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Original Article

The functional mobility with wheelchairs in individuals with spinal cord injury

A mobilidade funcional com cadeiras de rodas em sujeitos com lesão medular

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Abstract

Introduction: Functional mobility is a common aspect involved in spinal cord injured patients, requiring the use of a wheelchair. Although this resource is fundamental in the rehabilitation of these individuals, several aspects related to the physical environment can interfere with the levels of functional mobility. **Objective:** To describe aspects related to functional mobility with a wheelchair in patients with spinal cord injury. **Method:** This is a descriptive study with samples composed of 11 patients with spinal cord injuries from an association of people with disabilities in a medium-sized city of São Paulo State. For data collection, a Spinal Cord Injury Identification Form was used. Data were analyzed through simple descriptive analysis. **Results:** Most of the sample used a motorized wheelchair (63.63%; n = 7) and reported barriers in the home environment (81.81%; n = 9), on the sidewalk (90.90%; n = 10) and in the block of the household (90.90%; n = 10). Despite these barriers, 100% (n = 11) reported independence for mobility at home and 90.90% (n = 10) outside. Among the reported mobility difficulties, there were limitations for transfers to the car (54.54%; n = 6), transfers to surfaces of the same height (36.36%; n = 4), and transportation of the wheelchair in own vehicle (63.63%; n = 7). **Conclusion:** The findings demonstrate the relevance of interventions aimed at promoting functional mobility in individuals with spinal cord injury with an emphasis on the physical environment and assistive technology resources.

Keywords: Locomotion, Wheelchairs, Rehabilitation, Spinal Cord Injury, Occupational Therapy.

Resumo

Introdução: A mobilidade funcional é aspecto comumente comprometido em sujeitos com lesão medular, requerendo o uso de uma cadeira de rodas. Embora esse recurso seja fundamental na reabilitação desses sujeitos, diversos aspectos

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relacionados ao ambiente físico podem interferir nos níveis de mobilidade funcional. **Objetivo:** Descrever os aspectos relacionados à mobilidade funcional com o uso de cadeiras de rodas entre sujeitos com lesão medular. **Método:** Tratou-se de um estudo descritivo com amostra de conveniência composta por 11 sujeitos com lesão medular advindos de uma associação de pessoas com deficiência de uma cidade de médio porte do interior do Estado de São Paulo. Para coleta de dados, utilizou-se um Formulário de Identificação do Sujeito com Lesão Medular. Os dados foram submetidos a uma análise descritiva simples. **Resultados:** A maioria da amostra fazia uso de cadeira de rodas motorizada (63,63%; n=7) e reportou a presença de barreiras no ambiente domiciliar (81,81%; n=9), sendo na calçada (90,90%; n=10) e no quarteirão do domicílio (90,90%; n=10). A despeito dessas barreiras, 100% (n=11) relatou independência para a mobilidade no domicílio e 90,90% (n=10) em locais externos. Dentre as dificuldades de mobilidade reportadas, estavam as limitações para as transferências para o carro (54,54%; n=6) e transferências para superfícies da mesma altura (36,36%; n=4), além de transporte da cadeira de rodas em veículo próprio (63,63%; n=7). **Conclusão:** Os achados demonstram a relevância de intervenções voltadas à promoção da mobilidade funcional em sujeito com lesão medular, com ênfase no ambiente físico e recurso de tecnologia assistiva.

Palavras-chave: Locomoção, Cadeira de Rodas, Reabilitação, Traumatismos da Medula Espinal, Terapia Ocupacional.

1 Introduction

According to the American Occupational Therapy Association (2014), mobility is an individual's ability to move or go from one position to another when performing their daily activities. It is one of the aspects of occupational performance related to self-care, comprising locomotion in internal/external environments and transfers (Law et al., 2005). For the Organização Mundial da Saúde (2008), mobility is an essential condition for the participation of individuals in different areas of social life.

Mobility depends on a complex combination of cardiopulmonary condition, motor coordination, stability, strength, cognition, and sensitivity (Van Der Woude et al., 2006). Therefore, impairments in these components can cause limitations in mobility. The individuals´ ability to perform mobility is not a factor exclusively related to their pathophysiological limitations, and it is the result of their association with environmental factors, such as the absence of accessible spaces or physical barriers to mobility (Miller, 2012).

