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RESEARCH ARTICLE

A retrospective observational study of the effect of physiotherapy treatment on outcomes in stroke patients

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ABSTRACT

Background: Stroke is a major economic burden as it causes both motor and functional deficits in stroke patients. It requires immediate medical and surgical treatment, along with medical and surgical treatment, early rehabilitation like physiotherapy may reduce most of the human and economic costs associated with burden of the disease and immobility related complications. **Aims and Objectives:** This study aims to assess the motor outcomes among stroke patients who had received different combinations of physiotherapy treatment approaches using manual muscle test (MMT) score. **Materials and Methods:** This was a retrospective study, which analyzed the medical records data (from January 2016 to January 2019) for stroke patients who followed up in physiotherapy Outpatient Department (OPD) after stroke at least for 1 month. **Results:** Of 50 patients, 66% were male and 34% were female with an average age of 49.61 ± 17.63 years. About 56% suffered from the left-sided hemiplegia, 42% from the right-sided hemiplegia, and 1% from bilateral hemiplegia. The average duration between occurrence of stroke and first visit to OPD was 71.21 ± 48.35 days. Patients with ischemic stroke constituted 58% and hemorrhagic 42%. After regular follow-up for 1 month, patients showed a significant improvement in MMT score. **Conclusion:** Early intervention in stroke by medical and physical rehabilitation and regular follow-up for physiotherapy help in motor function improvement.

KEY WORDS: Post-stroke Rehabilitation; Physiotherapy; Manual Muscle Test Score

INTRODUCTION

Stroke is the most common cerebrovascular disorder, with the prevalence progressively increasing with age. According to the World Health Organization in 2015, stroke is the second leading cause of death and is the third leading cause of disability, with 10 million deaths and permanent disabilities have been reported.[1] Stroke is a global epidemic, it is not only limited to western or high-income countries. About 85% of all stroke deaths are registered in low- and middle-income countries, which also account for 87% of total losses due to stroke in terms of disability-adjusted life years, calculated worldwide, it is 72 million/year.[2] Stroke is an important economic burden for the society, requiring increasing attention for more effective health-care planning and resources allocation. It can cause many sequelae which include limb weakness, sensory deficits, aphasia, dysphagia, hemiplegia, visual field deficit, coordination problems, and cognitive impairment.[3] Moreover, anxiety, depression, and lower physical activity are common symptoms in stroke survivors.[3] Stroke survivors are often dependent on a third person or special equipment in performing tasks of daily living. Hence, early rehabilitation for stroke patients can likely reduce economic burden and can prevent negative

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effects on the musculoskeletal, cardiovascular, respiratory, and immune systems and reduce immobility-related complications.[4] Secondary stroke prevention remains a top priority in treating patients after the first stroke. In addition to antithrombotics for stroke prevention, rehabilitation is an important therapy for facilitating functional recovery after stroke. Although many guidelines have recommended early rehabilitation after stroke to improve activities of daily living, such recommendations are only supported by limited evidence and also there are few studies reported in the Indian literature, regarding the effect of physiotherapy treatment on motor outcomes in stroke patients, and hence, the present study was taken up.

MATERIALS AND METHODS

Study Design

This retrospective observational study was done to assess the motor outcomes among stroke patients who had received different combinations of physiotherapy treatment approaches (medically treated/untreated cases of stroke patients) at the Physiotherapy Department of Kempegowda Institute of Physiotherapy, Bangalore.

Ethical Consideration

The study was approved by the Institutional Ethics Committee (Ref No – KIMS/IEC/A6-2019).

Study Population

Data of stroke patients who had taken physiotherapy treatment from January 2016 to January 2019 were recorded and analyzed.

