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Article · September 2018

DOI: 10.4322/2526-8910.ctoAO1117

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ISSN 2526-8910
Cad. Bras. Ter. Ocup., São Carlos, v. 26, n. 3, p. 558-568, 2018
https://doi.org/10.4322/2526-8910.ctoAO1117

Original Article

The use of mobility assistive devices and the functional independence in stroke patients[1]

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Abstract: Introduction: Post-stroke limitations may cause problems and lead to dependency in daily activities, which requires the use of mobility assistive devices. Objective: Identify the level of functional independence and the use of mobility assistive devices among men as well as to check the relationship between these variables. Method: It is a descriptive, correlational research using convenience sampling carried at medical centers specialized in physical rehabilitation in a medium size town of São Paulo state. Then, a Data Form of the patient with stroke and the Functional Independence Measure were used. The data were sent to a simple descriptive analysis and biserial test. Results: It showed predominance of stroke subjects dependent for the activities of daily life (63%), and those using mobility assistive devices (66.6%). The devices were wheelchairs (10), shower chairs (9), and canes (7). Moderate positive correlations between the use of mobility device and the motor functional independence ($p<0.05$ and $r=0.617$), and the total functional independence ($p<0.05$ and $r=0.590$) was also identified. Conclusion: Data demonstrate the possible impact in preventing mobility during daily activities, in particular motor activities among stroke subjects. That increases the need of occupational therapy interventions aiming at the mobility improvement among these subjects.

Keywords: *Self-Help Devices, Stroke, Occupational Therapy.*

O uso de dispositivos auxiliares para a mobilidade e a independência funcional em sujeitos com Acidente Vascular Cerebral

Resumo: Introdução: As limitações pós-AVC podem levar a dependência nas atividades de vida diária e mobilidade, requerendo o uso de dispositivos auxiliares para a mobilidade. Objetivo: Identificar os níveis de independência funcional e o uso de dispositivos auxiliares para a mobilidade entre sujeitos com AVC bem como verificar a presença de correlações entre essas variáveis. Método: Tratou-se de um estudo descritivo correlacional com amostra de conveniência, realizado em centros especializados em reabilitação física de uma cidade de médio porte do interior do Estado de São Paulo. Para tanto, foram aplicados o Formulário de Dados do Sujeito com AVC e a Medida de Independência Funcional. Os dados foram submetidos à análise descritiva simples e teste biserial. Resultados: 66,6% dos participantes faziam uso de dispositivos auxiliares para mobilidade, com maior frequência das cadeiras de rodas (10), cadeiras de banho (9) e bengalas (7). Observaram-se diferentes níveis de independência funcional para as atividades de vida diária entre a amostra, com preeminência de sujeitos dependentes (63%). Também foram identificadas correlações positivas moderadas entre o uso dos dispositivos auxiliares para a mobilidade e a independência funcional motora ($p<0,05$ e $r=0,617$) e independência total ($p<0,05$ e $r=0,590$). Conclusão: Os dados demonstram possíveis impactos da restrição na mobilidade no desempenho das atividades de vida diária com maior exigência de aspectos motores entre sujeitos com AVC, o que reforça a necessidade de intervenções em terapia ocupacional para a melhora da mobilidade entre esses sujeitos.

Palavras-chave: *Equipamentos de Autoajuda, Acidente Vascular Cerebral, Terapia Ocupacional.*

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Received on Mar. 18, 2017; 1st Revision on Ago. 17, 2017; 2nd Revision on Jan. 30, 2018; Accepted on Mar. 1, 2018.

1 Introduction

According to the American Occupational Therapy Association (AOTA), Activities of Daily Life (ADLs) also known as Basic Activities of Daily Living, are activities aimed at self-care such as bathing, bowel and bladder control, clothing, food, mobility, use of the toilet and personal hygiene (AMERICAN..., 2008). Mobility is the individual´s ability to move from one position to another by performing daily activities such as bed-movement, transfer, walking, transporting objects, and wheelchair-walking (AMERICAN..., 2014).

The stroke is chronic disease that can lead to functional impairments in ADL including mobility (BAUMANN et al., 2011). This disease is caused by an interruption in cerebral vascular flow of ischemic or hemorrhagic origin, which can lead to histopathological changes in certain brain regions and consequent neuronal death (BRUST, 2012). Thus, depending on the injured brain area, the stroke can lead to temporary or permanent, total or partial sequels of cognitive origin (GORELICK et al., 2011) and/or sensory-motor origin in the hemibody contralateral to the brain lesion (BOUKADIDA et al., 2015).

In Brazil, the stroke is the leading cause of death and disability, with an annual incidence of 108 cases per 100,000 individuals (BRASIL, 2013a). According to the American Heart Association, this disease is the leading cause of long-term disability, causing reduced mobility in more than half of survivors over 65 years old (MOZAFFARIAN et al., 2015). The disease has differences the gender, with a higher incidence, both ischemic and hemorrhagic, in males (GOLDSTEIN et al., 2011). Differences in functionality are also reported since women are less likely to be independent in ADL and return to their occupations when compared to men (WHITSON et al., 2010). There are also lower rates of mobility among women (DIRIK; CAVLAK; AKDAG, 2006).

The first six months after stroke is considered to be the most critical since it is characterized by greater dependence and demand for care (CAROD-ARTAL et al., 2002). After this period, the picture tends to stabilize, however, it still has limitations, as the study reported compromises among survivors of ischemic stroke at 65 years old or older, such as physical sequels (hemiparesis - 50%), cognitive alterations (46%), inability to walk without assistance (30%) and dependence on ADL (26%) (KELLY-HAYES et al., 2003).

