sciendo

Timişoara Physical Education and Rehabilitation Journal

10.2478/tperj-2022-0007

Dance therapy for Parkinson's disease: a systematic review

Raluca-Dana MOŢ[1], Bogdan ALMĂJAN-GUŢĂ [2]

Abstract

Introduction: Dance therapy has rapidly gained popularity among patients with Parkinson's disease because it is an enjoyable form of exercise and can provide multi-dimensional benefits. Clinical studies have shown that dance improves motor symptoms, particularly balance and mobility problems, as well as the overall physical condition of Parkinson's patients.
Purpose: The aim of this paper is to highlight the benefits of dance therapy in the clinical management of parkinsonian patients and also to find out which dance is the most advantageous for use in therapy and whether the type of dance used leads to significantly different results.
Methods: This paper is a systematic and topical review. After a keyword search, 20 articles on dance therapy in Parkinson's disease were selected according to the PRISMA model, using Google Scholar and Pubmed as search engines.
Results: As a form of physical exercise, dance incorporates vigorous movement, social interaction and cognitive stimulation. Studies have shown that dance can reduce tremor, bradykinesia and stiffness, increasing forward speed and multi-tasking gait. At the same time, spontaneous balance disturbances improved and the risk of falls decreased. Argentine Tango is the most widely used dance in therapy. Although other forms of dance used in research led to significant changes, tango dance was found to produce changes of greater value. However, all types of dance achieved positive results in terms of physical, motor and psycho-emotional aspects of patients.
Conclusion: Dance therapy is a feasible and safe method for the rehabilitation of parkinsonian patients, brings improvements in motor and non-motor signs of Parkinson's disease and practiced for at least 12 months regularly, slows down the progression of the disease.

***Key words**: Parkinson's disease; dance therapy; physical therapy;*

Rezumat

Introducere: Terapia prin dans a câştigat rapid popularitate în rândul persoanelor cu boala Parkinson deoarece este o modalitate plăcută de exerciţiu şi poate oferi beneficii multidimensionale. Studiile clinice au demonstrat că dansul îmbunătăţeşte simptomele motorii, în special problemele de echilibru şi mobilitate, precum şi condiţia fizică generală.
Scop: Scopul acestei lucrări este de a scoate în evidenţă beneficiile pe care le aduce terapia prin dans în managementul clinic al pacienţilor parkinsonieni şi totodată îşi propune să afle care este cel mai avantajos dans pentru a fi folosit în terapie şi dacă există diferenţe semnificative între celelalte tipuri de dans utilizate.
Material şi metodă: Această lucrare reprezintă un studiu de tip review sistematic şi de actualitate a literaturii de specialitate. În urma căutării cu ajutorul cuvintelor cheie au fost selectate 20 de articole despre terapia prin dans în boala Parkinson, conform modelului PRISMA, folosind ca motoare de căutare Google Scholar şi Pubmed.
Rezultate: Ca formă de exerciţiu fizic, dansul încorporează mişcări viguroase, interacţiune socială şi stimuli cognitivi. Studiile au arătat că prin dans putem reduce tremorul, bradikinezia si rigiditatea, crescând viteza de deplasare înainte şi mersul cu sarcini multiple. Totodată, perturbările spontane de echilibru s-au ameliorat şi riscul de căderi a scăzut. Tangoul argentinian este cel mai utilizat dans în terapie. Cu toate că şi celelalte tipuri de dans utilizate în cercetare au dus la îmbunătăţiri semnificative, dansul tango produce modificări de o valoare mai mare. Totuşi, toate tipurile de dans au obţinut rezultate pozitive în ceea ce priveşte aspectul fizic, motor şi psiho-emoţional al pacienţilor.

***Cuvinte cheie**: Boala Parkinson; terapie prin dans; kinetoterapie*

1 Student, Faculty of Physical Education and Sport, Department of Physical Therapy and Special Motricity, West University of Timişoara, Romania, *e-mail: raluca.mot01@e-uvt.ro*
2 Associate Professor PhD, PT, Faculty of Physical Education and Sport, Department of Physical Therapy and Special Motricity, West University of Timişoara, Romania

Introduction

Parkinson's disease is a degenerative disease with tremor, rigidity, bradykinesia and postural instability as its main symptoms (Downward & Pool, 2019).

