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Argentine tango in the rehabilitation of patients with Parkinson's disease

Tango argentyńskie w rehabilitacji pacjentów z chorobą Parkinsona

Joanna Stożek [1(A,B, D,E,F)], Urszula Pustułka-Piwnik [1(F)], Marta Curyło [2(F)]

[1] Section of Rehabilitation in Neurology and Psychiatry, Faculty of Clinical Rehabilitation, University School of Physical Education in Krakow, Poland
[2] Section of Rehabilitation in Internal Diseases, Faculty of Clinical Rehabilitation, University School of Physical Education in Krakow, Poland

Key words
Argentine tango, Parkinson's disease, rehabilitation

Abstract
Introduction: Parkinson's disease (PD) is a progressive, neurodegenerative disease leading to disability. Parkinson's disease causes the occurrence of movement disorders, such as bradykinesia, hipokinesia, rigidity, tremor, postural instability, gait disorders and falls as well as non-motor symptoms. Rehabilitation is an important part of treatment in Parkinson's disease and the Argentine tango is one of the suggested, more attractive forms of physical activity. The aim of the study is to present the effects and possibilities of using the Argentine tango in the rehabilitation of patients with Parkinson's disease on the basis of the overviewed literature.
Method: A review of literature was conducted.
Search strategy: The MEDLINE (PubMed) database was searched using the key words: "tango" and "Parkinson's disease".
Selection criteria: The study was based on titles and abstracts, and then on full texts, original papers with and without control groups as well as case studies.
Results: Ten out of twelve publications were included in the analysis. Most studies evaluating the effects of Argentine tango dancing were performed in patients with mild to moderate Parkinson's disease severity. Long-term as well as short, intensive tango dancing programs were used. One of the studies compared the effects of Argentine tango dancing to the effects of waltz and foxtrot dancing. One paper compared partnered to individual tango dancing. Studies indicate that the Argentine tango decreases the severity of Parkinson's disease symptoms and improves: balance, gait, spatial cognition, everyday activities as well as social integration and participation in patients with Parkinson's disease.
Conclusion: The Argentine tango can be an attractive, useful and effective form of rehabilitation in Parkinson's disease.

Słowa kluczowe
tango argentyńskie, choroba Parkinsona, rehabilitacja

Streszczenie
Wstęp: Choroba Parkinsona (PD) jest postępującą chorobą neurodegeneracyjną, która prowadzi do niesprawności. W przebiegu PD występują zaburzenia ruchowe, m.in. bradykinezja, hipokineza, sztywność mięśni, drżenie, niestabilność postawy, zaburzenia chodu i upadki oraz objawy pozaruchowe. Rehabilitacja jest istotnym elementem leczenia w chorobie Parkinsona, a jedną z proponowanych atrakcyjnych form aktywności ruchowej jest tango argentyńskie. Celem pracy jest przedstawienie efektów i możliwości zastosowania tanga argentyńskiego w rehabilitacji chorych na chorobę Parkinsona na podstawie piśmiennictwa.
Metody: Przegląd piśmiennictwa. Źródła informacji: Przeszukiwano bazę danych MEDLINE (PubMed), stosując słowa kluczowe: „tango" i „Parkinson's disease".
Wybór badań: Na podstawie tytułów, a następnie streszczeń i pełnych tekstów publikacji, do analizy włączano prace oryginalne z grupą kontrolną i bez oraz studium przypadku.

The individual division on this paper was as follows: A – research work project; B – data collection; C – statistical analysis; D – data interpretation; E – manuscript compilation; F – publication search

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Wyniki: Spośród 12 odnalezionych prac 10 włączono do analizy. Większość badań dotyczących oceny efektów tańczenia tanga argentyńskiego przeprowadzono u pacjentów z niewielkim i umiarkowanym nasileniem choroby Parkinsona. Stosowano zarówno długotrwałe, jak i krótkie, intensywne programy tańczenia tanga. W jednej z prac porównano efekty tańczenia tanga argentyńskiego z wynikami tańczenia walca i fokstrota, a w kolejnej tańczenie tanga w parze i bez. Badania wskazują, że tango argentyńskie poprawia wyniki oceny nasilenia choroby, równowagę, chód, postrzeganie przestrzenne, jakość życia i codzienną aktywność oraz integrację społeczną i partycypację u pacjentów z chorobą Parkinsona.
Wnioski: Tango argentyńskie może być atrakcyjną, przydatną i skuteczną formą usprawniania pacjentów z chorobą Parkinsona.

