

Tango Dance: Therapeutic Benefits: A Narrative Review

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Abstract

The aim of this comprehensive narrative review is to present, in a condensed form, the evolution of Tango as a popular enjoyable dance and all the published studies on the therapeutic benefits of tango dance in individuals with various illnesses, especially Parkinson's disease. The review provides useful information to researchers and healthcare providers in developing optimal individualized therapy based on tango dancing in improving physical and emotional health, and the quality of life of patients. Tango, a partner dance accompanied by music originated in the 1880's in Argentina and Uruguay. Of the many styles, Argentinian tango is the most popular dance practiced and enjoyed by a large number of people worldwide. Therapeutic benefits of tango dance were recognized in 1980, and numerous scientific studies have shown that tango dance improves quality of life, cognition, endurance, balance, social satisfaction, and emotional health. Tango dance targets five main areas considered to be important for improving quality of life: 1) physical exercise (increasing muscle tone, endurance, heart and lung conditioning and enhancing balance, stability and flexibility); 2) social satisfaction (improving self-confidence and socializing); 3) spirituality and mindfulness; 4) cognition ; 5) meaningfulness and emotional health (reducing stress and anxiety, and giving a sense of well-being). Although, the beneficial effects of tango dance have been demonstrated in elderly individuals and in subjects with anxiety, depression and neuropathy, most of the studies have been carried out in patients with Parkinson's disease, in whom the dance improves physical and neurological deficit, and the quality of life. Limitations of therapeutic application of tango dancing include patients' physical limitations, need for a committed dance partner and a trained tango instructor, and adequate space. Furthermore, there is no optimum intervention (duration and intensity of dance) to benefit individual patient.

Keywords: *Tango, Partnered Dance, Parkinson's disease, Therapy, Quality of Life.*

Abbreviations: BBS = Berg Balance Scale; MDS-UPDRS-1, 2, 3 = Movement Disorders Society-Unified Parkinson Disease Rating Scale 1, 2, 3; Mini-BESTest = Mini Balance Evaluation Systems Test; 6-MWT = 6-minute walk test; PD = Parkinson's Disease, PDQ-39 = Parkinson's Disease Questionnaire-39; QOL = quality of life; TUG = timed Up and Go test

Introduction

A number of non-pharmacological modalities have been used in the therapy of certain human diseases and conditions. These include acupuncture, computerized cognitive behavioral therapy, exercise (aerobics, cycling, swimming, walking, etc.), holistic-, light-, physio-, pet-therapy, massage, music, organized physical activity, robotic assisted training, transcendental meditation, virtual reality-based or neuro-feedback-based relaxation techniques, water gymnastics, Qi Gong, Tai Chi, yoga, and various types of dances (for example, tango, ballet, ballroom, salsa, structured dance, etc.).

In general, dance therapy, dance/movement or structured dance therapy is said to benefit both physical and mental health – by reducing stress, preventing certain physical and mental illnesses, and by helping individuals to achieve emotional, cognitive, physical and social integration as well as improving the quality of life (QOL) [1-4]. It is also believed that dance therapy improves communication and coordination skills, and increases muscular strength and mobility, and decreases muscular tension [4].

Tango, a partner dance originated in the 1880's in Argentina and Uruguay (mainly suburbs of Buenos Aires and Montevideo) and then spread to the rest of the world. In the early 20th century, tango became popular in Paris, London, Berlin and other European capitals, and then in New York. Early tango was known as Tango criollo (Creole tango). Subsequently, many forms and styles of tango [Tango american, angola, argentino, avellaneda, ballroom, camacupense, canyengue (club), devoto, fantasia (show), Finnish, flamenco, milonguero (apilado), liso, maxixe, neuvo, orillero, passionata, salon, uroguayan (oriental), vals (Waltz), vieja, villa urquiza and zarzuela] have evolved (mainly influenced by African and European cultures), which use different body techniques (such as close embrace or open embrace).

