

## Cane Use in Patients with Parkinson's Disease

Esra Dogru Huzmeli<sup>1\*</sup> and Esra Okuyucu<sup>2</sup>

<sup>1</sup>Mustafa Kemal University School of Physical Therapy and Rehabilitation, Hatay, Turkey

<sup>2</sup>Mustafa Kemal University Tayfir Sokmen Medicine Faculty Neurologia Department, Hatay, Turkey

### \*Correspondence to:

Esra Dogru Huzmeli, PhD  
Mustafa Kemal University School of Physical  
Therapy and Rehabilitation  
Hatay, Turkey  
Tel: +9005418049441  
Fax: +903262455516  
E-mail: [esradogru001@hotmail.com](mailto:esradogru001@hotmail.com)

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### Abstract

**Introduction:** Previous studies have primarily focused on whether there were any differences between walking with and without a cane. A small amount of studies examined properties of the canes used for patients with Parkinson's Disease (PD). The purpose of the present study was to examine properties of the canes that patients with PD use, to decide whether PD patients chose the right cane for themselves and to describe the properties of the used cane by PD patients.

**Materials and Methods:** People diagnosed with PD who used a cane were included in the study. The actual and ideal lengths of the canes were measured for each individual. The type of cane, material and effect on walking and falling were investigated. A modified Hoehn and Yahr Scale was used to describe the symptom progression of PD. Falling risk was examined using the Functional Reach Test and the Pull Test.

**Results:** Ten subjects (8 male and 2 female) were included in the study. Their mean age was  $70.0 \pm 13.0$  years (range: 48-84). Seven of the subjects reported that their walking was improved with a cane. Most of the patients ( $n = 9$ ) decided to use cane by themselves. There was not a significant difference between the ideal and the actual cane length.

**Discussion:** This study identified positive results for the use of a cane to reduce the risk of falling and to improve walking. Participants decided mostly by themselves to use a cane, and they were able to choose an optimal cane length; however, they were not satisfied with cane usage.

**Conclusion:** Patients with PD felt they needed an assistive device, so health professionals should consider this option. Health professionals should assist the patients with deciding which cane was the best fit. Only patients who needed external support should use assistive devices.

### Keywords

Cane, Parkinson's disease, Assistive device

### Introduction

Parkinson's disease (PD) is the second most common neurodegenerative disease, affecting about 1% of individuals over the age of 65 years. PD patients have many gait disturbances. The gait slows, the stride length becomes shorter, the cadence increases and there is a postural imbalance with retropulsion or propulsion that contributes to the occurrence of falls [1-3].

Assistive devices are prescribed to improve a patient's mobility and to help maintain balance. Balance is derived from a sense of safety and confidence, and it can be supported by assistive devices. Canes are commonly prescribed for people

with PD to improve mobility, to help maintain balance and to support activity and independence [1-3]. Also, it has been suggested that a cane may prevent or reduce the risk of falls in people with PD.

The effects following the use of a cane have mostly been investigated in stroke patients. Kuan et al., assessed the effects of cane use on the hemiplegic gait of stroke patients and found that stroke patients walking with a cane demonstrated more normal spatial variables and joint motion than did those without a cane [4]. Studies have primarily focused on whether any differences exist between walking with and without a cane [5]. Only a few studies have examined properties of the canes both in PD and other patient populations [6, 7]. The studies described in this paragraph have provided less useful information regarding the suitability, satisfaction, type and material of the cane.

The purpose of the present study was as follows:

- to examine cane properties of that people with PD use;
- to decide whether PD patients chose the most appropriate cane for themselves; and
- to describe the properties of the PD patients who use the cane.

## Materials and Methods

Ten participants were recruited from the Medicine Faculty Neurologia Department at Mustafa Kemal University. There were 8 males and 2 females who participated in the study, the mean age was 70 years (range: 48–84 years), and the mean time since diagnosis was 8.60 years (range 1-23 years). Ethical approval was gained from the Mustafa Kemal University ethics committee. All participants gave written informed consent according to the declaration of Helsinki before entering the study.

### Participants

Ten individuals with idiopathic PD participated in the present (Table 1). All participants were recruited from the Medicine Faculty Neurology Department at the Mustafa Kemal University, and data collection was performed from February 2017 to April 2017. People were included in the study if they used a cane. The actual and ideal length of the cane was measured for each individual. The following information was recorded: type of material of the cane, satisfaction of use, effect on walking and risk of falling. Satisfaction was examined by asking the participants to define their satisfaction level of walking with the cane on Visual Analog Scale (VAS). We wanted them to score on a 10 cm line and we explained them that the big score mean high satisfaction while low score mean low satisfaction level.