Mobility is positively related to functional independence and negatively to mental state (DIRIK; CAVLAK; AKDAG, 2006). Thus, limitations in mobility performance may compromise ADLs, such as transfers, walking, clothing and bathing (FINLAYSON; VAN DENEND, 2003). Other consequences of restriction in mobility are the reduction of social participation, reduction of social connections, and emotional impacts due to feelings of emotional loss, reduction of self-esteem, isolation, stress, and fear of abandonment (FINLAYSON; VAN DENEND, 2003).

In this context, the importance of Assistive Technology (AT), defined by Cook and Polgar (2015, p. 5), as

> [...] a wide range of equipment, services, strategies, and practices designed and implemented to alleviate the functional problems found by individuals with disabilities.

The mobility assistive devices are one of the AT branches, which include wheelchairs, bathing chairs, walking canes and walkers, commonly indicated to subjects with limitations in walking, as is the case of stroke subjects.

The use of these resources is provided by the Directives for Care to Person Rehabilitation with Cerebral Vascular Accident as an important component of the rehabilitation process (BRASIL, 2013a). The use of these resources overcomes barriers for subjects to perform their activities to be actively inserted in daily life (CRUZ, 2012). They are a model not only focused on clinical issues and deficits, but they also consider the importance of activities and participation as well as environmental and personal aspects, as advocated by the International Classification of Functioning and Disability and Health (ICF) (ORGANIZAÇÃO..., 2003).

The access to devices for mobility by stroke patients in Brazil can be done by the Unified Health System (SUS), and trained professionals are required to prescribe and dispense the resource by checking the safe and necessary indication for their prescription. Thus, the entire process is conditioned to the completion and issuance of a report with justification, according to established prescription rules, and prior authorization by the manager of the Federal, State or Municipal District, which should also consider the justification presented in the prescription (BRASIL, 2013b). In view of these demands and the significant increase of strokes in

Brazil, with a consequent increase in the demand for the use of assistive devices for mobility, it is fundamental to know the particularities of the use of these resources among stroke subjects, as well as aspects related to functional prognosis, for greater success rates in the prescription of the device and in the rehabilitation process of these individuals.

International studies have focused on the issue of the use of these resources among stroke subjects. A study indicates that the need for temporary or permanent use of the device and its choice depends on the degree of the stroke, whether in one or both cerebral hemispheres if there is little or no mobility (SOUZA; DUTRA, 2012). Another study points to the relevance of personal factors (SCHERER; CRADDOCK; MACKEOGH, 2011). Subjects with a stroke who use this equipment are generally low in balance and are at high risk for falls injuries (KIM; KIM, 2015). Correlations are also observed between worse motor levels and the use of assistive devices for mobility (JUTAI et al., 2007).

A study reports the use of assistive devices for walking in 43% of 316 subjects with stroke, with the cane as the most used type, followed by the walker and the wheelchair (JUTAI et al., 2007). The same study indicates that the use of wheelchairs can be predicted by cognition and functional independence, related to higher levels of dependence and cognitive alterations. Another aspect related to the use of wheelchairs is the laterality of the stroke, as the subjects with lesions in the left cerebral hemisphere more likely to use this device than those with stroke in the right hemisphere (MOUNTAIN et al., 2010). In addition, the subjects who use the walker have higher levels of motor impairment and lower levels of mobility compared to those who use the walking cane (JUTAI et al., 2007). The use of multiple assistive devices for mobility is often associated with worse physical levels than a single device. Worse physical levels associated levels with good cognition have been reliably associated with the use of mobility devices (JUTAI et al., 2007).

In spite of these international evidences on the topic, there are still few studies in the Brazilian context that seek to investigate the relationships between the use of these resources and the performance of the ADL among individuals with stroke, both from the motor and cognitive points of view. Therefore, this study aimed to investigate the level of functional independence (physical, cognitive and total) and the use of assistive devices for mobility in stroke subjects, and the specific objective was to investigate the presence of correlations between these variables. The following research questions were raised: What is the level of functional independence (physical, cognitive and total) between stroke subjects and which mobility assistive devices are most used among these subjects? Is there a correlation between levels of functional independence (physical, cognitive and total) and the use of these devices in these subjects? This study hypothesizes that stroke patients have different levels of functional independence for ADL, with preeminence of dependent subjects, as well as that most of them use assistive devices for mobility, with the walking cane as the most used, followed by walkers and wheelchairs. Another hypothesis is that lower levels of cognitive, motor and total functional independence are related to the use of assistive resources for mobility. It is believed that this type of research can contribute to planning interventions that focus on occupational performance and the quality of life of the assisted population (SANTOS et al., 2018).

2 Method

This study consists of a descriptive, correlational study with a quantitative approach carried out in two municipal public rehabilitation services, which offer outpatient and home care to physically disabled individuals in a medium-sized city in the interior of the State of São Paulo, with population between 400 and 500 thousand inhabitants.

The research was submitted to the Committee of Ethics in Research with Human Beings of the Federal University of São Carlos, whose approval was given by the opinion number 407,176. Participants were informed about the objectives and procedures of the study and assured about the confidentiality of their personal data, and then, they signed a Free and Informed Consent Form. It is worth mentioning that the terms were signed by the subjects with stroke or, in case of difficulties for signing due to physical and/or cognitive limitations, by their caregivers.

2.1 Participants

The non-probabilistic convenience sample consisted of thirty male subjects (n=30) with stroke. The selection of the sample had the following inclusion criteria: male subjects aged between 18 and 90 years old,

diagnosed with a single stroke, with a lesion time of more than six months, with no other neurological diseases and/or incapacitating patients who were in the process of rehabilitation or with discharge from the process in the last year and who had not used assistive devices for walking before the stroke.