Several types of music, derived mainly from the fusion of various European forms, using instruments such as accordion, bandoneón, double bass, flute, guitar, organ, piano, or a human singer, accompany tango. The history of tango dance [5] and music (Denniston CD-ROM; Denniston-Tango-history-1), basic elements (Argentine tango-1; Argentine tango-2 ;) and the meaning [6] of tango have been described. Tango is one of the most typical Argentinean folk dance-musical repertoires. Because of its cultural association with romance and the music and dance, tango is popular in activities related to gymnastics, figure skating, synchronized swimming, etc.,

In the tango, both the man and woman participate equally but in different roles. The man plays the active, determined, happy, masculine leading role, while the woman plays the receptive, lunar, sensitive role. However, the most important step of the dance, called the 'eight', is performed by the woman. The format is sometimes changed in that the female leads and the male follows [7]. In addition, participants may switch dance partners during the class (). No popular dance has reached the same level of communication that the tango has in terms of emotion, energy, breathing, embracing one another and pulsating; tango brings out the true essence of the individual, removing every mask and all the facades. Argentine tango is practiced by a large number of people worldwide; participants construct and actuate their identities in a dialogue between

their positions inside and outside tango community [8]. Tango dancers, in general, have high-level education and socio-economic status, and are motivated to achieve physical fitness, social interaction and emotional well-being [9]. Former US President Barak Obama and First Lady, Michelle Obama, participated in tango dancing when they visited Argentina in July 2016.

Brain Regions Responding to Dance

A number of studies, using neuroimaging of brain while dancing (dance execution and possibly observation), have implicated several brain regions in dance execution [10]. Employing Functional Magnetic Resonance Imaging (fMRI) of the brain, it was determined that neuro-cognitive mechanisms such as mentalizing (theory of mind) or language (narrative comprehension) in dance understanding involve superior parietal network as well as mentalizing regions in the dorsomedial prefrontal cortex [11].

Long-term dance training changes both gray and white matter structure of the brain [10]. Positron emission tomography has identified brain regions which are active during various types of movements in tango dancing: a) entrainment of dance steps to music, compared to self-pacing of movement, is supported by anterior cerebellar vermis; b) movement to a regular, metric rhythm, compared to movement to an irregular rhythm, implicates the right putamen; c) spatial navigation of leg movement during dance, when controlling for muscle contraction, activates the medial superior parietal lobule; and d) additional cortical, subcortical and cerebellar regions are also active at the systems level [12].

Furthermore, imaging studies have shown that any pleasant and enjoyable activity (such as singing or listening to music, and possibly dance/music) stimulates brain's reward circuitry, resulting in cortical remodeling (neuroplasticity), especially of ventral tegmental area and nucleus accumbens of the brain [13].

Tango Dance in the Therapy of Human Disabilities and Diseases

The beneficial effect of tango dance in the therapy of human disease was first described in a preliminary report but more widely recognized after presentations were made at the First International Congress of Tango

Therapy held in 2008 in Rosario, Argentina. A number of books have been written (for example, [14-15] describing the potential therapeutic benefits of tango dance, but without providing any references for scientific evidence. Furthermore, a number of websites extol the therapeutic benefits of tango dancing [16-20] [21] UK-tango; US-tango).

For example, UK Tango describes the advantages of tango therapy in the following terms: “Tango Therapy is a therapeutic technique that uses the Tango dance and Tango music (such as candombe, milonga, tango and criollo waltz) integrated and/or combined with special exercises as a palliative or to prevent diseases framed in a particular methodology and delivered by a trained expert with special skills,” and “Tango Therapy moves away from the medicalisation of mental or physical illness and addiction. It brings together and energises the connection between body, mind and spirit, providing a creative outlet for the emotions and for the self.” Another article, “Tango Therapy: The Healing Embrace[16] refers to some scientific studies (references not provided) which demonstrated the therapeutic benefits of tango dance in the elderly, and in patients with risk for cardiovascular disease, Alzheimer’s or Parkinson’s disease, mental illness, etc.

Several Tango therapy groups have been formed in many countries, such as US Therapy Foundation [US-tango), Therapy in Argentina [16], Canada, and many European countries, which exploit tango dance for therapeutic intervention in various pathologies. The International Association of Tango Therapy [22] champions tango ‘as a remedy for everything from depression and trauma to Alzheimer’s and Parkinson’s,’ but cites very few studies to back these claims. Tango has been used as adjuvant therapy in the treatment of several psychological disorders such as social phobia, depression, schizophrenia, and mental illness [21].