It affects sensory and cognitive as well as motor functions, leading to altered proprioception and kinaesthesia. These deficits are manifested by impaired movement sensitivity, awareness of body schema, spatial orientation and haptic acuity. The patient shows altered attention to stimuli and has an unstable center of gravity (Abraham, Andrade & Hackney, 2018).

Gait and balance difficulties are common among people with Parkinson's disease, contributing to an increased incidence of falls. Gait changes include slowed gait with short, shuffling steps and a stooped posture. They may also include a tendency to speed up when performing repetitive movements and/or freezing of gait. Aspects of gait that seem to be particularly affected include double loads, turning and walking backwards. Balance difficulties also seem to be particularly pronounced in the backward direction, with most falls occurring in this situation.

Health-related quality of life is affected early in Parkinson's by multiple non-motor symptoms. This is particularly affected by depression, which is comorbid with Parkinson's disease in almost half of those affected. Increased levels of depression, anxiety and stress are significantly associated with increased problems in self-reported social support (Lee, Lee, & Song, 2015).

Exercise therapy can reduce the patient's axial impairment, alleviating depression and therefore increasing health-related quality of life. Therapeutic interventions that promote achievable goals and improve the size and quality of social relationships, but at the same time target motor impairments, are necessary to be included in the recovery programs of parkinsonian patients. (Hackney & Bennett, 2014)

Therapeutic interventions that promote achievable goals and improve the size and quality of social relationships, but at the same time address motor impairments, are required to be included in the recovery programs of parkinsonian patients. (Hackney & McKee, 2014)

However, despite growing evidence on the importance of exercise for the general population and those with Parkinson's disease, more than 50% of the general population do not achieve the recommended daily level of physical activity. As such, developing exercise programs that incorporate key elements in an enjoyable and engaging format, potentially promoting motivation to participate in regular activity, is proving essential. With this in mind, dance may be an appropriate intervention for people with Parkinson's (Earhart, 2009).

In “What’s dance movement therapy therapy?” (2014), dance therapy has been defined by the American Dance Therapy Association as "the psychotherapeutic use of movement to promote the emotional, social, cognitive and physical integration of the individual in order to improve health and well-being."

Dance training uses strategic methods such as visual focus, rhythm, imagery, proprioceptive input and imitation of discrete parts of dance sequences to achieve superior control of posture, balance and movement. Dance is also an aesthetic, social activity and a form of exercise that develops flexibility and muscular strength (Westheimer et al., 2015).

Because dance often involves regular meetings to work in pairs or groups to hone skills and/or enjoy the activity, dance encourages teamwork, which can cultivate friendships and foster greater community involvement and provide social support. In this sense, dance can enhance motivation and can be considered an excellent form of exercise for those with Parkinson's disease (Earhart, 2009).

Dance for people with Parkinson's aims to improve movement, well-being and quality of life, as well as social engagement and effort capacity. Dance also enables creative expression and can shift the focus away from the disease to movement and towards music and social connection.

Purpose

The aim of this paper is to highlight the benefits of dance for people with Parkinson's and to find out how dance therapy can be introduced into the management of the Parkinson's recovery program. At the same time, this paper aims to discover whether

there are major differences between the types of dance used and which dance is the most advantageous to use as therapy.

Methods

This paper is a systematic and topical review of the literature that I have been studying for eight months. I used Google Scholar and Pubmed as search engines and the main keywords I used to find the desired articles were: Parkinson's disease; dance therapy; physical therapy.

Twenty articles from the database that met the selection criteria was chosen. All articles presenting pilot studies, randomized case studies, experimental studies, preliminary, controlled or uncontrolled studies and comparative case studies were included. We did not take into account the type of dance that was used as therapy in the study, thus obtaining data on the benefits of several dances such as: tango, ballet, Irish dances, virtual reality dance using Wii (K-pop), dance video games, dance improvisation, jazz and Broadway inspired movements. All selected studies were no more than 10 years old. Studies conducting a meta-analysis or literature review and studies prior to 2012 were excluded.

The general characteristics of the chosen studies included: elderly population (mean age over 60 years), both male and female, with mild to moderate Parkinson's stage (Hoehn and Yahr stages I-III). Various tests were used to assess the subjects for motor testing and for performing daily activities, as well as to assess quality of life and depression status. The most common were the Berg Balance Scale, the Up-and-Go Timed Test, the 6-minute Walk Test, the UPDRS-III Questionnaire and the Beck Depression Inventory.

Results

The characteristics of the 20 included studies are presented below in table form.