Study Procedure

Purposive sampling method was used for case record analysis for a period of 3 months (March 2019–May 2019). Hundred case records were studied after estimating sample size taking stroke prevalence[5] as 1.9%. The sample size calculated was 63. Of 100, only 50 fulfilled the inclusion criteria. The inclusion criteria were; the participants received multidisciplinary stroke rehabilitation in the department of physiotherapy, no previous history of stroke, not participating/participated in stroke rehabilitation program elsewhere, h/o able to walk independently before having a stroke, and available for follow-up at physiotherapy outpatient department (OPD) for at least 1 month after starting rehabilitation. Subjects with the following history were excluded from the study; recurrent stroke, bedridden patient. The available physiotherapy treatment records of the subjects were thoroughly scrutinized to obtain relevant information about the age, gender, the type of stroke (ischemic/hemorrhagic/others), onset of stroke, the side affected, and extent of motor damage which were recorded from each patient case record. Furthermore, available information about comorbid conditions was recorded. To simplify the analysis, three risk bands, "low," "intermediate," and "high," have been arbitrarily defined, respectively, on the basis of the presence of none, one or more than one risk factors, more than two risk factors and/or previous cerebrovascular event, and/or diabetes mellitus in anamnesis. As for the age, also for the analysis, patients were divided into four groups: ≤45 years, 46–60 years, 61–75 years, and >75 years. All patients were evaluated at their first visit to OPD after stroke and for 1 month thereafter on follow-up visits.

Statistical Analysis

Data were analyzed using MS Excel 2013 spreadsheet. Descriptive statistics, namely percentage, mean, and standard deviation, were used for quantitative variables. Paired t-test was used to compare the pre and post manual muscle test (MMT) score. $P < 0.05$ was considered statistically significant in the two-tailed analysis.

Primary Outcome

Manual Muscle Test (MMT) score after 1 month of starting physiotherapy.

RESULTS

A total of 50 case records were studied. The demographic data of the study subjects are presented in Table 1. Table 2 summarizes the clinical data of the study subjects. Table 3 shows the change in MMT score at admission and after 1 month following physiotherapy treatment as recommended.

DISCUSSION

The retrospective study was carried to evaluate the effect of physiotherapy on outcome in stroke patients. The study includes 50 patients, 33 (66%) males and 17 (34%) females. The mean age of the subjects in years was 49.61 ± 17.63 years. Majority of the subjects were in the age group of 45–65 years. The most common risk factors were hypertension, diabetes mellitus, and smoking. Patients with

Table 1: Age and gender distribution

Age (years)	Male *n* (%)	Female *n* (%)	Total *n* (%)
<45	4 (8)	2 (4)	15 (30)
45–60	14 (28)	6 (12)	22 (44)
61–75	12 (24)	4 (8)	8 (16)
>75	5 (10)	3 (6)	5 (10)
Total	35 (70)	15 (30)	50 (100)
Mean±SD	49.26±15.45	49.04±16.61	49.61±17.63

SD: Standard deviation

Table 2: Clinical data

Clinical data	*n* (%)
Affected side	
Left	28 (56)
Right	21 (42)
Bilateral	1 (2)
Type of stroke	
Ischemic	29 (58)
Hemorrhagic	21 (42)
Others	0 (0)
Risk factors*	
Low	19 (38)
Intermediate	28 (56)
High	3 (6)
Duration of stroke (in days)†	71.21±48.35

*Low=None/no risk factors, Intermediate − >1−2 risk factors, high≥2 risk factors, †average duration between occurrence of stroke and first visit to outpatient department

Table 3: Mean MMT score*

Change in MMT score	Day 0	Day 30	*P* value
MMT 22	2.66±0.33	3.18±0.4	<0.001

*Score	MMT score – description
0	No palpable or observable muscle contraction
1	Palpable or observable contraction, but no motion
1+	Moves limb without gravity loading less than one-half available ROM†
2−	Moves without gravity loading more than one half ROM
2	Moves without gravity loading over the full ROM
2+	Moves against gravity less than one-half ROM
3−	Moves against gravity >½ ROM
3	Moves against gravity less over the full ROM
3+	Moves against gravity and moderate resistance <½ ROM
4−	Moves against gravity and moderate resistance more than one-half ROM
4	Moves against gravity and moderate resistance over the full ROM
5	Moves against gravity and maximum resistance over the full ROM

