



Individuals with Spinal cord injury and their need for assistive devices.

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Abstract

Background:

Spinal cord injury (henceforth SCI) often results in a lifetime loss of body functions. SCI is a major cause of disability around the world. SCI may lead to serious disability in the patient resulting in loss of work. This, in turn, results in psychosocial and economic problems. So our study aims to explore the impact and the issues associated with existing assistive devices among individuals with spinal cord injury.

Methods:

This mixed-method study aimed to explore the need for assistive devices and the use and impact of the existing orthosis commonly used by individuals with spinal cord injuries towards improving mobility function.

Results:

Most of the individuals with SCI depend on one kind of assistive device for the mobility. The participants also require additional modifications to the existing devices to suit their need.

Conclusion:

A sustainable assistive device is necessary to help an individual to manage the disability due to loss of mobility after a spinal cord injury.

Key Words: Assistive devices, Orthosis, Spinal cord injury

INTRODUCTION

The spinal cord is a part of our body's central nervous system, protected by a bony structure called the spinal column. The spinal column provides the main support to our body, allowing us to do functions like standing upright, bending and twisting (Nógrádi and Vrbová, 2013).

Damage to the spinal cord may be classified into two categories. Damage due to trauma following falls, road traffic accidents, or violence and damage due to non-traumatic causes like infections or degenerative disorders.

It is commonly abrupt in onset and has a significant impact on the persons and their caregivers, who are mostly their families (McDonald and Sadowsky, 2002).

Spinal cord injury (henceforth SCI) often results in a lifetime loss of body functions. Loss of functions of the lower half of the body is termed paraplegia, which occurs due to injury at the lower lumbar level and loss of function in the upper limbs, trunk, and lower limbs called quadriplegia occurs due to the injury at the cervical level. Additional respiratory system complications may occur if the injury is in the upper cervical region (Sekhon and Fehlings, 2001).

SCI is a major cause of disability around the world. It is estimated to have an annual global incidence of 40-80 cases per million population (WHO fact sheet, 2011.) (Chhabra and Arora, 2013). In India, the estimated incidence is 20/ million / year (Singh et al., 2012).

The consequences of SCI significantly impact an individual's independence and physical function and include other complications like neurogenic bladder, pressure ulcer, spasticity, etc. SCI may lead to serious disability in the patient resulting in loss of work. This, in turn, results in psychosocial and economic problems (Nas et al., 2015).

The usual course of treatment and rehabilitation of SCI is long, expensive and exhausting (Nas et al., 2015) the acute and sub-acute phase, which is 6-8 weeks immediately post-injury. It usually includes a period of hospitalization and stabilization followed by bed rest. In this phase, there is expenditure on medicines, hospitalization, investigations, and surgery.

After the sub-acute phase, the patient's main issue is the modification of his / her home to the disability. This may lead to expenditure on modifications, like ramps, railings, etc., and assistive devices like wheelchairs. In addition, there may be regular sessions of physiotherapy.

The rehabilitation phase aims at achieving the maximum ability post-trauma. This phase, too, usually includes hospitalization or multiple sessions at a rehab centre. Overall there is a decrease in the quality of life, depression, stress, and anxiety due to decreased moments and difficulty in adapting to newer ways of using assistive devices (K, 1999; Silver, 2005)

Restoration of gait in cases with spinal cord injuries (SCIs) has several advantages. From the medical standpoint, a wheelchair-bound life can lead to many morbid conditions, similar to osteoporosis, constipation, urinary tract infection, and cardiovascular deconditioning. From the cerebral standpoint, advantages similar to increased tone- regard through standing and being at eye position with others as well as through walking, indeed if only a little, can not be neglected.

Orthoses are classified as the bilateral external common type and the medium single hipsterism joint type according to the position of the orthotic hipsterism joint. The most frequently used in European countries and the United States are the repaying gait orthosis (RGO) and the hipsterism guidance orthosis (HGO), both of which are hip – knee – ankle – bottom orthoses (HKAFO) of the bilateral external common type. As these orthoses have orthotic hipsterism joints on both sides, they enable cases with SCI to negotiate gaits more briskly than the Walkabout system.

The use of an orthosis can increase the postural stability while standing and walking in cases with spinal cord injury (SCI), particularly when the orthosis is used in confluence with a walking aid, similar as a forearm bolsterer. Three main types of orthoses can be used for orthotic gait recuperation; these include hipsterism-knee-ankle-bottom orthoses (HKAFOs), repaying gait orthoses (RGOs), and medium relation orthoses (MLOs). portable hipsterism joints are also included, which can be locked into an extension when the case is standing.

