

Review Article

Commonly Used Assistive Devices in Neurological Conditions

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Abstract: Background: Assistive devices used externally which made for adaptation with appropriate assisted an impaired person to perform their daily functions. It may be simple, low cost types and also controlled by specialized computer software. Various types of positional devices, mobility devices, daily living devices & also prosthetics, orthotics were used for support. Some evidence suggested that assistive devices helped for ambulation & ambulatory function assessment should be depending on the requirements of assistive device uses in neurological conditions especially on stroke and SCI. Study focused that application of stretch splint on experimental thumb where reduced the space. But result showed that intensive stretch which applied regularly for three months did not reduce thumb web-space contractures. On the other hand, other study suggested everyday used of assistive devices with environmental modification improves GMFS levels in CP children. Another RCT discussed that h-AFO may reduce toe walking on the hemiparetic side into a heel-toe gait pattern & it also controlled excessive ankle plantar flexion in swing phase. This study also focused that h AFO was more effective than dynamic AFO in gait rehabilitation for hemiplegic CP. Objective: To focus on the uses of assistive devices in neurology. Methodology: Study was done by narrative review. Conclusion: Assistive device helped a physiotherapist to achieve maximum goal during rehabilitation in neurological conditions. Some assistive devices were used for treatment purpose as well as ADL modification & it improved, maintain their quality of life. But it was very much important to know the proper use of devices with their rational and important concerning issue about the overuses and inappropriate uses of assistive devices which may lead to more dependency of neurological patients and also negatively impact on their rehabilitation process. If more RCT will be done about the use and effect of assistive devices may help us to clear conception about the uses of assistive devices and its importance on rehabilitation of neurological conditions.

Keywords: Assistive Devices, Neurological Conditions & Rehabilitation, ADL

1. Introduction

1.1. Assistive Devices

The devices which externally used & which made for adaptation with appropriate assisted an impaired person to perform their daily functions known as assistive devices. These assistive devices helped neurologically impaired patients to perform their activities in community [10]. It

helped to mobility and self-care especially neurologically involved patients. Assistive devices adjustments for ADL in case of functional disabilities was one of the most important strategies for neurological conditions [17].

1.2. Types of Assistive Devices

Assistive devices may be simple, low cost types and also maybe controlled by specialized computer software. It also various types like positional devices, mobility devices, daily

living devices & also prosthetics, orthotics. Wheelchairs, crutches, sticks used by neurological conditions and also some positional like wedges, special chair, standing frame also used by neurological impaired patients especially for CP patients [10]. The design of assistive devices dependent on some factors like environmental, cultural, social & economical. This device also made by skilled technologist and also simple, effective & friendly for patients [10].

1.3. Neurological Conditions & Assistive Devices

Among other neurological conditions TBI and stroke were more common. Brain injury now a day is one of the major causes in whole world for death and disability with other neurological conditions. This condition is mainly related with cognitive and motor functions which has a negatively impact on quality of life. Using of assistive device and robotic gait rehabilitation with the other strengthening exercises, postural control plays a vital role in rehabilitation program [3]. ADL reduces patients who have suffering different in neurological disorders specially stroke. Among them about 35% had seriously suffered by various types of disability [13]. Evidence also reported that most of the time this assisted devices were prescribed during discharge and mostly used at home [7]. Communication abilities were hampered in case of various neurological disorders. Among them CVA, GBS SCI faces more communication and mobility problems [14]. In case of neurological disease GBS outcome varies differently. But in good prognosis on mobility and longtime good quality of life depends on related appropriate assistive device [8]. Another common neurological conditions CP was the motor disability occurred in childhood also common. These CP children have different types of neurological deficits that can interfere their motor function and ADL. Now a day this type of neurological pediatric conditions rehabilitation not only focused on intervention but also multidimensional concepts as like as rehabilitation influenced by ICF. In ICF it almost focused on all dimensions like physiological, social, and environmental and all aspects. Among them use of the support of assistive devices plays key role for environment modification and ADL performance [16].

1.4. Prevalence of Using Assistive Devices in Neurological Conditions

In different types of countries including low- and middle-income countries about 5-15% people need assistive devices [10]. Most of the neurological impaired patients used various types of assistive devices and previous studies focused that most of the American older population with or without neurological impairment performed their ADL with the help of any type of assistive devices [5]. among different types of neurological conditions stroke is an acute neurological dysfunction where 30-40% has residual disability and on that cases assistive devices helped them [21].

1.5. Objectives of the Study

1. To focus on the uses of assistive devices on neurological

conditions.

2. To discuss about the strength and limitations of the uses of assistive device.
3. To know the advance evidence-based knowledge about devices which helps on rehabilitation process.

