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Early Mobilization and Physical Activity Improve Stroke Recovery: A Cohort Study of Stroke Inpatients in Kisumu County Referral Hospitals, Kenya

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Abstract Early mobilization in acute stroke care is highly recommended in a range of developed countries policy; however, in developing countries like Kenya, lack of evidence seems to hinder formulation and implementation of policy guideline on early mobilization in acute stroke care. Therefore, to estimate the safe optimal time for early mobilization of stroke patients in Kenya, we conducted a prospective cohort study in two purposively selected health facilities in Kisumu County, Kenya. About 100 stroke patients admitted in medical wards (mean age 59.1±2.3 years, females 61%) were recruited. Barthel Index' tool was used to assess recovery and physical activity levels. It comprised of scoring scale ranging from 0-100. The participants were categorized as follows: Patients who score between 0 – 30 were considered as mildly recovered, 31 - 60 as moderately recovered and patients who score from 61 – 100 were regarded as fully recovered. Multiple logistic regression model was used to compute adjusted ORs (AOR) of early mobilization and Barthel Index variable, adjusting for age, gender and type of stroke. Early mobilization improves patient recovery. Participants in early mobilization group were more like to independently feed, groom, dress, use toilet, use wheel chair and climb stairs with help compared to late mobilization (p <0.05). Most (76%) participants who were exposed to high physical activity had full recovery than the (5%) bones in low physical activity (p< 0.001). This study provides evidence that early mobilization and high physical activity improves stroke patient recovery.

Keywords: *stroke, early mobilization, Barthel Index score, physiotherapy*

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1. Introduction

Stroke remains one of the most devastating of all neurological conditions. Globally, it is the second leading cause of death above the age of 60 years, and the fifth leading cause of death in people aged 15 to 59 years old [1]. It affects 15 million people annually, resulting to 5 million deaths, and 5 million disabilities [1]. As a disease of aging, the prevalence of stroke is expected to increase significantly. Around the world in the years ahead as the global population older than 65 years of age continues to increase by approximately 9 million people per year [1]. By 2025, the global population of people older than the age of 65yearsisestimated to be approximately 800 million people, of whom two-thirds are expected to live in still-developing countries [2]. With such drastic changes projected in the years ahead. While stroke incidence is high in Europe; China, South America, and Africa have the highest mortality rate (19.9%) [3]. Africa is particularly worst hit, owing to population growth, unchecked industrialization and increased consumption of western diets, leading to a rise in many modifiable vascular disease risk factors including smoking, harmful use of alcohol, physical inactivity and unhealthy diets, and invariably resulting in increased prevalence of stroke [4,5].

Considering the high prevalence of the disease, the burden of post-stroke disability is of primary public health importance, translating to a substantial cost worldwide. In the US in 2008, for example, the direct and indirect costs of stroke are estimated to be more than $65 billion [6]. Much of this cost probably relates to the physical disability. Any treatment that improves functional outcome can significantly reduce disability and costs, setting regaining of functional independence, defined as improvement in mobility and activities of ADL, as an important goal [6]. Treatment of patients with acute stroke in stroke units has shown reduced mortality and disability compared with treatment provided in general medical wards [7].

Early mobilization is considered to be one of the most important aspects of stroke unit care that contributes to an improved outcome [8,9]. The rationale for commencing early mobilization after stroke hinges on three key evidences: First, bed rest has been shown to negatively impacts musculoskeletal, cardiovascular, and respiratory and immune systems across most conditions [10]. Bed rest after stroke, may therefore slow recovery. Secondly, immobility-related complications occur commonly and early after stroke [11,12]. Given that patients with stroke spend most of their time inactive early after stroke [13,14], breaking up long bouts of inactivity with early mobilization may reduce the potential for developing complications related to immobility. Finally, there is a likely narrow window of opportunity for brain plasticity and repair [15], brain remodeling is based on these experience [16]. If the optimal period for change is early [17,18], then commencing task-specific training early will improve recovery of stroke patients.

Previous studies have shown that early mobilization seems to be safe and feasible [19,20,21]. Early mobilization in acute stroke care is recommended in a range of European, American and UK policy guidelines as a strategy to minimize or prevent complications [22]; whereas, the evidence is missing to support its implementation in developing countries like Kenya. In addition, a debate exists as to the optimal exact time to begin mobilization [23]. Therefore, we assessed 6 months post-stroke in-patients mobilized within 24 hours versus above 24 hours after the admission in the hospital and subjected to physical activity with the aim of determining whether mobilization with 24 hours and physical activity improves stroke patient recovery. This study provides evidence for a tailored approach to delivery of safe and effective early mobilization to stroke patients in Kenya.