Choosing male participants was due to had a higher incidence of stroke (GOLDSTEIN et al., 2011) and differences reported in the functionality and mobility between the genders (DIRIK; CAVLAK; AKDAG, 2006; WHITSON et al., 2010. The choice of injury time over six months was due to the literature characterizes the first semester after the stroke as the period of higher levels of dependence of the subject as well as greater demands for care (CAROD-ARTAL et al., 2002).

2.2 Instruments

Two instruments were used to collect data: the Data Form of the Subject with Stroke and the Functional Independence Measure (FIM).

The Data Form of the Subject Stroke consists of a semi-structured questionnaire, prepared by the researchers. It dealt with the following aspects: (1) Sociodemographic data - age, education level, marital status, professional status; (2) Stroke-related data - injury and rehabilitation time, type of stroke, injured cerebral hemisphere, motor deficit, use of assistive devices for mobility and the type of device used.

FIM is an instrument developed in the 1980s by the American Academy of Physical Medicine and Rehabilitation and the American Congress of Rehabilitation Medicine (GRANGER et al., 1986) and validated in Brazil by Riberto et al. (2004), with individuals with spinal cord injury and brain injury. The instrument quantitatively assesses the level of independence for performing a series of motor and cognitive tasks of daily living, according to the following items: self-care, transfers, walking, sphincter control, communication and social cognition, memory, social interaction and troubleshooting. Each item receives a score ranging from 1 to 7, and the complete score can vary from 18 to 126, indicating the functional status of the individual, where 18 points correspond to total dependence - when the subject needs maximum or total help (75-100%); 19 to 103 points of modified dependence - when the subject needs supervision, minimal help or moderate help (25-75%); 104 to 126 points complete/modified independence - absence of help from third parties.

2.3 Procedures

Initially, ambulatory care and home care teams were responsible for the indication of male stroke subjects, with 114 candidates preselected. In the next step, all of them underwent a screening process, carried out by the researchers to verify the inclusion and exclusion criteria of the study. There were 19 participants from the ambulatory care service and 11 from home care selected, totaling 30 participants with stroke.

Subsequently, the data were collected by the researchers in the outpatient service or at home, depending on the subjects' availability. The application of the instruments was directed to subjects with stroke or, in the case of oral communication impairment, to their caregivers, with an average time of 30 minutes.

All the data collection was carried out between November 2013 and May 2014, taking 6 months to its conclusion.

2.4 Statistical analysis

The data obtained were tabulated in the Worksheet of the Microsoft Excel® 2010 program. Subsequently, quantitative data on sociodemographic aspects (age, education level, marital status and professional situation), aspects related to stroke (injury and rehabilitation time, type (motor, cognitive and total) were submitted to statistical tests of simple descriptive analysis, which aimed at the calculation of the minimum, maximum, mean and standard deviation and percentage.

Sequentially, a correlational analysis was performed through the biserial test between the variables: motor, cognitive and total independence and the use of assistive devices for mobility using SPSS Statistic software. The biserial correlation coefficient consists of an estimate of the Pearson linear correlation coefficient, established between a continuous variable and a dichotomous variable (WHERRY, 1984). The use of this coefficient is applied in cases of analysis of "right"/"wrong" or "yes"/"no" items, needing such categorical reduction as a way of obtaining data that can be analyzed (GUILFORD, 1950).

The classification of the correlation coefficient (r) used in this study was based on the proposal of Munro (2001), which establishes that values found in a range between 0 and 0.25 represent small correlation, between 0.26 and 0.49 indicate low correlation, between 0.50 and 0.69 indicate moderate correlation and from 0.70 represent high correlation. The level of significance was set at $p < 0.05$.

3 Results

The sample of subjects with stroke presented mean age characterized by the elderly age group (70.27 ± 11.48) as well as average years of study indicative of low educational levels (3.16 ± 1.96). There was a pre-eminence of married or stable union (77%), retired (73%) and outpatient public service patients (63%) (Table 1).

The lesions were predominantly ischemic (57%) in the right cerebral hemisphere (50%) and the most frequent motor deficit was hemiparesis (67%), with the left hemibody as the most compromised (50%). The mean time of injury and rehabilitation were 9 and 12 months, with a high coefficient of variation. About 66% of the participants used mobility assistive devices (Table 2).

Among the most cited assistive devices for mobility were wheelchairs (10) and bathing chairs (9), highlighting the fact that all subjects who use the bathing chair also used the wheelchair. Sequentially, the use of walking canes (7) and walkers (3) were used to help walking (Figure 1).

Regarding the independence, there was a wide interval between the minimum and maximum scores for motor (13-91), cognitive (5-35) and total independence (18-126). The mean of the total independence (81.8 ± 34.9) was shown to be indicative of dependence in the sample. According to the functional independence classification, the distribution of the participants showed a prevalence of subjects with modified dependence (56%), that is, subjects who needed partial third-party assistance for ADL (25-75%) (Table 3).

There was a moderate positive correlation between the use of mobility assistive devices and the motor independence variables ($p<0.05$ and $r = 0.617$) and total independence ($p<0.05$ and $r = 0.590$). Among cognitive independence and the use of these devices, no significant correlations ($p<0.00$ and $r = 0.541$) were observed (Table 4).

Table 1. Sociodemographic data of individuals with a stroke.

