 0.001$, no spasticity $p = 0.006$, and no depression $p = 0.034$. In African countries, studies conducted generally report significantly lower overall QoL in stroke survivors due to cost of medical services, environmental and socioeconomic factors among other reasons stated [18]. A case study to investigate changes in the quality of life of four post-stroke participants after aquatic exercises using the stroke impact scale tool for assessment was undertaken [44]. Improvement in all participants ranged from strength and mobility to activities of daily living. In our study the main score that improved was mobility leading to quality of life.

4.2.3 Using Barthel Index Scale (BI) to assess the level of quality of life

The Barthel Index (BI) assessed the behaviour of patients with stroke relating to the practice of activities of daily living. This assessment included bowels, bladder, grooming, toilet use, feeding, transfers, mobility, dressing, stairs and bathing. The results revealed a statistically significant improvement in independent mobility from the experimental arm. Similar to these results, [45] conducted a study to determine the health-related quality of life in stroke survivors. Their results proved that voluntary control of lower limbs and the BI had a significant positive correlation with stroke-specific quality of life. The Barthel Index is often regarded as a measure of general perceived health status and basic ADL function (dressing, bathing and grooming), [35, 46] and shows significance in emotional reactions, social isolation, physical mobility and sleep. These results are similar to findings in our study.

Further comparison was conducted between the baseline and endline using BI scores. The geometric standard deviation was

statistically significant at endline than baseline. The quality of life in stroke patients showed significant improvement after 12 weeks of strength training, assessed four months after the intervention. The most substantial gains were observed in pelvic movements and functional mobility, which contributed markedly to the overall positive change across all outcome measures. [47]. Pelvic stability of post-stroke patients is often challenged by hip muscle weakness and motor recovery of the paretic lower limb. This was in a study involving 80 post-stroke patients. Results showed that after strength training, balance and mobility training, muscle strength for hip flexors, extensors, abductors and adductors for the paretic limb increased, thereby improving gait speed and weight bearing asymmetry. A study [48] involving 64 community-dwelling individuals with chronic stroke revealed that muscle strength was associated with walking (self-selected and fast and walking speed reserve). Furthermore, community ambulation contributes to social participation after stroke just as mobility is important for ADLs. The pelvis is a key structure that connects the trunk to the lower limbs and carries the weight of the body and transmits to the lower limbs, hence pelvic instability affects balance and mobility in patients with stroke [49, 50]. A longitudinal observational study [51] highlighted participants admitted with a median BI score of 55 who required maximal assistance with self-care and mobility. On discharge, their median BI score improved by 35 points (median 90; $p < 0.001$).

6. CONCLUSION

This study concentrated on the ICF, SIS and BI to measure the quality of life in post stroke patients after their participation in strength training activities. All the three tools revealed changes in QOL post intervention. However, the ICF showed dominance in social aspects (the ability to sleep and dress oneself), and the improved pelvic movement which is cardinal to lower limb mobility. The SIS and BI were both

more significant to improved mobility. This supports the motion that rehabilitation is responsible for the high quality of life in post stroke survivors and in particular, strength training activities, although not a single tool significantly brought out all aspects of quality of life. The implication for research and practice is that outcome measures should be used to suit the environment and the specific objective of the study.