Table I . Characteristics of included studies

Authors	Year	Methods	Subjects	Interventions	Results	Conclusions
1.Batson et al.	2014	Phase I: pilot study Phase II: fMRI case study	Phase I: N=7 (2M/5F) Phase II: N=1 (F)	Phase I: 3 improvisational dance classes/week, 1 hour each (7 weeks). Phase II: 5 consecutive dance improvisation classes of 1 hour each (5 days)	Phase I: FAB: a mean total improvement of 5.29 points (p = 0.017) TUG: -2.34 s cTUG: -2.87 s Phase II: a possible increase in brain connectivity strengthening, especially between basal ganglia and cortical motor centers.	Dance improvisation has led to functional balance gains for people with mid-stage Parkinson's disease. For one participant, functional improvements correlated with the emergence of higher-order neural functioning.
2.Blandy et al.	2015	Pilot study	N=6 (3M/3F)	2 sessions of Argentine tango/week, duration of one session 1 hour (for 4 weeks). 1 class = 10' joint warm-up + 15' individual practice + 5' break + 20' tango in pairs + 5' break + 5' stretching and breathing exercises.	The intervention proved to be safe without any adverse events. Adherence to the dance program was 89%. The Beck Depression Inventory score decreased (from 5.5 to 0 (p = 0.042).	The 4-week Argentine tango program has been shown to be feasible and safe for people with mild to moderate Parkinson's disease and can relieve depression in some patients.

3.Duncan & Earhart	2012	Randomized comparative study	2 groups T.G.=26 (15M/11F) C.G.=26 (15M/11F)	Group Tango (T.G.): 2 classes/week (for 12 months) of 1 hour of Argentine tango Control group (C.G.): no intervention	MDS-UPDRS-3: G.T. had a decrease of 28.7% (12.8 points). There were statistically significant improvements within the dance group for MDS-UPDRS-3, MiniBESTest, FOG_Q, 6MWT, forward speed and multi-task gait and 9HPT.	Participants in the tango group demonstrated a significant reduction in disease severity as well as significant improvements in gait, balance and upper extremity function compared to the control group.
4.Foster et al.	2013	Randomized comparative study	N=52 T.G.=26 (15M/11F) C.G.=26 (15M/11F)	Group Tango (T.G.): 2 classes/week of 1 hour of Argentine tango (for 12 months) Control group (C.G.): no intervention	Total current participation in T.G. was higher at 3, 6 and 12 months compared to baseline ($p \leq 0.008$), while C.G. did not change ($p \geq 0.11$). Total activity retention in T.G. increased from 77% to 90% ($p = 0.006$) over the course of the study, while C.G. remained 80% ($p = 0.60$)	Subjects reported increased participation in complex daily activities, recovery from activities abandoned since the onset of the disease and engagement in new activities.
5.Hackney & McKee	2012	Pilot study	N=88 N.Parkinson= 25(13M/12F)	2 adapted Argentine tango classes of 90 min/week (12 weeks)	Both groups were able to perform more chair lifts during the 30-second test and received higher BBS scores at post-test, with gains maintained at follow-up.	Adapted Tango improves mobility and balance for Parkinson's patients and older people with balance disorders.
6.Hashimoto et al.	2015	Quasi-randomized comparative study	N=46 D.G.=15 (3M/12F) P.T.G.=17 (2M/15F) C.G.=14 (7M/7F)	Dance group (D.G.): 1 hour dance/week (for 12 weeks) Physical Therapy group (P.T.G): 1 hour exercise/week (for 12 weeks) Control group (C.G.): no intervention	D.G. showed significant improvements: TUG time (ES = 0.65, $p = 0.006$); No. of steps TUG (ES = 0.66, $p = 0.005$); BBS (ES = 0.75, $p = 0.001$); FAB (ES = 0.77, $p = 0.001$); MRT response time (ES = 0.79, $p < 0.001$); AS (ES = 0.78, $p < 0.001$); SDS (ES = 0.66, $p = 0.006$); UPDRS (ES = 0.88, $p < 0.001$).	Dance was effective in improving motor function, cognitive function and mental symptoms in parkinsonian patients. Dance is the only intervention that led to improvement in general symptoms, especially mental symptoms.
7.Houston & McGill	2013	Pilot study	N=24	12 weeks with one hour and a half/week ballet session 1 ballet class: flexion, extension and rotation movements, following	No statistical improvement in posture. Significant difference in balance scores ($p = 0.011$, with a mean of + 4.0 points	Dance would be an appropriate and enjoyable way to encourage exercise and creativity for people with