Characteristics (n=30)	Mean	Standard deviation
Age (years old)	70.27	11.48
Education level (years old)	3.16	1.96
Categorical variables (n=30)	**N**	**%**
Marital status		
Married/Stable Union	23	77
Divorced	3	10
Widower	3	10
Not married	1	3
Professional situation		
Retired	22	73
Unemployed	4	13
Sickness benefit/Social benefit	2	7
In professional practice	2	7
Service		
Ambulatory	19	63
Home care	11	37

Table 2. Data related to stroke.

Characteristics (n=30)	Mean	Standard deviation
Time of the Lesion	12.5	15.3
Time of the Rehabilitation	9.1	10.4
Characteristics (n=30)	**N**	**%**
Type of stroke		
Ischemic	17	57
Hemorrhagic	6	20
Not specified	7	23
Injured Brain Hemisphere		
Right	15	50
Left	14	47
Not specified	1	3
Motor Deficit		
Hemiparesis	20	67
Hemiplegia	7	23
Absent*	3	10
Compromised body		
Left	15	50
Right	12	40
None	3	10
Use of mobility devices		
Yes	20	66.6
No	10	33.3

*Participants who did not present motor and sensorial deficits in any of the hemibodies.

Table 3. Descriptive analysis of FIM and its components.

Variables	Minimum	Maximum	Mean	Standard Deviation
Motor FIM	13	91	56.8	24.9
Cognitive FIM	5	35	25	11.1
Total FIM	18	126	81.8	34.9
Classification			**N**	**%**
Complete/Modified Independence (104-126 points)			11	37
Modified dependency (19-103 points)			17	56
Complete dependency (18 points)			2	7

Table 4. Correlation between FIM motor component and AT use.

Variables	Use of assistive device of mobility	
	R	P-value
Motor Independence	0.617	0.05*
Cognitive Independence	0.541	0.00
Total Independence	0.590	0.01*

*Indicates significance of p <0.05; R = Pearson correlation coefficient.

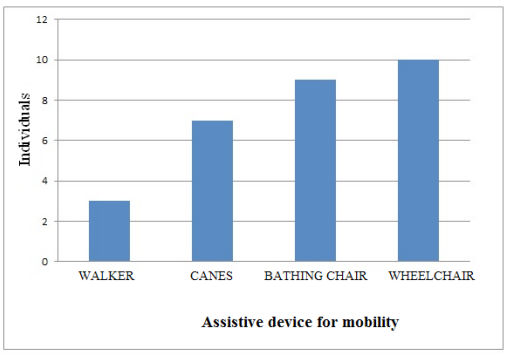

Figure 1. Distribution of the use of assistive devices for mobility between the sample (n=20).

4 Discussion

4.1 Sociodemographic and health profile

The sample of subjects with stroke was composed entirely of male participants, with preponderance of married or stable union subjects, elderly and retired as observed in other studies with subjects with stroke of both genders (BAUMANN et al., 2011; JUTAI et al., 2007; CAROD-ARTAL et al., 2002).

The lesions were predominantly ischemic, on the right, and the most frequent motor deficit was left hemiparesis/hemiplegia, as observed in another Brazilian study with subjects with stroke of both genders (COSTA; SILVA; ROCHA, 2011). Mean times of injury and rehabilitation were very close, indicating a possible beginning of rehabilitation around the third month of injury. Considering that the literature indicates the first semester after stroke as the period of greatest functional gain due to neurological recovery, the subjects in this study at the time of collection were in a phase of greater stability of their functional recovery (HILLIER; INGLIS-JASSIEM, 2010).

4.2 Functional independence and mobility conditions

Confirming part of the first hypothesis of this study, most of the participants used assistive devices for mobility (66%). Although 90% of the sample reported having a motor deficit, only slightly more than two-thirds of the sample reported using mobility assistive devices. The mean age was higher than a study that identified the use of assistive devices for mobility in only 43% of stroke subjects with a mean age of 65.3 years old (JUTAI et al., 2007). These findings demonstrate that the presence of motor deficits does not necessarily imply the need to use these devices, and they can be explained by the pre-eminent presence of subjects with hemiparesis, which is characterized by a partial impairment of sensory and motor function, with deficits of a milder character (BOUKADIDA et al., 2015), not requiring the use of assistive devices for mobility. This also corroborates findings that indicate correlations between worse motor levels and the use of mobility assistive devices (JUTAI et al., 2007).

Another possible justification for the high number of subjects with physical limitations and the less subjects who used assistive devices for mobility is the difficulty in accessing rehabilitation services and dispensing these resources. According to a study identified in a sample of 100 subjects with stroke, about 35% of participants did not undergo rehabilitation treatment due to non-referral to a specialized center (PAVAN et al., 2008). Another probable justification is the high rate of underutilization of AT resources in subjects with disabilities and/or reduced mobility, due to factors such as failure to accept disability and resource, inappropriate instruction, lack of training for professionals to use them, the lack of evaluation of a specialized professional, and the lack of maintenance and follow-up of the prescribed equipment (CRUZ,

2012; MELLO, 2008). Another possible factor is the changes in the mobility needs of stroke subjects, which can be altered over time due to the functional evolution of the picture (BOLAND et al., 2016). These aspects reinforce the importance of specialized and professional services, with adequate training for follow-up in the process of evaluation, prescription, training and periodic reassessment in the context of AT actions, according to the Guidelines for the Supply of Manual Wheelchairs in Places with Few Resources of the World Health Organization (WHO) (ORGANIZAÇÃO..., 2008).

