EFFECT OF DELAYED POST-STROKE REHABILITATION PROGRAM ON PATIENT'S FUNCTIONAL OUTCOME

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ABSTRACT

Objective: To examine the effects of delayed admission to rehabilitation on functional outcomes in post stroke patients.

Study Design: Observational study.

Place and Duration of Study: Department of Physical Medicine and Rehabilitation of Combined Military Hospital Kohat, from Sep 2016 to Sep 2017.

Material and Methods: A total of 55 patients with age ranging from 20-80 years who were diagnosed with first ever stroke and reported within 150 days of the onset of stroke to rehabilitation setup were selected through non-probability purposive sampling. The patients were divided into 2 groups as early (group-A ≤30 days) and delayed admission group (group-B=30-150 days) based on the length of time from stroke onset to admission to inpatient rehabilitation facility. Reasons for delay admission were identified and noted. Functional independence measure (FIM) score was used to assess functional status of the patient at admission. Patients in both groups underwent identical eight weeks of regular rehabilitation program with therapy sessions 3 hours a day, 5 days a week. Functional independence measure score was noted again at eight week of indoor rehabilitation.

Results: Total 52 patients completed the study with 27 (51.9%) male and 25 (48.1%) female. Lack of awareness of Rehabilitation was the most common patient related factor found in 11 (34.4%) while Lack of care giver support was most common external factor reported in 6 (18.7%). The patients with early admission to inpatient rehabilitation facility had a better functional independent measurement scores gain than the patients with delayed admission to inpatient rehabilitation facility (40.4 ± 11.4 vs. 11.9 ± 8.4, p=0.01). However, FIM scores at admission in both groups were not statistically significant.

Conclusion: Delayed admission to inpatient rehabilitation facility after stroke event caused poorer functional outcomes in stroke patients.

Keywords: Complications, Functional outcomes, Rehabilitation, Stroke.

INTRODUCTION

Stroke is globally the leading cause of long term disability resulting in deterioration of functional status and interfering with patient's activities of daily living[1]. In United States every year 800,000 individual are affected by stroke while in Pakistan the estimated annual incidence of stroke is around 250/100,000[2]. Contrary to developed countries where there is a gradual decline in incidence of stroke, the overall burden of new onset stroke is continuously increasing in countries like Pakistan, India, Bangladesh and Sri-Lanka[3]. In Pakistan the incidence of stroke in the middle age group is five to ten time higher than United Kingdom and United States[4]. The amount of functional recovery in stroke survivors is variable and is based on multiple known and unknown factors[1]. Several studies have been conducted to identify the factors that can help prognosticate the functional recovery among stroke survivors[5-8]. Researchers have identified age, gender, marital status, availability of caregiver support, history of previous stroke, cognitive impairment, incontinence, functional independence measure (FIM) scores at admission time from stroke onset to admission and sitting balance to be the major factors influencing functional outcome in post

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stroke rehabilitation[5-7]. Time from stroke onset to inpatient Rehabilitation facility (IRF) admission is an area of concern in developing countries like Pakistan where, on one hand, there is limited availability of post-stroke rehabilitation facilities and on other hand awareness among masses about post stroke rehabilitation as management option is also lacking[9]. Neurologic recovery and functional improvement among stroke survivors occurs maximum in the early post stroke period, hence delay in the initiation of rehabilitation may leads to poor functional outcomes, prolonged hospital stays, burden on govern-mental health budget and a liability to the society[10-13]. Besides functional impairment, stroke survivors are also prone to develop a wide range of complications like painful shoulder, shoulder dislocation, spasticity, falls, urinary tract infection and depression[14-15]. Most of these complications are potentially preventable and treatable if recognized timely. Sufficient data on the effect of delayed IRF admission on functional outcome in stroke survivors among Pakistani population is not available. Therefore this study was designed to document the effects of delayed entry to IRF in stroke patients.