Declaration by Authors

Ethical Approval: Approved

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REFERENCES

1. Scherbakov, N. & Doehner, W. (2011). Sarcopenia in stroke-facts and numbers on muscle loss accounting for disability after stroke. *Journal of Cachexia Sarcopenia Muscle*, 2(1), 5-8.
2. Kostka, J., Niwald, M., Guligowska, A. & Kostka, T. (2019). Muscle power, contraction velocity and functional performance after stroke. *Brain and Behaviour*, 9, e01243. 1-7. DOI: 10.1002/brb3.1243
3. Mas, M. F., Gonzalez, J. & Frontera, W. R. (2020). Stroke and sarcopenia, 8(4), 452-460. doi:10.1007/s40141-020-00284-2
4. Azzollini, V., Dalise, S. & Chisari, C. (2021). How does stroke affect skeletal muscle? State of the art and rehabilitation perspective. *Frontiers in Neurology*, 12, 1-7. doi: 10.3389/fneur.2021.797559
5. Bartlova, S., Sedova, L., Haviernikova, L., Hudackova, A., Dolak, F. & Sadilek, P. (2022). Quality of life of post-stroke patients. *Slovenian Journal of Public Health*, 61(2), 101-108. DOI:10.2478/sjph-2022-0014
6. Martini, S., Ningrum, D. A. S., Abdul-Mumin, K. H. & Yi-LI, C. (2022). Assessing quality of life and associated factors in post-stroke patients using the world health organisation abbreviated generic quality of life questionnaire (WHOQOL-BREF). *Clinical Epidemiology and Global Health*, 13, 1-5. <https://doi.org/10.1016/j.cegh.2021.100941>
7. Sharma, A., Sharma, P. & Tandon, R. (2023). Quality of life of post stroke patients: A review. *International Journal of Creative Research Thoughts*, 11 (8), 409-414. www.ijcrt.org
8. Islam, M. J., Ahmed, S., Kakuli, A. S., Rahman, M. H., Numan, S. M. & Chakraborty, S. R. et al. (2024). Health-related quality of life in post-stroke patients attended at tertiary-level hospitals in Bangladesh. *Frontiers in Stroke*, 3,1-13 .DOI.org/10.3389/fstro.2024.1411422
9. Adiqwe, G. A., Alloh, F., Smith, P. Tribe, R. & Regmi, P. (2024). Assessment of Health-related quality of life of stroke survivors in Southeast Communities in Nigeria. *International Journal of Environmental Research and Public Health*, 21(9), 1-18. <https://doi.org/10.3390/ijerph21091116>
10. Signal, E. J. (2014). Strength training after stroke rationale, evidence and potential implementation barriers for physiotherapists. *New Zealand Journal of Physiotherapy*, 42(2), 101-107.
11. Barbosa, D. D., Trojahn, M. R., Porto, D. V. G., Hentschke, G. S. & Hentschke, V. S. (2018). Strength training protocols in hemiparetic individuals post stroke: A systematic review. *Fisioter. Mov.*, 31, 1-11.
12. Ruzevicius, J. (2014). Quality of life and of working life: Conceptions and Research. pp.317-334 17th Toulon-Verona International Conference Excellence in Services. Liverpool John Moores University. Liverpool (England). August 28-29, 2014. Conference Proceedings ISBN 9788890432743. <https://orcid.org/0000-0002-2556-633X>
13. Badaru, U. M., Owumike, O. O. & Adeniyi, A. F. (2015). Quality of life of Nigerian stroke survivors and its determinants. *African Journal of Biomedical Research*, 18(1), 1-5.
14. Mahesh, P. K. B., Gunathunga, M. W., Jayasinghe, S., Arnold, S. M. & Liyanage, S. N. (2020). Post-stroke quality of life index: A quality-of-life tool for stroke survivors from Sri Lanka. *Health and Quality of Life Outcomes*, 18, 1-12. DOI:10.1186/s12955-020-01436-7
15. Galgam, F. A., Abdalla, A., Shahin, M., Yousif, M., Abdulrahman, N., Alamoudi, F. et al. (2024). Assessing the quality of life among African medical and health science students

