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Influence of Yoga on Body Mass Index and Heart Rate Among Middle-Aged Women Diagnosed with Hypothyroidism

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Abstract: Many Indian women suffer from hypothyroidism. Thyroid imbalance, if left untreated, may lead to elevated cholesterol, excess body fat, hypertension, cardiovascular disease, an irregular heartbeat, and even depression. Hypothyroidism is more common in India (11% prevalence) than in the United Kingdom (2%) and the United States (4-6%). The incidence of hypothyroidism is 13% higher in women aged 35-60 than in any other age group. Weight loss, dyslipidemia, depression, cardiovascular and respiratory difficulties, and autonomic nervous system balance are only few of the benefits of yoga. In this study we investigated whether middle-aged women with hypothyroidism would have different results for certain physiological variables such as body mass index and heart rate. The effects of yoga on body mass index and heart rate in middle-aged women (35-60 years old) with hypothyroidism were the subject of a randomized controlled trial. Thirty middle-aged women were recruited for the research, with 15 placed in a Yoga group and 15 in a control group, all for 8-week intervention period. Body mass index (BMI) and heart rate (HR) were measured before and after the training session for both Experimental group I and Control group II. The analysis of covariance (ANCOVA) was performed to identify group-specific differences. The significance threshold of the test was set at 0.05. In this study, Yoga significantly affect physiological variables in middle-aged women with hypothyroidism. Middle-aged women with hypothyroidism might benefit from practicing yoga to lower their body mass index and heart rate.

Keywords: Yoga, Hypothyroidism, Body Mass Index, Heart rate, Middle-aged women

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Introduction

When the thyroid gland is underactive, it causes hypothyroidism. Hypothyroidism is characterized by insufficient hormone production by the thyroid gland. Effects on cholesterol, body mass index, heart rate, blood pressure, cardiovascular risk, fertility, and mental health may all worsen

without treatment. Hypothyroidism is linked to increased weight, exhaustion, a foggy mind, and a weakened immune system. The neuroendocrine system that regulates metabolism and reacts to stress is a component of the hypothalamic-pituitary-thyroid axis, which is responsible for thyrotropic feedback control between the thyroid and anterior pituitary. In addition to raising BMR and sensitivity to catecholamines (such as adrenaline), these hormones also have a role in regulating long bone development (in conjunction with growth hormone) and brain maturation.

Stress levels increase for middle-aged women compared to previous life stages, making middle-age health particularly important since it predicts later quality of life. Women in their middle years play a crucial role in improving the health of their families and communities. Therefore, their holistic well-being is of highest significance, including their physical, mental, social, and spiritual states.

India has the highest global incidence of hypothyroidism at 11%, much higher than the UK's 2% or the USA's 4-6%. Individuals between the ages of 36 and 50 had the greatest incidence of hypothyroidism (13.1%), while those between the ages of 18 and 35 have the lowest incidence (7.5%). Patients with diabetes have a reported incidence of hypothyroidism ranging from 4.8% to 31.4%. Roughly 9.5% of the South Indian population has abnormally high levels of thyroid-peroxidase antibodies.

Yoga is a centuries-old Indian practice with the aim of restoring the body's natural endocrine balance through retraining and balancing the mind and body. The GABA level in the brain has been shown to rise due to yoga practice. Previous research has shown that practicing Yoga may have positive effects on a person's health by lowering their waist circumference, body mass index, heart rate, and total cholesterol.

The causes for hypothyroidism are -- Hashimoto's disease, Thyroiditis, or inflammation of the thyroid, Congenital hypothyroidism, or hypothyroidism that is present at birth, Surgical removal of part or all of the thyroid, Radiation treatment of the thyroid, Some medicines and Lack of Iodine. Symptoms of hypothyroidism include-- Fatigue, weight gain, trouble tolerating cold, joint and muscle pain, dry skin or dry, thinning hair, heavy or irregular menstrual periods or fertility problems, slowed heart rate, depression. Goitre, Heart Problems, Myxedema, Infertility, Birth Defects, Mental Health Issues ae some of the complications caused by hypothyroidism. Hypothyroidism is diagnosed by analysis of

TSH, T3 and T4 in blood. Some treatments for hypothyroidism are-- Thyroid Replacement, Levothyroxine, Lifestyle Changes, Food Habits, Exercise, Yoga

The objectives of this study was to find out whether there would be any significant difference on selected Physiological variable Body Mass Index (BMI) and Heart Rate (HR) due to Yoga on middle-aged women diagnosed with Hypothyroidism. It was hypothesized that there would be significant differences between Yoga group and the control group on Body Mass Index (BMI) and Heart Rate (HR) among middle-aged women diagnosed with Hypothyroidism.

