วารสารวิทยาศาสตร์และเทคโนโลยีการกีฬา ปีที่ 22 ฉบับที่ 1, กรกฎาคม 2565

Journal of Sports Science and Technology Volume 22, No. 1, 2022

Original article

PHYSIOTHERAPY PREFERENCE AND THE USE OF AMBULATORY DEVICES IN INDIVIDUALS WITH PARKINSON'S DISEASE

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ABSTRACT

Objective: This study was aimed to survey the reason of physiotherapy (PT) preference and the using of ambulatory devices in individuals with Parkinson's disease (PD). **Methods:** Sixty-nine individuals with PD with a variety of modified Hoehn and Yahr (H&Y) stages were recruited. Participants themselves answered open-ended questions including demographic data, PT preference, and walking status. A researcher examined the stage of PD in accordance with H&Y. The data were analysed in frequency. In addition, the association between PT preference and using ambulatory devices with the severity of PD were examined. **Results:** Forty-six percent of participants preferred PT, but fifty-four percent did not. The most motivation for PT preference was the advantage for health, whereas the non-PT-preference was the low expectations of PT outcomes. The Association between the using of ambulatory devices and severity of PD was found in moderate PD (χ^2= 26.69, $p<0.001$). **Conclusion:** Most individuals with PD appeared not to have PT preference. The using of ambulatory devices were highlighted in individuals with PD in the moderate stage. However, the crucial concerning on the low expectations of PT outcomes were the most important point for consideration. The evidences from our study would emphasize on focusing the education of the PT benefit to individuals with PD and the using of ambulatory device in individuals with PD in the advanced stage. This might be the promising benefit on understanding role of PT on PD patients for improving their quality of life.

(Journal of Sports Science and Technology 2022; 22(1):(49-58)

(Received: 6 February 2022, Revised: 17 March 2022, Accepted: 7 April 2022)

KEYWORDS: Parkinson's disease/ Physiotherapy/ Preference/Ambulatory Devices

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INTRODUCTION

Parkinson's disease (PD) is a movement disorder commonly associated with progressive neurological brain diseases. The main PD clinical symptoms are resting tremor, rigidity, bradykinesia, and postural instability.[1] Additionally, walking difficulties are commonly found and characterized by a decreased gait speed and shuffling gait. About 70% of individuals with PD report activity limitations due to gait disorders, which may result in social isolation.[2] Walking aids are realised to support or facilitate activity and participation.[3] Therefore, walking aids or ambulatory devices may assist walking difficulty in individuals with PD. However, there is still lack of evidence reporting the potential advantage on using of ambulatory devices in individuals with PD.

A combination of medication and physiotherapy (PT) seems to provide greater benefits to the patients than solely drug therapy.[4-7] The main objectives of PT intervention are to maximise functional ability and minimise secondary complications through movement rehabilitation, imparting education and supporting the caregiver.[5, 7] PT interventions, particularly exercise, alleviate functional performance, maintain stage of disease, decrease disability and improve quality of life in individuals with PD.[5] Furthermore, a previous study has been suggested that exercises and assistive devices are prescribed to improve individuals' mobility and help them maintain balance during walking in individuals with PD responding less to medication.[5, 8] In addition, individuals with PD in the moderate stage may not require assistive devices during walking, but an appropriate assistive device is needed with progressive disease.[8] The assistive device can increase confidence and sense of safety which can raise the individual's level of activity and independence.[3, 8] However, some reports have pointed out that assistive devices may increase risk of falls by a variety of mechanisms which are relevant to individuals with PD.[8] Moreover, exercise increases the dopaminergic neurons binding potential within the dorsal striatum of individuals with early stage PD.[9] Forced cycling combined with cognitive engagement can increase connectivity between cortico-subcortical regions involved in automatic control in individuals with PD.[9] The effects of PT may help to slow down the progression stage of PD.[7, 9-10] However, since PD is a progressive disease, PT may be a preferred mode for individuals with PD due to intervention effectiveness.The referral rates for individuals with PD to PT clinics have historically been low[11-14] that may be lack of rehabilitation knowledge[14] and exercise contents[13], influence of interpersonal[12] and situation[13, 14], and the level of PD severity.[13, 14] Therefore, the aim of the study was to survey preference towards the reason of physiotherapy (PT) preference and the using of ambulatory devices in individuals with PD, and to examine their associations with severity of PD.