				rhythmic patterns, improvisation, standing and walking concentration exercises, swaying from side to side and marches.	for the FAB scale). Fluidity of movements, increased rhythmicity, increased self-confidence, decreased stiffness.	Parkinson's. In the short term it can address issues of mobility, stability and confidence in movement, as well as increased potential for building social relationships and promoting well-being.
8.Lee, Lee & Song	2015	Randomized controlled trial	N=20 (10M/ 10F) 2 groups C.G.=5M/5F E.G.=5M/5F	Control group (C.G.) = 30' neurodevelopmental treatment + 15' functional electrical stimulation 5 times/week (6 weeks) Experimental group (E.G)= same as control group + 30' dance (K-Pop, Wii, Nintendo) for every session	Balance: G.C.= 45.0±1.3 to 45.4±1.5; p>0.05) G.E.= 46.0±1.3 to 48.1±3.0; p<0.05 ADL achievement: G.C.= 87.4±1.7 to 88.2±1.8; p>0.05 G.E.= 87.9±1.4 to 91.1±3.0; p<0.05 Depressive disorder status: G.C.= 21.2±1.3 to 20.6±1.5; p>0.05 G.E.= 20.4±0.9 to 18.2±2.0; p<0.05	Dance exercises in virtual reality have a positive effect on the balance, performance of activities of daily living and depressive disorder of patients with Parkinson's disease.
9.McKay, Ting & Hackney	2016	Pilot study	N=22 (7M/15F)	15 adapted Tango classes, 90' each, for 3 weeks 1 dance class: rhythmic and musical exercises + walking to different tango rhythms	Forward CoM displacement was reduced (P = 0.03) and correlated with improved Berg Balance Scale (ρ = -0.68; P = 0.04) and Dynamic Gait Index (ρ = -0.75; P = 0.03) scores. Time to overall antagonistic onset was delayed (P = 0.02) and duration was reduced (P = 0.02).	An adapted high-volume Tango program over a 3-week period is feasible and is a viable alternative to longer-term adaptation to dance programs.
10.McKee & Hackney	2013	Case study	2 groups: T.G.= 24 (11M/12F) E.G. = 9 (8M/1F)	Tango Group (T.G.) + Education Group (E.G.): 20 sessions of 90' twice a week.	T.G.: improvement in disease severity (p = .008), spatial orientation (p = .021), balance (p = .038) and executive function (p = .012).	Adapted Tango should be pursued as a potential means to improve the motor and cognitive impairments of Parkinson's disease and possibly slow the progression of the disease.
11.McNeely et al.	2015	Comparative study	2 groups: D4PD: 8 (4B/4F) T.G.: 8	Dance for Parkinson Disease (D4PD) + Tango Group (T.G.): 1 hour of dance 2	Measures of balance, repeated standing performance and endurance improved	Both groups demonstrated improvements in balance and mobility

			(4B/4F)	times/week (for 12 weeks)	from pre- to post-intervention similarly for both groups. MDS-UPDRS-III and TUG improved in the tango group and worsened in the D4PD group. Gait speed was not improved in either group.	test scores. However, the tango intervention was more effective than D4PD for improving outcomes related to severity of motor signs and functional mobility in parkinsonian patients.
12.Natale, et al.	2017	Randomized controlled trial	N=16 2 groups D.T.= 9 (7M/2F) T.R.=7 (4M/3F)	20 sessions of 60' each, 2 times/week (10 weeks) Dance Therapy (D.T.) = warm-up to music, teaching Tango steps, free dance with partner Traditional Rehabilitation (T.R.) = balance exercises, walking with sudden changes of direction and coordination	For D.T.: Motor skills: 6-minute walk test (+16.7%) and Up-and-Go timed test (-20.45%). Cognitive Skills: A (-46.6%) and B (-8.3%) route completion test. Motor and cognitive performance in T.R. did not change significantly after the intervention.	Dance therapy is a fun unconventional physical therapy and can have a significant impact on the motor and cognitive functions of Parkinson's patients.
13.Natbony et al.	2013	Preliminary study	N=16 (11M/5F)	Subjects participated in a dance system orientation session and a demonstration by research staff. Each participant then had the opportunity to try DDR under the direct supervision of a staff member.	TGN has 21 advantages and 17 disadvantages. Advantages: "fun" "easy to use", "improves balance or coordination", etc. Disadvantages: limited range of movement, risk of falls and possible technical problems, etc.	The interactive video game dance exercise was appealing to participants with Parkinson's and may help promote adherence to physical activity.
14.Prewitt et al.	2017	Case study	N=6 (3M/3F)	2 dance classes of 60'/week (for 8 weeks)	The results of the fist-edge-palm test ($p = 0.03$) and the S&E ADL scale were significantly improved ($p = 0.02$). There were no other significant findings ($p = 0.12$).	The benefits of dance identified in this study include improved cognition, improved self-efficacy and decreased depression in people with Parkinson's disease.
15.Rocha et al.	2018	Randomized controlled trial	2 groups T.G.=10 (4M/6F) M.D.G.=11 (4M/7F)	Tango Group (T.G.): Argentine tango steps Mixed Dance Group (M.D.G.): tap, Irish and creative dance steps Both groups: one 1 hour class per week (for 8 weeks) + 40' daily home dance	No adverse events occurred. The average participation rate was 70.0% for T.G. and 78.4% for M.D.G. Statistically significant improvements occurred for mobility, balance and motor disability in the tango group and for gait	Argentine tango and mixed dance therapy classes accompanied by a home dance program are feasible and safe for people in the early and middle stages of Parkinson's disease.