Scientific Studies Demonstrating the Therapeutic Benefits of Tango Dance

Although, all types of dance confer some kind of benefit [23-26], Argentine tango dancing, in particular, has been shown to benefit social, mental and physical well-being across ages (adults), both in healthy individuals and those with certain disabilities. Tango is a

dance that (physically able) adults can enjoy [21]. It is a good exercise, since it entails the well-known benefits of walking, a high degree of coordination, balance and synchronization within the dancing couple and with the music. Tango dance targets five main areas considered to be important [19] for good QOL: 1) physical exercise (increasing muscle tone and endurance, heart and lung conditioning and enhancing balance, stability and flexibility); 2) social satisfaction (improving self-confidence and helping in socializing); 3) spirituality and mindfulness; 4) Cognition (possibly improvement in memory and attention); 5) Meaningfulness and emotional health (reducing stress and anxiety and giving a sense of well-being). Social ties formed during tango dance improve cognitive health by keeping brain healthy.

Most of the scientific studies have been carried out in patients with Parkinson’s disease (PD), which show that tango dance improves physical and neurological deficits.

Cardiovascular Health

Since, tango is an exercise of slight to moderate intensity; it is similar to other types of exercises that are recommended to decrease the risk of cardiovascular (CV) disease. According to Dr. Roberto Peidro, chief of Cardiovascular Rehabilitation Ward at the Favaloro Foundation (Buenos Aires, Argentina), tango has been found to be helpful in improving cardiac health and in fighting arteriosclerosis [19]. In Dr. Pedro’s words, “Tango implies a physical activity and it is, also, related to positive emotions... All circumstances that lead us to joyful moments act as ‘positive emotions’ and, therefore, help us to live more and better,” and “tango has been recommended by the World Health Organization to improve CV function and prevent heart disease [19- 21].

The Frail and the Elderly

Many old people have sensory, motor, and cognitive impairments leading to reduced independence and social isolation. Cognitive impairment causes decline in QOL, increase in morbidity and mortality risk, and also increases the financial burden on the individual. Exercise and physical activity improve functional mobility and cognition, but, more than half of the elderly population, in general, does not achieve recommended daily levels of physical activity. Self-help and physical leisure activities are important in

maintaining safe functional mobility among older people. Dance, regardless of its style, can significantly improve muscular strength and endurance, gait, balance, and other aspects of functional fitness in older [27-28].

Partnered dance, especially Adapted tango (involving movement initiation and cessation, multi-directional perturbations, varied speeds and rhythms, focus on foot placement, whole body coordination, and attention to partner, path of movement, and aesthetics), which improves mobility (measured with the Timed Up and Go, Tandem stance, Berg Balance Scale, Gait Speed and 30 sec chair stand) can serve as an adjunct to traditional treatments to improve mobility, gait, balance, and QOL in older adults with balance impairment the elderly [29]. Tango dance can also be helpful in the frail and elderly, who are at high risk for falls. It has been reported that the older adults are more likely to participate in Adapted Tango dancing than patients with Parkinson's disease (PD) [30].

The Following Scientific Studies Exemplify the use of Tango Dancing to Improve Various Deficits in the Elderly and Frail

- In a small study in frail elderly individuals, Argentine tango dance compared to walking (based on community exercise program) demonstrated greater improvement in balance and complex gait tasks, suggesting that tango dance may be as effective as strength/fitness exercise, since dance involves coordination of movement to music [31].
- Tango dancing (two hours twice/week for 10 week) was superior to fast-walk in 30 elderly at risk for falls, in increasing strength, walk speed and balance skills [32].
- Old adults (n = 13) with visual impairment who participated in Adapted tango program (twenty 1.5 hour lessons in 11 weeks) reported enjoyment and improvement in physical well-being as well as dynamic postural control, lower body strength, and general vision-related QOL following training [33].
- In 74 oldest-old (>80 year-olds) individuals with mild cognitive impairment, a comparison between tango-adapted dance (n =52) and group educational program (n=12) [twenty 90-min sessions for 12 weeks],

showed an improvement in Timed Up and Go Cognitive scores in the tango group; other parameters (Trail Making Test, with parts A and B, Montreal Cognitive Assessment, and Brooks Spatial Memory Test) were not different [34].

- A comparison of adapted tango dance and FallProof (a balance and mobility program) carried out for 90-min per week for 12-weeks, in 32 elderly individuals with visual impairment showed that tango was better than FallProof in terms of endurance, cognitive dual-tasking and vision-related QOL [35].
- In older adults (n = 62), adapted tango dance (90-min sessions/week for 12 weeks) improved mobility, motor-cognitive function and backward-forward gait speed more than by health education program (n=12) [36].

