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Influence of selected yogic practices on body mass index and flexibility among middle aged women

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Abstract
The purpose of this study was to find out the influence of selected yogic practices on body mass index and flexibility among middle aged women. To achieve the purpose of this study 40 middle aged healthy women from Trivandrum District, Kerala, India were randomly selected as subjects during the year 2015-2016 and their age ranged from 35 to 45 years. The selected subjects were divided into two equal groups of twenty subjects each. Group-I (n=20) considered as experimental group and Group-II (n=20) considered as control group. The experimental group underwent their selected yogic practices for ten weeks (6 days per week) and a session on each day. Control group was not exposed to any specific training apart from their daily activities. The body mass index and flexibility were selected as criterion variables and which were assessed by using the formula, BMI = Weight in kg/ Height in meter^2. (McCall, Timothy, 2007) [5] And sit and reach test (James R. M orrow *et al*. 2000) [6]. The pre and posttest were conducted one day before and after the experimental treatment. Analysis of Covariance was used to analyze the collected data. The level of significance was fixed at 0.05 level of confidence. The results revealed that there was a significant different between experiment group and control group on body mass index and flexibility and there was a significant improvement on body mass index and flexibility due to ten weeks of selected yogic practices which was followed in this study.

Keywords: Yoga, suryanamaskar, asana, body mass index, flexibility

1. Introduction
Yoga, which is a way of life, is characterized by balance, health, harmony and bliss (Nagendram H.R.; Nagarathna, 1997) [7]. Yoga is becoming popular in different parts of the world. For the restless mind, it gives solace (Bloomfield, H.H.; Cain, M.P. and Jaffe, D.T., 1975) [2]. For the sick, it is a boon (Brena, S.H., 1975) [3]. The practice of yoga creates harmony in the physical, mental, psychological and spiritual aspects of the human personality (Chidananda, Sri Swami., 1985) [4].

The term yoga comes from a Sanskrit word which means yoke or union. Traditionally, yoga is a method joining the individual self with the Divine, Universal Spirit or Cosmic Consciousness. Physical and mental exercises are designed to help achieve this goal, also called self-transcendence or enlightenment. On the physical level, yoga postures, called asanas, are designed to tone, strengthen and align the body. These postures are performed to make the spine supple and healthy and to promote blood flow to all the organs, glands and tissues, keeping all the bodily systems healthy. Regular practice of yogic practices helps to lead healthy way of life. Yoga is an activity that increases the flexibility, muscle strength, and peaceful mind. There are thousands of yoga poses, and in Sanskrit, these are called kriyas (action), mudras (seals), bandhas (locks).

The Body Mass Index (BMI) was estimated in all the participants before and after the experimental procedure using the formula, BMI = Weight in kg/ Height in meter 2. (McCall, Timothy, 2007) [5]. If a middle-aged woman with a normal body mass index wants to maintain her weight over an extended period, she must engage in the equivalent of 60 minutes per day of physical activity at a moderate intensity, according to new findings by Harvard researchers at Brigham and Women's Hospital (BWH). Yogasanas practice is a suitable recommendation for middle aged women to maintain their good health.

Yoga and flexibility go hand in hand. It increases the range of motion in joints and also the lubrication in the joints.

Apart from stretching the muscles, it also stretches the ligaments, tendons and the fascia sheath that surrounds the muscles. Constant practice of yoga will result in enhanced flexibility. The more flexible a body, the better it is for that individual as it saves the body from unnecessary torture and pain. According to Helen [2], flexibility is the ability of an individual to move the body and its parts through a wide range of motion as possible without strain to the articulation and muscle attachment. The increased flexibility leads to less muscle resistance from contraction and tension, which leads to less energy expended during activity (Shrier, 2005) [10]. A key to preventing premature muscle fatigue is proper stretching methods, or by increasing the range of flexibility (Schwellnus, 1999) [9]. By increasing the range of flexibility, one can increasing his/her economy of motion, or the amount of oxygen required to run a given distance. The built-up of lactic acid in skeletal muscle is caused by the lack of oxygen getting to the muscle is caused by the lack of oxygen getting to the muscle, which occurs more in shortened, or tight muscles (Shrier, 2005) [10].

2. Methodology

Purpose: The purpose of this study was to find out the influence of selected yogic practices on body mass index and flexibility among middle aged women.

2.1 Subjects: To achieve the purpose of this study 40 Middle Aged Healthy Women from Trivandrum District, Kerala, India. Were randomly selected as subjects during the year 2015-2016 and their age ranged from 35 to 45 years.