2. Methodology

2.1. Study Design

This was a prospective cohort study, in which all stroke patients aged 18 years and above were followed upon admission in the medical wards of the hospitals of study to the time of their discharge. Patients who received mobilization in less than 24 hours after admission were categorized as early mobilization, while more than 24 hours were considered late mobilization. They were then followed and their progress in the wards was assessed using Barthel index. The study was conducted between January and June 2015.

2.2. Study Setting

The study was carried out at Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) and Kisumu County Referral Hospital, Kisumu County, Kenya. These health facilities were purposively selected because they are the main referral health facilities in the Kisumu County, thus receive most of stroke patients from the County.

2.3. Study participants

The study included all the inpatients with confirmed stroke (first or recurrent) identified from medical record in the medical wards. While patients with history of Transient Ischemic Attack (TIA), subarachnoid hemorrhage, those admitted directly to the intensive care units, those with disabilities, those with progressive neurological disorders, heart failure and fractures were excluded from the study.

2.4. Data Collection

A questionnaire was used to collect information on age, gender, diagnosis of stroke, type of mobilization, timings of mobilization. While 'Barthel Index' tool was used to assess recovery and physical activity levels of independence or activities of daily living.

Barthel Index is an international ordinal scale used in stroke patients to measure performance of activities of daily living. It comprises scoring scale which ranges between 0-100. The participants were categorized as follows: Patients who score between 0 – 30 were considered as mildly recovered, 31 - 60 as moderately recovered and patients who score from 61 – 100 were regarded as fully recovered.

Physical activity levels were further classified as high when the patient was able to stand and walk without support, moderate when patient was able to sit on bed unsupported and move from bed to chair independently, while low, when sitting on bed with support, doing self care activity and moving from bed to chair with support. The effects of mobilization types were evaluated using Barthel Index as described by Mahoney & Barthel [24]. According to Tomoko et al., Barthel Index is highly reliable, valid and has internal consistency in a health facility setup [25].

2.5. Data Analysis

All statistical analyses were performed using SPSS software (version 17.0; SPSS Inc., Chicago, IL), and 5% was the level of significance. The patients' characteristics are presented as proportion. Chi-square test was used to determine association between recovery groups and mobilization type. To predict the outcome of early mobilization based on Barthel Index variables, logistic regression was used. Variables with P value <0.05 in the binary analyses were entered into the multivariate logistic regression model and eliminated stepwise, leaving only those with a significance level <0.05 in the final model, age, sex, and type of stroke were controlled. Results are presented as Adjusted odds ratios (AORs) with 95% CIs.

3. Results

A total of 100 stroke patients participated in the study with a mean age of 59.1±2.3 years; almost two thirds (61%) were females; 63% were inpatients in JOOTRH, while 37% were inpatients in Kisumu County referral hospital. About 51% of participants suffered from ischemic stroke, while more than two thirds (69%) of the participants were early mobilized as shown in Table 1.

There was association between mobilization and recovery rate, 87.75% of those who fully recovered were mobilized early while 75% of those who had mild recovery had late (p-value < 0.001) as shown in Table 2.

Table 1. Participants overall profile

Participant characteristic	Percentage
Gender	
Female	61%
Male	39%
Age	
Mean age ± SD	59.1±2.3 years
Below 30	7%
31-40	9%
41-50	10%
51-60	18%
61-70	26%
Over 70	30%
Type of stroke	
Ischemic	54%
Hemorrhagic	46%
Type of mobilization	
Early mobilization	69%
Late mobilization	31%

In assessing recovery using Barthel Index, our study shows that early mobilization improve patient recovery. Participants in early mobilization group were more like to independently feed, groom, dress, use toilet, use wheel chair and climb stairs with help compared to late mobilization (p <0.05). However, bathing was not significant (Table 3).

There was a general trend in decrease in rate of recovery with decrease in physical activity. About 76% cases were fully recovered in high physical activity group as compared to 5% in low physical activity group (p< 0.001). There was a decreasing trend among high physically active stroke patients from full recovery to moderate recovery while in low physically active patients; it was a reverse trend (Figure 1).