- using the WHOQOL-BREF tool. *Peer Journal*, 13, 1-16. DOI 10.7717/peerj.18809
16. Rhoda, A. J. (2014). Health-related quality of life of patients six months poststroke living in the Western Cape, South Africa. *African Journal of Disability*, 3(1), 1-6. DOI: <https://doi.org/10.4102/ajod.v3i1.126>
 17. Heikinheimo, T. & Chimbayo, D. (2015). Quality of life after first-ever stroke: An interview-based study from Blantyre, Malawi. *Malawi Medical Journal*, 27(2), 50-54. DOI:10.4314/mmj.v27i2.4
 18. Bello, U. M., Chutiyami, M., Salihu, D., Abdu, S. I., Tafida, B. A., Jabbo, A. A. et al. (2021). Quality of life of stroke survivors in Africa: A systematic review and meta-analysis. *Quality of Life Research*, 30(1), 1-19. DOI: 10.1007/s11136-020-02591-6
 19. Hailu, A. D., Mohammed, S. A. & Yimer, Y. S. (2020). Health-related quality of life of stroke patients before and after intervention: Systematic review. *Journal of Biology and Medicine*, 4(1), 022-028. DOI: 10.17352/jbm.000023
 20. De Haan, R., Aaronson, N., Limburg, M., Hewer, L. R. & Van Crevel, H. (1992). Measuring quality of life in stroke. *Stroke*, 24(2), 320-327.
 21. Tastekin, N. (2015). Rehabilitation and quality of life in stroke patients. *Turkey Physical Medical Rehabilitation*, 61(2), 97-98. DOI: 10.5152/tftrd.2015.001
 22. Goma, S. H., Mahran, S. A., Mahran, D. G., El-Hakeim, E. H. & Ghandour, A. M. (2020). Quality of life (QOL) among stroke patients. DOI: 10.9734/bpi/ctmamr/v3
 23. Snegalatha, D. & Bai, R. S. (2024). Impact of stroke on the quality of its survivors. *International Journal of Science and Healthcare Research*, 9(2), 378-390. DOI: <https://doi.org/10.52403/ijshr.20240249>
 24. Graef, P., Michaelsen, S., Dadalt, M. L. R., Rodrigues, D. A. M. S., Pereira, F & Pagnussat, A. S. (2016). Effects of functional and analytical strength training on upper-extremity activity after stroke: A randomised trial. *Brazilian Journal of Physical Therapy*, 20(6), 543-552. doi: 10.1590/bjpt-rbf.2014.0187
 25. Patten, C., Lexell, J. & Brown, H. E. (2013). Weakness and strength training in persons with poststroke hemiplegia: Rationale, method and efficacy. *Journal of Rehabilitation Research and Development*, 41(3a), 293-312. 293-312. doi:10.1682/JRRD.2004.03.0293
 26. Vinstrup, J., Calatayud, J., Jakobsen, D.M., Sundstrup, E. & Andersen, L. L. (2016). Focus on increasing velocity during heavy resistance knee flexion exercise boosts hamstring muscle activity in chronic stroke patients. *Journal of Neurology Research International* Vol. 2016, 1-6. doi: 10.1155/2016/6523724
 27. Segerdahi, M., Hansson, P-O., Samuelsson, C. M. & Persson, C. U. (2023). Health-related quality of life in stroke survivors: A 5-year follow-up of the fall study of Gothenburg (FallsGOT). *BMC Geriatrics*, 23, 1-9. <https://doi.org/10.1186/s12877-023-04308-z>
 28. Gul, M. (2016). Bias in randomised controlled trial and how these can be minimised. *Journal of Psychiatry*, 19(2), 1-3. DOI: 10.4172/2378-5756.1000357
 29. Zabor, E. C., Kaizer, A. M. & Hobbs, B. P. (2020). Randomised Controlled Trials. *Chest Journal*, 158(1S), S79-S87. DOI: <https://doi.org/10.1016/j.chest.2020.03.013>
 30. Babbie, E. & Mouton, J. (2006). *The Practice of Social Research. South African Edition*. Cape Town. Oxford University Press, South Africa (Pty) Ltd.
 31. Younge, J. O., Kouwenhoven-Pasmooij, T., Freak-Poli, R., Roos-Hesselink, J. W. & Hunink, M. G. M. (2015). Randomised study designs for lifestyle interventions: A tutorial. *International Journal of Epidemiology*, 44(6), 2006-2019. doi: 10.1093/ije/dyv183
 32. Nair, B. (2019). Clinical trial designs. *Indian Dermatology Online Journal*, 10(2), 193-201. doi: 10.4103/idoj.IDOJ_475_18
 33. Coppers, A., Moller, J. C. & Marks, D. (2021). Psychometric properties of the short form of the stroke impact scale in German-speaking stroke survivors. *Health and Quality of Life Outcomes*, 19, 1-13. <https://doi.org/10.1186/s12955-021-01826-5>
 34. Abatan, S. M. & Olayemi, M. S. (2014). The role of statistical software in data analysis. *International Journal of Applied Research and Studies*, 3(8), 1-15.
 35. Mudaliar, M. R., Yaragamreddy, S. R., Tejaashwani, P. P., Umamathi, S., Sake, N. & Sharma, S. (2018). Quality of life in stroke patients using SSQoL Scale and Barthel Index. *Indian Journal of Pharmacy Practice*, 11(1), 44-50. DOI: 10.5530/ijopp.11.1.8
 36. Surapichpong, C., Jisarajito, S. & Surapichpong, S. (2020). The conceptual framework for development of quality-of-life assessment in stroke patients according to ICF model: Narrative review. *Revista Argentina de Clinica Psicologica*, 29(5), 592-600. DOI: 10.24205/03276716.2020.1056