METHODS

Participants

Eighty outpatients, who diagnosed with PD by a neurologist were recruited from the movement disorder clinic of a hospital between January to May in 2020. Eleven participants did not meet the criteria, therefore, 69

participants (n = 69) were included in the study. The inclusion criteria were: 1) all stages of PD accordance to modified Hoehn and Yahr (H&Y) Scale assessment[15], 2) able to read and understand Thai 3) Mini-Mental State Examination Score ≥24/30. The exclusion criteria were 1) being diagnosed with dementia, and 2) having other neurological, cardiopulmonary, or other disorders affecting exercise and physical activity. The study was approved by the local Ethics Committee on Human Experimentation and adhered to the guidelines laid down in the Declaration of Helsinki (COA. No. Si 626/2020) and all participants willingly wrote informed consent prior to participate in this study.

Procedure

The English global physical activity questionnaire was translated into Thai.[16] Participants completed the Thai version by themselves except severity of PD was assessed by a researcher as mild (modified H&Y 0-2), moderate (modified H&Y 2.5-4) and severe (modified H&Y 5) stages, according to previous studies.[17]

Questionnaires

The original English questionnaire was constructed based on the "Global Physical Activity Questionnaire (GAQ)" version 2.0. Translation and adaptation of the original version to Thai were granted for use in this study. In addition, we have modified some questions in this questionnaire for our objectives. The GAQ determined perception barriers to regular exercise behaviour, and the test-retest reliability was reported to 0.75 with an internal consistency of 0.73 for healthy adults. The questionnaire consisted of open-ended questions in 2 parts and took about 15-20 minutes to complete. Part 1 records the demographic data including age, sex, ethnicity, duration of diagnosed PD, comorbid health conditions, walking status, and severity of PD. Part 2 records exercise characteristics and PT preferences.

Statistical analysis

All analyses were performed in SPSS (24.0, IBM, (IBM Corporation, Armonk, NY). Kolmogorov Smirnov Goodness of Fit tests were used to assess the distribution of the data and found that the data were not normally distributed, therefore nonparametric statistics were used. Descriptive statistics were used to describe the characteristics of participants. Chi-square tests were used to explore the associations between PT preference and using ambulatory devices with the severity of PD. The statistical significance was set at $p<0.05$.

RESULTS

Demographic data

The demographic characteristics of participants are shown in Table 1. Participants were older adults with PD diagnosed approximately for 8 years, with 55% of them being males and 45% females. About 35% of participants had one or more comorbidities; for example, hypertension, diabetes mellitus, and dyslipidemia.

Approximately 36% of participants were diagnosed with mild PD (modified H&Y 0-2), 60% were diagnosed as moderate (modified H&Y 2.5-4) and 4% were diagnosed as severe (modified H&Y 5). Half of the participants walked without assistive devices, 20% used gait aids, and 10% used wheelchairs. About 65% of participants exercised regularly, with the three most popular exercises being walking, gentle exercise, and cycling.

Table 1. Demographic data of participants

Characteristics (n = 69)	**Values**
Age (years) (mean ± SD)	67.91 ± 8.65
Weight (kg) (mean ± SD)	60.98 ± 10.13
Height (m) (mean ± SD)	1.62 ± 0.07
Gender (n, %)	
Male	38 (55.1%)
Female	31 (44.93%)
Severity of PD (mean ± SD)	2.72 ± 0.84
H&Y stage of PD (n, %)	
1.5	3 (4.3%)
2	22 (31.9%)
2.5	16 (23.2%)
3	16 (23.2%)
4	9 (13.0%)
5	3 (4.4%)
Education levels (n, %)	
Primary school	14 (20.30%)
Secondary school	22 (31.88%)
Bachelor degree	25 (36.23%)
Higher than bachelor degree	8 (11.59%)
Duration from diagnosis (years) (mean ± SD)	8.07 ± 6.60
Number of comorbidities (n, %)	
Hypertension	35 (50.7%)
Diabetes mellitus	21 (60%)
Dyslipidemia	8 (22.86%)
Heart disease	5 (14.28%)
Cancer	1 (2.86%)
Ambulation method (n, %)	

Characteristics (n = 69)	Values
Walking without gait aids	51 (73.92%)
Walking with gait aids	15 (21.73%)
Transferring by wheelchair	3 (4.35%)
Exercise (n, %)	
Yes	46 (66.7%)
No	23 (33.3%)

PT preferences, its reasons, and association with severity of PD

number of participants who indicated a preference for PT was 46%, with 54% indicating no preference towards PT with the reasons as shown in table 2. For participants preferring PT, about 69% of participants communicated benefits of PT for their health and PD status, whereas approximately 31% revealed functional mobility improvement (table 2). Participants who did not prefer PT presented the most reason on low expectations of PT outcomes (table 2). Participants preferring PT were mild (52%) and moderate (46.3%), but none with severe PD did not prefer PT (table 3). No associations between PT preference and mild PD (χ^2= 0.29, p = 0.588) as well as moderate PD (χ^2= 3.83, p=0.147) were observed.