For effective recuperation, it's important to be suitable to nicely prognosticate the final outgrowth of treatment on the base of an original assessment as well as other applicable factors to rightly direct training towards the achievement of the asked outgrowth. goods of the following factors on the degree of gait independence that cases with SCI can attain when they essay to restore gait have been independently studied neurological position, inflexibility of injury, the strength of arms and provocation, age, degree of spasticity, contracture, body weight, essential dexterity, and collaboration of movements.

Spinal cord injury (SCI) is a catastrophic event that leads to an expensive life-altering state, thus requiring specialized intensive rehabilitation. The outcome of spinal cord injury is very distressing. There are studies that suggest that there are a high number of neglected spinal cord injury cases mainly due to lack of awareness and lack of recourses. (Chhabra and Arora, 2013).

The outcome is a lifelong impact the morbidity is high. The spinal cord injury patients require lifelong care resulting in high direct medical, direct non-medical, indirect and intangible costs.

Thus a sustainable hip-knee-foot orthosis will help an individual with a complete spinal cord injury. It will help in improvement in mobility and in turn will improve mental and social wellbeing. So our study aims to explore the impact and the issues associated with existing HKO among individuals with spinal cord injury.

METHODS

This mixed-method study aimed to explore the need for assistive devices and the use and impact of the existing orthosis commonly used by individuals with spinal cord injuries towards improving mobility function. The study was conducted among individuals with SCI. The people with SCI coming to the rehabilitation during the course of study or those who underwent rehabilitation from government rehabilitation and a private rehabilitation centre in Odisha were purposively selected, and individuals who underwent rehabilitation long back were contacted through an NGO working in the state and were invited to be a part of the study.

An interview schedule was developed with sections related to demographic details, socio-economic details, injury status, expenditures on assistive devices and their experiences with the currently used assistive devices. This tool was used to document the details.

In-depth interviews were conducted among a few purposively selected participants to gather in-depth insight into the usage of assistive devices, issues faced and benefits of using an assistive device.

Informed consent was obtained before data collection and privacy was ensured throughout the research. SPSS 25 version software was used to do the analysis.

The information will be used to ideate the product and develop the prototype of the assistive device, which will be further tested for its beneficence. The product will be tested at the field level on successful lab testing among individuals with spinal cord injuries. The data from the trial will be analysed for its effectiveness.

Results:

Between September 2022 and November 2022, a total of 84 individuals with SCI were contacted at the rehabilitation centres and through NGOs working in Odisha. Out of them, 79 consented to participate in the study and provided us with complete information.

Of the 79 individuals, males constitute 87.3 percent and females constitute only 12.7 percent. Out of the total, 46.8 percent are unmarried, 49.4 percent are married and 3.8 percent are widow/widower. Out of the 79 SCI individuals 63.3 percent belong to rural areas, and 36.7 belong to urban areas.

Road Traffic Accident (RTA) is the most common cause of injury as 49.4 percent of individuals had injury because of RTA, followed by fall from heights and other causes like fall from stairs, slipping in bathroom or injury during farming. 65.8 percent of the total 79 people were between 18 years to 40 years of age when they sustained injury. Of the total participants, 30.4 percent have a cervical-level injury, 48.1 percent have a thoracic-level injury, and 21.5% have a lumbar spine injury. The demographic details of the participants are mentioned in Table 1.

Table 1- Demography and injury status

Table 5.1 Demographic and injury details			
Variable name	Category	Frequency	Percent
Gender			
	Male	69	87.3
	Female	10	12.7
Marital status			
	Unmarried	37	46.8
	Married	39	49.4
	Widow/widower	3	3.8
Area of residence			
	Urban	29	36.7
	Rural	50	63.3
Cause of injury			
	RTA	39	49.4
	Fell from height	23	29.1
	Fell from tree	6	7.6
	Others	11	13.9
Level of injury			
	Cervical(C1_C7)	24	30.4
	Thoracic(T1-T11)	38	48.1
	Lumbar(L1-L5)	17	21.5
Age at which injury occurred			
	Less than 18 years	9	11.4
	18-40 years	52	65.8
	More than 40 years	18	22.8

