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Effect of Indian folk-dance therapy on physical performances and quality of life in elderly

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Abstract

Study aim: To study the effect of Indian folk-dance therapy on physical performances and quality of life in elderly.
Material and methods: Forty healthy seniors with age between 60–70 years were randomly allocated into two group; Group A: Indian folk-dance therapy and Group B: Conventional therapy. Both the groups received 60 minutes session, five sessions a week for six weeks.
Results: Inter-group analysis showed significant improvements in Group A in Fullerton advanced balance scale ($Z = –2.91$, $p < 0.01$; Montreal cognitive assessment scale ($T = 4.77$, $p < 0.01$); single leg stance with eyes open ($Z = –2.07$, $p = 0.03$); eyes closed $Z = –2.12$, $p = 0.03$), 6 min walk distance ($Z = –3.03$, $p < 0.01$) and SF 36 (physical component) ($T = 2.38$, $p = 0.02$) and SF 36 (mental component) ($T = 2.42$, $p = 0.02$).
Conclusion: Indian folk-dance therapy showed significant improvements in static and dynamic balance, reduced risk of fall, improved cognitive function, improved physical functioning and quality of life than conventional therapy among elderly individuals.

Key words: Geriatrics – Dance therapy – Postural balance – Cognition – Quality of life

Introduction

Dance is performing art form consisting of purposefully selected sequences of human movement which is usually done in time to music [2]. These movements have aesthetic and symbolic value. Studies suggest that dance is effective for increasing quality of life and decreasing the clinical symptoms such as depression and anxiety. Aging is natural process, in India, population aged 60 years and above was 138 million (67 males and 71 females) in 2021, it is expected to reach 56 million by in 2031. Aging causes progressive decline in biological and functional abilities results due to changes at structural and functional components of organs in a natural way. These decline in function results in various impairments and other factors that attributes to physical frailty in older adults such as decreased strength, range of motion, slowness and paucity of movement, poor balance, cognitive changes and decrease in muscular and cardio vascular endurance [27]. Physical inactivity is commonly observed among individuals aged 60 years and above [14]. Moreover, older people's participation and adherence to exercise programs is suboptimal. Therefore, creative appealing and effective methods of physical activity need to be investigated to manage this growing population.

Successful aging is defined as the ability to maintain vital factors like low risk of diseases and disease related, high mental and physical function and active engagement with life. Dance Therapy in other words Dance based exercise approach has a potential to be a versatile activity that can be adjusted to fit a target populations age, physical limitations and make exercise more interesting. According to American dance therapy association, Dance Therapy is psychotherapeutic use of movement that promotes emotional, cognitive, physical, and social integration of the individual in a creative form. One of the Indian traditional dance named 'Garba' which is a classical Gujarati folk dance consisting of different choreographies that include rhythmic and low to moderate level movements that is performed in small group. Garba dance is a celebration of womanhood; fertility and respect to mother goddess. Celebration is during Navratri festival, where men also participate but women are the true performers. Garba folk dance

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had attained its practice and popularity not only within large diversified country India but also in various Indian communities across the world.

Studies have shown effectiveness of various western dance forms as part of therapy on physical performance and other aspects of functional fitness in elderly [4, 7, 8, 11, 12, 24]. Studies have shown that exercise in the form of dance can significantly improves physical fitness in older adults [6]. There is scarcity in literature on efficacy of social group dance exercise programs and its effectiveness among elderly people. Hence the need is to explore the effects of Indian folk-dance therapy on physical functions and quality of life among elderly. There is limited literature available on Indian traditional dance form and its therapeutic effects. Hence presents aims to explore the effect of Indian folk-dance therapy on physical performances and quality of life in elderly.

Material and methods

Permission from Institutional Ethical committee (*N-EC/2019/SC/04/70)* was taken. Preliminary screening was done. Forty community dwelling healthy elderly participants from geriatric clinic and geriatric club in and around Mumbai Thane and Navi Mumbai district India fitted the study criteria and written informed consent was obtained after explained study procedures. They were randomly allocated into two groups (n = 20 each), Group A received Indian Folk dance *(Garba)* therapy (IFDT) and Group B received conventional therapy using lottery method.