2.2 Groups: The selected subjects were divided into two equal groups of twenty subjects each. Group-I (n=20) considered as experimental group and Group-II (n=20) considered as control group. The experimental group underwent their selected yogic practices for ten weeks (6 days per week) and a session on each day. Control group was not exposed to any specific training apart from their daily activities.

2.3 Variable: The selected criterion variable namely, body mass index was assessed by using the formula, BMI = Weight in kg/ Height in meter^2. (McCall, Timothy, 2007) [5] and flexibility was assessed by using sit and reach test (James R. Morrow *et al*. 2000) [6]. The pre and posttest were conducted one day before and after the experimental treatment.

2.4 Statistical Technique: Analysis of Covariance was used to analyze the collected data. The level of significance was fixed at 0.05 level of confidence (Anne, L. Rothstein, 1985) [1].

3. Result: The results revealed that there was a significant different between experiment group and control group on body mass index and flexibility and there was a significant improvement on body mass index and flexibility due to ten weeks of selected yogic practices which was followed in this study.

3.1 Yogasanas practice

The experimental group practiced yogasanas weekly six days per week for six weeks. i.e., Monday to Saturday, between 6.00 to 8.00 Am., for a period of ten weeks. The practice schedule of the experimental group is given in the Table – I.

Table 1: Yogasanas practice schedule for experimental group

	Preparatory Exercises (5min.)				
	Suryanamaskar (3 Rep.) (5 Min.)				
Asanas	**I & II Weeks**	**III & VI Weeks**	**V & VI Weeks**	**VII & VIII Weeks**	**IX & X Weeks**
1. Tadasana 2. Ardhachandrasana 3. Trikonasana 4. Padmasana 5. Vajrasana 6. Ushtrasana 7. Baddhakonasana 8. Paschimattanasana 9. Matsyendrasana 10. Bhujangasana 11. Danurasana 12. Halasana 13. Sarvangasana 14. Salabhasana	2 – Repetitions. 30 Sec. - Recovery.	3 – Repetitions. 30 Sec. - Recovery.	4 – Repetitions. 30 Sec. - Recovery.	5– Repetitions. 30 Sec. - Recovery.	6– Repetitions. 30 Sec. - Recovery.
	Savasana – Relaxation (10Min.)				

3.2 Analysis of body mass index

The analysis of covariance on body mass index of experimental group and control group were statistically examined and presented in table - II.

Table 2: Analysis of covariance on body mass index of experimental group and control group

Test	**Experimental Group**	**Control Group**	**Source of Variance**	**Sum of Square**	**df**	**Mean Square**	**'F' Ratio**
Pre-test							
Mean	25.53	25.72	Between	0.36	1	0.36	0.29
S.D	0.89	1.32	Within	47.82	38	1.26	
Post-test							
Mean	24.58	25.81	Between	15.31	1	15.31	15.31*
S.D	0.64	1.26	Within	37.92	38	1.00	
Adjusted Post-test							
Mean	24.64	25.75	Between	12.03	1	12.03	33.42*
			Within	13.36	37	0.36	

*Significant at 0.05 level of confidence.

(The table values required for significant at 0.05 level of confidence with df 1 and 38 & 1 and 37 were 4.096 and 4.104 respectively)

Table-II shows that the pre-test mean values of body mass index for experimental group quotation and control were 25.53 and 25.72 respectively. The obtained 'F' ratio value of 0.29 for pre-test scores of experimental group and control group on body mass index was less than the required table value of 4.096 for significance with df 1 and 18 at 0.05 level of confidence. The post-test mean values of body mass index for experimental group and control group were 24.58 and 25.81 respectively. The obtained 'F' ratio value of 15.31for post-test scores of experimental group and control group on body mass index was higher than the required table value of 4.096 for significance with df 1 and 18 at 0.05 level of confidence. The adjusted post-test mean values of body mass index for experimental group and control group were 24.64 and 25.75 respectively. The obtained 'F' ratio value of 33.42 for adjusted post-test scores of experimental group and control group on body mass index was higher than the required table value of 4.104 for significance with df 1 and 17 at 0.05 level of confidence.

The adjusted post-test mean values of experimental group and control group on body mass index are graphically represented in Figure - 1.

