

Functional Outcomes of Stroke Survivors after Physiotherapy Rehabilitation Program at a Tertiary University Teaching Hospital in Rwanda

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Abstract

Background

After suffering from a stroke, serious long-term disability occurs and physiotherapy is one part of rehabilitation for stroke survivors that plays a significant role in improving functional recovery, mobility and has positive impact on outcome.

Objective

To identify functioning outcomes of stroke survivors after physiotherapy rehabilitation.

Methodology

By using both retrospective and cross-sectional study designs, 71 stroke cases were identified, and a Modified Barthel Index (MBI) was applied to score functioning outcomes. Data were managed and analyzed using IBM SPSS Statistics for Windows version 21.0 (IBM Corp, Armonk, NY, USA).

Results

The findings showed that patients who received physiotherapy rehabilitation improved in activities of daily living (ADL). This was demonstrated by changes in the total MBI that were 0.72 ± 1.59 on admission and 15.3 ± 4.89 on current status (after physiotherapy rehabilitation). However, some failed to achieve expected outcomes even though they received physiotherapy rehabilitation. This could be attributed to delayed onset, frequency and duration of rehabilitation.

Conclusion

Stroke survivors after physiotherapy rehabilitation showed improvement in activities of daily living. Hypertension has been identified as the most influencing risk factor of stroke. Financial constraints were also identified for those who struggle to achieve the highest outcomes due to poor attendance at physiotherapy rehabilitation. Appropriate management of hypertension is necessary to reduce stroke; and facilitation of those under rehabilitation will improve their participation in the rehabilitation for better outcome.

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Introduction

Stroke is the second leading cause of death and disability globally in both low- and middle-income countries.[1] In 2013, as a result of stroke there were reported 6.5 million deaths, 25.7 million survivors, 10.3 million new cases and with 113 million disability-adjusted life-years (DALYs) lost due to stroke. Most stroke deaths (75.2%) and disability (81.0% of the associated DALYs lost) occur in low- and middle countries, mainly due to poor health care facilities.[2]

Males have been reported to have higher age-specific stroke rates (59.7%) than females (40.3%); and the elderly 67-70 years of age are more prone than the rest of the population.[3] According to Global Burden of Disease (GBD) study in 2010, more than 11 million ischemic strokes occurred and 63% of them were in low and middle-income countries; while the incidence mainly of ischemic stroke increases with age.[4,5] In Africa, data published within the past decade show that stroke has an annual incidence rate of up to 316 per 100,000, with a prevalence of up to 1,460 per 100,000 and a 3-year fatality rate greater than 80%. Moreover, many Africans have a stroke within the fourth to sixth decades of life.[6]

Rapid exposure to risk factors such as hypertension and obesity, rapid population growth, abuse of western diets and rapid growth of industries in low-income countries, have significantly contributed to the increment of stroke cases. Moreover, other risk factors of stroke in Africa apart from the previously identified include low standards of care, limited access to health services and pharmacological interventions, and delay in hospitalization.[7] In addition, evidence confirmed by analysis of head CT scan radiograph reports ischemic stroke to be more prevalent at 77.6%, whereas hemorrhagic stroke accounts for 22.4%.[8]

Clinically this disease presents with sudden weakness or numbness of the face, arm, or leg, which affects one side of the body

or unilateral. Due to inadequate supply of oxygen and nutrients or disruption of blood supply which leads to damage of brain tissue. [9] However, clinical symptoms typically lasting less than 24 hours, and without evidence of acute infarction are referred to as Transient ischemic attack (TIA).[10] After suffering from a stroke, it leads to serious long-term disability, activity limitations and participation restrictions. This has a large bio-psychosocial and economic impacts on stroke survivors and their families.[11]

The burden of stroke is projected to significantly increase in the future, therefore public awareness of stroke, and its risk factors mostly high blood pressure, and large effort in rehabilitation such as physiotherapy should be put on countries priorities.[12] Physiotherapy is one part of rehabilitation for stroke survivors, and it plays a significant role in improving functional recovery, mobility and has positive impact on outcome. In addition, it reduces complications resulting from inactivity. Early physiotherapy rehabilitation improves long-term functional recovery, and improves rates of independence.[13]

Early physiotherapy rehabilitation for stroke patients could significantly have positive impacts on the musculoskeletal, cardiovascular, respiratory, and immune systems, and improve mobility, but some stroke survivors fail to achieve expected functioning outcomes even though they are attending and getting physiotherapy services. This means that maybe the rehabilitation provided is not up to the standards in terms of its timing, frequency and duration.[13]

It is in this regard that the current study sought to identify functioning outcomes of stroke survivors after physiotherapy rehabilitation. And factors that influences compliance to rehabilitation program. It is believed that these findings will help to improve awareness of stroke condition to the population, it will also be used by health institutions (Ministry of health, hospitals, health agencies...)

to establish health policies which will minimize the extent of stroke in our country and to set preventive measures to control its modifiable risk factors, and appropriate treatment of stroke, which will improve wellness of its survivors.