The spinal cord injury is one of the several conditions that can affect mobility. It can compromise the conduction of motor and sensory signals and the autonomic nervous system, caused by factors that may be of traumatic or non-traumatic origin (Kirshblum et al., 2011). Spinal cord injury is a chronic problem that leads to disability causing physical and sensory impairments, and psychological, social, and economic changes, affecting almost all spheres of life of the individuals (Blanes et al., 2009).

According to the World Health Organization (2013), about 500,000 individuals worldwide suffer from spinal cord injury each year, with lower survival rates in low-income

countries. The age group most at risk are men between 20 and 29 years old and 70 years old or more, women aged 15 to 19 years old and 60 years old or more. The traumatic cause is the most frequently such as traffic accidents, falls and urban violence, with about 90% of cases (World Health Organization, 2013). In the United States, estimates point to about 17,000 new cases per year, according to data from the National Spinal Cord Injury Statistical Center (2015). In Brazil, national epidemiological data are not accurate due to the lack of notification of the injury (Campos et al., 2008), with notes of about 10,000 new cases each year, with trauma as the predominant cause (Masini, 2000).

The condition of restricted mobility in individuals with spinal cord injury is a determining factor in the use of assistive technology resources (Hetz et al., 2008). Assistive technology has "[...] a wide range of equipment, services, strategies, and practices designed and applied to alleviate the functional problems found in individuals with disabilities" (Cook & Hussey, 2015, p. 5). The wheelchairs are one of these resources, which maximize functionality through stability, alignment and comfort in sitting posture (Simpson et al., 2008), allowing individuals to complete daily tasks with greater independence and access environments such as school, work and the community (Cooper et al., 2006).

Wheelchairs can be manual when mobility depends on manual skills or association between them and the aid of a foot for propulsion or the assistance of third parties to push the resource. Motorized wheelchairs are those that depend on a motor unit and access to controls, such as joysticks (Cook & Hussey, 2015). Manual wheelchairs are the most used type worldwide (Organização Mundial da Saúde, 2008), which is also reported in studies with individuals with spinal cord injuries (Hetz et al., 2008).

For WHO, on the one hand, wheelchairs are a means for people with disabilities to exercise their human rights and achieve inclusion and equal participation, contributing to health, quality of life, and full and active life in the community (Organização Mundial da Saúde, 2008). On the other hand, environmental barriers related to accessibility are still a major challenge for users of this resource, since they hamper mobility and interfere with social experiences (Miller, 2012). The ramps and steps (33.3%), difficulties in mobility outdoors (13.3%), and wheelchair transportation (13.3%) are among the most common barriers (Medola et al., 2014). Difficulties in using the wheelchair in indoor environments, with the kitchen as the place of greatest difficulty (72%), in the use of public transport (59%) and private (64%) were also mentioned (Vieira et al., 2015; Silva & Medola, 2016).

Given the relevance of functional mobility and the possible barriers found by the individuals using wheelchairs reported in the literature, this study aimed to describe aspects related to functional mobility with the use of wheelchairs in individuals with spinal cord injury.

2 Method

This is a descriptive study of mobility with a wheelchair in a group of individuals with spinal cord injury. The study had a quantitative approach, based on the numerical measurement and statistical analysis to establish patterns of sample behavior (Sampieri et al., 2005).

The study was conducted based on a non-probabilistic convenience sample composed of individuals with spinal cord injury from a medium-sized city in the interior of the State of São Paulo, with an average population of 400 to 500 thousand inhabitants.

This study was submitted to the Human Research Ethics Committee of the Federal University of São Carlos, under the number 407,176. All participants were invited to read and sign the Informed Consent Form before data collection. In case of difficulties in signing the term due to functional limitations in the grip, the signature was made by the responsible caregiver, with verbal consent from the participant with spinal cord injury.

2.1 Sample

The sample consisted of 11 individuals with spinal cord injuries who met the inclusion and exclusion criteria proposed by this study.