Table 2. Association of Recovery with Mobilization

	Consequences of Mobilization and Recovery Groups						
	Mild Recovery		**Moderate Recovery**		**Full Recovery**		**P-Value**
	n	%	n	%	N	%	
Early Mobilization	3	25	23	59	43	87.75	
Late Mobilization	9	75	16	41	6	12.25	<0.001

Table 3. Association of Barthel Index Categories and Early Mobilization

Barthel Index	**Categories of Barthel Index**	**Early Mobilization**			
		n	**AOR**	**95% CI**	**P-value**
Feeding	Independent	33	1.484*	1.183-4.100	0.007
	Needs help cutting	33	1.350*	1.112-3.867	0.009
Bathing	Independent	32	1.795	0.645-2.134	0.114
	Dependent	37	0.723	0.423-1.167	0.052
Grooming	Independent : face/hair/teeth	52	1.946**	1.662-2.124	< 0.001
	Needs help with personal care	17	0.402*	0.165-0.783	0.011
Dressing	Independent	28	4.100*	2.368-6.345	0.008
	Can do half unaided	28	0.628*	0.201-0.933	0.048
	Dependent	13	0.729	0.564-1.093	0.234
Bowels	Continent	45	1.835*	1.345-3.246	0.002
	Occasional accident	18	0.621	0.256-1.986	0.364
	Incontinent	6	0.250*	0.032-0.564	0.019
Bladder	Continent	37	1.848*	1.388-3.967	0.013
	Occasional accident	27	0.867	0.214-2.487	0.136
	Incontinent or Catheterized	5	0.281	0.119-1.094	0.086
Toilet use	Independent	27	2.429*	1.801-4.236	0.008
	Need some help	35	0.983	0.633-1.567	0.178
	Dependent	7	0.314*	0.102-0.887	0.034
Transfer(Bed to chair and back)	Independent	19	8.540**	5.451-11.634	< 0.001
	Minor help to sit	40	1.283*	1.084-1.654	0.041
	Major help to sit	9	0.269*	0.115-0.567	0.024
Mobility (on level surfaces)	Independent may use aid > 50 yards	6	1.754*	1.498-1.987	0.001
	Wheelchair independent > 50 yards	47	1.924*	1.611-2.354	0.034
	Walks with help of person >50 yards	15	0.481*	0.114-0.786	0.045
Stairs	Independent	6	8.691*	3.815-14.881	0.012
	Needs help	53	1.488*	1.116-1.980	0.026
	Unable	10	0.298*	0.107-0.689	0.035

* Significance level of $p < 0.05$
** Significance level of $p < 0.01$.

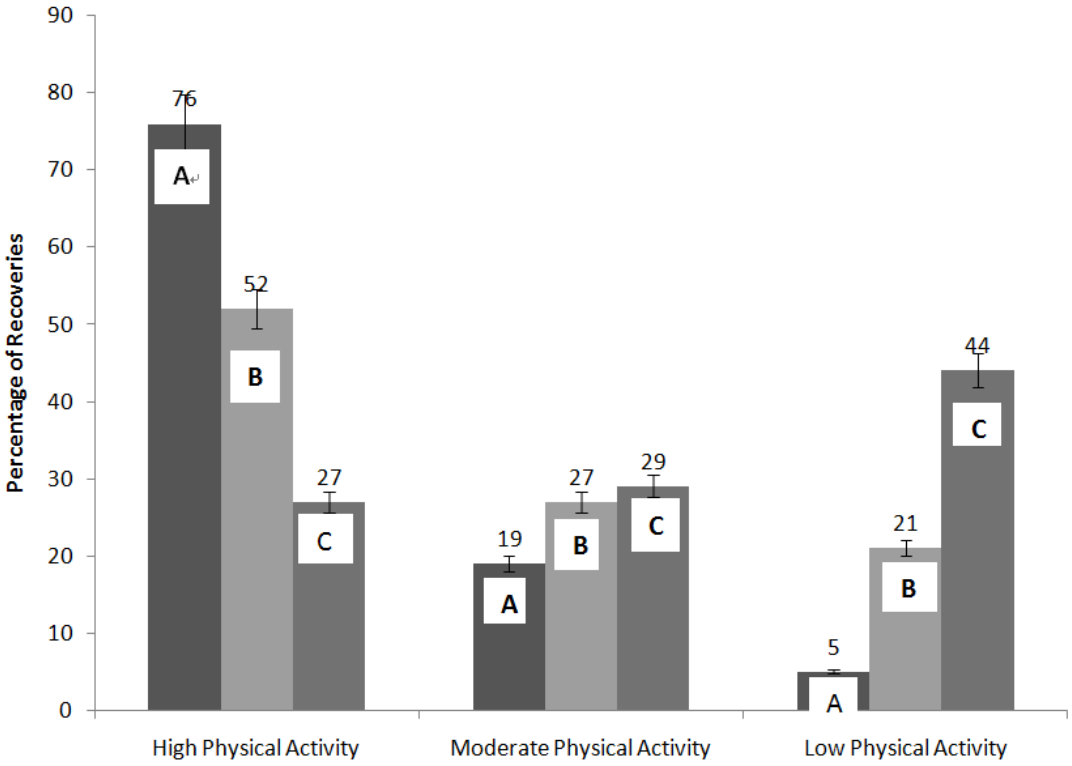

Figure 1. Association of type of recovery with level of physical activity (%); A- full recovery, B- moderate recovery, C- mild recovery. Within high physical activity, there is a decreasing trend among people with different level of recovery while in moderate and low physical activity the trend is opposite

