Original Research

Home Safety of Individuals with Neurological Disorders: A Turkish Sample

Nörolojik Özürlü Bireylerin Ev Güvenliği: Bir Türk Örneklemi

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ABSTRACT

Purpose: The aim of this study is to determine the home safety status and associated risks of individuals with neurological disorders. **Material and Methods:** Eighty-three individuals with neurological disorders living in Denizli constitute the sample group of the study. The Home Safety Checklist was employed in order to evaluate the home safety status of the participants. **Results:** While 93% of the participants (n=77) were considered to be living in 'dangerous' homes, 7% (n=6) had 'good' homes according to the Home Safety Checklist scores. In this study's sample, no participant was considered to be living in a 'perfect' home. **Conclusion:** The results are indicative of the fact that the home safety scores of participants with neurological disorders are very low. In light of this, the environment and living area of the affected individuals should be adapted according to their limitations in such a way so as to enable them to live a barrier-free and easier life.

Key Words: Neurological Disorders; Disabled Persons; Risk Assessment; Safety

ÖZ

Amaç: Bu çalışmanın amacı nörolojik bozuklukları olan bireylerin ev güvenliği durumlarını ve buna bağlı riskleri belirlemektir. **Gereç ve Yöntem:** Denizli'de yaşayan nörolojik özrü olan seksen üç birey, araştırmanın örneklem grubunu oluşturmaktadır. Katılımcıların ev güvenlik durumlarını değerlendirmek için Ev Güvenlik Kontrol Listesi kullanılmıştır. **Sonuçlar:** Ev Güvenlik Kontrol Listesi puanlarına göre, katılımcıların% 93'ü (n = 77) "tehlikeli" evlerde yaşarken, %7'si (n = 6) 'iyi' evlerde yaşamaktaydı. Bu çalışma örnekleminde hiçbir katılımcı "mükemmel" bir evde yaşamamaktaydı. **Tartışma:** Sonuçlar, nörolojik rahatsızlıkları olan katılımcıların ev güvenliği puanlarının çok düşük olduğunu göstermektedir. Bundan dolayı, etkilenen bireylerin çevresi ve yaşam alanı, bariyersiz ve daha kolay yaşama imkânı verecek şekilde kısıtlılıklarına göre düzenlenmelidir.

Anahtar Kelimeler: Nörolojik Bozukluklar; Özürlü Bireyler; Risk Değerlendirmesi; Güvenlik.

Pragmatic findings by Hirtz, Thurman, Gwinn-Hardy et al. (2007) indicate that neurological disorders, including Cerebrovascular Disease(CVD), Parkinson's Disease(PD), Multiple Sclerosis(MS), and Spinal Cord Injury(SCI) are most common diseases and their prevalence are higher. Neurological diseases affect a person's life such as daily living, physical functioning, occupational life, social relations, health related quality of life. The main problem resulting from these disorders is functional inadequacy in the musculoskeletal system.

Many studies showed that the Home Safety Checklist(HSCL) can be used to prevent potential hazards and risks at home (Pynoos, Steinman, Nguyen et al., 2012; Büker, Altuğ, Kitiş et al., 2008). Recently, HSCLs has been used in order to assess homes/houses in terms of potentional hazards and risks by the health professionals, including physiotherapists and ergotherapists (Pynoos, Steinman & Nguyen, 2010; Büker et al., 2008; Atwal, McIntyre, Craik et al., 2008).

Since the rising prevalence of chronic neurological diseases physical therapists have worked to prevent falling at home and home based injuries. A few studies have focused on home safety in Turkish literature. The pragmatic aim of this study is to determine the home safety status of the individuals with neurological diseases.

MATERIAL AND METHODS

Study Design
The present study was conducted between March 2012 and June 2013.A physical therapist with three years of experience assessed all of the participants' living area. The Pamukkale University Ethics Committee in Denizli, Turkey approved this study(B.30.2.PAÜ.0.20.05.09/30). All the assessments were home based visits and observations. Informed consent was also obtained from all of the participants.

Study Group
The characteristics of the participants are summarized in Table 1. Eighty-three subjects (43 with CVD;10 with PD; 16 with MS; and14 with SCI) were included in the study. The inclusion criteria were established as follows: (1) A participant should have received only one diagnosis of CVD, PD, MS, or SCI; (2) A participant should 20 years of age or older; and (3) A participant should be living in his/her own home.