Methods

Study setting

This study was conducted at Centre Hospitalier Universitaire de Kigali (CHUK). It was chosen because it is one of referral hospitals in Rwanda, located in Kigali city, it receives many stroke cases, it is easily accessible by population from different locations, and because of its mandate as a university-teaching hospital it is favourable for the researchers to obtain data.

Study design

This study used two different designs namely retrospective and cross-sectional. A retrospective study was used to collect data from patient records admitted in 2019 in physiotherapy and internal medicine wards then a cross-sectional study was used for gathering data related to functioning outcomes using telephone administered questionnaire containing modified Barthel index (MBI) and other questions such as the nature of physiotherapy session in terms of its onset, duration, length and reasons for not attending physiotherapy sessions.

Subjects

A census sampling strategy was used to identify all eligible study population (all patients diagnosed with stroke during 2019 at CHUK excluding those who were dead), aged 21 years old and above with a diagnosis of stroke.

Materials

A Data capture sheet was used to collect retrospective data such as demographic data, past medical history to identify risk factors of stroke, personal history and Computed Tomography (CT) scan finding, and a validated standardized modified Barthel index was used to measure patients functioning outcomes.

This tool assessed 10 aspects: bladder, bowel, feeding, transfer, toilet use, mobility, grooming, dressing, bathing, and stairs climbing. MBI item records what a patient does and score the performance in those activities of daily living at different levels, the highest score is associated with greater independence. The total score is interpreted as follows:

0-4: Total dependence

5-9: Severe dependence

10-14: Moderate dependence

15-19: Slight dependence

20: Independence

Data collection procedure

In January 2021 Patients' records were retrieved, researchers captured data by reviewing patient's records and then capture needed information (demographic data: age, sex, occupation and residence, past medical history: hypertension, blood vessel disorders, diabetes and heart disease, personal history: alcohol and smoke), and CT scan finding (ischemic, hemorrhagic). After filling all capture sheets, data were entered in computer to be analyzed, and to be used in cross-sectional study.

Apart from retrospective data that were collected through medical records, this study also conducted a cross sectional study where 53 stroke patients were recruited, they were requested to voluntarily respond to the questionnaire via telephone call, researchers asked them questions and fill questionnaire related to functional independence after a stroke, 47 among them reported that they received physiotherapy rehabilitation while 6 did not.

The MBI was used to collect data related to their functioning level, and functioning outcomes after rehabilitation. This tool (scale) that indicates the ability to perform a section of ADLs. It consists of 10 items (tasks) with a total score ranging from 0 (complete dependence in ADLs) to 20 (independence in ADLs), and it has been used to assess functioning outcomes of stroke rehabilitation.

These tasks in the MBI address a patient’s ability in feeding, bathing, grooming, dressing, bowel and bladder control, toileting, transfer, ambulation and stair climbing, as shown by (Musa and Keegan, 2018).

Data analysis

Data were exported from Microsoft excel (version 2016) to IBM SPSS Statistics for Windows version 21.0 (IBM Corp, Armonk, NY, USA) for analysis. Data about age, gender, onset, duration, number of sessions, length of rehabilitation were presented in tables with frequency and percentage and total modified Barthel index score were presented as mean score both on admission and the current status then a paired sample t-test was computed and mean difference was presented in tables with significance was set at P=0.05 with the confidence interval of 95%.

Ethical consideration

Ethical clearance to conduct the study was approved by the College of Medicine and Health Sciences (CMHS) institutional was granted by CHUK ethics committee (Ref. No. EC/CHUK/007/2021). Participants were informed about the procedures, the purpose of the study and that the provided information will be kept confidential and there will be no harm to participate. Moreover, they were informed that participation is voluntary.