INTRODUCTION

Parkinson's disease (PD) is a progressive neurodegenerative disease that leads to disability. In the course of PD, movement disorders occur, among others: bradykinesia, hypokinesia, muscle rigidity, tremor, postural instability, gait disorders and falls, and non-motor symptoms[1,2]. Progression of the disease reduces efficiency, limits mobility and the performance of everyday activities and decreases the quality of life. The priority of PD treatment should be prevention of disability[3]. An important element of the complex treatment of patients with Parkinson's disease is motor rehabilitation[4]. The adaptation of various attractive forms of physical activity, and their usage for rehabilitation treatment in PD is observed. Used are, among others: Nordic Walking, swimming and water exercises, karate, boxing, workouts on an exercise bike, treadmill gait training, Tai Chi, yoga, music and dance, including Argentine tango[5]. The Argentine tango, both in the context of music and dance, has many features that can be particularly useful in improving the condition of patients with Parkinson's disease.

The aim of the study is to present the possibilities and effects of using the Argentine tango in the rehabilitation of patients with Parkinson's disease, on the basis of the literature.

Argentine tango (dance custom)

The Argentine tango is music and dance. Argentine tango dancing along with the music and accompanying rituals create a contemporary dance custom. The Argentine tango effects the imagination, it emphasizes the mutual energy of music and dance, which are more than just a usual sound or maneuver[6]. In the tango, the dance moves are a reflection of the music and its elements: rhythm, tempo, dynamics, articulation and overall character[7,8]. In the Argentine tango, the leader interprets the music and expresses the interpretation in leading, through the dancing of the follower. The Argentine tango is a special dance – both in terms of music that is unique, emotionally engaging and provocative of movement as well as special properties – spontaneous leading, improvisation and basic steps based on walking. In the tango, danced are, among others: the basic step, which is a step of gait, steps forward, backward, in different directions, stepping over the foot of the partner, turns and halting in dance. The reverse movement of the trunk relative to the legs is also used.

Usage of the Argentine tango in rehabilitation

Dancing the tango has many advantages, including its therapeutic properties. Woodley and Sotelano[9] believe that treatment with the use of tango therapy is a therapeutic technique which uses dancing the tango and tango music integrated with/or in combination with special exercises as a prophylactic and therapeutic means developed in a given method and lead by a qualified instructor. Following the program, the elder people dancing tango for 10 weeks (2 x per week, for 2h, a total of 40h) achieved significant improvement in the Activities-specific Balance Confidence (ABC scale), muscle strength of the lower limbs and walking speed, compared to those participating in gait training[10].

Argentine tango dancing can be an attractive and useful form of rehabilitation for people with Parkinson's disease. The positive effects of tango dancing correspond with the objectives of therapeutic rehabilitation in PD. Dancing the tango is associated with the performance of a variety of posture, balance and gait exercises performed through the rhythm and music of the tango. Argentine tango music evokes movement, makes it easier to initiate movement and perform it at the right time; it inspires the type and nature of the danced movement, rhythmizing gait.

The benefits of dancing the tango are multidimensional. The motor advantages include: improving posture, instigating trunk movement – trunk rotation and mobility of the chest, separating the movements of the shoulder and hip girdle. Dancing the tango improves mobility: muscle stretching, increasing joint mobility, improving flexibility, increasing the amplitude and fluidity of movement. Dancing the tango allows static and dynamic balance exercises: weight shifting, longer loading times of one lower limb, body inclination, changing the direction of movement, spins in couples dancing, partnered dancing. Gait exercises for patients with Parkinson's disease dancing the tango consist in frequent starting and stopping, turns, change of direction, walking forward, backward and moving in different directions, moving at a different pace and rhythm of steps, with different length and step type[11, 12]. Strategies used to improve patients with Parkinson's disease are naturally used during dancing the Argentine tango. These include: focus on movement, focus on gait, which is the fundamental step of the Argentine tango, carrying out several programs of movement at the same time (i.e. multitasking) and performing simultaneous cognitive, spatial and motor tasks (i.e. multitasking), the use of sensory cues, which are provided by the music and rhythm, the partner and instructor. Those dancing the tango practice the forward and backward walking step. Performing step over the foot of one's partner is one of the

moves performed during the tango as well a strategy to overcome freezing in Parkinson's disease[11,12]. The motor benefits are also associated with regular physical activity, and consequently, better physical condition and endurance, improving the cardiovascular and respiratory systems[11,13,14]. The positive effects of tango dancing also include aspects which are psychological, emotional, cognitive and intellectual, aesthetic, as well as cultural and social, as Argentine tango lessons are a form of group activities for patients with Parkinson's[11,12,15].