Neurological Rehabilitation

Tango incorporates elements found in standard neurological rehabilitation programs in persons with functional mobility deficit, such as those with PD, visual impairment or history of stroke. These include forward, backward and side to side weight shift, one leg stance, walking on a straight line both backwards and forwards, increasing step length in all directions, and turning within a narrow space. An added benefit with tango is that its movements are performed to music, which is known to facilitate performance of ambulatory activities.

Psychological Disorders

Tango dance has been used as adjuvant therapy in the treatment of several psychological disorders such as social phobia, depression and schizophrenia [15].

Neuropathy

In 20 cancer survivors, who had developed chemotherapy-induced neuropathy with deficit balance, Argentine adaptive tango dancing (1-hr sessions twice a week for 10 weeks) improved balance (improvement in biomechanical measure of fall risks), QOL, with high satisfaction [37].

Spinal Cord Injury

A study was performed to assess the physical benefits from participation of spinal cord injured (SCI) paraplegic and tetraplegic wheelchair users in a community based,

mixed ability social dance class. Subjects (5 power and 10 manual wheelchair users) attended and participated in mixed ability social dance class including salsa, tango and rumba for 4 hours weekly for 6 weeks. The improvement in pain perception, weight loss, active range of motion, and coordination demonstrated that social dance may provide a fun, safe, and socially engaging form of exercise with measurable benefits, allowing participation of nearly all abilities. Latin dance may improve overall health and QOL of life of SCI patients [38-39].

Stroke

Dance has demonstrated beneficial effects on mobility in older individuals with movement disorders; In one individual (73-year-old man, 13 years post-stroke with spastic hemiplegia, visual impairment, and multiple comorbidities), the effect of adapted tango classes (twenty 1 ½ -hour tango classes adapted for older individuals with sensory and motor impairments over 11 weeks) was assessed on balance, mobility, gait, endurance, dual-task ability, QOL, and enjoyment.

There was improvement on the Berg Balance Scale, 30-s chair stand, Timed Up and Go (single, manual, and cognitive conditions), 6-Minute Walk Test, and backward gait speed. However, not all measures improved: balance confidence decreased, and there was no change in forward and fast gait speed or QOL, as measured by the Short Form-12 and the Visual Function Questionnaire-25. Some gains were maintained at one-month follow-up. The patient reported enjoying the classes, noted improvement in physical wellbeing, and wanted to continue the program [40].

Cancer Survivors (Post Therapy)

Cancer survivors post therapy have increased risk of falls due to functional impairment. In a study of 7 survivors, Argentine tango dance intervention (1 hr-twice a week for 10 weeks), improved gait (stride to stride) variability decreasing the risk of falls [41].

Depression

- In 20 community-dwelling older adults with depression who received 8 ballroom dancing lessons (foxtrot, waltz, rumba, swing, cha-cha, or tango), there was improvement in several measures of depression; the dance lessons were enjoyable and well-received [42].

- In 66 patients with self-declared depression, tango dancing (1½ hour per week sessions for 6 weeks) was more effective than mindfulness meditation in reducing symptoms of psychological stress, anxiety and depression, in terms of Stress Scale, Self Esteem Scale, Satisfaction with Life Scale, and Mindful Attention Awareness Scale [43] the authors recommended tango dancing as a complementary adjunct for the treatment of depression and stress management.

- Sixty four individuals with self-reported psychological stress, anxiety, depression, insomnia and fatigue completed six-week program of meditation, exercise, tango dance (n=18) or no intervention. The tango group showed decreased depression and insomnia and increased satisfaction with life and mindfulness at post-test and the effect was long-lasting [44].

Parkinson's disease

Parkinson's disease (PD) is a chronic, progressive and disabling neurodegenerative disorder which affects millions of people worldwide. PD has wide reaching implications (slow-, involuntary muscle-, or no movement, resting tremor, rigidity, decreased flexibility, postural instability and an increased risk of falls) for the people it affects. PD impacts on physical, psychological, emotional, social and financial function and consequently has a profound effect on QOL. Individuals with PD experience a range of movement disorders that affect mobility and balance, and increase in risk of falls.

