ORIGINAL ARTICLE

Effects of Active Self Propelled Wheel Chairs versus Regular Standard Wheel Chairs on Quality of Life in Paraplegic Population

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ABSTRACT

Objective: To observe the effects of Active Self Propelled Wheel Chairs versus Regular (Standard) Wheel Chairs on Quality of Life in Paraplegic Population.

Materials and Methods: This observational study was conducted in three union councils of district Swat from the period of January to December 2012. The total of 50 paraplegic patients were selected and placed into two groups. After taking a written consent Active Wheel Chair Self Propelled was provided to the patients in group A, and Regular Wheel Chair Standard to the patients in group B. Initially all the patients were trained for the proper use of wheel chair. The baseline characteristics were same in all patients. The individual prioritize problem assessment instrument (IPPA) was used an assessment toll, and it measures the effects of assistive technology. IPPA score was calculated for all patients at baseline and after 3 months use of wheel chairs.

Results: The quality of life was significantly more enhanced in group A with Active Self Propelled Wheel Chairs (P=0.001), as compared to group B with Regular Standard Wheel Chairs (P=0.541), in paraplegic population, as assessed by the individual prioritize problem assessment instrument (IPPA).

Conclusion: The Active Self Propelled Wheel Chairs are more effective for the enhancement in quality of life, as Compare to Regular Standard Wheel Chairs in Paraplegic Population.

Key Words: *Quality of Life, Wheel Chair, Paraplegic Population.*

Introduction

Spinal cord injury (SCI) may result from motor vehicle accidents, falls, sports injuries, and violence.[1] The spinal cord injuries are commonly divided into “incomplete", which can vary from having no effect on the patient and "complete" injury which means a total loss of function. The symptoms after spinal cord injury depend on the level of injury, nerve root involvement and vary widely, from pain to paralysis to incontinence with common presentation of paraplegia and quadriplegia.[2] The medical, surgical and rehabilitation are the commonly used management for patients with spinal cord injuries. The rehabilitation is the key component of evidence - based management, when the patient gains medical and surgical stability.[3] The rehabilitation is emphasized on patient's respiratory status, prevention of indirect complications (such as pressure sores), maintaining range of motion, and keeping available musculature active and with great emphasis on airway clearance during this stage of recovery.[4] The American Spinal Cord Injury Association (ASIA) motor score is a 100 point score based on ten pairs of muscles each given a five point rating. A person with no injury should score 100. Paraplegia is impairment in motor or sensory function of the lower extremities and results of damage to the cord at T1 and below.[5] The goals of rehabilitation at the chronic level are patients' mobility and accessibility. The paraplegics are mostly wheel chair dependent and selection of wheel chairs have very important role in patients' mobility and accessibility. Currently many types of wheel chairs are used for the mobility in paraplegics, including the Active (Self Propelled) Wheel Chairs, and Regular (Standard) Wheel Chairs. The individual prioritize problem assessment instrument (IPPA) is commonly used tool for measurement of effectiveness of assistive technology.[6] The total individual prioritize problem assessment instrument (IPPA) score has a range between 1 and 25, and represents the total average perceived inconvenience experienced by the paraplegic s population with respect to problems associated with daily living activities.[7] A higher IPPA score indicates that the paraplegic population perceives their life to be more troubled by this problems.The purpose of this study was to compare the effectiveness of Active Self Propelled Wheel Chairs, with Regular Standard Wheel Chairs in paraplegic population.[8]

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Table I: Description of Active (Self Propelled) Wheel Chairs and Regular (Standard) Wheel Chairs

S. No.	Active (Self Propelled) Wheel Chairs	Regular (Standard) Wheel Chairs
01	The back rest is adjusted below the inferior angle of scapula to free the shoulder brim for propelling purposes	The back rest is adjusted above the superior border of scapula for full back support and to help the care givers to push easily
02	The Arm rest is either removable or adjusted below the iliac bones (waist)	The Arm rests are either fix or adjusted above the iliac bones (waist)
03	The rare wheels are adjusted a little ahead at the level of the arms for independent	The rare wheels are adjusted a little at the level of arms
04	propelling of wheel chairs	
05	There is a positive camber in rare wheels for proper safety and freely use	There is no positive or negative camber in rare wheels. They are adjusted straight
06	The foot rest are adjusted according to the leg length	The foot rest are adjusted according to the leg length
07	The pressure relief cushion is made according to the width of the two hip bones.	The pressure relief cushion is made according to the width of the two hip bones

Fig1: Active (Self Propelled) Wheel Chairs

Fig 2: Regular (Standard) Wheel Chairs

Materials and Methods

This observational study was conducted in three union councils of district Swat from January to October 2012 on traumatic and non-traumatic wheel chair dependent spinal cord injury patients. A total sample of 50 patients were identified and placed into group, where 35 were male and 15 females with age ranged from 10 to 60 years. The inclusion criteria was traumatic and non traumatic paraplegic patients of both gender with sufficient upper extremity strength, and exclusion criteria was individuals' presentation other than paraplegia and insufficient upper extremity strength. A written consent was taken from all patients before enrolling into study. The Active Wheel Chair (Self Propelled) was provided to the patients in group A, and Regular Wheel Chair (Standard) to the patients in group B. All the patients were trained for the proper use of wheel chair. The baseline characteristics were same in all patients. The individual prioritize problem assessment instrument (IPPA) was used an assessment tool, and it measures the effectiveness of assistive technology. IPPA score was calculated for all patients at baseline and after 3 months use of wheel chairs. The data was analyzed by SPSS-20, and paired t test was applied to calculate the confidence interval at 95 % for both the groups

Results

The quality of life was significantly more enhanced in group A with Active (Self Propelled) Wheel Chairs (P=0.001), as compared to group B with Regular (Standard) Wheel Chairs (P ≤ 0.541), in paraplegic population, as assessed by the individual prioritize problem assessment instrument (IPPA).