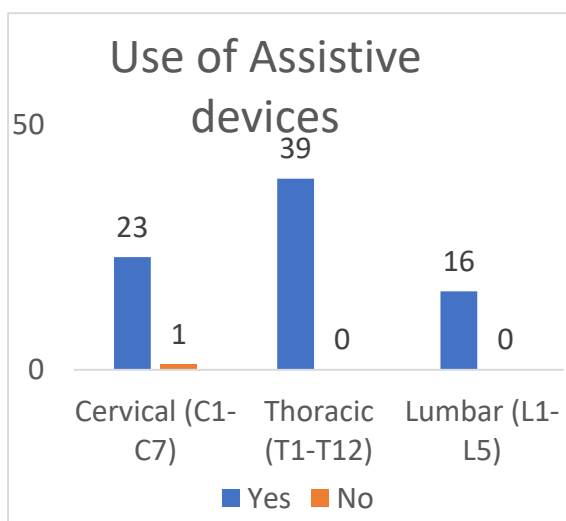


Figure 1 Use of assistive devices

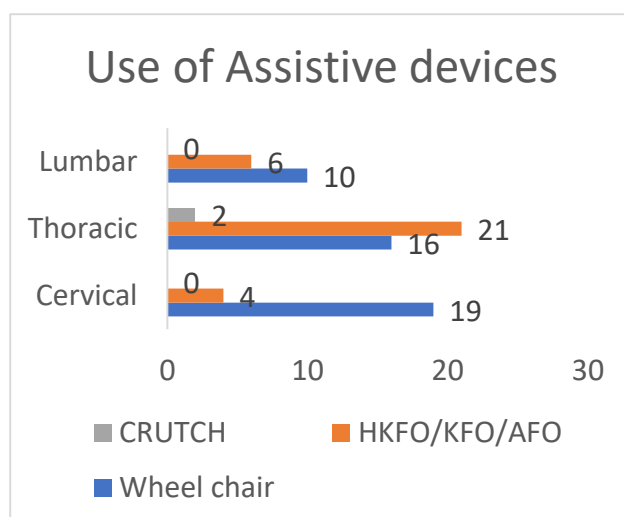


Figure 2 Type of assistive devices used

As shown in Figure 1, Out of the total participants only one individual who has a cervical-level injury doesn't use any assistive device otherwise everyone else uses one or the other type of assistive device for mobility.

Among the 16 individuals who had an injury in the lumbar level 10 used a wheelchair and 6 used HKFO/KFO/ AFO for mobility. 2 individuals among the 39 individuals with thoracic level injury used an elbow crutch, 21 of them used HKFO/KFO/AFO and 16 used a wheelchair. Among the 24 individuals with cervical level injury 19 used wheelchairs, 4 used HKFO/KFO/AFO for mobility. There is a visible association between functional ability and the use of assistive devices. Majority of the participants who had complete injuries used wheel chairs for mobility where as individuals with incomplete spinal cord injuries used HKFO, KFO, AFO for better GAIT function. Participants involved in sports complained about lack of adaptability of HKFO for playing sports. Issues like weight of the orthosis, using of orthosis with regular foot wear, comfort and issues with size were significantly reported. Few individuals wanted minor modifications like adding a strap for better functionality and support.

The participants were asked about the modifications they desired for their assistive devices. Most participants explained the issues related to handles, arm supports, seta and wheels of their assistive devices. Few of them complained about the type of material used as padding or shock absorption. The individuals involved in sports wanted to modify their wheelchairs for more ground clearance and better turnabout. The participants explained the issue of managing the inadequacy of their physical movements with the help of the right assistive device. A few individuals with injury for more than ten years explained the need for appropriate assistive devices. Thus assistive devices are an integral part of the lives of individuals with spinal cord injury, and an appropriate selection of the device will amplify their physical ability.

DISCUSSION AND CONCLUSION

The assistive devices are crucial for enhancing an individual's physical functioning with SCI. The assistive devices help increase mobility, which is an important aspect of one's being. The other studies also showed the importance of assistive devices in managing disability due to spinal cord injury (Kumar, Roy and Kar, 2012). Spinal cord injury being abrupt in onset results in physical impairment and psychological and social burden. The impairment adding to the social stigma adds to the psychological burden. Thus, assistive devices are helpful in increasing the mobility thereby decreasing the psychological burden of the individuals with spinal cord injury. The information gathered is enough to let us know that the assistive devices are important part of the rehabilitation process after spinal cord injury. These devices need to be fitted according to the size of the individuals for maximum impact. The experience shared by the participants will be helpful in designing a assistive device helpful for individuals with spinal cord injury.

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