Balance dysfunction and gait disturbance leads to mood disorder, anxiety, depression and apathy. Low health-related QOL, depression, and anxiety are more common in people with PD than age-matched individuals. Physical activity levels in people with PD are also lower (due to impaired mobility, fatigue, fear of falling and low outcome expectation) than in age matched healthy adults [45].

Although, any type of dance will produce, often short term, clinically meaningful benefits in patients with PD [46-51], tango dancing has been shown to be more effective in improving measures of physical function,

such as to improve a) motor function [52] gait and balance [53-57-7-58-60-52-61] functional mobility [62-63-59] depression scores [64] psychological health [65], and health-related QOL [66-58]. It also reduces a) falls [53-66-67] fatigue [58-52-] motor sign severity [68-59] improves spatial [68] slows disease progression [53-69-68-59].

Furthermore, a community-based tango dance program encourages increased participation of PD patients [70]. It has been reported that patients with PD could benefit from Tango Dance training strategies that require the use of mental simulation through motor imagery, without the actual dancing [61-71].

Some Studies Demonstrating the Benefits of Tango Dancing in Patients with PD Include

- Nineteen PD subjects, who participated in tango dance or group exercise classes (two one-hour sessions per week for 20 weeks), showed improvement in overall Unified Parkinson's Disease Rating Scale (UPDRS) score and nonsignificant improvements in self-reported Freezing of Gait. In addition, the tango group showed significant improvements on the Berg Balance Scale and a trend toward improvement on the Timed Up and Go test, while the exercise group did not improve [72].
- Fifty-eight people with mild to moderate PD were randomly assigned to tango, waltz/foxtrot or no intervention (control) groups. Those in the dance groups attended 1-h classes twice a week, completing 20 lessons in 13 weeks. Both dance groups improved more than the control group, which did not improve. The tango and waltz/foxtrot groups improved significantly on the Berg Balance Scale, 6-minute walk distance, and backward stride length. The tango group improved as much or more than those in the waltz/foxtrot group on several measures [56].
- Fourteen people with idiopathic PD who completed ten 1.5-h long Argentine tango dance lessons within 2 weeks, significantly improved on the Berg Balance Scale [effect size (ES) = 0.83, $p = 0.021$], Unified Parkinson Disease Rating Scale Motor Subscale III (ES = -0.64, $p = 0.029$), and percent of time spent in stance during forward walking (ES = 0.97, $p = 0.015$).

There were non-significant improvements on the Timed Up and Go (ES = -0.38, $p = 0.220$) and 6 min walk (ES = 0.35, $p = 0.170$). In conclusion, frequent social dance lessons completed within a short time period appear to be appropriate and effective for these individuals with mild-moderately severe PD [66].

- In a study in 75 individuals with PD, the effect of Tango, Waltz/Foxtrot, Tai Chi (20 classes in 13 weeks) or No Intervention on health-related QOL Tango significantly improved on mobility ($p = 0.03$), social support ($p = 0.05$) and the PDQ-39 SI ($p < 0.01$) at post-testing. No significant changes in health-related QOL were noted in the Waltz/Foxtrot, Tai Chi or No Intervention. Tango may be helpful for improving health-related QOL in PD because it addresses balance and gait deficits in the context of a social interaction that requires working closely with a partner [67].
- In one patient with advanced PD (who used wheelchair for transportation), the effect of partnered tango classes (20, 1-hour classes in 10 weeks) on balance, walking, endurance and QOL was evaluated before and after the intervention and at a 1-month follow-up. There were improvements on the Berg Balance Scale, 6-min walk test, and functional reach, balance confidence and QOL (as measured by the Parkinson Disease Questionnaire-39 summary index). The improvements were maintained at the 1-month follow-up [57].
- Sixty-two participants (aged 70.3 ± 8.8 years) with idiopathic PD (56% male) were randomly assigned to a twice weekly, one hour community-based 3-month tango class or to a no exercise control group. Participants were assessed with the MDS-UPDRS while off medication at baseline and after 3 months of intervention or no exercise.
- There were no differences between groups at baseline on any of the MDS-UPDRS subscales. For the MDS-UPDRS-III motor subscale there was a significant main effect of time ($p=0.006$) and a significant interaction between group and time ($p=0.008$). Post-test MDS-UPDRS-III scores were significantly better for tango (39.9 ± 11.9) as compared to pre-test tango (45.3 ± 11.8) and both control time points. For the

MDS-UPDRS-II ADL (activities of daily living) subscale, there was a significant interaction between group and time ($p=0.008$); the tango group improved slightly while the control group worsened. Non-motor symptoms (MDS-UPDRS-I) and motor complications (MDS-UPDRS-IV) did not change significantly [7].