Most of the participants used wheelchairs (10) followed by bathing chairs (9) and walking canes (6), refuting part of the first hypothesis of this study. This finding was also divergent from a study with subjects with stroke who first identified the use of walking canes, followed by walkers and, thirdly, of wheelchairs, the first being more used by male subjects, while the others by female subjects (JUTAI et al., 2007). The preeminence of wheelchair use was not expected by this study, since the literature reports better mobility conditions among male subjects, being this sample composed exclusively of men (DIRIK; CAVLAK; AKDAG, 2006). One possible factor that may explain such differences between the studies is the mean time of injury, which in our study was 12.5 months and the subjects were still in the rehabilitation phase. While in the other study, the average was 15.3 years, which may determine a greater adaptation of the subjects in the mobility limitations. Another possible aspect is the difference in the age groups, since the mean of our study was 70.27, while in the other study was 65.3 years, with age being a factor associated with the reduction of mobility among elderly people with stroke (MOZAFFARIAN et al., 2015). Another possible factor is the partial collection of data from our study in a home care service, which spares attention to bedridden subjects, especially in the elderly age group. This reality prompts the need for specific actions, focused on the problem of restricting mobility in this type of rehabilitation service, especially when dealing with elderly subjects.

The prevalence of wheelchair use (30%) can be explained by the presence of hemiplegia in 23% of the participants since hemiplegic patients used them and bathing chairs in their entirety. This reality can be justified by more severe constraints on mobility due to this motor impairment (BOUKADIDA et al., 2015). This functional condition may also imply the use of more than one resource, such as the concomitant use of wheelchairs and bathing chairs by some individuals with a stroke (9). This is corroborated by a study that points out an association between worse physical conditions and the use of multiple devices for mobility (JUTAI et al., 2007). In the case of wheelchair use, it is essential that the individuals acquire a variety of basic skills, such as transfers and propulsion of the chair, as well as more complex ones, such as climbing and descending ramps, climbing and cranking the chair that can be trained by a professional, who guide the training to the user of the resource or to their caregiver (ORGANIZAÇÃO..., 2008).

In turn, the use of walking canes and walkers, representing a third of the sample, can be related to the group with better physical conditions. Corroborating with this study, a study showed that individuals who used canes had better levels of mobility, as well as lower levels of physical disability (JUTAI et al., 2007). Evidence indicates the relevance of the cane in the rehabilitation process of individuals with a stroke, providing independent early walking, favoring orthostatism, increasing the support base, increasing stability, and decreasing gait asymmetry. On the other hand, the same study pointed out as a negative factor, the fact of stimulating synergic muscle activity on the plegic/paretic side, which favors associated reactions and orthopedic problems due to joint overload (PINHEIRO, 2011). However, it does not seem a major problem, according to a study that identified participants' preference for walking as fast as possible, rather than working with what could be considered normal walking pattern, regardless of the gait device used (TYSON; ROGERSON, 2009). The authors further point out that the benefits of providing adaptive equipment early in the stroke to increase function outweigh the potential disadvantages of preventing the use of them to the detriment of recovery from normal movement patterns.

Confirming part of the first hypothesis of this study, different levels of functional independence between the sample (18-126), with preeminence of dependent subjects (81,8) were observed. These findings corroborate other studies with stroke in both genders (PRAKOSO; VITRIANA; ONG, 2016; RIGBY et al., 2009). The difference between levels of functional independence in the participants can be related to the use of different types of mobility assistive devices, as well as the high levels of dependence on the predominant use of the wheelchair between the individuals. One of the possible explanations is that limitations in functional independence may be results of mobility restriction, as pointed out by a study with elderly people with Multiple Sclerosis (FINLAYSON; VAN DENEND, 2003). Other

possible justifications are the greater worsening of the motor picture, the use of an assistive device for inadequate or ineffective mobility for the satisfactory performance of mobility or even environmental limitations related to accessibility, compromising the performance of their daily activities. A study pointed out that, although using assistive devices for mobility, about 12.4% of individuals with a stroke may have difficulties leaving home and 11.9% difficulties to move within their own (SKOLARUS; BURKE; FREEDMAN, 2014).

4.3 Correlations between use of assistive devices for mobility and functional independence

Correlations between the use of assistive devices for mobility and motor and total functional independence were identified, confirming part of the second hypothesis of this study. These findings confirm a study that identified a positive correlation between the use of wheelchairs and higher levels of functional dependence (JUTAI et al., 2007); and also with another study that presented a negative correlation between functional independence and the level of mobility (DIRIK; CAVLAK; AKDAG, 2006). This can be explained by the motor FIM items, usually compromised in the case of limitations in mobility performance, such as transfers, walking and activities such as upper and lower dressing and bathing (KELLY-HAYES et al., 2003). Another possible justification for these relationships is the presence of 47% of lesions in the left cerebral hemisphere, since in these cases, there is a greater propensity to use wheelchairs (MOUNTAIN et al., 2010), due to cognitive alterations and motor impairments more significant among individuals with right dominant laterality (PIRES, 2013; ARSIC et al., 2016). These statements suggest the relevance of actions aimed at promoting mobility among individuals with a stroke for greater functional independence, and the occupational therapist is an important professional in this process, with actions such as the indication of AT resources for ADL, accessibility as well as adaptations environmental impacts.

Considering the relationships found by this study, the presence of impacts on caregivers is highlighted, since studies have identified that individuals with a stroke with greater mobility restrictions and higher levels of dependence have caregivers with higher levels of overload and with substantial reduction in roles (RIGBY et al., 2009; RUDMAN; HEBERT; REID, 2006; CARO et al., 2017). It is believed that the promotion of mobility through assistive devices can also bring positive effects to caregivers. This is because these resources provide greater functionality and participation of the individuals with a stroke. The Occupational Therapist is an important professional in reducing the physical demand of the caregiver, as he performs actions aimed at increasing the functional independence, reducing the demands of care by a caregiver, with possible reduction in the overload rates.