Inclusion criteria for the study were patients with idiopathic PD diagnosed by a neurologist, an ability to walk indoors with a cane, adequate hearing and vision to perceive questions and the use of a cane for more than one year.

### Measures

Tests were chosen because they are commonly used in

clinical practice and they have been reported in the literature. The modified Hoehn and Yahr scale was used to describe the symptom progression of PD [8]. The Hoehn and Yahr scale was administered to participants with PD during the “on” stage by a physical therapist. All participants with PD took their usual medications within two hours of testing (“on” stage), and none reported a wearing off of their medication or exhibited freezing during data collection.

The modified Hoehn and Yahr scale is as follows:

- Stage 0: No signs of disease
- Stage 1: Symptoms are very mild; unilateral involvement only
- Stage 1.5: Unilateral and axial involvement
- Stage 2: Bilateral involvement without impairment of balance
- Stage 2.5: Mild bilateral disease with recovery on pull test
- Stage 3: Mild to moderate bilateral disease; some postural instability; physically independent
- Stage 4: Severe disability; still able to walk or stand unassisted
- Stage 5: Wheelchair bound or bedridden unless aided

Falling risk was examined using the Functional Reach Test and Pull Test. The Functional Reach Test is a single-item test developed as a quick screen for balance problems in older adults. A score of 6 inches or less indicated a significantly increased risk of falls. A score between 6 and 10 inches indicated a moderate risk of falls [9, 10]. The Pull Test was used as a measure of postural instability in PD and other movement disorders. The scoring is as follows: 0 = normal, recovered unaided in up to two backward steps; 1 = recovered unaided, but more than two steps were required; 2 = independent of the number of steps, the patient would fall if not caught by the examiner; 3 = very unstable, may lose balance spontaneously; and 4 = unable to stand without assistance [11].

### Statistical analyses

Statistical analyses were performed using the SPSS statistical software (SPSS 22.0 for Windows). Categorical variables were arranged by frequency, and scaled measurements were arranged by the mean  $\pm$  standard deviation. Parametric data were tested for normality by using the Shapiro–Wilk test. Spearman's test was used for the analysis of the correlation of the independent variables. To categorise the level of Spearman's correlation coefficient ( $r$ ), we adopted the following scores:  $r < 0.40$  corresponded to a weak correlation,  $r = 0.75$  corresponded to a moderate correlation, and  $r > 0.75$  corresponded to a strong correlation [12]. The level of significance was 5%.

## Results

Ten subjects (8 male and 2 female) were included in the study. The mean age was  $70.0 \pm 13.0$  years (range: 48–84). The mean disease duration was  $8.60 \pm 7.97$  years (range:

2-30 years) (Table 1). Seven of the subjects had a defined falling history.

Participants were asked about the effects of using a cane on falling risk, and five of the participants reported a decrease in their risk of falling. Seven of the participants reported that their walking was better with a cane. Most of the patients (n = 9) made the decision on their own to use a cane. Satisfaction of cane use was moderate (5.22 out of a scale of 0-10), and there was no significant difference between the ideal and the actual length of the cane (Table 2).

**Table 1:** Demographic characteristic of People with PD.

Variable	PD (n = 10)
Age (year), X ± SD	70.0 ± 13.0
Sex	8 male/2 female
Duration of the disease (year) X ± SD	8.60 ± 7.97
Hochm and Yahr stage	2.5 (n = 3) 3 (n = 3) 4 (n = 4)
Falling history	Yes (n = 7) No (n = 3)
Pull test	1 (n = 1) 2 (n = 4) 3 (n = 2) 4 (n = 3)
Dominant hand	9 right/1 left

**Table 2:** Properties of the cane and falling risk of the People with PD.

Variable	PD (n = 10)
Falling risk with cane	Increased (n = 2) Decreased (n = 5) Not changed (n = 3)
Functional Reach Test X ± SD	20.77 ± 5.44
<10 inch	N = 1
6-10 inch cm	N = 7
<6 inch	N = 2
Walking with cane	Better (n = 7) Worse (n = 1) Did not change (n = 2)
Person offered using cane	Self (n = 9) Physiotherapist (n = 1)
Cane type	9 cultural/1 walking aid
Cane material	8 wooden/2 metal
Satisfaction of the cane X ± SD	5.22 ± 3.15
Duration of using cane (year)	3.35 ± 1.70
Using cane length (centimeter)	84.70 ± 6.61
Ideal cane length (centimeter)	85.5 ± 9.58
Comparison of using cane length and ideal cane length	p = 0.79 z = -0.255
Correlation between duration of the disease and using a cane	Rho = 0.49 P = 0.147

## Discussion

The present study identified positive results of cane use on risk of falling and walking. Participants decided, mostly by themselves, to use a cane, and they chose the most appropriate length of cane. However, their satisfaction of using a cane was not high. The canes that were used were cultural wooden sticks, not medical canes. Even participants who indicated no risk for falls used a cane.