Results

This study used two different designs namely retrospective and cross-sectional with 71 stroke patients, admitted at CHUK in 2019. It was carried out from January up to February 2021. The researchers retrieved patients ‘medical records diagnosed with stroke during 2019. These were analyzed as frequency, percentages and average means comparison using paired sample T-test. The Mean age for the participants was 59.46 with a minimum age being 24 while the maximum was 88 years old. According to Table 1. Among 71 stroke cases, 38 were males (53.5 %) and 33 females (46.5%) and 49 (69 %) of the participants were married.

Table 1. Demographic characteristic of participants (n=71)

Variables	Frequency	Percentage
Gender		
Male	38	53.5
Female	33	46.5
Marital Status		
Married	5	7.0
Divorced	49	69.0
Widow	3	4.2
Single	14	19.7
Occupation		
Employed	39	54.9
Non-Employed	17	23.9
Student	2	2.8
Retired	13	18.3
Residence		
Urban	51	71.8
Rural	20	28.2

Table 2. Physiotherapy service delivery status (n = 71)

Variables	Frequency	Percentage
Onset of Stroke		
Immediate/First Week	18	38.0
1-2 Months	22	46.0
3- Above	7	14.0
Number of Sessions/Week		
Once	6	12.0
Twice	19	40.0
Thrice	17	36.0
Four times	2	4.0
Five times	3	6.0
Duration per Session		
15-30 Minutes	15	31.0
30-45 Minutes	13	27.0
45-60 Minutes	18	38.0
60 Minutes and above	1	2.0
Period of Rehabilitation in Months		
0-3 months	7	14.0
3-6 months	16	34.0
Above 6 Months	24	51.1

According to Table 2. Among 47 patients who got physiotherapy rehabilitation services, 46.8% (n = 22) began rehabilitation between one week and two months, while only 6.4% (n = 3) received it five times per week, and 38.3% (n = 18) received physiotherapy rehabilitation services between 45-60 minutes.

Table 3. Risk factors for stroke (n=71)

Variable	Yes n (%)	No n (%)	Not
			Mentioned n (%)
Alcohol Use	24(33.8)	33(46.4)	14(19.7)
Cigarette smoking	9(12.6)	54(76.1)	8(11.2)
Physical Activity	18(25.3)	27(38.0)	26(36.6)
Hypertension	60(84.5)	9(12.6)	2(2.8)
vascular Disease	12(16.9)	42(59.1)	17(23.9)
Diabetes	18(25.3)	44(61.9)	9(12.6)
Heart Diseases	25(35.2)	31(43.6)	15(21.1)
High Cholesterol	5(7.0)	40(56.3)	26(36.6)
Obesity	0(0)	1(1.4)	70(98.5)
Prior Stroke	18(25.3)	38(53.5)	15(21.1)

According to Table 3. The most frequent risk factor was hypertension with 84.5% (n=60). Furthermore, in this study as shown by Table 3, 64.8% (n = 46) suffered ischemic attack, while 35.2% (n = 25) had hemorrhagic stroke.

The findings showed by Table 4 demonstrate that patients who received physiotherapy rehabilitation had improvement in activities of daily living (ADL). As shown by total mean BI scores on admission which was 0.72 (±1), compared to the current status it was 15(±4) for patient who received physiotherapy rehabilitation, the achieved scores explain that they are slightly dependent.

Table 4. Paired sample difference comparison of functional outcomes for stroke survivors

Physiotherapy services functional outcomes	Paired Differences				t	df	P value (2-tailed)
	Mean	Std. deviation	Mean diff.	Std. deviation			
Modified Barthel Index Score at admission	0.72	1	-14	4	-21	46	<0.001**
Modified Barthel Index Score after Physio Rehab	15	4					

**Significant at P < 0.001; df, degree of freedom

Discussion

In this study the researchers found that the mean age of stroke occurrence was 59.4 years where the males 53.5% (n=38) were more commonly affected than females 46.5% (n=33). These results correlate with other studies where it is reported that mean age was 61 years and males were more affected than females. The high occurrence of stroke in males is possibly due increased variety of risk factors in males, such as smoking and alcohol consumption.[13,14]

Among the risk factors of stroke found in patients received at CHUK in 2019, hypertension was the most common at 84.5% (n=60) out of 71, which is in agreement with other previously published research where they found that hypertension was high with 34.1% (n=84) out of 238 patients. Moreover, in conformity with [14] in this study we identified other risk factors such as heart diseases, 35.2% (n = 25), alcohol use (33.8%, n=24),, diabetes, 25.4% (n = 18), physical inactivity, 25.4% (n=18), and prior stroke, 25.4% (n=18).