Opposite to the second hypothesis of this study, no correlation was identified between cognitive independence and the use of assistive devices for mobility. In contrast to this finding, a study indicates that wheelchair users can be predicted by functional cognition and independence, and is related to higher levels of dependence and cognitive changes (JUTAI et al., 2007). These correlations were expected since the cognitive changes correlate with the lower levels of functional independence in ADL in individuals with a stroke (CARO et al., 2017), therefore their influence on mobility is also considered. These findings were also expected, since 47% of the sample presented lesions in the left cerebral hemisphere, which implies a greater probability of severe cognitive impairments (ARSIC et al., 2016), limitations in ADL (SPALLETTA et al., 2002) and worse performance in the rehabilitation process, given the relevance of cognition in the execution of exercises commonly used in therapies (HERSHKOVITZ; BRILL, 2007). These aspects presuppose the influence of the cognitive aspects in the acquisition of skills related to the mobility and adequate use of the assistive devices for the mobility between individuals with a stroke for this group, aiming at the safety and reduction of risks of injuries.

The findings of this study demonstrate the need for a specific attention to the individuals, through a careful evaluation of the post-stroke picture, previously indicating the AT resource, as well as throughout the rehabilitation. This is fundamental, as the mobility device prescribed to the patient with a stroke can be more useful when adapted to the participation of people and occupational goals, also bringing better quality of life indices to them (BOLAND et al., 2016). In this context, the role of the occupational therapist is highlighted as one of the professionals responsible for prescribing and dispensing assistive devices for mobility in order to achieve patient-centered goals with a focus on occupation, for example, taking a shower or to move within the home (GELDERBLOM; WITTE, 2002). Since this professional works from the assessment of patient´s needs, physical, cognitive and sensory abilities, the receptivity of the individual to the

device, the sociocultural condition and environment where it will be used, indicating the resource, the use instructions and guides to other people involved in this process (PELOSI; NUNES, 2009).

5 Conclusion

This study was carried out with men with a stroke, and the prevalence of individuals who used assistive devices for mobility was identified, with the highest frequency of wheelchairs and bathing chairs, followed by canes. The sample was preeminently dependent for ADL. Correlations between the use of assistive devices for mobility and the level of total and motor functional independence were identified. To know these aspects related to the use of assistive devices for mobility between subjects with stroke is fundamental to the occupational therapist and other professionals involved in the process involving the prescription of assistive devices for mobility, training, and accompaniment for mobility as well as rehabilitation process to bring greater parameters for clinical decision.

There are limitations of this study regarding the number of participants, generalization of the sample results, as well as the pre-eminence of elderly people coming from a home care service, which is a predictor of worse mobility conditions. Also, the absence of an investigation into the use of these resources and functional independence in other areas of occupations of patients with a stroke is observed, such as instrumental activities of daily living, rest and sleep, education, work, leisure and social participation.

In this perspective, future studies that aim to understand the relationship between the type of assistive device for mobility and functional independence in other areas of occupations are suggested, as well as the performance of occupational roles among the individuals with a stroke. Regarding caregivers, investigations to understand the relationship between the use of these devices and the impacts on the levels of overload, quality of life and occupational performance of these individuals are suggested.

References

AMERICAN OCCUPATIONAL THERAPY ASSOCIATION – AOTA. Occupational therapy practice framework: Domain and process. *American Journal of Occupational Therapy*, Bethesda, v. 62, n. 6, p. 625-683, 2008. http://dx.doi.org/10.5014/ajot.62.6.625.

AMERICAN OCCUPATIONAL THERAPY ASSOCIATION – AOTA. Occupational therapy practice framework: domain and process. *American Journal of Occupational Therapy*, Bethesda, v. 68, p. S1-S48, 2014. Supplement 1. http://dx.doi.org/10.5014/ajot.2014.682006.

ARSIC, S. et al. Correlation between demographic characteristics, cognitive functioning and functional independence in stroke patients. *Srpski Arhiv Za Celokupno Lekarstvo*, Belgrade, v. 144, n. 1-2, p. 31-77, 2016. http://dx.doi.org/10.2298/SARH1602031A.

BAUMANN, M. et al. Increased residual disability among poststroke survivors and the repercussions for the lives of informal caregivers. *Topics in Stroke Rehabilitation*, Abingdon, v. 18, n. 2, p. 162-171, 2011. http://dx.doi.org/10.1310/tsr1802-162.

BOLAND, P. et al. Equipment provision after stroke: A scoping review of the use of personal care and mobility aids in rehabilitation. *British Journal of Occupational Therapy*, London, v. 80, n. 2, p. 1-16, 2016.

BOUKADIDA, A. et al. Determinants of sit-to-stand tasks in individuals with hemiparesis post stroke: a review. *Annals of Physical and Rehabilitation Medicine*, Amsterdam, v. 58, n. 3, p. 167-172, 2015. http://dx.doi.org/10.1016/j.rehab.2015.04.007.

BRASIL. Ministério da Saúde. *Diretrizes de atenção à reabilitação da pessoa com acidente vascular cerebral*. Brasília, 2013a.

BRASIL. Portaria nº 1272, de 25 de junho de 2013. Inclui procedimentos de cadeiras de rodas e adaptação postural em cadeira de rodas na tabela de procedimentos, medicamentos, Órteses, Próteses e Materiais Especiais (OPM) do Sistema Único de Saúde. *Diário Oficial [da] República Federativa do Brasil*, Poder Executivo, Brasília, DF, 25 jun. 2013b. Disponível em: <http://bvsms.saude.gov.br/bvs/saudelegis/gm/2013/prt1272_25_06_2013.html>. Acesso em: 16 out. 2013.