All included participants were between 60 to 70 years of age, had history of any dance form practice in initial stage of life but not in current practice since at least 20 years and independently performing all the activities of daily living. Exclusion criteria were any history of neurological impairment, severe cardiovascular disease; unstable chronic or terminal illness, severe cognitive impairment and severe musculoskeletal impairment which might affect their ability to participate in the research program and performing balance tests and not willing to participant. In the study 11 participants were excluded: 7 had history of cardiovascular disease; 2 with recent lower limb injury and 1 not willing to participant.

All the participants were assessed on day 1 and were re-assessed on last day of six-week protocol. Both groups received 60 minute session, five times a week for six weeks.

Group A received IFDT. Participants were divided into four cluster groups with 5 participants in each group in order to deliver individual attention and set proper coordination of movements as per music beats.

The therapy was divided into three sections: a warm up period, IFDT and cool down period. Warm up period included free mobility exercises which includes ROM exercise of all joints, 1 set of five repetitions each for 10 minutes followed by 45 minutes of IFDT that is low to moderate level of intensity and consisted of programmed choreography like ‘aathama’ (circle/spin of 8), ‘chattama’ (circle/spin of 6) and many more such movements that purely depends on rhythm and beats. Movements were designed and administered in the presence of subject. Following movements were majorly involved while performing the therapy were: Upper limb – trunk movement: Moving and swinging their arms sideways along with shoulder and elbow flexion movement, shoulder elevation, circular movements of wrist, rhythmic clapping movements, various hand gestures (opening and closing of fingers) and Lower limb – trunk movement involved Semi flexion of both knees, alternate movements of the right/left foot sideways, moving the feet forward and backward rhythmically, alternate kicking sideways, tapping the floor lightly rhythmically, heel raises, moving in circular manner. Trunk: forward, backward and lateral movement along with rhythmic leg movements. Session ended with cool down breathing and savasana exercise for 5 minutes.

Figure 1. IFDT Alternate movement of feet and hand sideways

Figure 2. IFDT Up and down movement of hand and leg with trunk movements

Group B received conventional therapy exercise program according to the American College of Sports Medicine (ACSM) guidelines that included general joint mobility and range of motion exercises for all joints 2 sets of 10 repetitions for 10 minutes followed by 30 minutes of brisk walking along with conventional balance training like weight shifts, one leg stance and tandem stance and 10 minutes of breathing and relaxation exercise as part of cool down session.

Outcome measures

1) To assess Cognitive domain: Montreal Cognitive Assessment Scale was used [28]. The Montreal Cognitive Assessment (MoCA) is a widely used screening assessment for detecting cognitive impairment. The MoCA test is a 30-point test. The MoCA assesses several cognitive domains: The short-term memory recall ask (5 points) involves two learning trials of five nouns and delayed recall after approximately five minutes. Visuo-spatial abilities are assessed using a clock-drawing task (3 points) and a three-dimensional cube copy (1 point). Multiple aspects of executive functions are assessed using an alternation task adapted from the trail-making B task (1 point), a phonemic fluency task (1 point), and a two-item verbal abstraction task (2 points). Attention, concentration, and working memory are evaluated using a sustained attention task (target detection using tapping; 1 point), a serial subtraction task (3 points), and digits forward and backward (1 point each). Language is assessed using a three-item confrontation naming task with low-familiarity animals (lion, camel, rhinoceros; 3 points), repetition of two syntactically complex sentences (2 points), and the aforementioned fluency task. Finally, orientation to time and place is evaluated by asking the subject for the date and the city in which the test is occurring (6points).

2) To assess balance domain, Fullerton Advanced Balance Scale [15] was used. The Fullerton advanced balance test (FAB) is mainly intended to identify highly-active older adults who are at an increased risk to experience fall-related injuries due to sensory impairments. The test uses both dynamic and static balance under different situations to identify balance deficits in older adults. The test includes the following: 10 performance-based activities in both static and dynamic phases Score of 0-40/40 points possible (higher scores are better)Items scored on a 5-point ordinal scale (0-4).

