



Journal for Current Sign

Online ISSN (3006-1504)

Print ISSN (3006-1490)



EFFECTS OF HATHA YOGA TRAINING UPON THE CIRCUMFERENCE OF HIP, THIGH AND CALF AMONG OVERWEIGHT COLLEGE STUDENTS

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Title

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ABSTRACT

Health related fitness is a blessing. It is the quality which enables a person to perform the daily routine tasks efficiently and effectively. Overweight is one of the factors that affect the health-related fitness. The main aim of the current study was to determine the effects of hatha yoga training on circumference of hip, thigh and calf among overweight college students. Twenty-five subjects were selected for the study through PAR-Q having age 20 to 24 years. The pretest data on dependent variables was collected through tape measurement. Ten weeks treatment of

Hatha yoga was given to the subjects for three days on alternate days per week. After the treatment, posttest data was collected of dependent variables through the procedure as adopted for the pretest data. The collected data (pre and post) of the subjects was tabulated. Mean, standard deviation and paired sample t test were used to



analyses the data. The significance level was fixed at 0.05. It is concluded after the data analysis and findings that hatha yoga training has significant effects circumference of hip, thigh and calf among overweight college students it is recommended that overweight students should take part in the hatha yoga exercises for the enhancement of their health-related fitness.

Key words: Hatha Yoga, hip, thigh, calf, overweight

Introduction

Hatha Yoga is a form of physical discipline that places an emphasis on breathing exercises, meditation, and postures (Pal, Adhikari, Heyat, Ullah, & You, 2023). Many individuals are interested in the potential health advantages that they may receive from practicing Hatha Yoga. As the prevalence of obesity continues to rise around the globe, particularly among college students, there is an urgent need for quick action to be taken in order to enhance the physical health of individuals (Ullah, Muhammad, Bibi, Khan, & Khan, 2023). The authors Khattak, Islam, and Manzoor (2020) state that body composition is one component of fitness that is associated to health benefits. The measurements of body circumference, which are important markers of general health and possible risk factors for metabolic disorders, are one of the many physical metrics that have been the topic of an increasing number of research on the advantages of yoga. Additional research has been conducted on the benefits of yoga.

According to the findings of a number of studies, one of the benefits of practicing Hatha yoga is that it improves both physical fitness and body composition. Yoga helps people lose weight by reducing their body fat percentage and waist circumference, according to a meta-analysis that was conducted in 2018 by Cramer and colleagues (Cramer, H., Lauche, R., Langhorst, J., & Dobos, G. 2018). One study conducted by



Gothe and McAuley (2019) discovered that doing yoga on a daily basis increase both flexibility and strength, which may be beneficial for weight distribution.

Recent research suggests that strengthening the muscles in the thighs and calves via the practice of yoga can assist individuals in achieving a larger calves and thighs. According to studies conducted by Lojanapiwat et al. (2021), participants in Hatha yoga classes had a significant drop in the measures of their hips and quadriceps while working out. The results of this study lend support to the hypothesis that Hatha yoga could be an effective method for reducing the prevalence of obesity among college students.

As a part of this Hatha yoga research process, the hip, thigh, and calf circumferences of college students who are overweight will be measured. Through the process of limiting our attention to this particular subset, we hope to contribute to the growing body of evidence that substantiates the beneficial effects of Hatha yoga on both physical fitness and general health. It is necessary to have a comprehensive understanding of the effects that obesity has on the physical and mental health of young adults in order to develop individualized treatments that can combat the epidemic and improve people's quality of life during this formative period.

Objective of the Study

- To find out the effects of Hatha yoga on circumference of hip, thigh and calf among overweight college students
- To prepare a list of recommendations for the enhancement of body weight among college overweight students.



Hypotheses of the study

There are significant effects of hatha yoga on the circumference of hip, thigh and calf among overweight college students having age 20 to 24 years

Delimitations of the Study

Following were the delimitations of the study

- The study was delimited to male overweight students only.
- The number of students was twenty-five.
- The age range of subjects was between 20 to 24 years.
- The study was delimited to those students only who were residing in college hostel.
- The duration of the training was ten weeks with three sessions per week on alternate days (Monday, Wednesday and Friday).
- The independent variable was hatha yoga exercises.
- The depended variables were circumference of hips, thigh and calf.
- BMI formula ($\text{Weight in kg}/(\text{Height (cm)}/100)^2$) was applied to calculate the body status
- Tape measurement was used to measure the circumference hip, thigh and calf.