Assistive devices are prescribed to improve a patient's mobility and to help them maintain balance. Participants who had balance problems were indicated for use of a cane; two of the study patients had no risk of falling based on in the Functional Reach Test, but they still used a cane. Nine of the participants decided to use a cane by themselves, and only one participant used the cane based on a recommendation by a physiotherapist. Patients that did not have an indication for cane use were using a cane because they chose to on their own accord.

Satisfaction for using a cane was not as high as we had expected. Some patients declared that their walk was not better when they used a cane, and their risk of falling increased. This is an important result. These results shows us that patients use unsuitable devices. We think that patients decide to use a cane without consulting a health professional, which results in an inappropriate choice for a cane that causes negative results. Health professionals should consider a PD patient's device needs so that patients do not use unsuitable devices. Nine of the patients in the present study were using cultural wooden canes. We think the cultural wooden canes were chosen because they are easy find.

Effects of cane use on postural recovery was investigated by Rumpa et al. and Kuan et al. [4, 7]. They assessed the effects of cane use on the hemiplegic gait of stroke patients. Many studies have examined the effects of the cane in many types of diseases, but only a few studies examined properties of the cane in PD patients. Therefore, the present study will contribute a new subject to the literature that should be considered in future studies.

Rumpa et al. evaluated the effects of cane use on postural recovery from a slip due to repeated surface perturbations in individuals with PD compared with age- and sex-matched individuals who were healthy. They reported that the use of a cane improved postural recovery from an unpracticed slip in individuals with PD [7]. There are many researches who have examined the effect of the cane, but a subjective answers from the patient have been rarely examined. In the present study, we questioned the patients and found that walking with a cane was reported as having improved, even though satisfaction was only reported as 5.22.

External support is needed to increase the sensory input and psychological support in physical disabilities while walking. The elderly often start to use a walking stick because of balance and postural disorders and to prevent falling that is more common in these disorders. Dogru et al. investigated cane use in geriatric patients and found that elderly people generally decided to use a walking stick by themselves, and

they chose the appropriate materials, which improved their balance [1, 4, 6, 13]. The patients in the present study decided on their own accord to use a cane just like the healthy elderly people in the Dogru et al. study [13].

Modern canes are lightweight, strong and easily adjustable for proper height. A variety of grip styles are available [1, 6]. Our patients used wooden cultural cane because they can be easily found. Both PD patients and healthy elders in Turkey commonly used a wooden cane.

Jeong et al. examined a single-point cane, a quad cane and a hemi-walker. The single-point cane, which we referred to as a cultural cane, was associated with significantly improved efficiency, a longer walking distance and a higher velocity of walking compared to the quad cane and the hemi-walker among a group with relatively good balance [14]. Canes are generally prescribed for patients with a moderate level of impairment and patients that have a risk of falling [1, 6]. Most of the patients in the present study declared a history of falling, we think the reason for making a self-decision to use a cane was based on that history of falling.

A cane can support up to 25% of a person's body weight [15], so in case of feeling unstable, patients preferred to use a cane by themselves; 90% of patients in the present study started to use a cane based on their own decision. We think health professions do not care about the need for assistive aides, so patients had to decide by themselves to use the cane. Health professionals should examine the need for assistive devices in PD patients during polyclinic visits.

The present study identified positive results of cane using on risk of falling and on walking. Participants decided, mostly by themselves, to use a cane, and they chose the most appropriate length of cane. However, their satisfaction of using the cane was not high. The canes used were of cultural wooden sticks, not medical sticks. Even participants that indicated no risk of falling used a cane. This make us think about little balance problems that can be rehabilitated because patients use assistive devices. Despite the positive results associated with using assistive devices, patients start to be dependent on that device, which diminished their sense of autonomy and control [16]. Therefore, patients that have no indication for use of an assistive device should not use them because after the body becomes used to the device, the balance becomes dependent on the device.

## Conclusion

Patients with PD have a need for an assistive device, so health professionals should consider this requirement and decide the right one for the patients. Only patients who need external support should use the assistive devices.

## Compliance with Ethical Standards

### Disclosure of potential conflicts of interest

No conflict of interest.

## Research involving Human Participants and/or Animals

Ethical approval was obtained from Mustafa Kemal University Ethical Council.

## Informed consent

Written informed consent was taken from the patients.

## Financial disclosure/Conflict of interest

None.

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