2. Methodology

2.1. Study Design

This study had done through narrative review. This study wanted to know the assistive devices which is used in neurological conditions in our country & globally.

2.2. Information Sources and Search Strategy

For this reason, researcher try to searched some evidence-based database like Google Scholar, Pub Med, Pedro, Specific journals etc.

3. Assistive Devices & Neurological Conditions

3.1. Mobility Aids

Different types of mobility aids were frequently used by older peoples with various neurological conditions which can helps them to move independently and maintain their balance. This different mobility aids also prevent falls & injuries as well as improve their daily living quality [1]. Some evidence also suggested that ambulatory function assessment should be depending on the requirements of assistive device uses & it also improves the gait function as well as occurred improvement of quality of life [6].

3.2. Stroke & Assistive Devices

One study discussed that to improve the speed of gait was related not only community ambulation but also it depended on balance, motor function endurance and the proper specific uses of assistive device in stroke patients [20]. Impairment: In stroke most patients suffered on gait and gross motor functions. Hemiplegic gait in stroke patients may reduce motor functions and as well as ambulation [15]. After stroke different disability may occurs due to loss of their independent ambulation [20]. Stroke or TBI patients were commonly suffered by upper limb weakness with movement loss. At the later stage they suffered by contracture due to loss of passive range of motion and also reduce functional activity [11]. These problems are more prominent and thumb wabe space contracture also present with other upper limb problems [18]. Effects: Assistive devices helped to assist their locomotion and ambulation [15]. It also helped them for independent ambulation [20].

3.3. Hand Splint & Effects

Sometimes patients were prescribed for hand splint. Different studies have different view and argument, among

them one RCT showed that stroke patient who suffered for 6 months and they used hand splint for 4 weeks in functional resting position which didn't improve contracture as well as hand function. This article also reported that if patients wear splint regimen for whole night on affected hand it did not create any significant clinical benefit for patients [11].

3.4. Stretch Splint & Effects

Another scholarly article said about this type of contracture. In this RCT they applied stretch splint on experimental thumb where reduced the space. It was used in stretched abducted position in every night for twelve weeks and may continue over three months. But result showed that intensive stretch which applied regularly for 3 months which did not reduce thumb web-space contractures and no clinical significance in neurological conditions [18].

3.5. Walker & Effects

Walker was other types of important assistive device which are so much helpful for gait. It was helpful but sometime it also reduced the functional capacity of a patient. So, it was compulsory to maintain and follow all precautions during the uses of cane or walker during hospital time and home to reduce their dependency [12].

3.6. Cerebral Palsy & Assistive Devices

CP was the most common and the used of various special assistive devices also popular. RCT showed that among thirty-eight devices their participants only used fifteen devices for everyday or once a week. AFO, wheelchair and ambulatory tricycle were more used. On the other hand, another twelve devices were used for a single time at home [9]. It was very much concerned issue that Assistive devices need to be carefully selected and also need to accurate comprehensive assessment. Comprehensive assessment included medical history, social history and also focused on recent reserve function, to set individual goal. All this process completed by an MDT team where physiotherapists played important role for rehabilitation [10]. To improve disable people physical function and reduced their environmental barriers design of devices was so much important and it was the greatest achievement of a physiotherapist. Especially for

CP children it should be easier, simple designed which can be easily used by patients and carriers [9].

Another study said that the Classification of Technical Aids for Persons with Disabilities was used to classify the environmental modifications for disable persons and especially for CP where they classified according to functional principle excluding non-technical solution. The government and insurance were supported disable people and CP child for assistive device at free of cost. Everyday uses of assistive devices with environmental modification improve GMFS levels in CP children [16]. Impairment: Disability reduces ambulatory functions and this was more common due to neurological conditions disability [4].

3.7. Axillary Crutch & Effects

Axillary crutch supported with pelvic girdle which now days were more effective ambulatory device for gait. It was very much supportive for lower limb during walking and weight transferring in rehabilitation period after any neurological conditions specially whose were more vulnerable in walking time [4].

3.8. AFO & Effects

In CP aim of using AFO was to correct the angle of foot specially in swing time and to improve pre-positioning of the foot at initial contact with to permit a heel strike in a gait cycle. Dynamic AFO were effective than other AFO which are influenced abnormal joint movement with the changes of spastic tone and reflexes in hemiplegic CP. This RCT discussed that the effect in patients with hemiplegic CP and they found that the h-AFO may reduce toe walking on the hemiparetic side into a heel-toe gait pattern & it also controlled excessive ankle plantar flexion in swing phase. This study also focused that h AFO was more effective than d AFO in gait rehabilitation for hemiplegic CP [18].