Argentine tango in modified form (*adopted tango*)

Hackney and Earhart[16] described the recommendations and guidelines for the conduct and implementation of tango lessons, and tango adaptation to the needs of patients with Parkinson's disease. The authors emphasize the selection of appropriate music. For the dance warm-up, they recommend Latin-American music: samba, salsa[16,17] and jazz or pop[17] because of their clear and uplifting rhythm[16]. For dancing the Argentine tango, the authors recommend uncomplicated, dance music, with a simple rhythm that is easy to hear, and played at a slower pace.

The authors recommend that a tango lesson should be attended by no more than 12-15 people with Parkinson's disease. Tango is a partnered dance: patients dance in pairs with healthy people – volunteers who have been trained in the assistance of people with PD. During the lessons, each of the dancers practice both being the leader and being led. Changing partners also occurs. Most often, patients prefer dancing the "closed practice" symmetrical and supported hold because they feel more secure and more stable than in the case of the traditional hold[16].

METHODS

Source of information

In order to obtain information on the possibilities and effects of using the Argentine tango in the rehabilitation of patients with Parkinson's disease, the bibliographic database MEDLINE (PubMed) was screened using the keywords: "tango" and "Parkinson's disease".

Selection of studies

Original works, with and without control groups, and a case study, were included in the analysis on the basis of titles, and then abstracts and full texts of works. Reviews and works issuing opinions were excluded.

RESULTS

Out of the twelve works discovered, ten were included in the analysis. Eight works are controlled studies, one study lacks a control group, and one work is an example of a case study. An overview of the works is presented in Table 1.

The first article on the introduction of the Argentine tango to rehabilitation of people suffering from Parkinson's disease was published by Hackney et al. in 2007.[18] Ten studies examined the influence of the Argentine tango on: severity of the disease, balance, gait, spatial cognition, quality of life, participation and activity in everyday and social life in patients with Parkinson's disease[14, 18-26]. Most of the studies evaluating the effects of Argentine tango dancing were conducted on patients with mild to moderate severity of Parkinson's disease (the first to third stages of the disease on the Hoehn and Yahr scale); only two studies involved patients at the fourth stage of the disease (according to Hoehn and Yahr): the case study describes a patient participating in tango classes[23], as well as the study by Duncan et al.[24] includes among its subjects patients at the fourth stage of the disease. Intensive programmes of tango dancing, both long and short, were utilised. Most of them were programmes planned for about 20-30 lessons lasting approximately 3 months (10-13 weeks). The shortest programme lasted two weeks, during which time 10 tango lessons lasting 1.5 hours each were conducted[21]. Two works assessed the effects of annual programmes[24,25]. The longest studied tango programme lasted for two years; the study was randomized, however, the sizes of the tango-dancing and the control groups were small (5 people in the dancing group and 5 people in the control group) [26].

One of the articles compared the effects of dancing the Argentine tango with the effects of dancing the waltz and foxtrot. Patients with Parkinson's disease were randomly divided into 3 groups: the tango group, the waltz and foxtrot group, and the control group (not doing any exercise). Dance lessons were held 2 times a week and lasted for an hour (13 weeks and 20 lessons in total). In both dancing groups, a significant improvement was reported on the Berg Balance Scale, in the 6-minute walk test and in the length of backwards step, as compared to the control group. The authors suggest that the therapeutic effect was greater in patients dancing tango and conclude that tango accurately targets the deficits associated with Parkinson's disease. Dancing the tango, waltz and foxtrot is connected with music, the presence of a partner and the ability to move at a short distance from the other person, with posture control, executing turns, starting and finishing dance moves. There are, however, differences between the dances: tango is based on improvisation, it is associated with spontaneous choreography, free combinations of steps and figures, multi-directional perturbations of dynamic balance and frequent changes of rhythm. On the other hand, waltz and foxtrot lessons are conducted according to a well-defined methodology of teaching steps, which includes more complex elements of the steps and figures accompanied by more predictable directions of balance disruptions, a negligible element of improvisation and little change of rhythm[19]. The next study compared the effects of partnered and non-partnered Argentine tango dancing. The dancing Parkinson's patients from both groups participated in 20 tango classes which took place over a period of 10 weeks (one hour, twice a week). In both groups, significant improvement was

