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CARDIOVASCULAR EFFECTS OF INTENSIVE YOGA PRACTICES IN MIDDLE-AGED AND OLDER WOMEN FROM MAHARASHTRA STATE

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Abstract

Background: *Intensive yoga practices can be an alternative to improve physical activity in middle- aged and older women. However, conventional exercising may not result in enough training stimulus to improve cardiovascular fitness. The purpose of this study was to evaluate the effect of an intensive intervention on cardiovascular risk factors in middle-aged and older women from Maharashtra State.*

Methods*: In this prospective quasi experimental design, four middle-aged and nine older yoga practicing females were enrolled into an 11-week program consisting of 5 sessions / week for 90 min (55 sessions). The program adherence, asana performance, and work intensity were assessed along the intervention. (BMI), % body fat, cardiovascular fitness [maximal expired air volume (VEmax), maximal O_2 consumption (VO_2max), parameters were evaluated before and after yogic training.*

Results*: Daily intensive yoga practices, program and exercising skills (asana performance) were similar in both middle-aged and older women. The yoga program did not modify any anthropometric measurements. However, it increased VO_2max remained stable in both middle-aged and older groups (P < 0.01).*

Conclusions*: The proposed yoga practices program improves different cardiovascular risk factors in middle-aged and older women.*

Key words: *BMI, % Body Fat, cardiovascular VO_2max and, intensive yoga practices.*

Introduction

Regular exercise has been proven to be effective in preventing chronic diseases by improving the quality of life in adults and older people. Nonetheless, the aging process always involves functional, physiological, and biochemical changes that reduce the elders' ability to perform daily activities, resulting in a fear to perform heavy physical exercise. Therefore, sports and many other physical activities may be unsafe for older people, especially for those untrained, injured, or handicapped.

Yoga is an ancient Indian philosophy based on diverse breathing, stretching, and meditation exercises. The "physical" part of Yoga (*Hatha*) consists of several stretching and strength-building exercises of varying degree of difficulty called *asanas*. In complementary alternative medicine, *Yoga* has proved to reduce stress and pain (muscle and systemic). *Yoga interventions* also help reduce body weight and blood glucose, total cholesterol and triacylglycerols, while they help to increase HDL-cholesterol (HDL-C) in patients with type 2 diabetes and coronary artery disease.

Recent reports suggest that *Yoga* can be a convenient alternative of physical activity in older people, because it reduces systolic blood pressure and sleep disturbances while it improves balance and shoulder's range of motion (flexion and abduction) in female elders. However, the effect of

an intensive *Yoga* program in elderly has not been studied enough. Our aim was to study the effects of an intensive *yoga* practice over cardiovascular fitness, and anthropometric parameters in middle aged and older women from Maharashtra State.

Methods

Subjects

The study was conducted at the BMHYP center in Amravati, Maharashtra. Seventeen healthy and physically active middle-aged (43 years) and older (62 years) women volunteered for the study. The inclusion criteria were as follows: (1) to be healthy, (2) conventional yoga practitioners (yogin is, 90 min, three times per week) and (3) not taking any drugs that affect either energy metabolism or hormonal status. Thirteen women complied with these criteria and finished the study. A sports physician performed a routine physical examination including an electrocardiogram to guarantee the health status of each participant, before and during the yoga practices program. Each participant signed a written and informed consent, and the Ethics Committee of the, BMHYP as stated by declaration, approved the study protocol.

Experimental design

The thirteen participants were enrolled into an 11-week of intensive yoga practices program consisting of 5 sessions / week for 90 min (55 sessions) with a prospective quasi experimental design. Subjects were asked to avoid any sort of heavy physical activity 24 h before the study. On day 1, anthropometric and food consumption data were registered. This day, they also completed a maximum exercise test during which the expired air volume (VE), O2 consumption (VO2), and CO2 production (VCO2) were continuously recorded. Having finished the intensive yoga practices intervention, a general evaluation was once again performed as previously mentioned.

Anthropometry and body composition

Anthropometric indicators and body fat were assessed with an anthropometric kit certified standard lab by a trained anthropometries, following the recommendations of the International Society of Advancement in Kin anthropometry. Precision and reliability for skin folds, diameters, and body girth measurements were as follows: Technical error 6.2, 1.5, and 1.7%, and interclass correlation coefficients 0.98. All data were analyzed with SPSS software, Percentage of body fat (%BF) was also estimated according to ISAK standardized equations.