Table 2. Reasons and number of participants (%) preferring (a) and not preferring (b) physiotherapy (PT).

a. Preference PT

Reasons	PT preference (n = 32)
Benefits for health and PD status (as regular exercise)	22 (68.75%)
Improving in functional mobility (e.g. balance, flexibility and walking)	10 (31.25%)

b. Non-preference PT

Reasons	No preference of PT (n = 37)
Lack of knowledge about physiotherapy	3 (8.1%)
Economic factors (financial problems)	8 (21.63%)
Lack of time	10 (27.03%)
Low expectations of PT outcomes	16 (43.24%)

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Using ambulatory devices and its association with severity of PD

Participants with mild, moderate, and severe PD using ambulatory devices were 20%, 24%, and 100%, respectively (table 3). All participants with severe PD used wheelchair. Only significant association between the using of ambulatory devices and moderate PD was observed (χ^2= 26.69, p<0.001) (Figure 1).

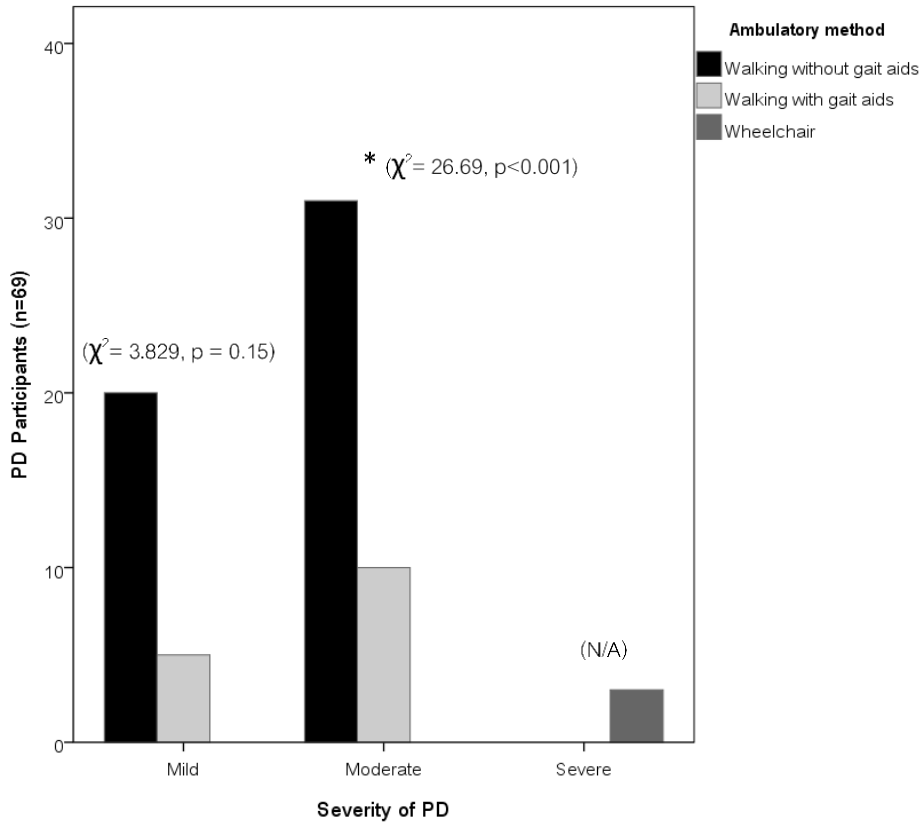

Figure 1. Bar graph demonstrates the use of ambulatory devices and its association with severity of Parkinson's disease (PD) from Chi-square tests. χ^2= Pearson Chi-square, * = significant of Pearson Chi-square, and N/A = No statistics are computed because Severe PD and wheelchair are constants.

Table 3. The number (n) and percentage (%) of participants with mild, moderate, and severe Parkinson's disease (PD) preference PT and the using of ambulatory devices.

Variables	Mild PD (n, %)		Moderate PD (n, %)		Severe PD (n, %)	
	Yes	No	Yes	No	Yes	No
PT preference	13 (52.0%)	12 (48.0%)	19 (46.3%)	22 (53.7%)	0 (0.0%)	3 (100.0%)
Using ambulatory devices	5 (20.0%)	20 (80.0%)	10 (24.4%)	31 (75.6%)	3 (100.0%)	0 (0.0%)

DISCUSSION

The purpose of the study was to survey preference towards the reason of PT preference and the using of ambulatory devices in individuals with PD, and to examine their associations with severity of PD. The study found 46% of individuals with PD preferring PT with the main reason being health benefit. Preference of PT did not associate with severity of PD. The number of individuals with PD using ambulatory device increased if PD progressed. However, using ambulatory devices was associated with the moderate stage of PD (χ^2= 26.69, p<0.001).