The inclusion criteria were individuals over 18 years old, diagnosed with spinal cord injury for more than six months; wheelchair users for over a year, and who had undergone a rehabilitation process in specialized services. The choice of these individuals with the referred injury time is because the first semester is characterized by the period of spinal shock, in which there is the greatest return of motor and sensory functions (Waters & Yoshida, 1996). The choice of individuals with spinal cord injuries using a wheelchair for more than a year was because this is the period of development of routines and standards for the use of the wheelchair (Coolen et al., 2004), which it also occurs during the rehabilitation period.

The exclusion criteria for the sample composition were individuals under 18; with other chronic diseases or disabling injuries in association with spinal cord injury, such as amputations, traumatic brain injury, neurological and degenerative diseases, for example; who did not use a wheelchair or with less than a year of using this resource; who had not yet gone through the rehabilitation process in a specialized service. The exclusion of individuals with other disabling diseases was because as spinal cord injuries, they also interfere with functional mobility.

2.2 Data collection instruments

We used a Person Identification with Spinal Cord Injury Form to collect data for this study, prepared by the researcher, containing data in four categories:

(1) Socio-demographic aspects - Age, gender, marital status, education level, presence of the caregiver, the person responsible for the care, professional situation;

(2) Aspects related to the injury - Time of injury, the spinal segment of the injury, type of injury, injury mechanism, main wheelchair, the form of acquisition of the wheelchair, prescription of the wheelchair by professionals specialized in the area;

(3) Physical barriers for the mobility in the home and surroundings, and adaptations made - the type of home, the area where the home is located, presence of barriers for the mobility in the home, sidewalk and block of the residence, type of barriers for the mobility at home, sidewalk, the block of residence, presence of adaptations at home, types of adaptations made at home, responsible for the adaptations;

(4) Mobility with the wheelchair used - home, on the sidewalk of the residence, in the home block, in public/private spaces accessible, in public spaces in general, in urban public transport, transport of the wheelchair in a private vehicle, transfers for the car

and wheelchair transfers to the same height surface, wheelchair falls and injuries from falls and wheelchair injuries.

The study participants answered the forms, and the contents were addressed in the form of closed questions on the themes.

2.3 Sample selection

The individuals with spinal cord injury who participated in this study were part of an association of people with disabilities in that city, which aims to provide social integration for people with disabilities in the region, as well as discuss issues related to people with disabilities.

Initially, there was a formal contact with the person in charge of the group, who nominated 38 candidates with spinal cord injury. There was telephone contact with all nominated candidates, according to the purpose of the study. Of the total indicated, 12 were not found, while 26 were contacted. After contacting and screening the inclusion and exclusion criteria for this study, two candidates were excluded because they had a diagnosis other than spinal cord injury, four because they had other limiting comorbidities associated with spinal cord injury; one for still being in the process of rehabilitation in a specialized service in the municipality and 8 for not agreeing to participate in the study.

Finally, we selected 11 participants who met the inclusion and exclusion criteria of this study. All subjects received a home visit, subject to prior agreement. The responsible researcher carried out the visits with the prior consent of the candidates. Sequentially, the agreement of the 11 individuals was formalized for the ethical procedures of this study, through the signing of the Informed Consent Term and, later, the data collection was carried out.

2.4 Data collection procedure

Data collection was carried out at home after scheduling and consent. The researcher responsible for the study carried out this phase, with all individuals invited to answer the Person Identification with Spinal Cord Injury Form. All questions about the socio-demographic aspects; aspects related to the injury; physical barriers for the mobility at home and surroundings and adaptations made; and mobilities with a wheelchair used were registered in the form. The application of the collection instrument lasted an average of 1 hour, carried out in just one meeting.

2.5 Data analysis procedure

Initially, the numerical and qualitative data obtained from the collection instruments were tabulated in a Microsoft Excel® spreadsheet, for further analysis.

After tabulation, the numerical data were subjected to statistical tests of simple descriptive analysis to study the analyzed variables. This procedure aimed at calculating the minimum, maximum, average and standard deviation of each of the variables, the first was, respectively, the lowest and the highest value studied; while

the latter was the measure of centrality and the measure of data dispersion (Morettin & Bussab, 2006).