Outcome Measurements
Demographics, information about living area, and clinical data of the sample were recorded. Severity of disease was assessed by using the Modified Rankin Scale for individuals with CVD, the Modified Hoehn Yahr Scale for individuals with PD, the Expanded Disability Status Scale for individuals with MS, and the American Spinal Injury Association Impairment Scale for individuals with SCI. The observer also asked the participants' opinion regarding satisfaction level with his/her living areas. In addition, home safety status was evaluated by using the HSCL.

Assessment of Disability Status
Modified Rankin Scale (MRS): The MRS is used to determine the severity of CVD as a clinician-reported measure. The scale measures independence rather than the performance of specific tasks (Van Swieten, Koudstaal, Visser et al., 2008). The scale consists of six grades from 0 to 5, with 0 corresponding to no symptoms and 5 corresponding to severe disability (Sulter, Steen & De Kayser, 1999). The MRS is a useful, effective and reliable assessment to measure the global disability level of participants with CVD (Van Swieten et al., 2008; D'Olhaberriague, Litvan, Mitsias et al, 1999).

Modified Hoehn Yahr Scale (MHYS): The MHYS system is commonly used to describe PD progress of symptoms. The original scale included Stages 1 through 5 with each scale representing the following: Stage 0 corresponds to no signs of disease; Stage 1 corresponds to unilateral symptoms only; Stage 2 corresponds to bilateral symptoms and impairment of balance; Stage 3 corresponds to mild to moderate balance impairment where physical independence is still apparent; Stage 4 corresponds to severe disability, the ability to walk or stand unassisted and Stage 5 corresponds to the required use of a wheelchair or being bedridden unless assisted(Hoehn & Yahr, 1967).

*Expanded Disability Status Scale (EDSS):*The EDSS is a widely used system that is used to determine the severity of the MS. It is based upon the original Kurtzke Disability Status Scale(DSS) and Functional Systems(FS) (Bushnik, 2011). There are eight FSs: pyramidal, cerebellar, brainstem, sensory, visual function, bowel and bladder, cerebral functions, and other. Following neurological examination, each FS is rated on a scale of 0–5(cerebellar and brainstem), 0–1(other), and 0–6(all the others). These ratings assist in assigning an EDSS score which ranges from 0 to 10 in increments of 0.5, where 0 indicates

a normal neurological examination (but cerebral grade 1 allowed) and 10 corresponds to death due to multiple sclerosis(MS)(Kurtzke, 1983; Noseworthy, Vandervoorth, Wong et al., 1990).

American Spinal Injury Association (ASIA) Impairment Scale: The ASIA Scale is used in the present study to determine the severity of SCI. Injuries are classified in general terms of being neurologically "complete" or "incomplete" injury based upon the sacral sparing definition. Here, sacral sparing refers to the presence of sensory or motor function in the most caudal sacral segments as determined by the examination (i.e. preservation of light touch or pin prick sensation at the S4-5 dermatome, deep anal pressure or voluntary anal sphincter contraction). A complete injury is defined as the absence of sacral sparing (i.e. sensory and motor function in the lowest sacral segments, S4-5), whereas an incomplete injury is defined as the presence of sacral sparing (i.e. some preservation of sensory and/or motor function at S4-5) (Kirschblum, Burns, Biering-Sorensen et al., 2011; Maynard, Bracken, Creasey et al., 1997; Cohen, Ditunno, Donovan et al., 1998).

Assessment of Home Safety

Home Safety Checklist (HSCL): The HSCL just used in this study includes subtitles of housekeeping, floors, bathroom, traffic lanes, lighting, stairways, ladders, steptools, outdoor areas, and personal precautions. Specifically, the HSCL consists of 65 questions which were developed by The United States of America National Safety Council. The cause to select this checklist in the study is due to the fact that it has previously been used for the Turkish population (Büker et al., 2008). The maximum total score is 65 points, and the scores correspond to the following evaluations: scores 1–7 are evaluated as perfect; scores 8–14 are good; and 15 and over are dangerous in terms of home safety (Herdman, 2000; Büker et al., 2008).

Statistical Analysis

In the present study, collected the Statistical Package for the Social Sciences (SPSS, Chicago, IL, USA) version 18.0 software for Windows was used for the data analysis. Characteristics of the sample are presented as mean ± standard deviation(SD), numbers (n) and percentages (%).

The data being collected by HSCL are presented as mean ± standard deviation(SD). The level of statistical significance was set at p≤0.05.