Inclusion criterion for this study was-- (i) Patients with hypothyroidism who are female and are between the ages of 35 and 60; (ii) T3 level normal range (2.0-4.0 pg/ml); T4 level normal range (0.8-1.8 ng/dl); 4.2 mIU/l>TSH level<10 mIU/l, normal range (0.5-4.20 mIU/l); (ii) participants must be willing and able to attend the intervention or control sessions on their own; participants must also be able to offer written informed permission. Exclusion criterion for the study was – (i) Participants who have previously had thyroid surgery of any kind; (ii) subjects who had been diagnosed with heart diseases, morbid obesity with stage III, diabetes that was not under control, pulmonary dysfunction, and carcinomas; (iii) patients who were born with hypothyroidism or developed it later in life as a secondary condition; (iv) women who are either pregnant,

nursing, or who have plans to get pregnant in the near future; (v) Drugs and alcohol dependence; and (vi) Subjects that do not want to engage in academic pursuits.

Materials and Methods

Thirty women with hypothyroidism, ranging in age from 35 to 60, were recruited using a random sample group design from Chennai, and they were divided into two groups of 15 participants each. It was expected that middle-aged women with hypothyroidism would benefit more from yoga than a control group in terms of their body mass index (BMI). Before beginning the training program, both Groups (I and II) were given a pre-test on the aforementioned dependent variables. Yoga was administered to Group I, whereas Group II (the Control Group) engaged in active rest. Groups I and II were retested on the same dependent variables after eight weeks of experimentation. To determine whether or whether there were statistically significant differences between the experimental and control groups, analysis of covariance (ANCOVA) was used.

Results and Dission

The hypothesis was tested using Analysis of Covariance (ANCOVA) to compare the pre- and post-training measurements of the dependent variable across the two groups at the 0.05 level of significance. To confirm the accuracy of the findings, this was done.

It was not possible to reach statistical significance at the 0.05 level due to the low F value of 0.08 obtained for the pre-test scores. This showed that there was no statistically significant difference between the groups before and after the intervention, and that the randomization at both points in time was the same. Post-test analysis showed a statistically significant performance gap between the two groups. The obtained F value of 121.02 demonstrated this, since it was more than the minimum required F value of 4.2. This allowed us to demonstrate that the subjects' post-test means varied considerably. The adjusted mean scores were calculated after factoring in both the pre- and post-test results for each group, and the data was then analyzed statistically. The obtained value of F (148.87) was more than the required value of F (4.21). According to the study conducted by Shetty *et al.* (2020), eight weeks of yoga led to a statistically significant difference between means on Body Mass Index (BMI) as assessed in kg/m^2. Figure 1 depicts the ordered adjusted mean body mass index in kilograms per square meter. This data was used to better illustrate the study's conclusions.

The yoga practice had a direct impact on Group I, as shown by their considerably lower body mass indices compared to Group II. This led to a 95% confidence that the hypothesis is correct. The observations of Shetty *et al*. (2020) corroborated the findings of present study.

As can be seen in Table 2, the F value of 0.16 for the pre-test scores is much lower than the required F value of 4.2 for significance at the 0.05 level. This showed that there was no statistically significant difference between the groups before and after the intervention, and that the randomization at both points in time was the same. The F value of 33.39, which was calculated from the post-test results, was much greater than the required F value of 4.2, indicating that there was a statistically significant difference in performance between the groups. This allowed us to demonstrate that the subjects' post-test means varied considerably. The adjusted mean scores were calculated after factoring in both the pre- and post-test results for each group, and the data was then analyzed statistically. The achieved value of F (40.02) was more than the required value of F (4.21). Based on their findings, Nair *et al*. (2021) concluded that eight weeks of yoga practice led to a statistically significant change in mean heart rate. Figure 2 is depicts the ordered adjusted mean heart rate in beats per minute.

Group I yoga practitioners were found to have considerably lower resting heart rates than

Table 1: Analysis of Covariance of the means of experimental group and the control group on body mass index (BMI) in kg/m²

TEST	EXP. GROUP	CONTROL GROUP	SOURCE OF VARIENCE	SUM OF SQUARES	DEGREE OF FREEDOM	MEAN SQUARES	OBTAINED F-RATIO
PRE	26.87	27.02	Between	0.16	1	0.16	**0.08***
			With In	57.81	28	2.06	
POST	21.15	27.02	Between	258.13	1	258.13	**121.02***
			With In	59.72	28	2.13	
ADJUSTED POST	21.02	26.98	Between	251.08	1	251.08	**148.87***
			With In	45.54	27	1.69	

* Significant at 0.05 level of confidence. (Table F ratio at 0.05 level, of confidence for Df 1 and28=4.2, 1and 27= 4.21)