					freezing in the mixed dance group.	
16.Romenets et al.	2015	Randomized controlled trial	2 groups T.G.=18 (12M/6F) C.G.=15 (7M/8F)	Tango Group (T.G.): 2 classes/week (for 12 weeks) of 1 hour of Argentine tango Control group (C.G.): self-directed exercise at home daily	For T.G.: MDS-UPRDS-3 improved slightly but not significantly (p = 0.66). Dynamic balance: Mini-BESTest, p = 0.032; Simple TUG test, p = 0.042; TUG Dual Task, p = 0.012. Cognitive function: MoCA, p = 0.049 and FSS, p = 0.01.	Argentine Tango may improve balance, functional mobility and patient care satisfaction and may have modest benefits on cognition and fatigue in Parkinson's disease.
17.Shanahan et al.	2015	Case study	N=10 (7M/3F)	8 weekly Irish dance classes, 90' each + 20' home-based dance program twice/week.	No adverse effects were detected. Attendance at Irish dance classes was 86%. Attendance at home was 67%.	Community Irish dancing is a feasible form of exercise and can positively influence quality of life.
18.Ventura et al.	2016	Pilot study	2 groups D.G.: N=8 (0M/8F) C.G.: N=7 (2M/5F)	1 dance class/week, duration 75 min (10 classes) 1 dance class = 20' warm-up on chair + 20' exercises in orthostatic for weight change and balance + 20' movements inspired by ballet, jazz, Broadway style dance, partner mirroring exercise or movement	Dance Group (D.G.) = positive results on all 12 tests at T2 compared to T1 Control group (C.G.) = positive results in 7 out of 12 tests at T2 compared to T1 Significant results for the dance group included improvements in gait speed (motor function), cognitive switching (cognitive function), and falls efficacy (emotion/quality of life).	This pilot study provides preliminary evidence that dance brings multiple benefits to people with Parkinson's, both for motor and cognitive function and quality of life. In addition, dancing reduces fear of falls and may allow participants to feel less self-conscious about their symptoms.
19.Volpe et al.	2017	Pilot study	N = 24 2 groups I.D.G.=12 (7M/5F) P.T.G.=12 (6B/6F)	Weekly sessions of 90', once a week (6 months) Irish Dance Group (I.D.G.) = 10' warm-up + 70' teaching Irish dance steps + 10' group dance and relaxation Physical therapy Group (P.T.G.)= 10' warm-up + 50' strength, balance and postural re-education	The Irish dance group outperformed the physiotherapy group. UPDRS II (motor control): (F (1, 23) = 6.35, p = .019) Up&Go timed test: (F (1, 23) = 8.938, p = .007) Berg balance scale:(F (1 ,23) = 4.254; p =.051) Modified Gait Freeze Questionnaire (F (1, 23) =13.648, p = .001).	Both the Irish dance program and the physiotherapy exercise program proved to be feasible and safe. Although improvements were made in both groups, the dance group showed superior results in terms of gait freezing, balance and motor deficit.

