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Effect of yoga vs yang tai-chi on balance and quality of life in healthy elderly: a comparison

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ABSTRACT

Objective

To determine if Yoga intervention and tai chi intervention could improve balance and QOL in healthy elderly. To identify the most efficient balance training intervention amongst the two.

Design

Pre-post design

Setting

Parks, Community centers

Participants

Total 83 healthy elderly (age range-65 yrs to 74 yrs) were recruited by chit method to either Yoga or Yang Tai-chi intervention group. 30 participants in each group completed the intervention program.

Intervention

A 6-week Yoga or Yang Tai Chi intervention specifically tailored to elderly and designed to improve strength, flexibility and proprioception was performed by healthy elderly. Participants attended five 40-minute exercise classes per week.

Main Outcome Measures

Forward reach test (FRT), Timed Up and Go test (TUG), Berg Balance Scale (BBS), Quality of life Questionnaire (SF-36)

Results

There was a significant difference in scores before and after 6 weeks of intervention (P<0.0001).Yang Tai chi exercise intervention showed a more significant difference in all outcome measures before and at end of intervention program as compared to Yoga intervention(P=0.049,0.0002,0.0004,<0.0001 for FRT,TUG,BBS,SF-36 respectively).

Conclusion

Both exercise interventions improve balance and QOL in healthy elderly. Yang Tai Chi intervention was more effective to improve balance and QOL as compared to Yoga intervention.

Keywords: *Yoga, Tai Chi, Balance, Elderly*

INTRODUCTION

India has acquired the title of 'an aging nation' with 7.7% of its population being more than 60 yrs of age. Number of elderly in India by 2050 is projected to be 324 million [1]. Falls, also labeled as 'Geriatric Giant', is the area of major concern currently. Precarious balance is one of the leading causes of falls in elderly. [2, 3] Role of regular exercise to improve proprioception, strength, flexibility ,reaction time and stamina thus impacting falls, improving quality of life in elderly is unchallengeable [4, 5, 6]. Varied literature is available on structured exercise programs, Aquatics, Aerobics, Zumba, Stability trainer exercises, Strengthening/flexibility protocols, Yoga, Tai-Chi etc for elderly [7, 8].

Yoga, an ancient form of exercise, is being practiced in India for centuries. It has proved its efficacy to enhance all aspects related to balance and thus to reduce fear of falls, stress and enhance Quality of life in healthy elderly as well as elderly with stroke, osteo arthritis, Low back pain and post menopausal females [9-16]. Another form of exercise with similar benefits is Yang Tai Chi. This traditional Chinese form of exercise has been practiced as an effective intervention to enhance physical and mental status in elderly and other pathological conditions [17-23]. Both these forms are designed to produce a balance between soul and body in a slow, meditative, relaxed manner with sequential graceful movements and gradual reduction in base of support. They are easy to be learned and can be practiced at home without any need for special equipment's by very elderly, ill or disabled too. Being based on a holistic approach they are gaining a rapid popularity. Elderly are getting aware of positive effects of such traditional exercises and are keen to choose the most beneficial form. They often seek guidance to decide whether to learn Yoga or Yang Tai Chi in order to gain highest benefits on balance and Quality of life .We could not come across any literature that can guide on such an issue. Hence, this study was designed to find the effect of Yoga Vs Yang Tai-Chi on balance in healthy elderly.

MATERIALS AND METHODS

This was a Longitudinal, experimental type of study with 30 participants included in each group who exercised on special tailor made protocols of Yoga and Yang Tai chi interventions(made in consultation with experts teaching Tai-Chi and Yoga + considering previous references and interventions) [9-25] (explained in Appendix I , II)

They exercised 5 times week for 6 weeks in parks and community centers. The intervention groups were chosen by participants using chit method. Participant selection criteria was as follows: (flow chart explained in table 1)

Inclusion criteria

Adult above 65 years of age, ambulating without assistive device, both genders, willingness and ability to come for regular exercise sessions and follow up for 6 weeks

Exclusion criteria

Any known neurological problems(stroke, parkinsonism, motor neuron disease, paraplegia) sensory loss, known orthopedic problems (amputation, symptomatic lower limb arthritis, lower limb deformities, total hip and knee replacement), symptomatic coronary artery diseases ,inability to follow commands, regular exercises for more than 2hrs/ week.

The participants were assessed on**,** Forward Reach Test (FRT), Timed Up and Go Test (TUG), Berg Balance Score (BBS), SF-36 health related Quality of life questionnaire before and after completion of exercise protocols.