- Argentine tango dance (20-one hour classes) had beneficial effects on gait, balance and balance confidence in 36 individuals with PD, irrespective of fall and gait freezing history [73].
- The effects of partnered and non-partnered dance on balance and mobility were studied in 39 people with mild to moderate PD, who were randomly assigned to partnered or non-partnered tango (1-hour classes twice per week, completing 20 lessons within 10 weeks). Both groups significantly improved on the Berg Balance Scale, comfortable and fast-as-possible walking velocity, and cadence. Improvements were maintained at the 1-month follow-up. The partnered participants expressed more enjoyment and interest in continuing the program [73].
- The effect of a short-term community-based tango program was studied in sixty-two participants with idiopathic PD (56% male; mean age \pm SD = 70.3 \pm 8.8 years), off medication, who were randomly assigned to a twice weekly, one hour tango class or to a no exercise control group. For the MDS-UPDRS-III motor subscale there was a significant main effect of time ($p=0.006$) and a significant interaction between group and time ($p=0.008$). Post-test MDS-UPDRS-III scores were significantly better for tango (39.9 \pm 11.9) as compared to pre-test tango (45.3 \pm 11.8) and both control time points (pre=46.2 \pm 10.3, post= 46.1 \pm 10.2). For the MDS-UPDRS-II activities of daily

living subscale there was a significant interaction between group and time ($p=0.008$); the tango group improved slightly (pre= 13.4 \pm 7.5, post=12.8 \pm 7.5) while the control group worsened (pre=12.9 \pm 7.8, post=14.8 \pm 8.8). Non-motor symptoms (MDS-UPDRS-I) and motor complications (MDS-UPDRS-IV) did not change significantly. The results suggest that a 3-month, community-based

tango program is effective for improving motor symptoms of PD and may positively impact activities of daily living. According to the authors, short-term intervention (duration and frequency) does not appear to influence non-motor symptoms or motor complication [74].

- In 7 patients with PD, who participated in a Dance Therapy Program using Argentine Tango (90 minute weekly sessions for 16 weeks). There was improvement in the 15-meter walk, gait speed, and Berg Balance Scale. Patients enjoyed the dance therapy and wished to continue and they also improved in organization of daily living [55].
- A study to investigate the exact neural mechanisms by which dance and music have a beneficial effect in PD involved the use of transcranial magnetic stimulation during action observation kinesthetic motor imagery and imitation of action. Forty two subjects [22 with moderate PD and 20 age matched (64.9 \pm 7 years-old) healthy subjects) were selected to determine the effects of music cueing on the modulation of motor cortex (M1)-corticospinal modulation (excitability). Rhythmic music alone increased the facilitation of corticomotor system equally in PD and healthy subjects, supporting the concept that music (as an external sensory cueing source) can modulate the motor cortex excitability, and that rhythmic music can be used with conventional neuro-rehabilitation programs for PD subjects [75].
- A study to assess the effect of tango dancing on disease severity and physical function was carried out in 62 PD patients, who were randomly assigned to a long-term (12 months) twice weekly, community-based Argentine Tango program or a control group (no intervention). Outcome

studies included Movement Disorders Society-Unified Parkinson Disease Rating Scale 3 (MDS-UPDRS-3), MDS-UPDRS-1, MDS-UPDRS-2, MiniBESTest balance test, Freezing of Gait Questionnaire, 6-Minute Walk Test; gait velocity for comfortable forward, fast as possible forward, dual task, and backward walking; and Nine-Hole Peg Test. Overall, the Tango group improved whereas the control group showed no

change on most measures, suggesting that long-term participation in tango may modify progression of disability in PD[69].