3 Results

The sample had a minimum age of 38.27 years old (SD ± 11.80), predominantly single (45.45%; n = 5) and with average levels of education (63.63%; n = 7). Most of them declared having one or more caregivers to assist in daily activities (90.90%; n = 10), in which the majority was the mother or the father (n = 8). Of these, 72.72% (n = 8) received some disability benefits, such as disability retirement or continuous benefit (BPC) (Table 1).

Table 1. Socio-demographic data of individuals with spinal cord injury (n=11).

Numerical Variables	**Minimum**	**Maximum**	**Mean**	**Standard Deviation**
Age (years old)	**23**	**61**	**38.27**	**±11.80**
Categorical Variables	**Categories**		**%**	**n**
Gender	Male		72.72	8
	Female		27.27	3
Marital Status	Single		45.45	5
	Married		36.36	4
	Divorced		18.18	2
Education level	Basic		9.09	1
	Elementary		18.18	2
	High school		63.63	7
	Higher education		9.09	1
Family care	Yes		90.90	10
	No		9.09	1
**Responsible by care (n=10)*	Mother/Father		-	8
	Spouse		-	4
	Brother		-	1
	Hired professional		-	1
*Current professional situation**	Disability retirement		63.63	7
	Work in the informal market		18.18	2
	Student		9.09	1
	BPC**		9.09	1
	Common retirement***		9.09	1

n= individuals with spinal cord; *Values exceed 100%, as some individuals fall into more than one category. **Continued Installment Benefit. ***By contribution time or age.

The median spinal cord injury time was 154.09 (± 115.05) months, which corresponds to 12.84 years of the injury. Spinal cord injuries were predominantly incomplete (90.90%; n = 10) and in the thoracic region (72.72%; n = 8), with the main injury mechanisms being a firearm trauma (27.27%; n = 3) and car accidents (27.27%; n = 3). Of these, 63.63% (n = 7) use the motorized wheelchair as the main resource for daily mobility. Most of the wheelchairs were purchased by the Unified Health Care System (SUS) and prescribed by professionals specialized in the area (72.72%; n = 8) (Table 2).

Table 2. Aspects related to spinal cord injury (n=11).

Numerical Variables	Minimum	Maximum	Mean	Standard Deviation
Injury time (months)	**51**	**480**	**154.09**	**±115.05**
Categorical Variables	**Categories**		**%**	**n**
Spinal cord injury segment	Thoracic		72.72	8
	Cervical		18.18	2
	Low back		9.09	1
Injury type	Incomplete		90.90	10
	Complete		9.09	1
Injury mechanism	Firearm		27.27	3
	Car accident		27.27	3
	Diving in shallow water		9.09	1
	Fall from own height		9.09	1
	Diseases		27.27	3
Main wheelchair	Motorized		63.63	7
	Manual		36.36	4
Way of acquiring the wheelchair	Unified Health Care System (SUS)		72.72	8
	Donation		18.18	2
	Own resources		9.09	1
Wheelchair prescription by a specialist	Yes		72.72	8
	No		27.27	3

n= individuals with spinal cord.

Most participants lived in houses (81.81%; n = 9) and in an urban area (90.90%; n = 10). At the time of collection, 81.81% (n = 9) of them indicated accessibility barriers at home, 90.90% (n = 10) on the sidewalk, and 100% (n = 11) in the household block (Table 3). Approximately 90.90% (n = 10) made adaptations at home and on the sidewalk, and the main ones were lowered ramps/guides (n = 8). All adaptations were made by the participants or their families (Table 3).

Table 3. Physical barriers to mobility in the home and surroundings and adaptations made (n=11).

Categorical Data	Categories	%	n
Type of household	House	81.81	9
	Apartament	9.09	1
	Farm	9.09	1
Area where the domicile is located	Urban	90.90	10
	Rural	9.09	1
Barriers to mobility at home	Yes	81.81	9
	No	18.18	2
Barriers to mobility on the sidewalk	Yes	90.90	10
	No	9.09	1
Barriers for the mobility on the block	Yes	100	11
	No	0	0
Home/sidewalk adaptations	Yes	90.90	10*
	No	9.09	1
Responsible for the adaptations (n=10)	The participant or the family	-	10
	Others	-	0
Types of adaptations (n=10)	Lowered ramps/guides	-	8
	Bathroom changes	-	3
	Extension of doors/jamb	-	3
	Non-slip on ramp	-	1
	Sill removal	-	1

n= individuals with spinal cord.