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Table 1

Review of literature on the effects of Argentine tango dancing in PD patients

Authors	Participants (number of persons, PD severity according to H&Y, study groups)	Tango lesson program Rehabilitation program (or lack) of control group	Studied parameters	Results, significant improvement
Hackney M.E., Kantorovich S., Levin R., Earhart G.M. (2007)[18]	19 patients with PD (2-3 according to H & Y) randomly divided into: dancing the tango TA (n=9) and exercise (control) group C (n=10)..	TA group: progressive tango learning C group: standard physiotherapeutic exercises Both groups participated in 20 tango/physiotherapeutic lessons over 13 weeks (2 x a week, lasting 1h).	Balance using the Berg Balance Scale, UPDRS p. 3, gait speed 5 m: 1. without additional task 2. dual task (walking 5 m + counting), Timed Up and Go, FOGQ	Berg Balance in TA group, but not in C group; UPDRS p. 3 in both groups, FOGQ improved when the results of all subjects were joined but not within individual groups.
Hackney M.E. and Earhart G.M. (2009)[19]	58 patients with PD (1-3 according to H&Y) randomly divided into 3 groups: dancing the tango (TA), dancing the waltz and foxtrot (WF) and control (C).	Dancing classes for both dancing groups (TA and WF): 2 x a week, lasting 1h. 20 lessons carried out within 13 weeks, C group without exercises.	Balance using the Berg Balance Scale, gait using the test: Timed Up and Go, 6-min. walk, forward and backward gait assessed using apparatus: speed, step length, single support time, FOGQ, end questionnaire in TA and WF groups.	Significant improvement in both dancing groups: in Berg Balance Scale, 6-min walk and backward step length, compared to C group.
Hackney M.E. and Earhart G. M, (2009)[20]	75 patients with PD (1-3 according to H&Y), randomly divided into 4 groups: dancing the tango (TA) vs. waltz/foxtrot (WF) vs. performing Tai Chi (TC) vs. control (C).	All programs (TA, WF and Tai Chi exercises) included: 20 lessons lasting 1 h, 2 x a week, for 13 weeks.	Quality of life using PDQ39 questionnaire.	Quality of life significantly improved in the tango dancing group (mobility, social support and SI).
Hackney M.E. and Earhart G.M. (2009)[21]	14 patients with PD (2-2.5 according to H&Y). No control group.	Intense, short program: 10 tango lessons lasting 1.5 h, over a 2-week period.	Balance using the Berg Balance Scale, UPDRS p.3, using apparatus: gait speed, step length, swing percent, stance percent during forward and backward gait, functional ambulation profile and Timed Up and Go test, 6-min.walk.	Berg Balance Scale, UPDRS p. 3 and decrease in stance percent during forward gait.
Hackney M.E. and Earhart G.M. (2010)[22]	39 patients with PD (11 women) (1-3 according to H&Y) randomly divided into partnered tango and non-partnered tango groups.	Tango classes took place 2 x a week, lasting 1 h. Total of 20 lessons over 10 weeks.	UPDRS p. 3, balance: Berg Balance Scale, tandem stance, one leg stance; gait: Timed Up and Go, 6-min. walk, using apparatus: 5 m gait at preferred and fast speeds (measured: gait speed, rhythm, step length, % of swing and double support phases); program evaluation using questionnaire.	Significant improvement in both tango groups regarding balance (Berg Balance Scale, TS, OLS), gait (speed, rhythm, % of swing and double support phases). Improvement maintained for a month after completion.
Hackney M.E. and Earhart G.M. (2010)[23]	86-year-old patient with stage-4 PD according to H&Y, ill for 3 years, with fast progression of the disease. Walked short distances using a walker, more often used a wheelchair.	Tango lessons: 2 x a week, lasting 1h. 20 lessons over 10 weeks. The patient participated in the tango program with other PD patients. He exercised according to an individually modified tango dancing program.	Balance using Berg Balance Scale and FRT, gait using 6-min walk test, quality of life using PDQ39: Summary Index (SI).	After tango lessons, the following results improved: Berg Scale, FRT, 6-min walk, quality of life PDQ39 SI. The effects maintained for a month after completion.
Duncan R.P. and Earhart G.M. (2012)[24]	62 patients with PD (1-4 according to H&Y) randomly divided into tango dancing group TA and control group C (without intervention). The study was completed by 52 persons, 26 from the TA group and 26 from the C group.	12 - month tango lesson program: 2 x a week, lasting 1h.	Assessment at off-phase: before and after 3, 6 and 12 months. UPDRS p. 3, 1, 2; balance using Mini-BESTest, gait: 6-min walk, FOGQ, gait speed at preferred and fast speeds, forwards, dual task, backwards, ul function: Nine-Hole Peg Test	TA group: UPDRS p. 3, Mini-BESTest, FOGQ, 6-min walk, forward and dual task gait speed, Nine-Hole Peg Test.
Foster E.R., Golden L., Duncan R.P., Earhart G.M. (2013)[25]	62 patients with PD (2-4 according to H&Y) randomly divided into tango dancing group TA and control group C. The study was completed by 52 persons, 26 from the TA group and 26 from the C group. The TA group consisted of persons with H&Y: 2-3.	12 - month tango lesson program: 2 x a week, lasting 1h.	Assessment at off-phase: before and after 3, 6 and 12 months. UPDRS p. 3, Beck Depression Inventory II. Participation evaluated using Activity Card Sort (part regarding dance was deleted) assessed: current, new and maintained participation in activities: instrumental (IADL), leisure time and social.	Total current participation after 3, 6 and 12 months was significantly higher compared to activity before the program in the TA group; it was unchanged in the C group. Activity maintained from the time of falling ill in the TA group increased significantly. Similar was in the case of individual domains of activity.