- The effect of a 12-month community-based tango dance program (twice-weekly for 12 months) on activity participation in 52 individuals with PD was evaluated at 3-, 6- and 12 months. Activity retention and increased participation in complex daily activities in the tango group (n = 26) was higher at all time periods than in no intervention group (n = 26) [70].
- In 33 individuals with PD, randomized to Adapted tango (n=24; twenty-90 min dance lessons) or education (n=9), there was significant improvement in disease severity, spatial cognition, balance, and fall incidence with tango compared to education. The authors also concluded that Adapted tango dancing can be safely practiced in community based settings [76].
- A study evaluated changes in motor and emotional aspects in PD patients (n = 18), that participated in the Dance Therapy Program using Argentine Tango (2-hour per week for 16 weeks). Comparing results at baseline and at the end showed improvement in UPDRS, MOCA test, Gait and balance Scale, Six-Minute-Walk Test and PDQ-39. Patients enjoyed the program [61].
- The effect of community-based Argentine tango (1-hour twice weekly for 2 years) resulted in improvements in motor and nonmotor symptom severity, performance of daily living activities and balance (Movement Disorder Society-Unified Parkinson Disease Rating Scale (MDS-UPDRS) III, Mini-Balance Evaluation Systems Test (Mini-BESTest), gait velocity (forward and backward), Timed Up and Go and dual-task Timed Up and Go, Six-Minute Walk Test (6MWT), MDS-UPDRS II, MDS-UPDRS I, and Freezing of Gait Questionnaire) in a small group of PD patients (n=5), while the control group (n=5) declined on some outcome measures [77].
- The influence of different rhythms (Latin-American songs or metronome beats) was studied on gait in subjects with moderate to severe PD. Listening to music improved cadence and stride length, while normalizing the timing of lower limb muscle activation. Highest gain from auditory cue was gained in patients with most severe deficits. Tango rhythm was more effective than listening to metronome beats; however, the benefits waned immediately after the withdrawal of cues.
- The effectiveness of three rehabilitation therapies [1. dance with Latino and Tango music (1-hr, 3 days/week×4 weeks), 2. balance training on a balance platform (1/2 hour, 5 days/week×4 weeks), 3. treadmill training (1/2 hour 5 days/week×4 weeks)] was compared for gait and balance disorders in patients with advanced PD (n = 43). Balance (Berg Balance scale), gait and Timed Up and Go scores improved for all treatments [54].
- In 6 patients with mild to moderate PD, Argentine tango dance intervention (1-hr twice per week for 4 weeks) was shown to be enjoyable and safe, with no adverse events. Depression scores improved (p = 0.04) after intervention [64].
- In a meta-analysis of 13 studies (9 randomized-controlled trials and other studies), Argentine tango demonstrated improvement in Unified Parkinson's Rating Scale 3 [ES = -0.62; 95% CI (-1.04, -0.21)], balance as measured with the Mini-BESTest [ES = 0.96 [0.60-1.31] or Berg balance Scale (ES = 0.45 [0.01,0.90] and gait with the Timed Up and Go Test (ES = -0.46 (-0.72, -0.20). Tango had positive effect on fatigue, activity participation and PD-associated QOL [58].
- A comparison of tango dancing with Dance for PD (1-hr twice a week for 12 weeks) in 11 PD patients revealed that tango was superior in terms of improving balance, endurance and functional mobility.
- The effect of Argentine tango on motor and non-motor manifestations of PD was evaluated in 33 patients with idiopathic PD. Tango participants (n=18; 1-hr twice a week for 12 weeks) found the activity more enjoyable and more satisfying than those who performed self-directed exercise (n=15). Tango improved balance, functional mobility and cognition, and reduced fatigue [52].
- A study of a single Argentine tango intervention (90 minutes) in 34 PD patients

supported the feasibility of measuring health-related psychological changes, acceptance and appropriateness of the intervention; tango improved the well-being, body self-efficacy, and outcome expectancies, as well as aesthetic aspects (such as beauty of their movements) [65].

- A relatively short, high-volume Adaptive tango intervention (15x1.5 hour lessons over 3 weeks) in 20 community-dwelling individuals with mild to moderate PD had a positive effect on electromyographic activity and center of body mass displacement during automatic postural responses to support surface perturbations [75] the study showed that a short high volume adaptive tango is a viable alternative to longer duration tango.
- In 26 patients with mild to moderate PD, on-site group tango was compared with telehealth approach (remote classes using virtual meeting software) for 2 times per week for 12 weeks. There was no difference in the two groups in participant retention and improvement in balance (BES Test) [78], suggesting the feasibility of using the telehealth approach in patients with PD and other disabilities.
- The effect of intensive short term tango dance (10 ninety-min dance classes within 2 weeks) was studied in 8 people with mild to moderate PD. There was significant improvement ($p < 0.05$) in motor behavior (measured by MDS-UPDRS part III) and positive outcome in terms of QOL (based upon 12-question Likert scale) [79].