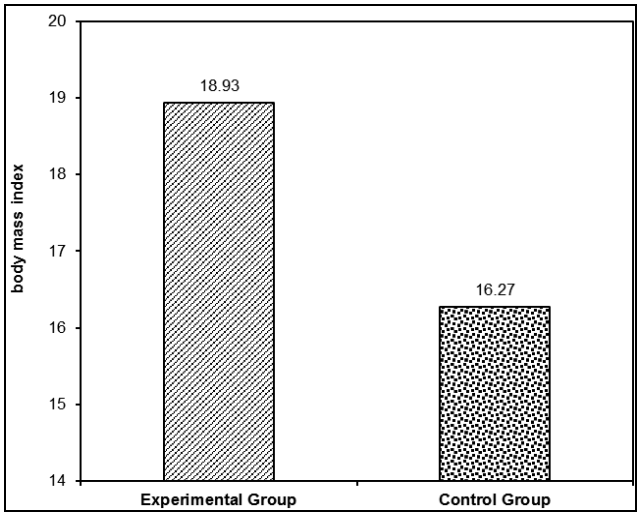

Fig 1: The Adjusted Post-Test Mean Values of Experimental Group and Control Group on Body Mass Index

3.3 The analysis of flexibility

The analysis of covariance on flexibility of experimental group and control group were statistically examined and presented in table - III.

Table 3: Analysis of covariance on flexibility of experimental group and control group

Test	Experimental Group	Control Group	Source of Variance	Sum of Square	df	Mean Square	'F' Ratio
Pre-test							
Mean	15.50	16.05	Between	3.03	1	3.03	1.64
S.D	1.40	1.32	Within	69.95	38	1.84	
Post-test							
Mean	19.55	15.90	Between	133.23	1	133.23	49.34*
S.D	1.84	1.41	Within	102.75	38	2.70	
Adjusted Post-test							
Mean	19.58	15.87	Between	131.92	1	131.92	47.80*
			Within	101.92	37	2.76	

*Significant at 0.05 level of confidence.

(The table values required for significant at 0.05 level of confidence with df 1 and 38 & 1 and 37 were 4.096 and 4.104 respectively)

Table-III shows that the pre-test mean values of flexibility for experimental group and control were 15.50 and 16.05 respectively. The obtained 'F' ratio value of 1.64 for pre-test scores of experimental group and control group on flexibility was less than the required table value of 4.096 for significance with df 1 and 18 at 0.05 level of confidence. The post-test mean values of flexibility for experimental group and control group were 19.55 and 15.90 respectively. The obtained 'F' ratio value of 49.34 for post-test scores of experimental group and control group on flexibility was higher than the required table value of 4.096 for significance with df 1 and 18 at 0.05 level of confidence. The adjusted post-test mean values of flexibility for experimental group and control group were 19.58 and 15.87 respectively. The obtained 'F' ratio value of 47.80 for adjusted post-test scores of experimental group and control group on flexibility was higher than the required table value of 4.104 for significance with df 1 and 17 at 0.05 level of confidence.

The adjusted post-test mean values of experimental group and control group on flexibility are graphically represented in Figure - 2.

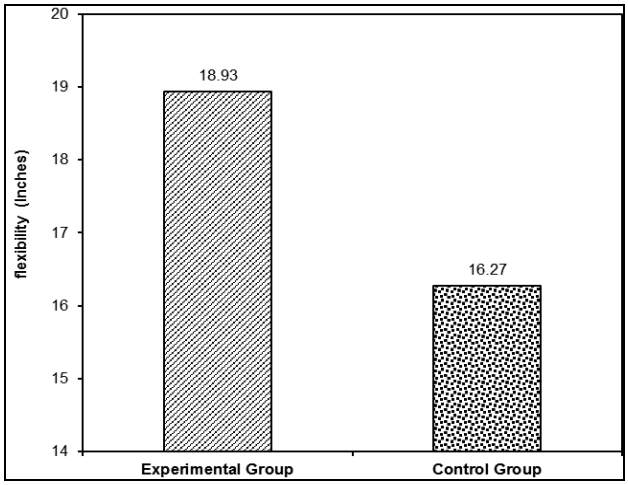

Fig 2: The Adjusted Post-Test Mean Values of Experimental Group and Control Group on Flexibility

4. Discussion on findings

The result of the study showed that there was a significant difference between experimental group and control group on body mass index and flexibility. And also it was found that there was a significant improvement on body mass index and flexibility due to ten weeks of yogic practices.

5. Conclusions

It was concluded from the results of the study that the yogic practices have followed in this study had significant impact on body mass index and flexibility of the middle aged women.

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