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An Evaluation of the Effectiveness of Yoga on Physical Fitness of Older Adults

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Abstract

This study aimed to evaluate the effectiveness of Yoga on physical fitness of older adults, and was carried out with controlled trial. Seventy participants were recruited at age 45 to 70 (56.75 ± 5.3). Subjects were divided into two groups, Yoga and Control. Participants in Yoga groups (aged 56.66±5.6) attended three sessions for practicing yoga (each session runs 60 minutes). Participants in Control group (aged 56.87±5.4) maintain daily activities. Senior Fitness Test is primary outcome measure. After 12 weeks of Yoga practicing, the participants in Yoga group showed significantly better performances in comparison with those of Control group in the subtests of Senior Fitness Test with p value from .05 to .001.

Keywords: Physical fitness, yoga, motor ability

Introduction

Physical activities and physiological functions have been related to aging (Brill, 2004). The older people are, the more difficulties they have in doing daily physical activities. It has been proven in a study of Yanowitz (Yanowitz & LaMonte, 2002) that decline in physical fitness of older people is strongly related to impairment of muscle strength, degeneration of joints, tendons and osteoporosis. According to statistics of World Health Organization, there is one of three people age over 65 fall at least one time a year (WHO, 2010). Furthermore, Fear of falling or falling in old population mainly caused by weakness of strength of lower extremities and balance ability.

Yoga is originated from India, which is beneficial for enhancing physical and mental health of people (Iyengar, 1976). According to the first comprehensive textual description of yoga, the yoga is cessation of thought waves in mind (Dass, 1981). Hatha yoga, one of the many forms of paths of yoga, focuses on overall fitness through pranayamas (breath-control exercise), asanas (postures), and chanda (meditation). As other form of yoga, hatha yoga is purported to quiet in mind and focus the concentration, however, of all the yoga traditions, the importance of physical fitness is emphasized most in hatha yoga (Worthington, 1981; Zorn, 1968). Previous studies proved that practicing yoga alleviated depression and anxiety in women (Javnbakht, Hejazi, & Ghasemi, 2009), enhance strength of upper extremities (Madanmohan, Thombre, & Balakumar, 1992), muscular endurance (C. T. Ray & Horvat, 2006), flexibility (Gharote & Ganguly, 1979) and maximal oxygen uptake (Balasubranmanian & Pansare, 1991).

To date, there have not been any studies that evaluate the effects of yoga on the combination of physical fitness such as lower-body strength, upper-body strength, aerobic endurance, lower and upper-body flexibility and agility/dynamic balance. In this study, we use the combination of test of Senior Fitness Test (SFT) (Rikli & Jones, 2001) for evaluating physical fitness of older adults with practicing yoga. SFT kit developed by Rikli and Jones, which has become a standard tool for assessing physical fitness of older adults. This test protocol was designed to evaluate aforementioned physiological abilities.

Materials and Method

Participants: Seventy participants were recruited at age 45 to 70 (56.75 ± 5.3). Inclusion criteria of both groups included the subjects being able to finish Mini Mental State Examination with a score greater than 25 and have no experiences in Yoga. Exclusion criteria included subjects with serious diseases such as symptomatic coronary insufficiency, orthostatic hypotension, and dementia.

Intervention: Subjects were divided into two groups – yoga and control. The subjects were expected to consent and volunteer. Participants in yoga group were assigned three month yoga practicing. Participants in control group were instructed to maintain their routine daily activities. Statistics analysis was based on previous finding (R. Sharma, Gupta, & Bijlani, 2008; Telles, Singh, Yadav, & Balkrishna, 2012), using standardized mean difference of the group means, alpha = 0.05, desired statistical power = 0.8, effect size is set at medium (0.5). Experienced yoga instructors were selected to teach a three month yoga course.

Senior Fitness Test: The SFT instrument includes seven items consisting of six domains of physical function: lower-upper body strength, aerobic endurance, lower-upper flexibility, agility and dynamic balance (as described by Rikli and Jones, 2001)

Instrumentation: The instrumentation for this study included: a folding chair; stopwatches with 1/10 second reading; hand-weights were dumbbells: 5Ibs (2.27kg) for women and 8 Ibs (3.63) for men (weight-changeable dumbbells); scale; masking tape, long tape measure, cones (or similar markers), pencils; and SFT score cards.

Statistical analysis: An independent simple t-test was performed to analyze the differences between groups. Analysis of variance (ANOVA) was used to analyze the differences in test phases. A $p < .05$ was considered to be statistical significant.

Findings

The descriptive characteristics of the research samples of the groups are indicated in table 1. The average age of both groups is equivalent. Mean and standard deviation of age, height, weight, BMI, WHR of both research groups are shown.

Table 1. Characteristics of the study samples

	Yoga group N = 35		Control group N = 35	
	Mean	SD	Mean	SD
Age	56.66	5.60	56.87	5.40
Height (m)	1.56	0.05	1.56	0.05
Weight (kg)	56.66	4.77	56.42	5.62
BMI (kg/m^2)	23.3	1.38	23.2	1.29
WHR (cm)	0.93	0.05	0.94	0.04

BMI = Body Mass Index; WHR = Waist Hip Ratio

Comparison of dependent variables between yoga and control group at pre-test. There were no significant differences in dependent variables between two research groups (table 2) with $p > .05$.