Stress Reduction

In a randomized controlled trial in 162 individuals suffering from stress, the effect of dance movement therapy (such as tango, 10 group therapy sessions) was compared with a wait-listed control group in terms of stress management [Stress verarbeitungsfragebogen/ SVF120], psychopathology and overall distress [Brief Symptom Inventory (BSI)]. Negative stress management strategies decreased significantly immediately after the intervention ($p < 0.005$) and after 6 months ($p < 0.05$). Significant short-term improvements were observed in the Positive Strategy Distraction ($p < 0.10$), BSI psychological distress scales, Obsessive-Compulsive ($p < 0.05$), Interpersonal Sensitivity ($p < 0.10$), Depression ($p < 0.05$),

Anxiety ($p < 0.005$), Phobic Anxiety ($p < 0.01$), Psychoticism ($p < 0.05$), and in Positive Symptom Distress ($p < 0.02$). At 6 months, there was significant improvement in psychological distress by dance music therapy [Interpersonal Sensitivity ($p < 0.05$), Depression ($p < .000$), Phobic Anxiety ($p < 0.05$), Paranoid Thinking ($p < 0.005$), Psychoticism ($p < 0.05$), and Global Severity Index ($p < 0.01$)]. In conclusion, dance music therapy was more effective in improving stress management and reducing psychological distress than non-treatment, and the effect lasted over time [6-7].

Intimate Relationship and Erotic Implications

Argentine Tango is an improvisational social dance, which brings two people (possibly strangers or acquaintances) closer, through gentle contact between men and women -- joining in an embrace, and engaging in an intimate, nonverbal conversation, requiring keen attention to the partner's subtle shifts in movement. Since tango is highly interdependent, the dancers must have clear communication, sensitivity, trust, and balance—all of which are also the foundations of intimate relationships. The emphasis is not the technique or mastering steps necessary for dance, but a learning tool for people to understand how they relate to others and a connection between the partners and vital expression of emotion. Tango dancing leads to sexual fantasies and interactions [80]. The requirement of tango of grasping all at once, the intention and the gesture (motor registry), the vision, the hearing and the proprioception (sensory register), as well as acknowledgement provides an ideal therapeutic setting to work interpersonal, communicative and erotic skill [81].

Adverse Effects of Tango Dancing

There are no known adverse effects of tango dancing, except the risk of falling, which can be prevented by a strong partner, and the possibility of getting addicted (dependence) to the dance [80-82], as is known for other types of physical activities (exercise, jogging, swimming, etc.) [83-84-85], in which brain peptides, such as brain derived neurotrophic factor [86], may be involved.

Limitations of Tango Dancing

Since tango is a partner dance, tango dance requires a committed partner (as in the

phrase, ‘takes two to tango’), who is strong enough to provide physical support when necessary and can devote time and energy to help an individual, possibly for a long period of time. In some places, volunteer Tangueros (male and female) are available as partners; there is much more enjoyment and sense of accomplishment when dancing with skilled partners.

For the uninitiated, a trained tango instructor will be needed initially to teach tango. Tango dance requires space (such as a dance hall) and accompanying music, which could be a recorded one.

The individual participant should be motivated and persistent to achieve desirable goals. Since, there is no individualized ‘dose’ in terms of duration and intensity to achieve long-term

therapeutic benefits, the participant may have to continue tango dance (for example, once a week) for a long duration. Physical limitations, such as arthritis, gout, sciatica, back pain, etc., may also interfere in performing the dance.

Conclusions

Argentinean tango is a popular dance practiced and enjoyed by a large number of people worldwide. Numerous studies show that tango dance improves QOL, cognition, endurance, balance, social satisfaction, and emotional health of individuals with anxiety, depression, neuropathy, Parkinson’s disease, etc. Limitations in the therapeutic application of tango dance include need for a committed dance partner, a trained tango dance instructor and adequate space. [87-93]

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