4. Discussion

This study confirms that early mobilization within 24 hours is of benefit to stroke patients. It also shows that high physical activity improves the rate recovery. We found that early mobilized participants were able to perform transferring activities independently and walk and climb stairs independently compared to late mobilized participants, an indication of quicker recovery. This is agrees with an earlier study which showed that early mobilization after stroke improves recovery [13]. Contrary to our findings, a systematic review by Bernhardtet and coworkers showed that both early and late mobilized patients have similar outcome [26]. In this review the greater part of the patients were mobilized within 48 hrs, therefore missed the benefit of initiating it within 24 hrs.

Apart from early mobilization, increased physical activity is of much benefit to post stroke patients. Current stroke guideline recommends increased physical activities early after stoke [27,28,29]. Furthermore, favorable outcomes have been reported within 24 hours of stroke [8], and preliminary evidence to support this intervention has emerged from two small randomized controlled trials [19,20]. This is also confirmed by this study, because most individuals who were exposed to high physical activity had full recovery than the ones in low physical activity.

A number of limitation need to be acknowledged. Although observation technique used in this study was standardized and the observer trained prior to influence the activity of the staff or patients observed. If this were true, the activity levels in this study are likely to be higher than those seen under usual circumstances. Furthermore, intermittent observation provides only a "snapshot" of patient activity, not continuous measurement of activity it remains however the only method currently available to capture not just activity, but people assisting and the location of the activity which is very valuable in examining how care is organized. For the purposes of this study, we believe that advantages afforded by observation outweigh the disadvantages.

A further limitation was the use of the medical record to determine time to first mobilization. It is possible that staff may have incorrectly documented the time of first mobilization or may have even failed to document the first mobilization altogether; therefore the precision of this data may be questionable. As many of the patients were recruited to the studies some days after they were first mobilized out of bed, this was the most accurate means we had acquiring this information.

Given the small sample size of the individuals in this study, this analysis should only be considered as an illustration of the method, rather than allowing any confident deductions to be made regarding the effectiveness of early mobilization.

In conclusion, this study provides evidence that early mobilization started within 24 hrs is of benefit to stroke patients. It shows that early mobilization and high physical activity improves the recovery rate of stroke patients. Therefore, we recommend a further study on effectiveness of early mobilization as a rehabilitation strategy for managing stroke patients using a randomized control trial.

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Contributors

OMM conceptualized the idea, carried out the study and developed the first draft of this article. ODO and ACO contributed to writing and revision of the article. All authors read and approved the final manuscript.

Competing Interests

The authors declare that they have no competing interests.

Ethical Approval

Ethical clearance was obtained from Great Lakes University of Kisumu ethics review committee and authoritative approval from the ethics and research committees of the hospitals of study were also given. Written consent was sought from participants of the study. Participants were assured of the confidentiality of the information they are providing. Participants' names were not included in the questionnaires to conceal their identity.

References

[1] WHO . The Atlas of Heart Disease and Stroke. WHO, Geneva, 2004. http://www.who.int/cardiovascular_diseases/resources/atlas/en/.

[2] Mukherjee D, Patil CG. Epidemiology and the Global Burden of Stroke. *World Neurosurg*, 2011;76(6):85-90.

[3] Kim AS, Johnston SC. (2011). Global Variation in the Relative Burden of Stroke and Ischaemic Heart Disease. *Circulation*, 2011;124:314-323.

[4] Connor MD, Walker R, Modi G, Warlow CP. Burden of stroke in black populations in sub-Saharan Africa. *Lancet Neurology*, 2007; 6: 269-278.

[5] O'Donnell MJ, Xavier D, Liu L, Zhang H, Chin S, Rao-Melacini P, et al. Risk factors for ischaemic and intracerebral haemorrhagic stroke in 22 countries (the INTERSTROKE study): a case-control study. *Lancet*, 2010; 376: 112-123.

[6] Rosamond W, Flegal K, Furie K, Go A, Greenlund K, Haase N, et al. Heart disease and stroke statistics-2008 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee, *Circulation*, 2008;117(4):25-146.