				exercises + 20' gait training + 10' stretching		
20.Westheimer et al.	2015	Uncontrolled preliminary study	N = 12 (6M/6F)	16 dance classes, 75' each, 2 times/week (for 8 weeks) 1 dance class = 40' warm-up and chair exercises + 15' ballet barre exercises + 20' movement around the gym	UPDRS III: 10.4% improvement from baseline ($p<0.05$). Gait subscoring: 26.7% improvement. Rest tremor subscore: 18.5% improvement. There were no significant changes in PDQ-39SI or BDI scores.	This small study showed that some motor functions improved in the short time of dance classes. Although scores on quality of life assessment tests did not change substantially, qualitative interviews showed that all participants reported physical as well as emotional and social benefits.

Discussions

One of the aims of this paper was to examine which dance is the most advantageous to use in therapy and whether there are any major differences between the other types of dance. It appears that the most widely used form of dance in therapy is Argentine tango or adapted tango (10 studies out of 20). Although other types of dance used in research such as Irish dance, ballet or improvisational dance have also led to improved balance, functional mobility, motor control, decreased risk of falls, improved depression and increased quality of life, tango dance scored statistically better each time (decrease in UPDRS-III by 28.7% - Duncan & Earhart, 2012). In addition, tango brings more benefits, reducing tremor, bradykinesia and slowing disease progression.

Based on all those studies we have noticed that tango can be more useful compared to other dances because of the specific movements it incorporates, such as walking backwards. Adapted tango involves movement initiation and cessation, multi-directional perturbations, varied speeds and rhythms. Focus on foot placement, whole-body coordination and attention to partner, direction of movement and aesthetic posture are at the core of adapted tango's proven effectiveness in improving mobility and balance in parkinsonian patients. Unlike physiotherapy sessions in which the patient must initiate movement at the command of the physiotherapist, in dance therapy the individual uses external cues provided by the music and the partner, and by making decisions on their own the patient gains greater confidence in their abilities, achieving greater confidence while walking. Importantly, in all studies that conducted a follow-up evaluation at a certain time interval (3, 8, 10-12 weeks to 3-12 months) after the completion of the dance intervention, it was found that the positive results obtained from the therapy were maintained. In the 12-month studies where periodic evaluations were conducted, it was observed that outcomes improved as the study progressed. In contrast, in studies of relatively short duration (8 weeks) like the one published by Prewitt et al. (2017), it appears that improvements in scores are only valid in the short term. Thus, in order to perpetuate the gains achieved, it is necessary for parkinsonian patients to regularly participate in therapy on a long-term basis. In most studies the frequency used was 2 dance classes of one hour per week for 6-12 weeks, achieving significant improvements particularly for balance and depression, with motor and non-motor signs of the disease being improved. Long-term studies (12 months) have

also shown positive changes in cognition, slowing the progression of the disease.

Increased adherence to therapy would not be a drawback as there have been multiple studies (5 out of 20) demonstrating that dance therapy is feasible and safe. Due to the high attendance (over 80%), we can argue that dance therapy provides a social context for integration and helps participants to want to come to therapy, unlike traditional therapy which they do not like. Increased adherence to therapy would not be a drawback as there have been multiple studies (5 out of 20) demonstrating that dance therapy is feasible and safe. Due to the high attendance (over 80%), it can be argued that dance therapy provides a social context for integration and helps participants to want to come to therapy, unlike traditional therapy which they do not like.

Another important point is that studies like the ones published by Duncan & Earhart (2019) or McNeely (2015) have been conducted evaluating patients off of antiparkinsonian medication. They found the same positive results in terms of improved balance, mobility, walking speed, improved depression and improved quality of life, demonstrating that entrapment therapy produces structural changes in the brain and that the results are not due to medication.

One of the most significant problems with Parkinson's disease is loss of independence and social isolation. Following participation in dance classes, Parkinson's patients became more involved in social activities, gained greater self-confidence and the motor gains achieved led to increased independence in carrying out daily activities. As shown in Houston & McGill's study (2013), a large proportion of patients who participated in studies benefiting from dance therapy claimed that they would continue dance classes if they had the opportunity, that it was an enjoyable way to exercise, and that they felt more motivated to work in groups.