†ROM=Range of motion, MMT: Manual muscle test

ischemic stroke constituted 58% and hemorrhagic 42%. Twenty-three (56%) suffered from the left-sided hemiplegia, 21 (42%) from the right-sided hemiplegia, and 1 (2%) from bilateral hemiplegia. The average duration between occurrence of stroke and first visit to OPD was 71.21 ± 48.35 days. There was a significant improvement in muscle strength after 1 month of physiotherapy treatment.

Stroke is found to be more common in male (70%) than female (30%). This is in line with the finding by Himaja *et al*., in which 71.4% were male and 28.6% were female.[6] This indicates that stroke has male preponderance. Although the result of this OPD-based study cannot be generalized to the entire population, because in a developing country like India, males seek more medical attention than female due to low socioeconomic status, barriers to access medical services, social deprivation, and superstition.[7] Majority of patients belonging to the age group of 45–60 years followed up in the OPD signifying the burden of stroke is more in old and dependent population. The study correlates with the study by Patel *et al*. which also showed that majority of the stroke patients belonged to the age group of 41–60 years with male preponderance.[8] The incidence of stroke increases with advancing age due to increase in comorbidities such as ischemic heart disease, hypertension, and atrial fibrillation. Of 50 patients, 56% suffered from the left-sided hemiplegia, 42% right, and 2% bilateral. The study by Portegies *et al*. has shown that the left-sided infarcts are more often better recognized than the right sided in MRI.[9] The study by Hedna *et al*. also supports that stroke in the left-sided hemisphere has more frequent, severe, and poorer outcome than right sided mainly due to higher incidence of large vessel infarct in region of the left middle cerebral artery.[5] Theories such as intima-media complex variation and flow velocity differences in the left carotid artery resulting in higher stress, and therefore, intima damage supports the higher incidences in the left hemisphere.[5] Ischemic stroke (52%) is more common than hemorrhagic (48%), in comparison with a study conducted by Mudhaliar *et al*.; ischemic stroke was 65.56% and hemorrhagic 32.22%.[10] The study by Himaja *et al*. also showed higher incidence of ischemic 84.28% than hemorrhagic stroke 15.71%.[6] Atherosclerotic risk factors with advancing age can be one of the causes for this high incidence. In our study, more common risk factors were hypertension, diabetes, and smoking which are modifiable risk factors. Similar results were shown in a study by Konduru *et al*.[11] Other risk factors were ischemic heart disease, dyslipidemia, and obesity. Lifestyle modifications such as exercise, smoking cessation, moderate alcohol consumption, and inclusion of Dietary Approaches to Stop Hypertension (DASH) diet (DASH) can reduce incidence of stroke.[12] The study by Rajalaxmi *et al*. also shows that exercise and nutritional alteration helps the patients to recover faster from neurological deficits.[13] Patients who attended stroke rehabilitation while continuing medications showed significant improvement in muscle strength. This is in accordance with the previous study carried by Lai *et al*. which showed improvement in both motor and functional outcome in post-acute care in stroke patients.[3] The study by Sehatzadeh has also concluded that high-intensity physiotherapy in early phase of stroke (<6 weeks) improves stroke outcome in patients.[14]

Strength of the study: Limited research has examined the effect of physiotherapy on motor outcome in stroke patients. This study assessed the effect of physiotherapy in post-acute care for stroke. Limitations to this study: Sample size was

less and the MMT score was only assessed at admission and after 1 month following physiotherapy treatment.

CONCLUSION

This study concluded that the early intervention in stroke patients by physical rehabilitation like physiotherapy helps in faster recovery. Thus, stroke patients with the potential for functional recovery could receive regular follow-up physiotherapy treatment, which could help them to reduce economic burden and can prevent negative effects and immobility-related complications.

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