Yoga intervention Program

- Pranayama (breathing exercises) and body awareness (10 minutes)
- Warm-up activities (10 minutes)-- II warm-up activities--(10 minutes)-- seated shoulder circles, wrist rolls, standing heel and toe raises, standing hip abduction, hip and knee flexion
- Asana (physical poses) in the supine, seated, and standing positions (30 minutes)-- tadasana (mountain pose), virabhadrasana, trikonoasana (triangle pose), vrikshasana, ardha kati chakrasana, trikonasana, salabasana, sasankasana, and surya namaskar (modified sun salutations)
- Relaxation; and shavasana (corpse pose) (10 minutes).

Yang Tai-Chi intervention Program

- Breathing exercises-- (10 minutes)
- Warm-up activities (10 minutes)-- seated shoulder circles, wrist rolls, standing heel and

toe raises, standing hip abduction, hip and knee flexion

- Tai –Chi(30 minutes)-- physical poses of Yang Tai–Chi: Commencing form, Repulse monkey, Grasp Peacock's Tail(ward off, roll back, press, push),Wave hands like cloud, Fair lady works shuttles, Golden Cock stands on one leg, Brush Knees and Twist steps, Closing form
- Relaxation-- (10 minutes) –supine lying and deep breathing
- To reduce the risk of injury, avoid discomfort and minimize risk of overstretching, blankets, chairs, blocks were used (as per requirement of participants).
- Both groups were matched on their baseline characteristics before starting the intervention program. (As shown in table 2).
- Data was analyzed using SPSS 16.0.It was presented as mean ± standard deviation X ± SD (any p value equals to 0.05 was accepted as statistically significant unless otherwise noted).

Table-1: Participant selection and analysis flow chart:

Assessed for eligibility n=(115)		
Excluded (n=32) not meeting the criteria (n=14) Declined to participate (n=10) Not fitting in baseline characteristics (n=8)		
PARTICIPANTS TO BE RANDOMISED BY CHIT METHOD (n=83)		
EXERCISE GROUPS	YOGA n=42	YANG TAICHI n=41
Could not receive intervention due to inability to come for exercises on given schedule	n=5	n=3
Received exs intervention	n=37	n=38
Drop outs during intervention period	Moved out of city n=1 Meet with accident n=1 Family emergency n=1 Personal reasons n=2	Getting tired while travelling n=1 Loss of interest n=1 Minor health ailments (fever,stomach upset) n=3
Excluded from analysis due to missing data	n=2	n=0
PARTICIPANTS DATA USED FOR FINAL ANALYSIS	n=30	n=30

Table-2: Base line characteristics comparison (Yoga Vs Yang Tai Chi) for scores before starting exercise intervention

	Yoga		**Yang Tai-chi**		**test**	**P value**	**inference**
	mean	**SD**	**mean**	**SD**			
Age	69.93	4.94	70.10	3.73	Unpaired t test	0.6624	Not Sig
No. of Falls	0.56	0.72	0.33	0.75	Mann Whitney-U	0.1497	Not Sig
FRT	11.3	1.57	10.46	1.86	Unpaired t test	0.5370	Not Sig
TUG	10.43	1.65	11.60	2.36	Unpaired t test	0.6571	Not Sig
BBS	43.86	3.21	43.26	2.76	Unpaired t test	0.2139	Not Sig
SF36	59.36	4.74	60.73	6.59	Mann Whitney-U	0.2116	Not Sig

(SD-standard deviation, FRT-forward reach test, TUG-Timed up and go test, BBS-Berg balance scale, SF36-quatity of life questionnaire)

Table-3: Comparison of score before and after exercise intervention (Yoga and Taichi Groups)

YOGA							
	pre		**Post**		**test**	**P value**	**inference**
	mean	**SD**	**Mean**	**SD**			
FRT	11.33	1.57	12.66	1.33	Paired t test	<0.0001	Ext sig
TUG	10.43	1.65	9.33	1.24	Paired t test	<0.0001	Ext sig
BBS	43.86	3.21	47.59	3.21	Paired t test	<0.0001	Ext sig
SF36	59.06	4.74	64.39	3.61	Wilcoxon Test	<0.0001	Ext sig
YANG TAI-CHI							
	pre	**post**	**Test**	**P value**	**inference**		
	mean	SD	Mean	SD			
FRT	10.46	1.86	12.13	1.56	Paired t test	<0.0001	Ext sig
TUG	11.6	2.34	9.46	1.50	Paired t test	<0.0001	Ext sig
BBS	43.26	2.76	45.6	1.32	Paired t test	<0.0001	Ext sig
SF36	60.73	6.59	74.78	7.87	Wilcoxon Test	<0.0001	Ext sig

Table-4: Comparison of difference in scores before and after exercise intervention (Yoga and Taichi Groups)