Limitations

There are some limitations to the present study. Firstly, the search was limited to English and therefore relevant studies published in other languages may have been omitted. Secondly, all the research done was on parkinsonian patients with mild to moderate stages of the disease (Hoehn & Yahr stages I-III), which suggests that dance therapy cannot be applied to patients with severe degrees of the disease. Another limitation is that some studies were conducted on a small group of subjects or over a very short period of time, and the results obtained cannot be generalized to the whole population. However, having in our database both randomized trials, case studies, comparative studies and pilot studies, conducted on varied groups of patients and over different time periods, with a diverse dosage of therapy that included several types of dance, we can argue that we have approached dance therapy from multiple perspectives, with the results obtained being similar and complementing each other.

Conclusions

The review of the 20 articles demonstrated that incorporating dance into the clinical management of Parkinson's disease can increase participation in therapy sessions and subsequently lead to improved quality of life for this population, bringing benefits in both the motor, cognitive and psycho-emotional spheres of patients.

The author's personal experience with dance was found to be a more enjoyable alternative to traditional exercise because most dance classes are held in groups and with partners, giving patients the opportunity to socialize. As evidenced in McKee & Hackney's (2013) study, the improvement and maintenance of spatial orientation gains in tango classes may suggest that tango dancing improves cognition. While social interaction and group learning may play an important role in rehabilitation gains, the significant improvement in group tango compared to group education, another highly interactive and social group activity, suggests that the motor training inherent in adapted tango may underlie the changes produced. However, the social context found in dance therapy helps participants to have a higher rate of participation in therapy.

In addition to the physical benefits of dance, this type of therapy has a great impact on the mental and emotional state of patients. While shame

about the symptoms associated with Parkinson's disease or fear of being judged by others can cause great anxiety, dance classes specifically designed for people with Parkinson's disease can allow participants to feel less self-conscious about their symptoms and temporarily forget about this degenerative disease. Subjects in the study by Foster et al. (2013) achieved a 13% increase in engagement in social activities from the onset of Parkinson's disease to the completion of the dance intervention.

In addition, there is a huge variety of dance types and music, so therapy can be tailored to the preferences of each patient. In addition, the atmosphere that is achieved during a dance class makes the participants feel good, have fun, focus on the sensations produced and on the present moment, but not specifically on the exercises that are performed during the class, as happens during a traditional exercise program.

In conclusion, dance therapy is a feasible and safe way to rehabilitate patients with Parkinson's disease and brings improvements in balance, functional mobility, motor control, relieves depression and increases quality of life, helps with gait coordination, reduces the risk of falls, supports patients' independence and if practiced for at least 12 months on a regular basis slows the progression of the disease.