PATIENTS AND METHODS

This cross sectional study was conducted at the Physical Medicine and Rehabilitation department of Combined Military Hospital Kohat from September 2016 to September 2017. Sample size was estimated through WHO sample size calculator. A total of 55 patients with age ranging from 20-80 years who were diagnosed with first ever stroke and reported within 150 days of the onset of stroke to rehabilitation setup were selected by non-probability consecutive sampling. Stroke was defined as "an acute neurological disorder of vascular origin causing focal and global neurological deficit that last more than 24 hours"[10]. Excluded from the study were those with history of previous stroke, subarachnoid hemorrhage, head injury and blindness. Patients who were not able to tolerate 3 hours of therapy per day or suffered from any other condition that lead to cognitive dysfunction or interference with therapy proceedings were also not enrolled in the study. After explaining study proceeding and informed consent, basic demographic data of the patient was recorded on a structured proforma. All the patients were examined to assess functional status by an experienced physiatrist. Reason for delay admission to rehabilitation were recorded and divided into two groups including patient related factors (patient's unwillingness, lack of patient education about rehabilitation, stroke related complications and financial constraints) and external factors (bed availability and lack of rehab resources) leading to delayed admissions. Functional independence measure (FIM) which is a valid and reliable tool to assess functional status of the patient was used within first 24 hours of admission and again at eight week of indoor rehabilitation, and FIM gain (FIM score at

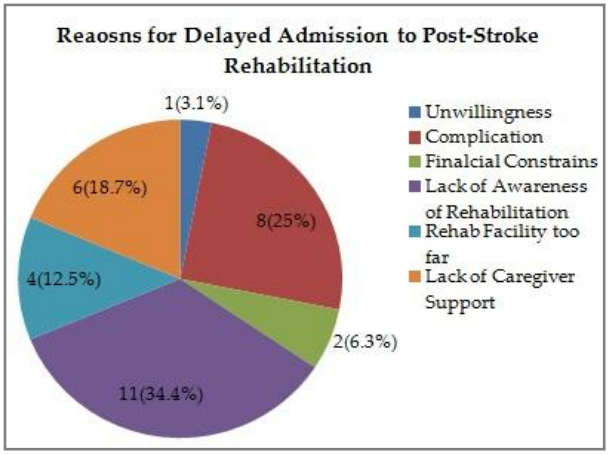

Figure: Reasons for delayed admission to post-stroke rehabilitation program in group B patients.

eight week of indoor rehab minus admission FIM score) was calculated[11] Based on FIM score, disability was categorized into mild disability (FIM>100), moderate disability (FIM 50-100) and severe disability (FIM<50). To study the effects of delayed admission on functional outcome, patients were divided into group A (admission of 30 days or less from stroke onset) and group B (admission between 30-150 days from stroke onset). The use of 30 days cutoff period to demarcate early from delayed IRF admission and the upper limit of 150 days have been proven

from previous studies[12-13]. All the patients in both groups underwent identical eight weeks of regular rehabilitation program with therapy sessions 3 hours a day, 5 days a week using physical modalities, therapeutic exercises, provision of assistive devices and adaptive equipment and psychological counseling sessions of patients and caregivers. All the therapies were carried by trained therapists under leadership of qualified physiatrist. Weekly multidisciplinary meetings about the patient's progress were also carried out regularly. Those who require more than eight weeks of admission were continued, but for the study purpose their FIM score at eight weeks post admission was recorded. All patients were given home plan of therapy at discharge detail of which is beyond the scope of this study. Study results were entered and analyzed using SPSS 21. Chi square test was used to compare the results of both study groups. A $p<0.05$ was considered statistically significant value.

RESULTS

Out of 55 patients, 3 were dropped due to non-compliance to study protocol. Among total 52 patients, 27 (51.9%) were male and 25 (48.1%) were female. Mean age of the patients at the time of admission was 54.8 ± 13.8 years, mean stroke from stroke onset to IRF admission was 69.8 ± 48.0. Group-A included 20 (38.5%) and Group-B included 32 (61.5%) patients. Characteristics of patients in both groups are given in table-I. Lack of awareness of Rehabilitation as the treatment option was the most common patient related factor for delayed admission to IRF found in 11 (34.4%) patients followed by stroke related

Table-I: Comparison of Baseline characteristics of both groups admitted for post-stroke rehabilitation.