Cardiovascular fitness

In order to determine maximal expired air volume and VO2max, the percentages of O2 and CO2 in inhaled and exhaled air as well as minute pulmonary ventilation were measured with a gas analyzer. The system was calibrated before and during each test by using certified gas mixtures of known concentrations (4% CO2, 16% O2, and 80% N2; 26% O2 and 74% N2). A 3-L syringe verified the flow of gases. The environmental barometric pressure was measured by a for tin-type mercurial barometer, and the temperature and relative humidity by a mason-type hygrometer. Exhaled gases during exercise were analyzed with the breath-by-breath system. The exercise tests were carried out on a treadmill ergo meter. VO2max was determined by the exercise protocol reported by Skiner. It consisted of walking at a constant and comfortable speed: The treadmill inclination began at 0% and rose in 2% increments every 3 min until the subject decided to end the test due to fatigue. VO2max and

maximal heart rate (HRmax) were defined as the highest O2 consumption and heart rate values, both recorded at the end of the exercise test.

Statistics

Data were analyzed using the statistical program SPSS system software. Middle-aged and older women's anthropometry, body composition, and cardiovascular fitness parameters were compared at initial and final time by a ANOVA test. Results were expressed as mean ± SD. The nominal level of statistical significance used was 0.05.

Results

Both groups (middle-aged and older women) showed the same program adherence (~85%) and asana performance. In addition, food consumption was not different between groups, neither before nor after yoga practices intervention in terms of total in middle-aged women than that observed for the older group 0.05). Additionally, higher work intensity during HY exercises was observed in older women. Intensive Yoga Practice did not influence any of anthropometric variables and except for BMI, all other anthropometry variables were similar between middle-aged and older groups Intensive Yoga Practice increased the VO2max and VEmax ($P < 0.05$) in both groups. In regard to cardiovascular fitness.

Table No.1

Effects of Intensive*Yoga Practices* program in middle-aged and older women.

Parameter	Middle Age (N-4)		Older Age (N-9)	
	Initial	Final	Initial	Final
Body Weight	59 ± 7	60 ± 6	63 ± 7	62 ± 8
BMI	23 ± 2	23 ± 2	26 ± 3	26 ± 3
Body Fat %	27 ± 5	25 ± 5	29 ± 5	28 ± 5
Cardiovascular Fintness VO_2 max	31 ± 3	32 ± 2	23 ± 2	27 ± 2

Values are expressed as mean ± SD, Values within a same row with different are statistically different at $P < 0.05$ either betweengroups or initial and final measurements, BMI = Body mass index, VO2 max.

Discussion

Intensive Yoga Practice is a convenient alternative to enhance physical activity in elders in such way that its popularity has increased in indian societies. However, as aforementioned, we did not found any study that analyzed the effect of Intensive Yoga Practice on cardiovascular physical fitness; most of the studies combine it with other physical activities, and their results are inconclusive. Some studies have shown that *Yoga* training neither significantly affects physical nor physiological performance but instead, decreases anaerobic power. Other studies have shown that *Yoga* training improves the cardiac recovery index, cardiovascular endurance, and anaerobic power and decreases blood pressure either at rest or during exercise. Other multidisciplinary programs that include Yoga Practice have reported a clear improvement in health-related physical fitness. Here, it has been demonstrated that an 11-week Intensive Yoga Practice program consisting of 5 sessions/week for 90 min (55 sessions), without any other significant physical activity, improves some cardiovascular risk factors in middle-aged and older women. However, given the small sample size of subjects in this study,

additional research work is required in order to support these findings. Also, another possible weakness is that we did not include sedentary women as a control group for Intensive Yoga Practice cardiovascular effects.

Conclusions

An 11-week Intensive Yoga Practice program consisting of 5 sessions/week for 90 min (55 sessions) was found to be capable of improving cardiovascular fitness. In spite of the relatively low intensity of the yoga practice, this program increased both VO2max. The data also suggested that intensive yoga practice asanas, practiced as a systematic physical activity and conducted by an expert instructor in untrained and aging individuals, can improve health and serve as the basis for a physically active lifestyle. However, given the small sample size of subjects in this study, additional research work is required in order to support these findings.

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