BRUST, J. C. M. Circulation of the brain. In: KANDEL, E. R. et al. (Ed.). *Principles of neural science*. New York: McGraw-Hill, 2012. p. 1302-1316.

CARO, C. C. et al. Independence and cognition post-stroke and its relationship to burden and quality of life of Family caregivers. *Topics in Stroke Rehabilitation*, Abingdon, v. 24, n. 3, p. 194-199, 2017. http://dx.doi.org/10.1080/10749357.2016.1234224.

CAROD-ARTAL, F. J. et al. Functional recovery and instrumental activities of daily living: follow-up 1-year after treatment in a stroke unit. *Brain Injury*, London, v. 16, n. 3, p. 207-216, 2002. http://dx.doi.org/10.1080/02699050110103337.

COOK, A. M.; POLGAR, J. M. *Cook and Hussey's assistive technologies*: principles and practices. Mosby: Year Book, 2015.

COSTA, F. A.; SILVA, D. L. A.; ROCHA, V. M. Estado neurológico e cognição de pacientes pós-acidente vascular cerebral. *Revista da Escola de Enfermagem da USP*, São Paulo, v. 45, n. 5, p. 1083-1088, 2011. http://dx.doi.org/10.1590/S0080-62342011000500008.

CRUZ, D. M. C. *Papéis ocupacionais e as pessoas com deficiências físicas*: independência, tecnologia assistiva e poder aquisitivo. 2012. 230 f. Tese (Doutorado em Educação Especial) – Universidade Federal de São Carlos, São Carlos, 2012.

DIRIK, A.; CAVLAK, U.; AKDAG, B. Identifying the relationship among mental status, functional independence and mobility level in Turkish institutionalized elderly: gender diferences. *Archives of Gerontology and Geriatrics*, Amsterdam, v. 42, n. 3, p. 339-350, 2006. http://dx.doi.org/10.1016/j.archger.2005.08.007.

FINLAYSON, M.; VAN DENEND, T. Experiencing the loss of mobility: perspectives of older adults with MS. *Disability and Rehabilitation*, Abingdon, v. 25, n. 20, p. 1168-1180, 2003. http://dx.doi.org/10.1080/09638280310001596180.

GELDERBLOM, G. J.; WITTE, L. P. The assessment of assistive technology outcomes, effects and costs. *Technology & Disability*, Amsterdam, v. 14, n. 3, p. 91-94, 2002.

GOLDSTEIN, L. B. et al. Guidelines for the primary prevention of stroke: a guideline for healthcare professionals from the American Heart Association. *Stroke*, Baltimore, v. 42, n. 2, p. 517-584, 2011. http://dx.doi.org/10.1161/STR.0b013e3181fcb238.

GORELICK, P. B. et al. Vascular contributions to cognitive impairment and dementia: a statement for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*, Baltimore, v. 42, n. 9, p. 2672-2713, 2011.

GRANGER, C. V. et al. Advances in functional assessment for medical rehabilitation. *Topics in Geriatric Rehabilitation*, New York, v. 1, n. 3, p. 59-74, 1986. http://dx.doi.org/10.1097/00013614-198604000-00007.

GUILFORD, J. P. *Fundamental statistics in psychology and education*. New York: McGraw-Hill Book, 1950.

HERSHKOVITZ, A.; BRILL, S. The association between patients' cognitive status and rehabilitation outcome in geriatric day hospital. *Disability and Rehabilitation*, Abingdon, v. 29, n. 4, p. 333-337, 2007. http://dx.doi.org/10.1080/09638280600787096.

HILLIER, S.; INGLIS-JASSIEM, G. Rehabilitation for community-dwelling people with stroke: home or centre based? A systematic review. *Internacional Journal of Stroke*, Thousand Oaks, v. 5, n. 3, p. 178-186, 2010.

JUTAI, J. et al. Mobility assistive device utilization in a prospective study of patients with first-ever stroke. *Archives of Physical Medicine and Rehabilitation*, Philadelphia, v. 88, n. 10, p. 1268-1275, 2007. http://dx.doi.org/10.1016/j.apmr.2007.06.773.

KELLY-HAYES, M. et al. The influence of gender and age on disability following ischemic stroke: the Framingham study. *Journal of Stroke and Cerebrovascular Disease*, Philadelphia, v. 12, n. 3, p. 119-126, 2003. http://dx.doi.org/10.1016/S1052-3057(03)00042-9.

KIM, O.; KIM, J. H. Falls and use of assistive devices in stroke patients with hemiparesis: association with balance ability and fall efficacy. *Rehabilitation Nursing*, Philadelphia, v. 40, n. 4, p. 267-274, 2015. http://dx.doi.org/10.1002/rnj.173.

MELLO, M. A Tecnologia Assistiva no Brasil. In: OLIVEIRA, A. I. A.; LOURENÇO, J. M. Q.; LOURENÇO, M. G. F. *Perspectivas da Tecnologia Assistiva no Brasil*: pesquisa e prática. Belém: UEPA, 2008. p. 7-14.

MOUNTAIN, A. D. et al. Rates and predictors of manual and powered wheelchair use for persons with stroke: A retrospective study in a Canadian rehabilitation center. *Archives of Physical Medicine and Rehabilitation*, Philadelphia, v. 91, n. 4, p. 639-643, 2010. http://dx.doi.org/10.1016/j.apmr.2009.11.025.

MOZAFFARIAN, D. et al. Heart disease and stroke statistics - 2015 update: a report from the American Heart Association. *Circulation*, Hagerstown, v. 131, n. 4, p. e29-e322, 2015. http://dx.doi.org/10.1161/CIR.0000000000000152.