37. Tsalta-Mladenov, M., Georgieva, D. & Andonova, S. (2020). Measuring quality of life in stroke survivors. *Russian Neurological Journal*, 25(3), 11-16. DOI 10.30629/2658-7947 2020-25-3-11-16.
38. Wong, M. N-K., Cheung, M. K-T., Ng, Y-M., Lam, B. Y-H., Fu, S. N. & Chan, C. C. H. (2023). International classification of functioning, disability, and health-based rehabilitation program promotes activity and participation. *Frontiers in Neurology*, 14, 1-12. doi: 10.3389/fneur.2023.1235500
39. Vellone, E., Savini, S., Barbato, N., Carovillano, G., Caramia, M. & Alvaro, R. (2010). Quality of life in stroke survivors: First results from the reliability and validity of the Italian version of Stroke Impact Scale 3.0. *Annali di Igiene*, 22, 469-479.
40. Abubarkar, S. A. & Isezuo, S. A. (2012). Health related quality of life of stroke survivors: Experience of a stroke unit. *International Journal of Biomedical Science*, 8(3), 183-187.
41. Richardson, M., Campbell, N., Allen, L., Meyer, M. & Teasell, Robert. (2015). *Disability and Rehabilitation*, 38(14), 1425-1430. DOI: 10.3109/09638288.2015.1102337
42. Lee, J-D., Chang, T-C., Yang, S-T., Haung, C-H., Hsieh, F-H. & Wu, C-Y. (2016). Prediction of quality of life after stroke rehabilitation. *Neuropsychiatry*, 6(6), 369-375.
43. Yinkjisathavorn, A. & Harnphadungkit, K. (2020). Quality of life in stroke patients at outpatient rehabilitation clinic, Siriraj Hospital. *ASEAN Journal of Rehabilitation Medicine*, 30(3), 123-128.
44. Carrasco, A. C., Silva, M. F., Dela Bela, L. F., Paixao, L., Pelegrinelli, A. R. M., Dias, J. M. et al. (2021). Evaluation of quality of life in individuals with chronic stroke who underwent aquatic exercises: A case series. *NeuroRehabilitation*, 48, 563-570. ISSN 1053-8135/\$35.00 © 2021– IOS Press.
45. Mahran, S. A., Mohamad, M. A., Abdulrahman, M. A., Janbi, F. S. & Jamalellail, R. A. (2015). The health-related quality of life in stroke survivors: Clinical, functional, and psychosocial correlate. *Egyptian Rheumatology and Rehabilitation*, 42, 188-195. DOI: 10.4103/1110-161X.168198
46. Yi, Y., Ding, L., Wen, H., Wu, J., Makioto, K. & Liao, X. (2020). Is Barthel index suitable for assessing activities of daily living in patients with dementia? *Frontiers in Psychiatry*, 11, 1-11. doi: 10.3389/fpsy.2020.00282
47. Darak, V. & Karthikbabu, S. (2020), Lower limb motor function and hip muscle weakness in stroke survivors and their relationship with pelvic tilt, weight-bearing asymmetry, and gait speed: A cross-sectional study. *Current Journal of Neurology*, 19(1), 1-7. <http://cjm.tums.ac.ir>
48. Da Silva, B. B. C., Faria-Fortini, I., Costa, P. H. V., Torriani-Pasin, C. & Polese, J. C. (2021). Association between walking and strength of lower limbs after chronic stroke. *Acta Fisiatrica*, 27(3), 131-138. DOI:10.11606/issn.2317-0190.v27i3a171118
49. Dubey, L., Karthikbabu, S. & Mohan, D. (2017). Effects of pelvic stability training on movement control, hip muscles strength, walking speed and daily activities after stroke: A randomised controlled trial. *Annals of Neurosciences*, 25, 80-89. DOI: 10.1159/000486273
50. Elsayed, R., Salem, N., Elsayed E., Fahmy, E., Ragab, W. M., Alkhamees, N. H. & Tawfik, R. M. (2024). Effects of pelvic and trunk control exercises on functional outcome of affected upper extremity in stroke patients. *Revista Iberoamericana de Psicología de Ejercicio y el Deporte*, 19(3), 326-329.
51. Hartley, Burger and Inglis-Jassiem (2022). Post stroke health-related quality of life, stroke severity and function: A longitudinal cohort study. *African Journal of Disability*, 11(0), 1-10. <https://doi.org/10.4102/ajod.v11i0.947>

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