[7] Stroke Unit Trialists' Collaboration. Organised inpatient (stroke unit) care for stroke. *Cochrane Database Syst Rev*, 2007; 4: CD000197.

[8] Indredavik B, Bakke F, Slørdahl SA, Rokseth R, Hamheim LL. Treatment in a combined acute and rehabilitation stroke unit: Which aspects are most important? *Stroke*, 1999;30:917-923.

[9] Langhorne P, Pollock A, Stroke Unit Trialists' Collaboration. What are the components of effective stroke unit care? *Age Ageing*, 2002;31:365-371.

[10] Mutin-Carnino M, Carnino A, Rofino S, Chopard A. Effects of Muscle Unloading, Reloading and Exercises on Inflammation During a Head Down Bed Rest. *Int J Sports Med*, 2013;35:28-34.

[11] Bamford J, Dennis M, Sandercock P, Burn J,Warlow CP. The Frequency, Causes and Timing of Death within 30 days of a First Stroke; The Oxfordshire Community Stroke Project. *J Neurol Neurosurg Psychiatry*, 1990;35:824-829.

[12] Langhorne P, Stott DJ, Robertson LS, Macdonald J, Jones LR. Medical Complications after Stroke: A Multicentre Study. *Stroke*, 2000;31:1223-1229.

[13] Benhardt J, Dewey HM, Thrift AG, Donnan GA. Inactive and Alone:Physical Activity within the First 14 Days of Acute Stroke Unit Care. *Stroke*, 2004;35:1005-1009.

[14] West T, Bernhardt J. Physical Activities in Hospitalized Stroke Patients. *Stroke Res Treat*, 2011; http://www.hindawi.com/journals/srt/2012/813765/.

[15] Murphy TH, Corbett D. Plasticity During Stroke Recovery; From Synapse to Behaviour. *Nat Rev Neurosci*, 2009;10:861-872.

[16] Johansson B. Brain Spasticity and Stroke Rehabilitation: The Willis Lecture. *Stroke* , 2000; 31(1):223-230.

[17] Krakauer JW, Carmichael ST, Corbett D, Wittenberg G. Getting Neurorehabilitation Right: What can be Learned from Animal Model? *Neurorehabil Neural Repair*, 2012;26:923-931.

[18] Pekna M, Pekny M, Nilsson M. Modulation of Neural Plasticity as a Basis for Stroke Rehabilitation. *Stroke*, 2012;4:2819-2828.

[19] Bernhardt J, Dewey H, Thift A, Collier J, Donna G. A Very Early Rehabilitation Trial for Stroke (AVERT): Phase II Safety and Feasibility. *Stroke*, 2008;39(2):390-396.

[20] Langhorne P, Stott D, Knight A, Bernhardt J, Barer D, Watkins C. Very early rehabilitation or intensive telemetry after stroke: A pilot randomized trial. *Cerebrovasc Dis*, 2010;29(4):352-360.

[21] Craig LE, Bernhardt J, Langhorne P, et al. Early mobilization after stroke: An example of an individual patient data meta-analysis of a complex intervention. *Stroke*, 2010;41:2632-2636.

[22] Arias M & Smith L. Early mobilization of acute stroke patients. *Journal of Clinical Nursing*, 2007; 16: 282-288

[23] Maulden SA, Gassaway J, Horn SD, et al., Timing of initiation of rehabilitation after stroke, *Arch Phys Med Rehabi*, 2005; 86(12): 34-40.

[24] Mahoney FI, Barthel D. "Functional evaluation: the Barthel Index." Maryland State Med Journal 1965;14:56-61.

[25] Tomoko O, Tatsuro I, Takahiro H, Kentaro K, Rika I, Kosuke N, Surya S, Takeo N. Reliability and validity tests of an evaluation tool based on the modified Barthel Index International. *Journal of Therapy & Rehabilitation*, 2011;18(8):422.

[26] Bernhardt J, Thuy MNT, Collier JM, Legg LA. Very early versus delayed mobilisation after stroke (Review). The Cochrane Collaboration. Published by John Wiley & Sons, Ltd. 2009.

[27] Intercollegiate Stroke Working Party. National Clinical Guidelines for Stroke. London: Royal College of Physicians, 2008.

[28] National Stroke Foundation. Clinical Guideliens for Stroke Management. Melbourne, Australia:2010.

[29] Scottish Intercollegiate Guidelines Network. Management of Patients with stroke: Rehabilitation, Prevetion and Management of Complications and Discharge Planning. A National Clinical Guideline. Edinburgh, Scortland: 2010.