RESULTS

The mean age of the participants with neurological disease was 56.89±16.53 years (range; 20-87). Demographics of the sample can be seen in Table1. 88% of the participants reported falling in the past year. 78.3% experienced falling 0-4 times after their disease.48.1% of the sample (n=40) were attended in a physiotherapy and rehabilitation program. Participants had a neurological diseases, respectively: 43 CVD (51.80%), 16 MS (19.27%), 14 SCI (16.86), and 10 PD (12.04%). The mean of disability levels of the participants was established as follows: 2.4±0.9 for CVD; 2.4±0.9 for PD and 3.2±1.8 for MS. According to ASIA scoring, 50% (n=7) of the participants had C grade, 42.8% (n=6) a D grade, and 7.1% (n=1) a B grade.

The majority of the participants (63.8%; n=53) were living with a partner. However, 32.5% of the participants were living with their relatives (n=27) and 3.6 % were living alone (n=3). 50.6% (n=42) of the participants were using an assistive ambulatory device such as forearm crutches, tripod, walker, wheelchair.

The HSCL scores of the participants by neurological condition are shown in Table 2. The scores of the 77 participants (93%) were accepted as "dangerous". Only 6 of the participants' scores were evaluated as "good". However, score referring "perfect" home was not found (Figure 1).

The following question 'Do you think your home is safe in terms of your disease?' was asked to all of the participants. 81.1% participants of the sample reported "yes", 10.8% said "no", and 6.0% reported "no comments". 91.6% of the participants reported that they were satisfied with their own homes (Table 3).

Table 1. Demographics of The Sample

Variable	CVD		PD		MS		SCI		General	
Educational Level	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Literate-Illiterate	9	21.0	2	20.0	0	0.0	4	28.6	15	18.0
Primary School	29	67.4	4	40.0	6	37.5	5	35.7	44	53.0
Secondary School	0	0.0	3	30.0	0	0.0	2	14.3	5	6.0
High School	3	7.0	1	10.0	5	31.3	3	21.4	12	14.5
University	2	4.7	0	0.0	5	31.3	0	0.0	7	8.4
Marital Status										
Married	34	79.1	8	80.0	13	81.3	7	50.0	62	74.4
Single	0	0.0	0	0.0	2	12.5	6	42.9	10	12
Divorced-Widow/Widower	9	20.9	2	20.0	1	7.1	1	7.1	3	3.6
Work Status										
Yes	1	2.3	0	0.0	3	18.8	3	21.4	7	8
No/Retired	43	97.7	10	100.0	13	81.3	11	78.6	76	92
Monthly Income										
<940 Turkish Lira	27	62.8	5	50.0	4	25.0	4	28.6	40	48
940-3162 Turkish Lira	15	34.9	5	50.0	9	56.3	9	64.3	38	46
3162 Turkish Lira<	1	2.3	0	0.0	3	18.8	1	7.1	5	6

CVD: Cerebrovascular Disease   **PD:** Parkinson's Disease **MS:** Multiple Sclerosis **SCI:** Spinal Cord Injury

Table 2. Home Safety Checklist Scores by The Groups

|	Home Safety Checklist Score*	
Group	**Min-Max**	**Mean±SD**
CVD (n=43)	11-26	19.2±3.0
PD (n=10)	15-25	19.6±3.1
MS (n=16)	14-29	20.4±4.1
SCI (n=14)	3-26	18.1±4.0
Total (n=83)	11-29	19.3±3.5

CVD: Cerebrovascular Disease   **PD:** Parkinson's Disease **MS:** Multiple Sclerosis **SCI:** Spinal Cord Injury
*Total score of the scale is 65.

Table 3. Residential Data by The Groups

Variables	CVD		PD		MS		SCI		TOTAL	
	n	%	n	%	n	%	n	%	n	%
Residence Type										
Private House	17	39.5	1	10.0	6	37.5	6	42.9	30	36.10
Flat	26	60.5	9	90.0	10	62.5	8	57.1	53	63.9
Own Room										
Yes	31	72.1	6	60.0	14	87.5	10	71.4	61	73.5
No	11	25.6	3	30.0	1	6.2	3	21.4	18	21.7
Shared	1	2.3	1	10.0	1	6.2	1	7.1	4	4.8
Indoor Accessibility of Participants 'homes										
Good	39	90.7	9	90.0	13	81.2	12	85.7	73	88.0
Poor	4	9.3	1	10.0	3	18.8	2	14.3	10	12.0