3) To assess risk of fall: Single leg stance test was used [6, 19], single leg stance with eyes closed without the use of walking aid for up to 60 seconds is performed. To perform the test, the participant is instructed to stand on one leg without the support of other extremities or bracing of the non-weight bearing leg against the weight bearing leg. The participant is then instructed to close his eyes and maintain balance for up to 30 seconds. The number of seconds that the participant is able to maintain his position is recorded. Termination or a failure test is recorded if 1) the foot touches the supported leg 2) hopping occurs 3) foot touches the floor 4) arms touch something for support. The participants are asked to choose what leg they would like to stand as you want record their best performance. It is a highly functional test, since transient balance on a single limb is needed for a number of activities such as normal gait, stair climbing and dressing. Single leg stance with eyes closed is a challenging and a reliable test that has been previously used in studies investigating dance among older population.

4) to assess cardiovascular endurance: 6 Minute Walk Test was used [11] The 6 Minute Walk Test is a sub-maximal exercise test used to assess aerobic capacity and endurance. The distance covered over a time of 6 minutes is used as the outcome by which to compare changes in performance capacity. An increase in the distance walked indicates improvement in basic mobility.

5) to assess Quality of life: SF 36Questionnaire was used [4]. It is a multi-dimensional generic health related

quality of life measure. On this widely used index, there are 36 questions for evaluating the quality of life. It is essential that a score be obtained for the designated life areas, such as physical functioning, physical role, pain, general health, vitality, social functioning, emotional role, and mental health. Each of these scales are directly transformed into a 0-100 scale, higher scores being better.

Statistical analysis

The results of the study were analyzed using the Statistical Package for Social Sciences (SPSS) version 16. Normality of the data was found by Shapiro Wilk test. For intra group comparison and inter group comparison of Fullerton advanced balance scale, Single leg stance eyes open and eyes closed,6-minute walk test distance and resting heart rate, Wilcoxon test and Mann Whitney U test were done respectively as the data was found to be freely distributed. For intra group comparison and inter group comparison of Montreal cognitive assessment scale, SF 36 physical component score and SF 36 mental component score, paired t test and independent t test were used as the data was found to be normally distributed.

Results

Table 1 shows demographic information of the participants. The mean age of group 1 and 2 were 64.9 ± 5.27 years and 66.4 ± 5.37 years respectively with p = 1.82 suggesting participants were uniformly distributed in both the groups. There was 80% of female population and 20% of male population in both the groups combined.

Table 2 shows pre and post analysis of IFDT group A there was statistically significant improvement in Fullerton advanced balance scale (p = 0.001), Montreal cognitive assessment scale (p = 0.002), 6 min walk distance (p = 0.003), resting heart rate (p = 0.005) and SF 36 physical component score (p < 0.001) and SF 36 mental component score (p = 0.001).

Table 3 shows pre and post analysis of Conventional therapy group B there was statistically significant improvement in Fullerton advanced balance scale (p = 0.021), 6 min walk distance (p = 0.002), resting heart rate (p = 0.001) and SF 36 physical component score (p = 0.002) and SF 36 mental component score (p = 0.003).

Table1. Demographic data of the participants

Variables	Group A (n = 20)	Group B (n = 20)	T value	p value
Age in years (Mean±SD)	64.9 ± 5.27	66.4 ± 5.37	0.869	0.390
Gender (n)	20	20		
Male	0	8		
Female	20	12		

Table 2. Intra group comparison of Fullerton advanced balance SCALE, Montreal cognitive assessment scale, single leg stance eyes open and closed, 6 min walk distance, resting heart rate and SF 36 physical and mental component score of IFDT (Group A)

Components	Group A			
	Pre-test	Post-test	Z value	p value
FAB	30 ± 4.47	30.8 ± 4.43*	–3.56	<0.01
MoCA	26.65 ± 1.39	27.95 ± 1.39*	–6.29	<0.01
Single Leg Stance (eyes open)	13.79 ± 6.28	13.86 ± 6.15	–1.38	0.17
Single Leg Stance (eyes close)	5.62 ± 3.53	5.73 ± 3.54	–1.85	0.06
6 Min walk distance	334.76 ±5 7.8	337.79 ± 81.3*	–3.18	<0.01
Resting heart rate	84.88 ± 9.34	82.66 ± 7.64*	–3.64	<0.01
SF 36 physical component score	70.74 ± 13.13	80.07 ± 11.62*	–5.38	<0.01
SF 36 mental component score	78.20 ± 9.98	84.30 ± 9.42*	–4.92	<0.01

* Different from pre-test, p < 0.05.