The most observed barriers at home were sills (10), uneven floor (6), and holes (4). On the sidewalk at home, the most observed were uneven floor (11); steep ramp (4), and floors with lateral inclination (4). In the block of the household were uneven floor (11); steep ramp (6) and floor with lateral inclination (4) (Figure 1).

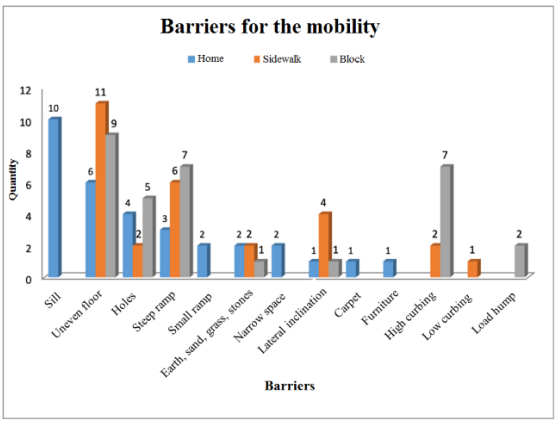

Figure 1. Barriers for the mobility at home, sidewalk and block (n=11).

Most participants reported being independent for mobility at home (100%; n = 11), on the sidewalk of the residence (100%; n = 11), in the block of the home (90.90%; n = 10), in an accessible public/private spaces (90.90%; n = 10), in general public spaces (90.90%; n = 10), in urban public transport (buses) (81.81%; n = 9) and for wheelchair transfers to the same height surface (63.63%; n = 7). On the other hand, 63.63% (n = 7) showed dependence for the transport of the wheelchair in a private vehicle and transfers to the car (54.54%; n = 6). All participants have already suffered falls from the manual wheelchair and had some injury resulting from them (100%; n = 11) (Table 4).

Table 4. Aspects related to wheelchair mobility of individuals with spinal cord injury (n=11).

	Categorical Data	Groups	%	n
Wheelchair Mobility	House	Independent	100	11
		Dependent	0	0
	Home sidewalk	Independent	100	11
		Dependent	0	0
	House block	Independent	90.90	10
		Dependent	9.09	1
	Public roads in general	Independent	90.90	10
		Dependent	9.09	1
	Accessible public and private spaces	Independent	90.90	10
		Dependent	9.09	1
	Public transportation	Independent	81.81	9
		Dependent	18.18	2
	Transporting the wheelchair in a private vehicle	Independent	36.36	4
		Dependent	63.63	7
	Transfer to the car	Independent	45.45	5
		Dependent	54.54	6
	Transfer to the same height surface	Independent	63.63	7
		Dependent	36.36	4
Accidents with the wheelchair	Falls during use	Yes	100	11
		No	0	0
	Injuries	Yes	100	11
		No	0	0

n= individuals with spinal cord.

4 Discussion

4.1 Socio-demographic and health profile

The sample had a mean age of 38.27 years old, predominantly composed of young adult males, corroborating international statistics on the prevalence of this type of injury in men of working age (National Spinal Cord Injury Statistical Center, 2015; World Health Organization, 2013).

Most of the participants lived with family members and had one or more caregivers to help with daily activities, especially their parents (mother). The need for a caregiver can be explained by limitations in mobility and chronicity of the injury, leading to disability (Kirshblum et al., 2011; Blanes et al., 2009). The mother as the main figure responsible for the care can be a reflection of the sample's composition, mostly composed of young and single individuals. The profile of caregivers follows the cultural trend of women as the main responsible for care (Bicalho et al., 2008).

Although most of the sample was in the young-adult age group, only 18% developed paid work, while 72% was insured by some benefit/disability. This condition shows the impacts on occupational performance in the sphere of productivity, as observed in another study with people with spinal cord injury (Donnelly et al., 2004). This reality can lead to social security and social spending since most of the sample was in an age group considered productive. Impacts can also be considered in financial terms, with reduced income, and costs with formal caregivers. Even with a family caregiver, this impact is perceived, since many of them need to leave the job market to dedicate to the family member with spinal cord injury.