Among participants in this study, most participants were individuals with mild (36%) and moderate (60%) PD. Of the total individuals with PD 46% preferred PT with the reasons being benefit for health and improvement in functional mobility. The findings confirm a suggestion that exercise improves functional mobility[5, 7, 10] and alleviates the motor symptoms of PD.[9, 10] Those who preferred PT were individuals with mild or moderate PD, approximately 50% of them. A wide range of PT techniques including exercise, task specific training, cueing strategies, treadmill training, dancing and martial arts has been shown to be beneficial for individuals with PD at the mild to moderate stages of the disease in terms of mobility and transfers, posture and balance, gait and functional performance which can help to optimise the individual's independence, safety and well-being, thereby decreasing the risk of falls and enhancing quality of life.[6, 10, 18]

Surprisingly, the other half of individuals with mild or moderate PD, and all individuals with PD in the severe stage did not favour PT in spite of the fact that PD is a progressive disease causing an impairment on motor symptoms [10, 19] and loss of physical independence corresponding to advanced stage of PD.[10, 19] The most overall common reason was low expectations of PT outcomes. It may be from poor exercise adherence and perception of no PT interventions enhancing physical function or delaying functional mobility with progressive PD.[10,19] Additionally, individuals with PD with physically active or inactive had similar expectation in PT.[20] Individuals with PD who believed in regular exercise had greater improvements in physical and cognitive functional capacities than individuals who did not take part in regular physical exercise.[20] Therefore, education on the health-related benefits of exercise to individuals with PD is important and may change expectations of exercise outcomes. It is suggested to provide the education not only to the individuals with PD but also to caregivers, which may be essential in the support and motivation of outcome expectation in individuals with PD.[21] This may improve their engagement with exercise support groups including socialization, counselling, and problem-solving skills and increasing their understanding of the benefits of PT. In the present study, financial consideration was one of the reasons given for PT non-preference. It may be limited incomes since the majority of PD population are older adults.[20, 22] Visiting PT settings as the outpatients need expenses, such as cost of transportation, which may increase expenses in the family.

No association between PT preference and severity of PD was found in the present study. It may be that the majority of participants in the present study were mild to moderate PD and were able to walk. Moreover,

the ratio of PT preference and non-preference in individuals with PD both mild and moderate severity was similar. Another explanation was about 67% of participants experiencing regularly exercise such as cycling, playing sport, yoga, mobility hand function, gentle exercise, or walking.

About 26% of participants used ambulatory devices. In the present study, the majority of participants with moderate stage were able to walk independently without walking assistive devices. However, only the moderate stage of PD was related with using ambulatory devices. An explanation is varieties of symptoms in the moderate stage of PD which can be detected throughout the progression of the disease; for instance, festination gait, reduced step length, shuffling steps, reduced amplitude of arm swing, increased cadence, reduced smoothness of locomotion, freezing of gait, reduced balance and postural control and increase the risk of falls.[10, 20, 23] Ambulatory devices are prescribed to improve mobility and help to maintain balance during walking in individuals with PD responding less to medication.[23]

There are limitations in the present study. Firstly, the sample was small, particularly individuals with PD in the severe stage, and from a single site. Future research should calculate the sample size according to our study and recruit a larger sample size from several places to apply in general. Secondly, participants in the present study tended to be mild to moderate stages of PD. The findings may not apply to individuals with severe stage of PD. Lastly, we did not explore gait characteristics or observe the questionnaires related to gait confidence. Future investigations with gait characteristics and the questionnaire with and without gait aid confidence are recommended.

CONCLUSION

Less than 50% of individuals with PD preferred PT with the reason being benefit for health, whereas most of individuals with PD appeared not to prefer PT with the important reason of low expectations of PT outcomes. The moderate stage of PD associated with using ambulatory devices. The present findings suggested to educate or inform PT role in PD. Furthermore, physiotherapists are suggested to concern choosing assistive devices for ambulation in individuals with moderate stage of PD.

ACKNOWLEDGEMENTS

The authors would like to thank Professor Jim Richards, Allied Health Research unit, University of Central Lancashire, UK for his guidance, proofreading and editing of this manuscript. In addition, we would like to give special thanks to Assoc.Prof. Amornpan Ajjimaporn and Miss Khanitha Jitaree and support throughout the development of this study.

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