Table 3. Intra group comparison of Fullerton advanced balance SCALE, Montreal cognitive assessment scale, single leg stance eyes open and closed, 6 min walk distance, resting heart rate and SF 36 physical and mental component score of conventional therapy (Group B)

Components	Group B			
	Pre-test	Post-test	Z value	p value
FAB	31.4 ± 3.55	31.65 ± 3.48*	–2.24	0.02
MoCA	27.05 ± 2.11	27.15 ± 1.98	–0.69	0.49
Single leg stance (eyes open)	14.23 ± 5.84	13.96 ± 6	–1.19	0.23
Single leg stance (eyes close)	5.17 ± 3.27	4.91 ± 2.94	–1.27	0.20
6 Min walk distance	397.55 ± 16.81	409.2 ± 17.31*	–3.85	<0.01
Resting heart rate	78.73 ± 6.47	76.78 ± 6.79*	–3.17	<0.01
SF 36 physical component score	73.47 ± 10.12	78.34 ± 9.17*	–4.38	<0.01
SF 36 mental component score	82.12 ± 6.32	84.69 ± 6.42*	–3.27	<0.01

* Different from pre-test, $p < 0.05$.

Table 4. Inter Group comparison of Fullerton advanced balance SCALE, Montreal cognitive assessment scale, single leg stance eyes open and closed, 6 min walk distance, resting heart rate and SF 36 physical and mental component score among the Mean Difference of Group A and Group B

Scales	Group A Mean Diff	Group B Mean Diff	Z value / T value	p value
FAB	0.8 ± 0.62	0.25 ± 0.44*	–2.91[&]	<0.01
Single leg stance (eyes open)	0.22 ± 0.58	0.10 ± 0.42*	–2.07[&]	0.03
Single leg stance (eyes closed)	0.24 ± 0.75	0.31 ± 0.33*	–2.12[&]	0.03
6 Min walk distance	20.21 ± 8.84	11.74 ± 7.68*	–3.03[&]	<0.01
Resting heart rate	4.22 ± 1.76	4.08 ± 1.86	–1.68[&]	0.06
MoCA	1.3 ± 0.92	0.1 ± 0.64*	4.77[#]	<0.01
SF36 Physical component score	9.62 ± 7.97	4.24 ± 6.21*	2.38[#]	0.02
SF36 Mental component score	6.13 ± 5.53	2.60 ± 3.48*	2.42[#]	0.02

[&]Z value as per Mann Whitney U Test; [#]T value as per Independent T Test; * Different from group A, $p < 0.05$.

Table 4 shows on inter group comparison there is significant improvement in Fullerton advanced balance scale ($p = 0.004$), Montreal cognitive assessment scale ($p < 0.001$), single leg stance eyes open ($p = 0.038$) and single leg stance eyes closed ($p = 0.035$), 6 min walk distance ($p = 0.002$) and SF 36 physical component score ($p = 0.021$) and SF 36 mental component score ($p = 0.022$). On inter group analysis of resting heart rate there was no significant difference ($p = 0.065$) between the two therapies.

Discussion

The purpose of this study was to find out the effects of IFDT on balance, cognition, risk of fall and quality of life in elderly population. Our study showed that there is significant improvement in balance, functional capacity and quality of life in the elderly population in both IFDT and conventional therapy. On inter group comparison there is significant improvement in balance, cognition, risk of fall,

functional capacity and quality of life of elderly in IFDT than in conventional therapy.

Our study showed significant improvement in balance in IFDT as compared to conventional therapy group. The improvement in balance is credible as dance steps involved repetitive torso rotations, 360 degree turns, truncal movements and rotations which constantly activates and challenges vestibular system. Also, protocol consisted of stepping in multi – directions, weight shifts and transfer and sequential coordinated movements of limbs in the form of claps and stepping on rhythmic beats, which repetitively stimulates somatosensory system that improved joint position sense and movement sense with visual performance feedback of their dance steps. Indian dance therapy entails all three visual, somatosensory and vestibular components of balance and also integrates various stretching poses, coordinated movements and variation in base of support steps which explains the improvement in balance. Studies shows similar results with 12 weeks of aerobic dance routine and dance-based exercise therapy improved balance and agility in elderly participants [5, 25].Our study also revealed prolonged one leg stance suggesting decrease in risk of fall in dance therapy group participants. The predominant factor of IFDT is time based, beat dependent coordinated steps and movements which require frequent transitioning between positions that must have improved postural reaction time in order to justify movement steps on beats. Along with quicker response, there was faster activation of muscle response to stimuli, balancing strategies and improved muscle strength of lower limb. Reduction in anxiety and improved confidence to stand on one leg as modified form of one leg stance was a part of therapy could have resulted in lowering the risk of fall in dance therapy participants. Similar result was obtained by Cao et al. on dance-based exercise program emphasizing on balance training and strength training in elderly participants who found quicker body reaction time, and decreased risk of fall in elderly [26].