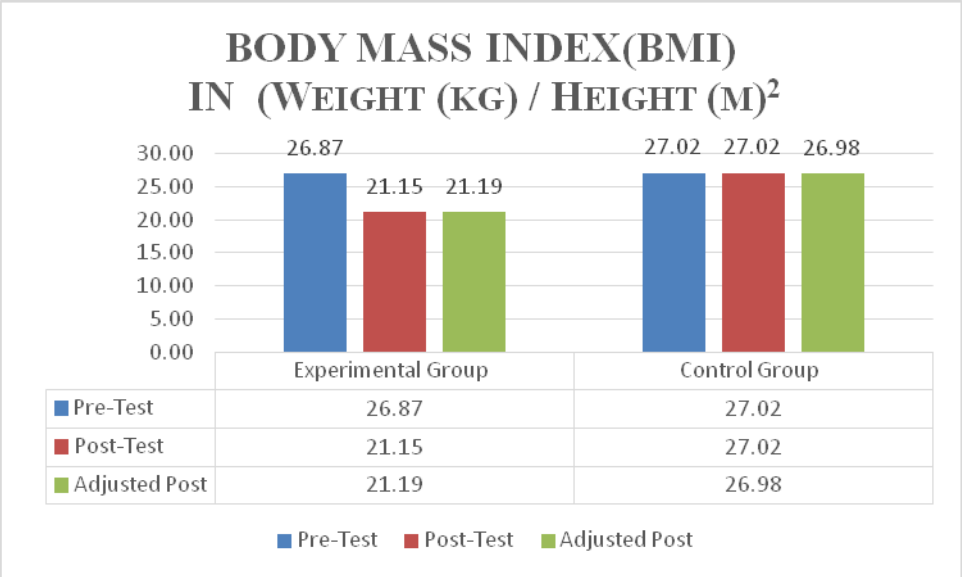

Fig. 1: Mean differences among the groups on body mass index (BMI) in weight (kg)/height (m²).

Table 2: Analysis of Covariance of the means of experimental group and the control group on heart rate per min

TEST	EXP. GROUP	CONTROL GROUP	SOURCE OF VARIENCE	SUM OF SQUARES	DEGREE OF FREEDOM	MEAN SQUARES	OBTAINED F-RATIO
PRE	66.07	65.87	Between	0.30	1	0.30	**0.16***
			Within	52.67	28	1.88	
POST	73.47	65.80	Between	440.83	1	440.83	**37.39***
			Within	330.13	28	11.79	
ADJUSTED POST	73.34	65.90	Between	410.93	1	410.93	**44.02***
			Within	252.04	27	9.33	

*Significant at 0.05 level of confidence. (Table F ratio at 0.05 level, of confidence for Df 1 and28=4.2, 1and 27= 4.21)

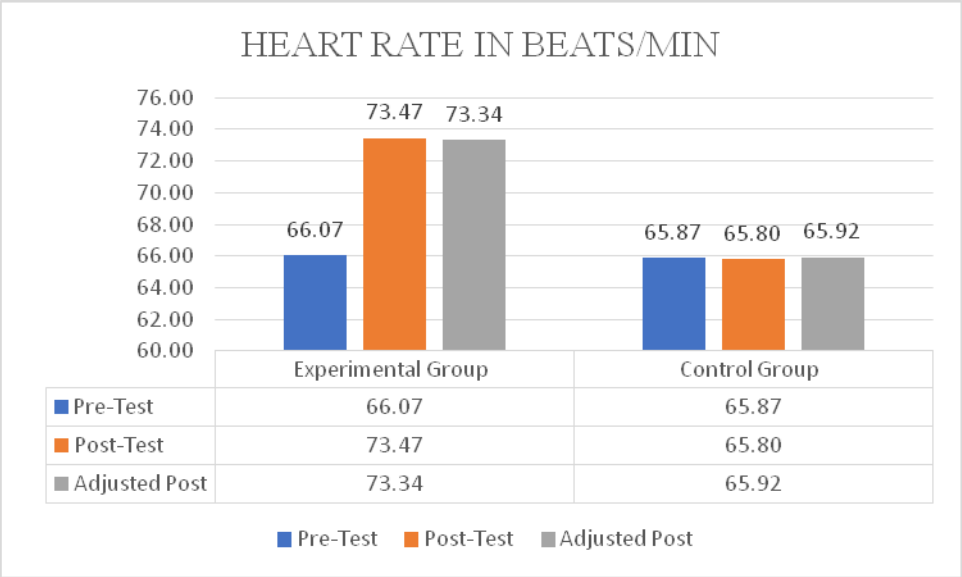

Fig. 2: Mean differences among the groups on heart rate in beats/min.

Group II participants. This led to a 95% confidence that the hypothesis is correct.

Conclusion

Yoga on Group I among middle-aged women with Hypothyroidism led to substantial reductions in Body Mass Index (in kilograms per square meter) and improvements in Heart Rate (in beats per minute). Therefore, Yoga is helpful for middle-aged women with hypothyroidism.

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