Characteristics	Group-A n=20(%)	Group-B n=32(%)
Male	15 (75)	12 (37.5)
Female	5 (25)	20 (62.5)
Age (in years)	46.0 ± 7.5	60.3 ± 14.0
Time from stroke onset to IRF* admission (days)	16.8 ± 6.1	102.9 ± 28.9
Marital status		
Married	20 (100)	20 (62.5)
Single	-	1 (3.1)
Widow/widower	-	11 (34.4)
Type of stroke		
Ischemic	17 (85)	19 (59.4)
Haemorrhagic	3 (15)	13 (40.6)
Side involved		
Right	10 (50)	23 (71.9)
Left	10 (50)	9 (28.1)
Comorbidities		
IHD**	1 (5)	11 (34.4)
Diabetes Mellitus	6 (30)	3 (9.4)
Hypertension	13 (65)	13 (40.6)
More than one comorbidity	0	5 (15.6)

*IRF: inpatient Rehabilitation facility, **IHD: Ischemic heart disease.

Table-II: Comparison of functional independence measure (FIM) scores of both groups admitted for post-stroke rehabilitation.

FIM Scores	Group A (n=20)	Group B (n=32)	*p*-value
FIM score at admission	66.2 ± 17.1	66.4 ± 28.5	0.98
FIM score after 8 week rehabilitation	107.1 ± 10.4	78.0 ± 26.0	0.02
FIM gain	40.4 ± 11.4	11.9 ± 8.4	0.01

complications found in 8 (25%) patients. Lack of care giver support was most common external factor for delayed admission to IRF reported in 6 (18.7%) patients (figure). On statistical analysis there was significant difference (*p*-value=0.02) in FIM score after eight-week rehabilitation program and in FIM gain among early versus delayed admission group, however FIM score at admission in both groups was not statistically significant.

DISCUSSION

In our study the overall time from stroke onset toIRF admission was 69.8 ± 48.0 days which was consistent with other studies from the developing countries. However, after taking into consideration our exclusion criteria where we had excluded the patients with admission time exceeding 150 days, the actual overall time may still be higher in Pakistan. On the contrary, the time among developed countries like United States and Italy is 20 days[2]. Studies have identified limited number of stroke rehabilitation centers and limited bed availability as the leading cause of significant delay in time to IRF admission in developing countries as compared to the developed countries[11]. In our study lack of awareness of post-stroke Rehabilitation was the most common patient related factor identified for prolong stroke onset to IRF admission. Lack of care giver support was the most common external factor identified in 6 (18.7%) of our group B study participants. One of the factor for lack of caregiver support might be related to the fact that 11 (34.4%) of our group B patients were widow/widowers against none in group A. studies have also shown that a living and healthy life partner is an asset for stroke survivor's post-stroke rehabilitation[7]. Post-stroke healing process and synaptic plasticity is greatest in the early phase of stroke which can be augmented with early initiation of post-stroke rehabilitation[13] Studies have shown that the majority of neurologic and functional recovery after stroke occurs within the first 30 days of stroke and by 6 months maximum recovery is already achieved. Beyond 6 months, the process almost comes to a plateau despite rigorous rehabilitation protocol[11-16]. In our study those who were rehabilitated early (group-A) had statistically significant FIM gain than those who were rehabilitated late, which is in accordance with other studies. Researchers have also taken into consideration factor other than time from stroke onset to IRF admission that might play a role in functional recovery like age difference, disability status and type of stroke, and found that even if age and disability was matched, those with early initiation of rehabilitation had much improvement in functional status as compared to late onset rehabilitation[12-16] Studies have also shown that timely rehabilitation not only improves functional recovery but also help to identifying and prevent many distressing post-stroke complications like spasticity, contracture, shoulder pain, shoulder dislocation, depression, urinary tract infection and pressure ulcers[17]. Our study has a limitation for being a single center study, so the results of the study cannot be generalized. Secondly, we could not follow up our patients over long period to see the long-term effect of delayed rehabilitation on functional outcome, hence a large scale study with long-term follow up should be conducted to see the long term functional outcome of delayed rehabilitation up to the level of community reintegration of these patients.