3.9. SCI & Assistive Devices

Impairment & Effects: SCI patients mostly used wheelchair, walker and tricycle. It was helpful but sometime it also reduced the functional capacity of a patient. Compulsory to maintain and follow all precautions during the uses of cane or walker during hospital time and home to reduce their dependency [12].

Table 1. Common neurological conditions and necessary assistive devices.

Assistive devices	Neurological conditions	Benefits of devices with evidence	Limitation of devices with evidence
AFO	Cerebral Palsy	<ol style="list-style-type: none"> 1. Correct the foot angle specially in swing time. 2. Improve pre-positioning of the foot at initial contact with to permit a heel strike in a gait cycle. 3. H-AFO may reduce toe walking into a heel-toe gait pattern & 4. It also controlled excessive ankle plantar flexion in swing phase. 5. This study also focused that h AFO was more effective [18]. Daily uses of assistive devices with environmental modification improve GMFS level. Ambulatory devices improve their Gait [9] 	Evidence suggested that sometime it also reduced the functional capacity if appropriately it would not prescribe & used.
Axillary crutch		<ol style="list-style-type: none"> 1. More effective ambulatory device for gait. 2. supportive for lower limb during walking 3. Weight transferring in rehabilitation. 4. It is very much supportive specially whose are more vulnerable in walking time [4] 	Need to be maintaining accurate measurement and proper effective use.

Assistive devices	Neurological conditions	Benefits of devices with evidence	Limitation of devices with evidence
Night splint	Stroke	1. Night splint used to prevent contracture	Patients who wear splint regimen for whole night on affected hand it did not create any significant clinical benefit for patients [11] Evidence suggested that sometime it also reduced the functional capacity & essential to maintain and follow up [12] Some evidence also suggested that use of Bobath sling did not correct the subluxation as well. Sometime it also reduced the functional capacity Compulsory to maintain and follow all precautions during the uses of cane or walker during hospital time and home to reduce their dependency [12] Good prognosis depends on related appropriate assistive device if appropriately prescribed [8] One RCT result showed that it has no clinical significance [18]
Walker		2. Helpful for gait during rehabilitation.	
Sling		3. Used to prevent shoulder subluxation [19] 4. Bobath sling has some effect of effectiveness and specificity of shoulder support to decrease subluxation after hemiplegia [2]	
Wheelchair, Walker, Tricycle	SCI	1. Helpful for rehabilitation and gait cycle reeducation. 2. Improve functional capacity.	
Toe pick up	GBS	1. Helps to ambulation. 2. Prevent further complications 3. Also Help during ADL	
Hand splint		4. Prevent further complications 5. Also Help during ADL.	

4. Discussion

Assistive devices are commonly used in neurological conditions during rehabilitation time. When a physiotherapist tries to achieve maximum goal during rehabilitation that time various types of assistive devices used. In case of stroke patients primarily they used wheelchair, walker, crutches for ambulation and daily purpose. Previous study showed that assistive devices helped to assist their locomotion and ambulation [15]. CP patients also used wheelchair, walker and crutches also and these devices make their life easier. Evidence suggested that everyday uses of assistive devices with environmental modification improve GMFS levels in CP children [16]. Some assistive devices are used for treatment purpose as well as ADL modification which may improve and maintain their quality of life. As like as physiotherapist used hand splint, night splint, back slub, toe pick up, and modified shoes, supportive devices for transferring, ambulation and ADL. But sometimes patient, careers and physiotherapists also faced common problems and challenges to use of these devices. This common problems and challenges about the easy, simple use of devices, the financial cost and device maintenance for long time. Also, they faced some social barriers as well as some communication barriers and challenges. But it is very much important to know the proper uses of devices with their rational. Another concerning issue about the overuses and inappropriate uses of assistive devices

may lead to more dependency of neurological patients and also negatively impact on their rehabilitation process as well as reduces quality of life [12].

5. Conclusion & Recommendation

Appropriate and accurate rehabilitation of neurological conditions dependent on accurate prescription and uses of assistive devices. If the use is not appropriate and also its design is not corrected than it also has a negative effect on patients. Patients extra dependency also depends on unusual and over use of devices. It needs to be developed all accessibility which may help to appropriate use of devices. Government and non-government need to develop their strategy. More evidence needs to develop in this area which may help physiotherapists to improve their skill about devices and as well as patient get more benefit. Physiotherapists always tried to suggest about devices which may be completed patients' maximum functions. Government and non-government all organizations, educational institutions and hospitals, markets & other public places need to be maintained universal design with environmental modifications. For these consequences physiotherapists & MDT may prescribe appropriate devices and neurological impaired patients also easily used it and get their accessibility. More evidence needs to be developed in this area to clear conception about the uses of assistive devices and its importance on rehabilitation of neurological conditions.

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