Discussion

The results of our study shows significant improvement in group A with Active Self Propelled Wheel Chairs (P=0.001), as compared to group B with Regular Standard Wheel Chairs (P≤ 0.541), in paraplegic population, as assessed by the individual prioritize problem assessment instrument (IPPA). The results of our study are supported by many other studies conducted in different environments. Boninger and associates conducted a research study on Engineering Better Wheelchairs to Enhance Community Participation. They highlighted that about 2.2 million Americans currently using wheeled mobility devices, and used by the individuals with impair mobility for free accessibility in the community. The typical users of wheel chairs are individuals with spinal cord injuries, arthritis, balance disorders, and other conditions or diseases which causes mobility related problems. However, secondary injuries and wheelchair-related accidents are risks in wheel chair users. They concluded that Research is underway to advance wheelchair design to prevent or accommodate secondary injuries related to propulsion and transfer biomechanics, while improving safe, functional performance and accessibility to the community. They summarizes research and development underway aimed at enhancing safety and optimizing wheelchair design.[9] Cooper and colleagues conducted a research study on Comparison of fatigue life for three types of manual wheelchairs. This study examines three different types, including depot, lightweight, and ultralight. All these manual wheelchairs have been tested to fatigue according to ISO standards. They concluded that ultralight wheelchairs were significantly better than lightweight and depot with regard to fatigue life.[10] The same study was replicated by the Kwarciak and team and concluded the same results.[11] RD Wessel and team conducted a research study on Effectiveness of provision of outdoor mobility services and devices in the Netherlands on 59 patients with disabilities in outdoor mobility. They concluded that the latest technology based Active (Self Propelled) Wheel Chairs is more effective than Regular (Standard) Wheel Chairs in improving quality of life in patients with disabilities in outdoor mobility as assessed by IPPA.[12] Paul Chappell carried out research study on the quality of life achieved by 20-40 year old males living in Sri Lanka who have either received rehabilitation or have or not spinal cord injury. They concluded that the proper rehabilitation along with appropriate training and use of modern wheel chairs can enhance quality of life in patients following spinal cord injuries.[13]

Conclusion

The Active Self Propelled Wheel Chairs are more effective for the enhancement in quality of life, as compared to Regular Standard Wheel Chairs in paraplegic population.

REFERENCES

1. Marino RJ, Barros T, Biering-Sorensen F, Burns SP, Donovan WH, Graves DE, et al. ASIA Neurological Standards Committee. International standards for neurological classification of spinal cord injury. The journal of spinal cord medicine 2003; (1) 26:50-6.
2. Ho CH, Wuermser LA, Priebe MM, Chiodo AE, Scelza WM, Kirshblum SC. Spinal cord injury medicine: epidemiology and classification. Archives of Physical Medicine and Rehabilitation 2007; 88(3): 49-54.
3. Sherwood AM, Dimitrijevic MR, McKay WB. Evidence of subclinical brain influence in clinically complete spinal cord injury: discomplete SCI. Journal of Neurological Sciences 1992: 110(1): 90–8.
4. Frood R. The use of treadmill training to recover locomotor ability in patients with spinal cord injury. Oxford Journals 2010; 4(1): 108–17.
5. Fulk G, Schmitz T, Behrman A. Traumatic Spinal Cord Injury. In: O'Sullivan S editor. Physical Rehabilitation. 5th ed. Philidelphia Pennsylvania: F.A. Davis; 2007.p. 937-96.
6. Reid WD, Brown JA, Konnyu KJ, Rurak, JM, & Sakakibara BM. Physiotherapy secretion removal techniques in people with spinal cord injury: a systematic review. The journal of spinal cord medicine 2010; 33(4):353.
7. Brown R, DiMarco AF, Hoit JD, Garshick E. Respiratory dysfunction and management in spinal cord injury. Respiratory care 2006; 51(8): 853-70.
8. Goosey-Tolfrey VL, Leicht CA. Field-based physiological testing of wheelchair athletes. Sports medicine 2013; 43(2): 77-91.
9. Cooper, R. A., Boninger, M. L., Spaeth, D. M., Ding, D., Guo, S., Koontz, A. M. & Collins, D. M. Engineering better wheelchairs to enhance community participation. Neural Systems and Rehabilitation Engineering 2006; 14(4): 438-55.

10. Cooper RA, Robertson RN, Lawrence B, Heil T, Albright SJ, VanSickle DP et al. Life-cycle analysis of depot versus rehabilitation manual wheelchairs. Journal of rehabilitation research and development 1996; 33 (1): 45-55.
11. Kwarciak AM, Cooper RA, Ammer WA, Fitzgerald SG, Boninger, ML, Cooper R. Fatigue testing of selected suspension manual wheelchairs using ANSI/RESNA standards. Archives of physical medicine and rehabilitation 2005; 86(1):123-9.
12. Wessels RD, De Witte LP, Jedeloo S, van den Heuvel WP, van den Heuvel WJ. Effectiveness of provision of outdoor mobility services and devices in The Netherlands. Clinical rehabilitation 2004; 18(4):371-8.
13. Chappell P, Wirz S. Quality of life following spinal cord injury for 20–40 year old males living in Sri Lanka. Asia Pacific Disability Rehabilitation Journal 2003, 14(2): 162-78.