The small participation of the individuals in this study in the labor market can be justified by the restriction in mobility and the low educational levels of the sample. The low qualification is related to the performance of professional activities with greater physical effort than the intellectual one, hindering to perform the social role of the worker after the installation of a physical disability (Veltrone & Almeida, 2010). In this sense, we highlight the need for public policies aimed at professional rehabilitation, at the qualification/requalification, and increase in the education levels of these people, allowing the insertion/reinsertion of work compatible with the individuals with spinal cord injury.

The United Nations (UN), the World Health Organization (WHO) and the International Labor Organization (ILO) recommend professional rehabilitation, and Brazil is a signatory (Rossi, 2007). The Statute of the Person with Disabilities, chapter VI, article 36, reinforces the right to professional qualification and professional rehabilitation of the person with disabilities, and the public power must implement these programs so that the person with disabilities can enter, continue or return to their jobs, respecting their free choice, vocation and interest (Brasil, 2015). Despite this legal guarantee, there are still many practical challenges in terms of inserting people with disabilities in the labor market, especially when considering the precariousness of labor relationships with the recent labor reform.

The participants had an average of 12 years of spinal cord injury, demonstrating a chronic condition. Almost all injuries were incomplete and most were located in the thoracic region. However, we observed several levels of injury, which gives us evidence of different degrees of functionality among the sample. The main type of injury mechanism was urban violence, firearms, and car accidents, which corroborates international and national evidence (National Spinal Cord Injury Statistical Center, 2015; World Health Organization, 2013; Masini, 2000). This reality shows the great impact of urban violence in terms of the disability of the working-age population, with major social impacts and health costs. Given this condition, the need for actions aimed at preventing this aspect at the level of public policies is emphasized.

4.2 The main wheelchair

Most individuals used a motorized wheelchair as the main resource for daily mobility, although only 18% had impaired upper limbs due to quadriplegia. This finding contradicts evidence on manual wheelchairs as the most used resource by people with spinal cord injuries (Hetz et al., 2008).

The presence of shoulder pain was one aspect that may justify the use of the motorized wheelchair by most of the participants, a problem commonly reported in these patients. One study shows that half of the adults with spinal cord injuries have pain complaints in both shoulders that last longer than one year (Alm et al., 2008). This may reflect the long periods of spinal cord injury and the great demand for the use of the upper limbs in daily activities, such as transfers and propulsion of the wheelchair. Thus, the use of a motorized resource can represent greater ease and less energy expenditure compared to the use of the manual wheelchair.

The Unified Health Care System (SUS) purchased most of the wheelchairs and was indicated by a specialized professional. This reality demonstrates greater access to public rehabilitation services, as well as to auxiliary devices for mobility. These findings can be justified by the advances in health care for people with disabilities, which has occurred in recent years in Brazil (Brasil, 1993, 2009, 2011, 2012, 2013a, 2017). The access of most of the sample to the motorized wheelchair may be a reflection of the expansion of the list of auxiliary resources for mobility available by the Brazilian Unified Health Care System in the last decade (Brasil, 2011, 2013a), which included the dispensation of motorized wheelchairs (Brasil, 2013b).

Despite greater access to the wheelchair through SUS, we observed that some resources were acquired through donations, which still reflects a historical trend in philanthropy as a means of assisting people with disabilities (Pozzoli, 2008). On the one hand, the donation of assistive technology resources shows the presence of a support and solidarity network aimed at individuals with disabilities. On the other hand, the lack of a prescription performed by a specialized professional can be a negative factor in the use of the resource since an inadequate indication and incompatible with the functional conditions presented by the individual can lead to difficulties in functional mobility.

In this context, we emphasize the importance of a qualified professional in the process of prescription/indication of a correct resource for functional mobility. According to Cruz (2012), the occupational therapist is of great importance in the interdisciplinary clinical process of assistive technology. This professional has been pointed out as fundamental in this area, acting in the assessment of users' needs, their physical, cognitive and sensory skills, in the individual's receptivity to the device, socio-cultural condition, and environment where it will be used (Pelosi & Nunes, 2009). Therefore, discussions aimed at inserting this professional in teams that develop these practices in public health services are essential.