References

1. Abraham, A., Hart, A., Andrade, I., & Hackney, M. E. (2018). Dynamic neuro-cognitive imagery improves mental imagery ability, disease severity, and motor and cognitive functions in people with Parkinson's disease. *Neural plasticity*, *2018.*
2. Batson, G., Migliarese, S. J., Soriano, C., H. Burdette, J., & Laurienti, P. J. (2014). Effects of improvisational dance on balance in Parkinson's disease: a two-phase fMRI case study. *Physical & Occupational Therapy in Geriatrics*, 32(3), 188-197.
3. Blandy, L. M., Beevers, W. A., Fitzmaurice, K., & Morris, M. E. (2015). Therapeutic argentine tango dancing for people with mild Parkinson's disease: a feasibility study. *Frontiers in Neurology*, 6, 122.
4. De Natale, E. R., Paulus, K. S., Aiello, E., Sanna, B., Manca, A., Sotgiu, G., ... & Deriu, F. (2017*).* Dance therapy improves motor and cognitive functions in patients with Parkinson's disease. *NeuroRehabilitation*, 40(1), 141-144.
5. Downward, E., & Pool, J.J., (2019). Accessed at: https://parkinsonsdisease.net/basics/statistics, on 02.11.2021.
6. Duncan, R. P., & Earhart, G. M. (2012). *Randomized controlled trial of community-based dancing to modify disease progression in Parkinson disease*. Neurorehabilitation and neural repair, 26(2), 132-143.
7. Earhart, G. M. (2009). *Dance as therapy for individuals with Parkinson disease.* European journal of physical and rehabilitation medicine, 45(2), 231.
8. Foster, E. R., Golden, L., Duncan, R. P., & Earhart, G. M. (2013). Community-based Argentine tango dance program is associated with increased activity participation among individuals with Parkinson's disease. *Archives of physical medicine and rehabilitation*, 94(2), 240-249.
9. Hackney, M. E., & Bennett, C. G. (2014). Dance therapy for individuals with Parkinson's disease: improving quality of life. *Research and Reviews in Parkinsonism*, 4, 17-25.
10. Hackney, M. E., & McKee, K. (2014). Community-based adapted tango dancing for individuals with Parkinson's disease and older adults. *JoVE (Journal of Visualized Experiments)*, (94), e52066.
11. Hashimoto, H., Takabatake, S., Miyaguchi, H., Nakanishi, H., & Naitou, Y. (2015). Effects of dance on motor functions, cognitive functions, and mental symptoms of Parkinson's disease: a quasi-randomized pilot trial. *Complementary therapies in medicine*, 23(2), 210-219.
12. Houston, S., & McGill, A. (2013*).* A mixed-methods study into ballet for people living with Parkinson's. *Arts & health*, 5(2), 103-119.
13. Lee, N. Y., Lee, D. K., & Song, H. S. (2015). Effect of virtual reality dance exercise on the balance, activities of daily living, and depressive disorder status of Parkinson's disease patients. *Journal of physical therapy science*, 27(1), 145-147.
14. McKay, J. L., Ting, L. H., & Hackney, M. E. (2016). Balance, body motion and muscle activity after high volume short term dance-based rehabilitation in individuals with parkinson's disease: a pilot study. *Journal of neurologic physical therapy: JNPT*, 40(4), 257.
15. McKee, K. E., & Hackney, M. E. (2013). The effects of adapted tango on spatial cognition and disease severity in Parkinson's disease. *Journal of motor behavior*, 45(6), 519-529.
16. McNeely, M. E., Mai, M. M., Duncan, R. P., & Earhart, G. M. (2015). Differential effects of tango versus dance for PD in Parkinson disease. *Frontiers in Aging Neuroscience*, 7, 239.
17. Natbony, L. R., Zimmer, A., Ivanco, L. S., Studenski, S. A., & Jain, S. (2013). Perceptions of a videogame-based dance exercise program among individuals with Parkinson's disease. *GAMES FOR HEALTH: Research, Development, and Clinical Applications*, 2(4), 235-239.
18. Prewitt, C. M., Charpentier, J. C., Brosky, J. A., & Urbscheit, N. L. (2017*).* Effects of dance classes on cognition, depression, and self-efficacy in Parkinson's disease. *American Journal of Dance Therapy*, 39(1), 126-141.
19. Rocha, P., Aguiar, L., McClelland, J. A., & Morris, M. E. (2018). Dance therapy for Parkinson's disease: a randomised feasibility trial. *International Journal of Therapy and Rehabilitation*, 25(2), 64-72.
20. Romenets, S. R., Anang, J., Fereshtehnejad, S. M., Pelletier, A., & Postuma, R. (2015). Tango for treatment of motor

and non-motor manifestations in Parkinson's disease: a randomized control study. *Complementary Therapies in Medicine*, 23(2), 175-184.

21. Shanahan, J., Morris, M. E., Bhriain, O. N., Volpe, D., Richardson, M., & Clifford, A. M. (2015). Is Irish set dancing feasible for people with Parkinson's disease in Ireland?. *Complementary therapies in clinical practice*, 21(1), 47-51.
22. Van Den Eeden, S. K., Tanner, C. M., Bernstein, A. L., Fross, R. D., Leimpeter, A., Bloch, D. A., & Nelson, L. M. (2003). Incidence of Parkinson's disease: variation by age, gender, and race/ethnicity. *American journal of epidemiology*, 157(11), 1015–1022.
23. Ventura, M. I., Barnes, D. E., Ross, J. M., Lanni, K. E., Sigvardt, K. A., & Disbrow, E. A. (2016). A pilot study to evaluate multi-dimensional effects of dance for people with Parkinson's disease. *Contemporary clinical trials*, 51, 50-55.
24. Volpe, D., Signorini, M., Marchetto, A., Lynch, T., & Morris, M. E. (2013). A comparison of Irish set dancing and exercises for people with Parkinson's disease: a phase II feasibility study. *BMC geriatrics*, 13(1), 1-6.
25. Westheimer, O., Mcrae, C., Henchcliffe, C., Fesharaki, A., Glazman, S., Ene, H., & Bodis-Wollner, I. (2015). Dance for PD: a preliminary investigation of effects on motor function and quality of life among persons with Parkinson's disease (PD). *Journal of Neural Transmission*, 122(9), 1263-1270.