Furthermore, as shown by these study results, the ischemic stroke was more existing with percentage of 64.8% (n=46) and that of hemorrhagic was 35.2% (n=25). So, most common type of stroke was cerebral infarction (ischemic stroke). Similarly to another study where 64.2% of stroke were ischemic while 15.0% were hemorrhagic stroke, the remaining 20% were TIA.[15]

However in this study physical inactivity and obesity, was not clearly highlighted in patient' records, it might be explained by the fact that healthcare professionals did not understand the relationship between them with stroke as influencing risk factors of stroke, yet in other studies, they were reported as risk factors, they stated that lack of exercises associated with urban lifestyle contributes to sedentary lifestyle, which is risk factor of different cardiovascular disorders,89.4% (n=227) of this study participants were reported to be physically inactive.[15]

In this study, data regarding weight and height of stroke patients were not recorded yet it could be used to calculate patient's body mass index (BMI) to establish whether they are obese or not as it is among risk factors of stroke. Yet it is shown in another reviewed published data that 9.76% (n=20) were obese,[16] it is therefore obvious that obesity is one of the risk factors of stroke. Moreover this study results revealed that recurrent stroke was 25.4% (n=18), this could be attributed to lack of proper treatment and/or control of risk factors, poor health care and reduced awareness among the patients.[16]

The MBI score was measured at the time of admission and current state, this study revealed that the total score on current state increased compared to that of admission, the mean of total MBI on admission was 0.72 (± 1), compared to the current status it was 15(± 4) for patient who received physiotherapy rehabilitation. This indicates that significant recovery had taken place from the time of admission up to current state. This improvement might be a result of period of rehabilitation whereby 51.1% of the participants who got rehabilitation it was beyond 6 months, their mean age was 56 years, 38.3% of them begun rehabilitation within the first week, 38.3% had a rehabilitation session lasting between 45-60 minutes. These results correlates with other studies,[17] which states that, the earlier rehabilitation and more intensity of motor training post-stroke, the better functioning outcomes as result of effect of neuroplasticity enhancement (brain reorganization), moreover, they showed that the stroke patients in short term onset (in first 3 weeks) revealed higher index score than others who got rehabilitation in medium(between 3 weeks to one month and a half) and long term onset (above one month and a half) while they received same program of physiotherapy.[17]

Reasons to fail to attend rehabilitation were also inquired for the 6 stroke patients who reported to have not receive physiotherapy rehabilitation, 50% (n=3) reported that

it was due to financial constraint, 16.7% was personal factors (age, educational level, weight...), while 33.3% reported other factors.

Despite the failure to attend rehabilitation, the mean total MBI scores on admission was 1.00 (± 0.00), and on current status it was 6.00 (± 5.00). This indicates that in this group also there was some improvement though less marked than in those who received rehabilitation.

Limitations

In this study, the researchers did not compare the improvement between two groups (one who got physiotherapy rehabilitation and who did not), because of big difference in number of participants (one had 47, other had 6), the researchers measured improvement in each group by independent t-test. Also used a filled questionnaire via telephone call, which could impact the score on the MBI as patients might not understand well the description and report a wrong score. Future studies should diversify the methods of data collection. Moreover, this study did not consider the severity of stroke participants had before receiving physiotherapy, therefore we recommend further studies to take into account stroke severity and relate it to the observed functional outcomes.

Conclusion and Recommendation

This study identified hypertension as a most influencing risk factor of stroke. Therefore, we recommend to the ministry of health and other stakeholder to put much effort in raising awareness of non-communicable diseases, and their risk factors to the community as prevention mechanism and building the culture of early healthcare utilization.

This study revealed an improvement in activity of daily living (ADL) for patients who received physiotherapy, however we would also like to recommend medical doctors to prescribe early physiotherapy for

stroke patients because the improvement seen in these patients was not maximum, this could be related to delays in beginning rehabilitation and not staying in rehabilitation for long. We would also like to recommend to initiate community-based rehabilitation programs, for addressing the financial constraints for those who struggles to attend rehabilitation as revealed in our study.

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Conflict of interest

The authors declare no competing interests.

Author's contribution

AO, PB, PM and JCN designed the study, collected the data, analyzed, and interpreted the data. JBS, JN, JDR, CCN designed the study, analyzed, and interpreted the data and contributed to the manuscript writing. All authors read and approved the final manuscript.

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