4.3 Barriers to mobility

Most of the participants lived in houses in the urban area; however, one of them lived in a rural area, which probably can be a factor that makes mobility even more difficult due to the lack of paved roads around the home. All the participants reported the presence of barriers to mobility in the block of the household. Thus, we can conclude that these barriers were also present in individuals who lived in urban areas. The most cited barriers in the household block were the uneven floor, steep ramp, and lateral inclination. Corroborating these findings, the study by Medola et al. (2014) referred to ramps and steps as the most common barriers when using a wheelchair.

The presence of these barriers around the home shows the lack of accessibility on public roads, reaffirming evidence about problems for the mobility in outdoor environments (Silva & Medola, 2016; Vieira et al., 2015; Medola et al., 2014). This is a significant problem, considering that environmental limitations and lack of accessibility can result in important impacts on people´s mobility (Miller, 2012). Consequently, we can think of secondary developments, insofar as they can contribute to social isolation (Simpson et al., 2008) and hinder the individuals' participation and social interaction (Finlayson & Van Denend, 2003).

In Brazil, Decree 5,296 of 2004, known as the "Accessibility Law", stipulates deadlines and regulates projects of an architectural and urban nature, communication and information, public transportation, and the execution of any type of work with the public or collective destination (Brasil, 2004). NBR 9050 establishes criteria and technical parameters to be observed regarding the design, construction, installation, and adaptation of the urban and rural environment, and buildings to accessibility conditions (Associação Brasileira de Normas Técnicas, 2015). Despite these laws, there are still many challenges around the implementation of accessible spaces, especially in public roads and spaces. We emphasize the importance of studies and discussions aimed at implementing public actions and policies ensuring accessibility in these spaces as a way of promoting the social inclusion of people with disabilities.

Most of the sample also mentioned the presence of accessibility barriers inside the home and on the sidewalk. Problems in the home environment have also been reported in other studies, with the kitchen as the place of greatest difficulty (Silva & Medola, 2016; Vieira et al., 2015; Medola et al., 2014). The lack of accessibility in the home

environment can be a problem as it can lead to restrictions on access to the rooms/spaces in the place where the person stays most. This can also interfere with the levels of functional independence for the individuals' daily activities, such as those related to self-care, home maintenance, food preparation, often requiring a caregiver to assist in activities in which there could be independence.

Although most participants reported the presence of barriers in the home/sidewalk environment, about 90% said they had already made adaptations in these spaces previously. Some of the adaptations made were the construction of ramps and lowering of guides, which were carried out at the indication of the person in the wheelchair or his families. The need for changes in the home environment is possibly due to the mobility limitations presented by the individuals (Miller, 2012). These adaptations demonstrate strategies for coping with physical barriers for mobility and problem solving by individuals with spinal cord injury and their families. On the other hand, the presence of reported barriers in the home can demonstrate that the adaptations previously made have not been effective, adequate, or even sufficient to promote accessibility in the place.

In this sense, we highlight the relevance of a specialized assessment of the home environment to identify barriers and indicate possible changes aiming at improving accessibility, optimizing the environment, and promoting functional independence to the individual with mobility restrictions. The occupational therapists are a professional who can assist in this process since they play a fundamental role in the identification of strategies that help individuals to modify their homes, increasing the capacity to participate in daily tasks and activities (American Occupational Therapy Association, 2016). It is essential to include these professionals in the home care teams focused on assisting individuals with disabilities, and enabling home visits by occupational therapy professionals working in the context of specialized rehabilitation services.

4.4 Aspects of mobility with a wheelchair

Although most of the sample reported physical barriers at home, the sidewalk at the residence, and the block at home, all reported independence from these locations. This fact seems to demonstrate that the individuals may have developed mobility patterns that favored independence and/or overcoming these barriers.

Most individuals also reported independence for mobility in an accessible public/private spaces, in public spaces in general and in urban public transportation (buses), which may reflect the use of the motorized wheelchair. Although only two participants have impaired upper limbs due to quadriplegia, other conditions can also interfere with the effective and independent use of a manual wheelchair, such as pain, inability to maintain the posture for effective propulsion and low cardiopulmonary reserve (Cooper et al., 1999). Thus, the motorized wheelchair may have facilitated the overcoming of barriers in the home environment and on public roads, favoring the reported independence.