CONCLUSION

Delayed initiation of post-stroke rehabilitation results in poor functional outcome in Pakistani patients. Awareness should be created among stroke survivors about under-going stroke rehabilitation program and efforts should be done to initiate rehabilitation as soon as possible to improved functional outcomes.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

REFERENCES

1. Khalid W, Rozi S, Ali TS, Azam I, Mullen MT, Illyas S, et al. Quality of life after stroke in Pakistan. BMC Neurol 2016; 16(1): 250.

2. Hashmi M, Khan M, Wasay M. Growing burden of stroke in Pakistan: a review of progress and limitations. Int J Stroke 2013; 8(7): 575-81.
3. Singh V, Prabhakaran S, Chaturvedi S, Singhal A, Pandian J. An examination of stroke risk and burden in South Asians. J Stroke Cerebrovasc Dis 2017; 26(10): 2145-53
4. Khealani BA, Hameed B, Mapari UU. Stroke in Pakistan. J Pak Med Assoc 2008; 58(7): 400-3.
5. Berges IM, Kuo YF, Ottenbacher KJ, Seale GS, Ostir GV. Recovery of functional status after stroke in a tri-ethnic population. PM R 2012; 4(4): 290-5.
6. O'Brien SR, Xue Y. Predicting goal achievement during stroke rehabilitation for Medicare beneficiaries. Disabil Rehabil 2014; 36(15): 1273-8.
7. Wang H, Camicia M, Terdiman J, Hung YY, Sandel ME. Time to inpatient rehabilitation hospital admission and functional outcomes of stroke patients. PM R 2011; 3(4): 296-304
8. Meyer MJ, Pereira S, Mc Clure A, Teasell R, Thind A, Koval J, et al. A systematic review of studies reporting multivariable models to predict functional outcomes after post-stroke inpatient rehabilitation. Disabil Rehabil 2015; 37(15): 1316-23.
9. Taj F, Zahid R, Syeda UE, Murtaza M, Ahmed S, Kamal AK. Risk factors of stroke in Pakistan: a dedicated stroke clinic experience. Can J Neurol Sci 2010; 37(2): 252-7
10. Boone M, Chillon JM, Garcia PY, Canaple S, Lamy C, Godefroy O, et al. NIHSS and acute complications after anterior and posterior circulation strokes. Ther Clin Risk Manag 2012; 8: 87–93.
11. Chiou-Tan FY, Keng MJ Jr, Graves DE, Chan KT, Rintala DH. Racial/ethnic differences in FIM scores and length of stay for underinsured patients undergoing stroke inpatient rehabilitation. Am J Phys Med Rehabil 2006; 85(5): 415-23
12. Savaş S, Akkuş S, Soyupek FC, İlgün E, Yıldiz S. Impact of delayed initiation to stroke rehabilitation on functional outcomes and medical complications. Turk J Phys Med Rehab's 2007; 53(2): 45-49.
13. Salter K, Jutai J, Hartley M, Foley N, Bhogal S, Bayona N, et al. Impact of early vs delayed admission to rehabilitation on functional outcomes in persons with stroke. J Rehabil Med 2006; 38(2): 113-7.
14. Akhlaq U, Ayaz SB, Akhtar N, Khan AA. Frequency and intensity of shoulder pain after stroke: A hospital based study. Pak Armed Forces Med J 2016; 66(1): 71-4.
15. Scrutinio D, Lanzillo B, Guida P, Mastropasqua F, Monitillo V, Pusineri M., et al. Development and validation of a predictive model for functional outcome after stroke rehabilitation: The Maugeri Model. Stroke 2017; 48(12): 3308-15.
16. Bates BE, Xie D, Kwong PL, Kurichi JE, Ripley DC, Davenport C, et al. Development and validation of prognostic indices for recovery of physical functioning following stroke: Part 1. PM R. 2015; 7(7): 685-98.
17. O'Brien SR, Xue Y, Ingersoll G, Kelly A. Shorter length of stay is associated with worse functional outcomes for medicare beneficiaries with stroke. Phys Ther 2013; 93(12): 1592-602.