CVD: Cerebrovascular Disease **PD:** Parkinson's Disease **MS:** Multiple Sclerosis **SCI:** Spinal Cord Injury

Figure 1. Home Safety Status by The Groups
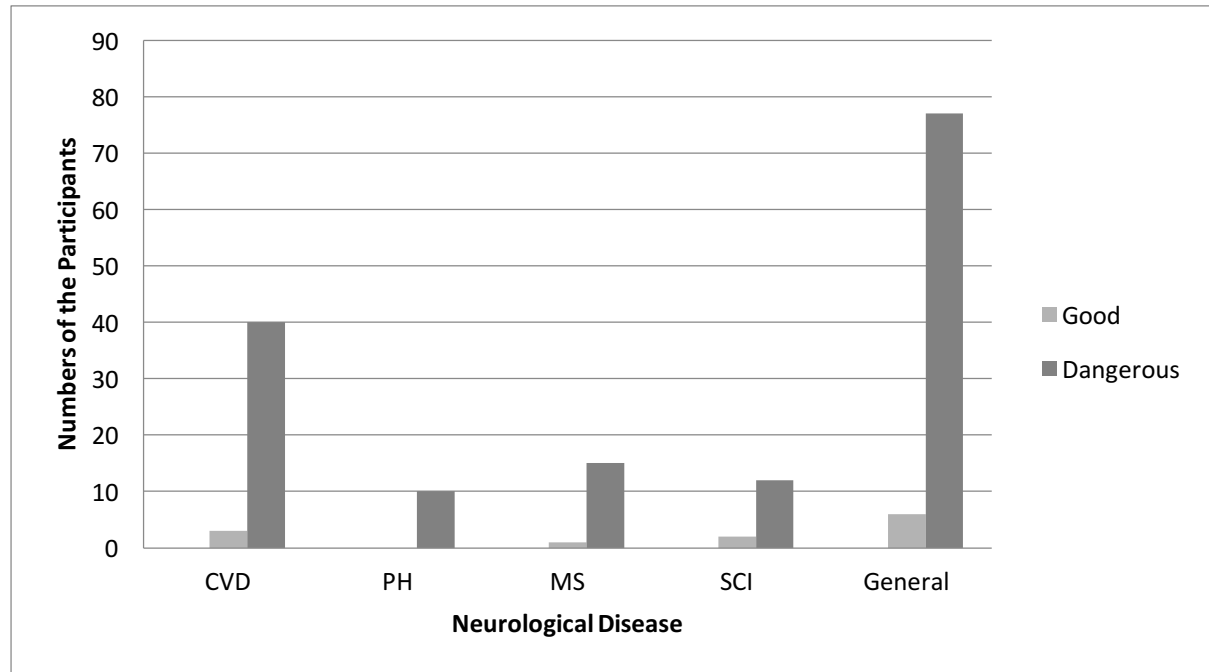
CVD: Cerebrovascular Disease   **PD:** Parkinson's Disease
MS: Multiple Sclerosis   **SCI:** Spinal Cord Injury

DISCUSSION

The results obtained from this study show that majority of the homes of individuals with neurological diseases living in Denizli are unsafe and risky. The authors consider that the participants are at risk of home accidents. Moreover, home accidents such as falls are the most common in the related literature.

There are few of studies focusing on home safety for individuals with neurological diseases have been conducted by Struckmeyer & Pickens, (2016), Matsuda, Shumway-Cook, Bamer et al. (2011), and Whiteneck, Meade, Dijkers et al. (2004). However, no study has been conducted in our national literature. Actually, most of the studies have been conducted on geriatric population (De Coninck, Bekkering, Bouckaert et al., 2017; Stark, Keglovits, Arbesman et al., 2017; Kamei, Kajii, Yamamoto et al., 2015; Matsuda et al., 2011). Whiteneck et al. (2004) reported that the five most important environmental barriers for subjects with SCI: natural environment, transportation, domestic assistance, the availability of healthcare, and governmental policies.