McKee K.E. and Hackney M.E. (2013)[14]	42 patients with PD (ultimately 31 persons) (1-3 according to H&Y) randomly divided into tango dancing group TA (n=23) and C group (n=8) taking part in educational classes.	TA group: 3-month program, tango lessons 2 x a week, lasting 1.5h C group: education 2 x a week, lasting 1.5h 20 lessons, 30 hours (tango or education) over 12 weeks.	Assessment before, after the program and 12 weeks following its completion. Severity of disease UPDRS p. 3, spatial learning Brooks Spatial Task, eye-spatial memory Reverse Corsi Blocks, executive functions Montreal Cognitive Assessment, balance Fullerton Advanced Balance, frequency of falls, gait: Timed Up and Go, Four - Square Step Test, FOGQ, quality of life: PDQ 39, SF 12.	Significant improvement in the TA group in UPDRS p. 3 and spatial cognition Brooks Spatial Task relative to the C group. Significant improvement in balance and executive functions in TA group compared to assessment 1.
Duncan R.P. and Earhart G.M. (2014)[26]	10 patients with PD (2-3 according to H&Y), randomly divided into tango dancing group TA (n=5) and control group C (n=5) .	The dancers participated in tango lessons for 2 years, 2 x a week, lasting 1h. The C group did not do exercises.	Assessed: UPDRS p. 3, balance Mini-BESTest, gait: forward and backward gait speed, Timed Up and Go, dual task Timed Up and Go, 6-min. walk, FOGQ, UPDRS p. 2 and UPDRS p.1.	Significant improvement: UPDRS p. 3, balance Mini -BESTest Significant changes also concerned UPDRS p. 2 and 1 as well as 6-min walk. The C group worsened after 2 years.

Abbreviations: PD – Parkinson's disease, H&Y– Hoehn and Yahr Scale; UPDRS – Unified Parkinson's Disease Rating Scale; TA – tango dancing group; WF – waltz and foxtrot dancing group; C – control group; h– hour; FOGQ – Freezing of Gait Questionnaire; ul– upper limb; DT – dual task – two tasks performed simultaneously (e.g. two movement, movement and cognitive); 6-min walk – Six-Minute Walk Test; TS – tandem stance – tests standing one foot in front of the other; OLS – one leg stance – tests standing on one leg; FRT – Functional Reach Test; p. – part; SI – Summary Index

reported on the Berg Balance Scale, in Tandem stance, one-leg stance and walking (walking speed, stride length, cadence, the percentage of individual phases in the gait cycle). However, after all the classes, those dancing the tango in pairs showed greater satisfaction and interest in continuing the lessons than those dancing solo.[22]