Most participants reported difficulties in transferring to their car, which was also reported by other studies (Silva & Medola, 2016; Vieira et al., 2015; Medola et al.,

2014). Difficulties in transfers between surfaces of the same height were also reported by 36.36% of the sample. These difficulties may reflect the lack of strength in the upper limbs resulting from cervical injuries (Cooper et al., 1999), the presence of pain in the upper limbs due to their excessive use (Alm et al., 2008), as well as the increase in body fat and loss of lean mass in people with spinal cord injury (Buchholz & Bugaresti, 2005). Another reason for the difficulties in transfers may be the loss of physical conditioning due to the use of the motorized wheelchair (Karp, 2008).

The dependence on transporting the wheelchair in their car was another aspect observed in most of the samples. This difficulty may be due to the high weight of the motorized resource, as well as the difficulty in keeping it inside the car, so the manual wheelchair can be a more viable resource for this type of transportation. This can demonstrate that not always a single auxiliary resource for mobility can be sufficient to meet all the mobility needs of a person with a disability. Therefore, a professional can assist in choosing the most appropriate devices for each situation.

In addition to these difficulties, the participants reported falls from the manual wheelchair and consequent injuries. North American studies also point out the presence of these events among wheelchair users, with consequent injuries and even death (Gavin-Dreschnack et al., 2005). These findings demonstrate a high risk of new accidents, with possible impacts on the individuals' health, as well as health care costs. Possible justifications for these falls may be insecurity in the use of the resource or even a lack of specific training for proper and safe use of the wheelchair.

Training for the use of a wheelchair is rarely performed in the clinical practice of rehabilitation professionals (Costa et al., 2015; Giesbrecht et al., 2013; Smith & Kirby, 2011; Karmarkar et al., 2010; Samuelsson et al., 2001). One of the possible justifications for this condition may be the lack of professional qualifications for this type of training or deficient training of rehabilitation professionals on this type of intervention. Thus, we emphasized the importance of dispensing services to implement actions aimed at training users of this resource.

The occupational therapist has been appointed as an important professional in the instruction for the appropriate use of assistive technology resources, as well as in guiding other people involved in this process (Pelosi & Nunes, 2009). Considering the important role of this professional in occupational performance, skill training with a wheelchair is essential in promoting functional mobility as one of the aspects of self-care. Therefore, occupational therapists undergoing training in undergraduate and graduate courses must receive training on how to develop actions for this purpose in clinical practice.

5 Final Considerations

This study sought to describe the aspects of mobility with a wheelchair in individuals with spinal cord injuries in chronic periods. Most of the sample used a motorized wheelchair as the main resource for mobility. The individuals reported several barriers in the home environment, on the sidewalk, and in the home block. Despite these barriers, most of them reported being independent for mobility in

these spaces and an accessible public spaces and public spaces in general. The reported mobility difficulties showed limitations for transfers to the car and transfers to surfaces of the same height, in addition to transporting the wheelchair in a vehicle.

This study has some limitations such as the restricted number of participants, which prevents the generalization of the results to all individuals with spinal cord injury, applied only to the studied group. Other limitations were the non-standardization of the levels and types of spinal cord injuries, age, and time of wheelchair use, since these aspects would make the sample heterogeneous, with different levels of functionality, hindering the comparison between the aspects investigated.

The study reinforces the idea that mobility restrictions are not only the result of physical and sensory limitations presented by individuals with spinal cord injury but also the result of physical barriers to mobility and the absence of accessible spaces. We can also point out the wheelchair as a factor that can favor or hinder mobility in different situations and conditions.

The findings demonstrated the need for occupational therapy actions aimed at these individuals, both for the assessment and adaptation of the home environment and in the prescription of a wheelchair. The role of the occupational therapist in training users of wheelchairs for the proper and safe use of the resource is also important, favoring independence in daily activities. We expect that the results may foster public policies aimed at the attention of the person with spinal cord injury for their mobility difficulties.

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