Home safety is also related to mobility of the persons. Good home safety can be an indicator for a

good mobility. Fall incidence increases among neurological patients with reduced mobility. In several studies, falls have been described as the major cause of home accidents. The results obtained from previous studies show 31.9% of the elderly adults living in their own homes reported accidents associated with falls (Evci, Ergin and Beşer, 2006). Fall incidence has been reported as 47.0% for CVD population (Weerdesteyn, Niet, Van Duijnhoven et al., 2008) and as 58.2% for MS population (Matsuda et al., 2011). The causes of falls for individuals with MS are linked to assistive ambulatory devices and the balance problems. Matsuda et al. (2011) reported the other individuals with different disabilities experienced the same problems. Moreover, the usage of an ambulatory device has been reported as a risk factor for falls if balance ability is impaired in individuals with CVD and with PD (Weerdesteyn et al., 2008; Behrman, Light, Flynn et al., 2002; Bloem, Grimbergen, Cramer et al., 2001), with MS (Nilsagård, Lundholm, Denison et al., 2009). In addition to this, older adults also show the same problems (Stevens, Thomas, Teh et al., & 2009). The previous studies support the idea referring an increased risk for people suffering from neurological diseases or aging.

In our study, 50.6% of the subjects were using ambulatory assistive devices. Furthermore, 88% of the subjects had experienced falls in the range of 0-4 times in the past year. On the other hand, 78.3% experienced falls during their disease. The authors of this study found that the rate of falls was higher than the extant literature. According to the results about the HSCL, all of the participants with or without ambulatory devices were found to be at risk in terms of home safety. Consequently, the results indicate the prevalence of falls for individuals with disabilities and for older adults is very high. That's why; health providers and caregivers should consider the risk factors and home hazards for these persons to maintain the home safety.

Home safety assessments occupy an important place in the literature. Güner and Güler(2002) recommended that the HSCL can be used to determine and to describe the risk factors for both older adults and individuals with neurological diseases. In addition to this, the HSCL is an important tool to prepare safe living areas and to improve of domestic conditions for older adults in the primary healthcare system (Büker et al., 2008; Uysal, Ardahan and Ergül, 2006).

According to the HSCL scores collected in our study, 77 participants (93%) described as having 'dangerous' homes, while only 6(7%) had 'good' homes. Nobody had a score that would qualify as 'perfect' home. Nevertheless, 81% of the participants with neurological disorders reported that their homes' safety are good. This discrepancy emphasises the importance of objective assessment of home safety. Furthermore, we suggested that participants with neurological diseases should be informed about home safety. These results indicate that home visits are needed to determine the environmental risk factors of the individuals with neurological diseases after discharge from hospital. In addition to this, home modifications should be done to prevent falls and home accidents. Altuntaş (2010) tried to show the effects of home modifications in terms of the quality of life for older adults. She reported that home modifications, adaptive equipments, and behavior change might be useful to prevent falls and to improve the quality of life of older adults. In addition to this, Altuntaş reported that usage of assistive devices at home can be advised (Altuntaş, 2010).

In the Turkish national literature, there are very few results regarding home safety and home hazards. Our study is the first study focusing on home safety of the population suffering from neurological diseases. This is strongest aspect of our study. Nevertheless, our study has some limitations:

▪ No checklist exists in our national literature that can be used as a benchmark to compare our results;

▪ This study was conducted with small sample living exclusively in the city of Denizli;

▪ The number of participants in each group is not equal.

Nonetheless, the results of our study have made it possible for the authors to formulate a number of suggestions for health providers, including physiotherapists, ergotherapists, and medical doctors. Suggestions for health providers are listed below:

1. A multidisciplinary healthcare team should work for individuals suffering from neurological diseases after discharge from hospitals or rehabilitation centers.

2. The team members should make home visits to survey and describe the risk factors regarding home hazards and accidents. In accordance with this, an action plan should be prepared to prevent home accidents. The team should arrange periodical home visits.

3. The most suitable home modifications should be provided.

4. Both indoor and outdoor modifications

should be covered by the national insurance system or, alternatively, private insurance companies should be encouraged to create a home safety policy for disabled people.

5. Further studies are needed to conduct a Turkish National Home Safety Checklist.

In conclusion, our results show that the home safety of individuals with neurological diseases living in Denizli represents a significant danger. This increases the risk of home accidents and decreases indoor activity participation. As a consequence of this, home safety assessments and home modifications are vital to improve quality of life of living area of individuals with neurological diseases. All modifications and adaptations should be done according to their limitations so that they can manage the barriers in their homes. In brief, individuals with neurological diseases should be informed about home hazards and home safety to be able to make their lives easier and safer. This is also vital to maintain independent daily living activities.

Conflict of Interest
All authors declare no any conflict of interest.

Kaynaklar

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