In the randomized trial on the quality of life of patients with Parkinson's disease, comparison was conducted for 4 groups: the tango dancing group, the waltz and foxtrot dancing group, the group practicing Tai Chi and the control group (not doing any exercise). Each of the active groups of patients took 20 classes lasting 1 hour each 2 times a week, for 13 weeks. After the classes had finished, only the tango dancing group reported a rise in the quality of life assessed with PDQ39 (Parkinson's Disease Questionnaire); the quality of life improved significantly in the following areas: mobility, social support and summary index (SI)[20].

Effects of Argentine tango

The severity of PD evaluated by the 3rd part of the Unified Parkinson's Disease Rating Scale (UPDRS) significantly decreased in patients dancing the tango in 5 studies[14,18,21,24,26] (4 controlled). Balance improved significantly in patients dancing the tango in all the tests, in which it was rated, i.e. in 8 studies[14,18,19,21-24,26] (6 controlled). Most often, balance was tested using the Berg Balance Scale and with the usage of the following tests: Tandem stance – standing with one foot in front of the other, One leg stance – standing on one leg, Functional Reach Test (FRT) and Mini-BESTest. A significant improvement in gait (in the following parameters: 6-minute walking test, step length of backward step, speed and rhythm of gait, % of transfer phase and double support, Freezing of Gait Questionnaire - FOGQ) was observed in patients with Parkinson's disease dancing the tango in 6 studies[19,21-24, 26] (4 controlled). Participation, including social activities and those of daily living were assessed in 1 controlled study, using the Activity Card Sort. Significant improvement was noted in patients dancing the tango for one year as compared to the non-exercising control group[25]. Quality of life assessed using the PDQ39 questionnaire improved only in the tango dancing group, in regard to self-assessment of: mobility, social support, and summary index in the controlled study[20], and also in the patient with more advanced Parkinson's disease (case study)[23]. Spatial cognition evaluated in only one work by The Brooks Spatial Task significantly improved in patients dancing the tango compared with the control group[14].

SUMMARY

The Argentine tango, its music and dance moves adapted to the music are of irreplaceable and unique character. They transmit energy and evoke emotions. The Argentine tango is a form of artistic expression and the tango music - full of significance, creates an aura and conditions for multi-directional development[27]. Analysis of studies indicate that therapy using the Argentine tango can be used in patients with Parkinson's disease, and dancing the tango brings positive results in many spheres of life of the patient. From the presented works, it may be stated that dancing the Argentine tango can significantly reduce the symptoms of Parkinson's disease in patients. In the analyzed studies on dancing tango by patients with Parkinson's disease, significant improvement in balance, gait, spatial cognition, quality of life and participation were observed.

Most of the studies were conducted in patients with mild to moderate severity of Parkinson's disease. The tango was used in the form of various, for example, 3-month[18-20] or 12-month programs[24 -25]. The longest tango dance program lasted 2 years[26], and the shortest 2 weeks[21]. Tango lessons are an attractive form of rehabilitation for people with Parkinson's disease and that is why patients regularly took part in them, and after completion of the study they declared a desire to continue learning

the tango[18,22,27]. Dancing the tango is not only a form of achieving pleasure for the patients, but also posture, balance and gait exercises in the form of dance lessons; it also has a much broader dimension: patients establish social contacts and have the support of a group. Dancing the tango can have positive impact on various aspects of human life: motor and physical, psychological and emotional, cognitive and intellectual, aesthetic, and cultural as well as social development. Further studies on the use of the potential of the Argentine tango in rehabilitation are needed.

Based on the research results achieved so far, it can be stated that the Argentine tango can be an attractive, useful and effective form of rehabilitation of patients with Parkinson's disease.

Conflict of interest: none declare

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Address for correspondence

Joanna Stożek PhD
Akademia Wychowania Fizycznego w Krakowie
(*University School of Physical Education in Krakow)*
Zakład Rehabilitacji w Neurologii i Psychiatrii
al. Jana Pawa II 78, 31-571 Kraków, Poland
phone: +48 12-683-10-84, mobile phone: +48 605-115-895
fax: +48 12-683-13-00
e-mail: jstozek@poczta.fm