	Yoga		**Yang Tai-chi**		**test**	**P value**	**inference**
	mean	**SD**	**Mean**	**SD**			
FRT	1.36	0.99	1.66	1.51	Unpaired t test	0.0491	Sig
TUG	11	0.88	2.31	1.13	Unpaired t test	0.0002	Ext sig
BBS	3.73	1.74	2.33	1.09	Unpaired t test	0.0004	Ext sig
SF36	5.32	3.09	14.03	5.87	Mann Whitney-U	<0.0001	Ext sig

RESULTS AND DISCUSSION

It was seen that, both interventions were effective to enhance balance and quality of life in healthy elderly with a significant improvement in FRT, TUG, BBS, SF-36 scores after completion of 6 weeks of intervention (P<0.0001) (as shown in table 3). Both the intervention are known for their positive effect on strength, proprioception and movement control which ultimately leads to enhanced balance control, thus reducing fear of fall and improving quality of life. Many of the previous researchers have found similar results of these programs individually [9-19].

Yoga and Tai-Chi have many similarities. Health and longevity are primary goals of both and many people cross-train in both disciplines. Both emphasize on stretching, breath work and inner energy called as “prana/chi”. They seek to integrate the body, energy, and mind. Their approaches to physicality are significantly more subtle than ordinary exercise methods and sports. Both help calm mind and deal with stress. There is a very subtle difference in type of muscle contractions required to maintain postures and range in which both forms are practiced. Yoga emphasises on maintaining particular posture in end range whereas Tai-Chi promotes a fluid like movement instead of a static posture. The practitioner stretches to relax in Yoga and relaxes to stretch in Tai chi. Yoga tends to use more extreme stretches and some postures lock the joints and arch the back and Tai-Chi emphasizes stretching through sophisticated dynamic fluid motions rather than by holding static postures. The Effect of these dissimilarities on their efficacy to improve balance remains unexplored. Need for comparing Yoga and Tai-Chi with other interventions has been expressed for a long time [21]. Hence, we planned this study to find the most effective exercise program among these two to enhance balance in healthy elderly. Yang Tai-Chi is the most basic type. It consist of eight forms, that are easy to learn and can be practiced independently. We choose Yang Tai Chi as our exercise intervention as most of the participants were beginners. The results revealed that, Yang Tai-Chi is more effective to augment balance and thus Quality of life in elderly (as shown in Table 4)

In this study, the chosen Tai-Chi forms were multi component, featuring constant swinging, shifting, and turning in all directions (left, right, forward, and backward). Such activities require a high degree of concentration and coordination between mind and different body parts. It stimulates Motor, nervous and the proprioceptive systems [22]. Chosen Yoga postures lacked this constant variability .Thus, rotational movements performed in a flow in a slow and controlled manner throughout a full range may be the main reason for efficacy of Yang Tai Chi.

Yoga emphasizes on posture maintenance whereas Yang Tai-Chi concentrates on slow, fluid movements throughout the range .It requires conscious awareness of body position and extremity movements, which may improve joint proprioception. Since all chosen forms required slow, fluid and coordinated motion of upper limb, lower limb and trunk, the effect might be more pronounced in Tai-Chi group than Yoga group. A previous study on elderly assessing effect of Tai-Chi on knee proprioception has found similar results [23].

Another reason can be stimulation of vestibular system by repeated slow head movement which helps to enhance the balance control. They were a key feature of Tai-Chi forms selected. This reasoning can be supported by a previous study where Tai-Chi has proved to be beneficial for vestibular system improvement [24]. This effect seems to be less in Yoga as no similar movements are associated in Yoga postures.

Inefficient quadriceps strength, low knee and ankle proprioception are found to be the main cause of balance affection in elderly. Most of the forms included in our Tai-Chi program composed of performing movements in a semi-squatting posture, which puts more stress on the knee joint and gives a great range of motion to control the height of centre of gravity during the smooth and slow movement [25]. Yoga program did not include such postures. Thus, the effect of quadriceps training and proprioception might be more in Tai-Chi group as compared to Yoga group .It might have lead to enhanced balance in Tai-Chi participants.

All the above mentioned factors might have given the additional benefit to the participants of Tai-Chi group over Yoga participants, leading to superior balance. This in turn, might have been the cause of reduced falls, augmented confidence while performing activities and hence greater Quality of life in Tai-Chi participants. Along with the strengths like carefully matched participants on the basis of age, number of falls and baseline scores before start of intervention in both groups ,the study also has some weaknesses. Our sample was small and consisted unequal number of male and female participants .Studies have shown that ,women have worse balance than men and their balance is less likely to improve with exercise interventions [26]. It remains to be seen whether gender bias within this age group would also show any changes in results. Secondly, the number of exercise sessions was only 30. Most of the studies have documented at least 40 sessions to show significant improvements in balance. Only one study showed a significant reduction in the risk of falls after 30 sessions. [27] So, we recommend long term effect of these interventions to be explored in future.

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