There is significant improvement in cognition in IFDT than conventional therapy. IFDT involves not only physical but intense cognitive demand, such as memorizing steps, sequences of movement, various patterns and constant sustained attention to unintended changes in movements that involves increase level of higher cognitive function which in turn improves the cognitive function [9]. The dance technique used in our protocol develops focus and attention to task while a participant executes the movements, be it turning, stepping, balancing, or a combination of all three. Numerous studies have shown, positive impact that dance can have on cognitive demand in elderly which showed significant cognitive improvements in attention, concentration and intelligence after 3 months of dance therapy sessions than conventional therapy [1, 16, 28].

There is no significant improvement in cardio vascular endurance in IFDT therapy and conventional therapy group participants; however, there was a significant decrease in resting heart rate in both the groups individually suggesting, both the therapies are equally efficient in improving cardiovascular endurance among participants as dance and brisk walking both are aerobic in nature which was an important part of the therapy protocol. There was a significant improvement in physical functioning in IFDT as compared to conventional therapy group in terms of increase in six-minute walk distance covered. This can be attributed to the progressive nature of dance therapy protocol from low to moderate intensity along with coordinated steps tasked with time based rhythmic beats which also improved their psychological approach i.e their attentiveness, vigilance and quicker reaction time towards the activity making it more efficient. Whereas in conventional therapy 30 minutes brisk walking was given but its speed sustainability throughout the walk was not uniform which could be reason for less distance covered among conventional participants. Supporting these numerous studies have found that exercise, be it resistance training [13, 18, 23] or aerobic exercise might offer many significant physical benefits for older adults including, muscle strength, endurance and aerobic power [10].

There was a significant improvement in quality of life among IFDT than conventional therapy participants. The quality of life is a multidimensional concept, categorized in two major components i.e. physical and mental component. An increase in physical activity level of an individual increases their sense of well-being. The improved levels of physical activity like number of steps covered during stair climbing, walking and prolonged fatigue level in IFDT participants can be due to progressive protocol and beats-based intensity of dance therapy which improved overall strength of major muscles, endurance and general task oriented physical performance of participants.

Cognitive function is one of the important factors of mental component that determines quality of life of an individual. Studies have shown age-related decline in cognitive performance in elderly is a major factor negatively affecting quality of life [3, 16, 22]. Dance incorporates not only physical but high-level mental functioning that involves pre planning for steps at the time of performance, memorizing various components of steps and synchronizing it with songs and beats. Over all improved executive function helped them to socialize, promote emotional well-being and also psychological benefit of intense exercise like dance may have attributed to enhanced mental component of quality of life.

On comparison with conventional therapy, IFDT participants showed increased quality of life level due to immersive learning nature of therapy, constant self-correcting and therapist guided motor movements with multiple

repetitions which made therapy more novel and enjoyable whereas conventional therapy was non progressive monotonous in nature showed less improvement in Quality of life. Numerous studies on waltz dance, Turkish folkloric dance, modified jazz dance, tango and ballet dance therapy, was effective to increase quality of life among elderly heart risk patients, Parkinson's disease patients and stroke patients [1, 20, 21, 24] suggesting dance-based therapy is potential enough to improve quality of life in elderly and condition-based population.

Conclusion

The conclusion of our study showed significant improvements in static and dynamic balance, reduced risk of fall, cognitive function, physical functioning and quality of life in elderly population in IFDT when compared to conventional therapy.

There was no significant improvement in cardiovascular endurance between both the groups but reduced resting heart of participants suggested that both the therapies are equally effective in producing cardiovascular endurance changes.

Adaption of IFDT as an alternative to exercise programs for elderly can be enjoyable and effective in achieving physical and functional capacity, thereby improving overall fitness and quality of life in elderly.

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