Table 2. Comparisons of variables between Yoga and Control groups at Pre-test

Dependent variables	Yoga (n=35)	Control (n=35)	Sig.*
	Mean ± SD	Mean ± SD	
Chair stand (stands)	16.34 ± 2.71	16.35 ± 2.53	.968
Arm curl (times)	16.83 ± 2.34	16.62 ± 2.19	.574
2 minute step(steps)	89.12 ± 8.63	87.75 ± 6.76	.148
Chair sit reach (cm)	-1.11 ± 5.78	-1.24 ± 5.734	.906
Back scratch (cm)	-2.33 ± 4.25	-2.39 ± 4.45	.544
8foot up and go (second)	6.77 ± .85	6.29 ± .67	.234

* *Determined by ANOVA.*

The results in table 3 showed the comparison of in dependent variables between yoga and control group at end-test. There were two participants dropped out due to travelling. There were significant differences between all dependent variables (items of SFT). This means that physical fitness of yoga group represented by chair stand (lower strength), arm curl (upper strength), 2 minute step (aerobic endurance), chair sit and reach (lower flexibility), back scratch (upper flexibility), and 8 foot up and go (dynamic balance/agility) are significantly improved in comparison with counterpart in control group with p value < .001

Table 3. Comparisons of variables between Yoga and Control groups at End-test

Dependent variables	Yoga (n=35)	Control (n=32)	Difference	Sig.
	Mean ± SD	Mean ± SD		
Chair stand (stands)	21.26 ± 2.40	17.10 ± 2.12	4.16	.000*
Arm curl (times)	20.59 ± 2.48	16.51 ± 2.17	4.08	.000*
2 minute step (steps)	93.64 ± 6.29	85.52 ± 5.68	8.12	.000*
Chair sit reach (cm)	3.87 ± 3.41	-0.68 ± 4.746	3.19	.000*
Back scratch (cm)	3.17 ± 2.78	-1.76 ± 3.50	1.41	.000*
8foot up and go (second)	6.19 ± .71	7.52 ± .62	-0.33	.000*

* *Student t test.*

The results in table 4 indicated the comparison of dependent variables in between-subjects. This comparison was to find out how long the effectiveness of yoga could remain after stopping practicing yoga. There were no significant differences in between-subjects. It means that after two months since the intervention has stopped, participants in yoga groups can maintain their physical fitness with p > .05.

Table 4. Comparisons of variables between End- test and Follow - up of Yoga group

Dependent variables	End-test (n=35)	Follow-up (n=32)	Difference	R[a]	Sig.
	Mean (SD)	Mean (SD)			
Chair stand (stands)	21.26 (2.40)	21.13 (2.24)	0.13	.89	3.40
Arm curl (times)	20.59 (2.48)	20.09 (1.96)	0.50	.88	1.38
2 minute step (steps)	93.64 (6.29)	92.13 (7.22)	1.51	.96	2.41
Chair sit reach (cm)	3.87 (3.41)	3.07 (3.95)	-0.80	.08	.60
Back scratch (cm)	3.17 (2.78)	3.07 (3.00)	-0.10	.05	.13
8foot up and go (s)	6.19 (.71)	6.15 (.64)	0.4	.89	3.46

[a]. *Determined by Pearson regression*

Discussion and Conclusion

In this study, the effect of yoga practicing on physical fitness was assessed. After 3 months of yoga practicing, physical fitness of older adults was significantly improved. Previous findings supported yoga as a measure to improving cognitive functions (Chattha, Nagarathna, Padmalatha, & R, 2009), subjective well-being (K. Sharma, 2008), different aspects of mental health (Gururaja, Harano, Toyotake, & Kobayashi, 2011; Telles, et al., 2012), cardiovascular system (Bharshankar, Bharshankar, Deshpande, Kaore, & Gosavi, 2003), physical and mental health (Buessing, Michalsen, Khalsa, Telles, & Sherman, 2012). Researchers also revealed that yoga has benefits for aging population. During the later years of life, it often becomes increasingly difficult to obtain a full, restful night's sleep. A recent study compared the impact of yoga, including physical postures, relaxation techniques, and voluntary regulated breathing on sleep in the geriatric population, the study's conclusion was that yoga practice improved quantity and quality of sleep among aging population (Manjunath & Telles, 2005). In another study was conducted for measuring improvement in hand grip in rheumatoid arthritis patients versus non-arthritis volunteer following yoga training. The results have shown that hand grip strength improved in yoga group (Dash & Telles, 2001). Yoga is also proven to be beneficial for treatment of diabetes (Jain, Uppal, Bhatnagar, & Talukdar, 1993), good impact for both fear of falling and balance.

A regular practice of yoga has been shown to improve flexibility and muscle force in adults without known pathology (Tran, Holly, Lashbrook, & Amsterdam, 2001), vital capacity (Birkel & Edgen, 2000), aerobic capacity (U. S. Ray, Sinha, & Tomer, 2001) and motor speed (Dash & Telles, 1999). The present study indicates that yoga participant outperformed their counterparts in control group in all items of SFT. This finding, to some extent, is consistent with results of previous study that yoga improved the fear of falling and balance (Schmid,

Van Puymbroeck, & Koceja, 2010), health-related aspects of physical fitness (Tran, et al., 2001), improvement of mental and physical health (Buessing, et al., 2012).

However, this study has some limitations, such as small sample size. In this study, we used two groups, while the yoga group received training program but control group did not. That might lead to the social effects or biased opinions resulting from individuals in both groups.

In this controlled trial study, yoga is beneficial to improve physical fitness in the term of lower-upper strength, lower-upper flexibility, agility, aerobic endurance and dynamic balance of older adults.

Conflict of Interest

The author has not declared any conflicts of interest.

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