MUNRO, B. H. *Statisticals methods for health care research*. Philadelphia: Lippincott, 2001.

ORGANIZAÇÃO MUNDIAL DE SAÚDE – OMS. *Classificação Internacional de Funcionalidade, Incapacidade e Saúde*. São Paulo: Edusp, 2003.

ORGANIZAÇÃO MUNDIAL DA SAÚDE – OMS. *Diretrizes sobre o fornecimento de cadeiras de rodas manuais em locais com poucos recursos*. São Paulo, 2008. Disponível em: <http://apps.who.int/iris/bitstream/10665/43960/38/9789241547482_por.pdf>. Acesso em: 10 mar. 2016.

PAVAN, K. et al. Identificação de pacientes com incapacidades pós-AVC no ambulatório de neurologia da Santa Casa de São Paulo do ponto de vista reabilitacional. *Medicina de Reabilitação*, São Paulo, v. 27, n. 3, p. 93-97, 2008.

PELOSI, M. B.; NUNES, L. R. O. P. Formação em serviço de profissionais da saúde na área de tecnologia assistiva: o papel do terapeuta ocupacional. *Revista Brasileira de Crescimento e Desenvolvimento Humano*, São Paulo, v. 19, n. 3, p. 435-444, 2009.

PINHEIRO, H. A. Uso da bengala padrão na reabilitação da marcha de pacientes com sequela de Acidente Vascular Cerebral. *Revista de Neurociências*, São Paulo, v. 19, n. 2, p. 358-364, 2011.

PIRES, C. P. L. *Impacto das alterações cognitivas na preparação de uma refeição simples após AVC*: comparação entre lesões direitas e esquerdas. 2013. 102 f. Dissertação (Mestrado em Neuropsicologia) – Universidade Lusófona de Humanidades e Tecnologias, Lisboa, 2013.

PRAKOSO, K.; VITRIANA, V.; ONG, A. Correlation between cognitive functions and activity of daily living among post-stroke patients. *Althea Medical Journal*, Bandung, v. 3, n. 3, p. 329-333, 2016. http://dx.doi.org/10.15850/amj.v3n3.874.

RIBERTO, M. et al. Validação da versão brasileira da Medida de Independência Funcional. *Acta Fisiátrica*, São Paulo, v. 11, n. 2, p. 72-76, 2004.

RIGBY, H. et al. Caring for stroke survivors: baseline and 1-year determinants of caregiver burden. *International Journal of Stroke*, Thousand Oaks, v. 4, n. 3, p. 152-158, 2009. http://dx.doi.org/10.1111/j.1747-4949.2009.00287.x.

RUDMAN, D. L.; HEBERT, D.; REID, D. Living in a restricted occupational world: the occupational experiences of stroke survivors who are wheelchair users and their caregivers. *Canadian Journal of Occupational Therapy*, Thousand Oaks, v. 73, n. 3, p. 141-152, 2006. http://dx.doi.org/10.2182/cjot.05.0014.

SANTOS, P. S. et al. Uso de dispositivos de assistência por indivíduo com osteoartrite de mãos. *Cadernos Brasileiros de Terapia Ocupacional*, São Carlos, v. 26, n. 1, p. 145-152, 2018.

SCHERER, M.; CRADDOCK, G.; MACKEOGH, T. The relationship of personal factors and subjective well-being to the use of assistive technology devices. *Disability and Rehabilitation*, Abingdon, v. 33, n. 10, p. 811-817, 2011. http://dx.doi.org/10.3109/09638288.2010.511418.

SKOLARUS, L. E.; BURKE, J. F.; FREEDMAN, V. A. The role of accommodations in poststroke disability management. *Journal of Gerontology*, Washington, v. 69, p. S26-S34, 2014. Supplement 1.

SOUZA, A. C. A.; DUTRA, F. C. M. D. Prescrição de cadeira de rodas. In: CRUZ, D. M. C. *Terapia ocupacional na reabilitação pós-acidente vascular encefálico*: atividades de vida diária e interdisciplinaridade. São Paulo: Santos, 2012. p. 155-172.

SPALLETTA, G. et al. Predictors of cognitive level and depression severity are different in patients with left and right hemispheric stroke within the first year of illness. *Journal of Neurology*, Berlin, v. 249, n. 11, p. 1541-1551, 2002. http://dx.doi.org/10.1007/s00415-002-0885-z.

TYSON, S. F.; ROGERSON, L. Assistive walking devices in nonambulant patients undergoing rehabilitation after stroke: The effects on functional mobility, walking impairments, and patients' opinion. *Archives of Physical Medicine and Rehabilitation*, Philadelphia, v. 90, n. 3, p. 475-479, 2009. http://dx.doi.org/10.1016/j.apmr.2008.09.563.

WHERRY, R. J. *Contributions to correlational analysis*. Orlando: Academic Press, 1984.

WHITSON, H. E. et al. Chronic medical conditions and the sex-based disparity in disability: the cardiovascular health study. *The Journals of Gerontology*: Series A Biological Sciences and Medical Sciences, Washington, v. 65, n. 12, p. 1325-1331, 2010. http://dx.doi.org/10.1093/gerona/glq139.

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Notes

[1] This work consists of part of the Master´s Dissertation titled "Independence and post-stroke cognition and its relationship with the overload, pain and quality of life of family caregivers" developed in the Post-Graduate Program in Occupational Therapy of the Federal University of São Carlos, whose completion was in April 2015. Because it was a research involving human beings, all existing ethical procedures were fulfilled.