Limitations of the Study

The following were the limitations of the study.

- The lack of time for the study was a drawback.
- Food habits were not controlled
- Weather condition was not taken into consideration.
- The social and economic conditions were not given attention.

Materials and Methods

Participants of the Study



According to Ullah, Khan, Gul, and Ullah (2022), the participants in an experiment are individuals, products, or things that are directly related to the subject matter and are used for the purpose of data collecting to gather information. All of the male students who were overweight and between the ages of 20 and 24 who lived in the college hostels were included in the investigation.

Exclusion and Exclusion Criteria

The Physical Activity Readiness Questionnaire (PAR-Q) served as the basis for the inclusion and exclusion criteria that were established. The PAR-Q is a screening instrument that is stand-alone. It is utilized by fitness instructors prior to the beginning of an exercise program in order to identify individuals who are suitable for the program and to address any potential health issues. It frequently has questions that do not allow for open-ended responses (Venkataraman et al., 2024). A total of two hundred eighty students were tasked with completing the PAR-Q, and sixty-five of those individuals were deemed suitable for the research project. Twenty-five out of the sixty-five students were selected at random to take part in the study as subjects.

Research Design

According to Strong, Tulu, Agu, and Pedersen (2020), a study design could be defined as a process for tackling a problem. In this particular study, an experimental approach was taken, and a pre-test and post-test methodology was utilized. A pre-test was administered to every participant prior to the beginning of intervention, and their results were recorded during this course of action. For the purpose of the pre-test, the dependent variables, more precisely the circumference of the hip, thigh, and calf as measured by a tape measure, served as the foundation. A hatha yoga treatment was administered to the experimental group on Monday, Wednesday, and Friday during alternate weeks for a period of 10 weeks after the pretest. During the post-test of each dependent variable issue, which took place after the 10-week treatment period and



involved 25 overweight subjects, the pre-test protocol was adhered to. Each participant's post-test results were recorded using the dependent variable, which served as a baseline for the data collection process.

Orientation of Subjects

The gathering of trustworthy information is the primary objective of the orientation. Participants in the selected training and examinations were given the opportunity to participate in an orientation session that was designed to inspire and fully engage them. As well as elaborating on the significance and purpose of the current investigation, the researcher outlined the roles that each individual will play. A comprehensive explanation of the methodology for evaluating the dependent variable was provided by the researcher, who also provided support to all participants regarding the necessary measurement protocol. In addition to the introductory session, the researcher met with the participants three times in order to acquaint them with the procedures and protocols that were relevant to the exercises that were related with their training. They were able to efficiently carry out the tasks and avoid any potential risks to their health as a result of this. The researcher carried out each activity while the participants were at the same time present.

Instrument for Collection of Data

One definition of an instrument is a device that is used for measuring. According to Lasmana, Festiyed, Razak, and Fadilah (2024), a research study instrument is a gadget that is utilized by the researcher primarily for the purpose of data collection. The type of instrument that is most suitable for the study, such as questionnaires, interviews, or tests, will be determined by the nature of your investigation. The current research was conducted with the intention of determining the effect that Hatha yoga has on the circumferences of the hip, thigh, and calf. In this investigation, the existing body of literature demonstrates that tape measuring was employed as a criteria



measure in order to obtain relevant data on the variables that were dependent on the investigation.

Test Administration

The height (in centimeters) and weight (in kilograms) of each subject were assessed following the distribution and collection of the PAR-Q from the study participants. Weight was assessed with a digital scale, and height was determined using a stadiometer (e.g., without footwear). The athletes stepped the weight scale in minimal clothes. The results were deemed accurate following the averaging of the three weight readings. The overweight status was assessed using the BMI formula ($\text{Weight in kg}/(\text{Height (cm)}/100)^2$), which considered the following values.

BMI	Classification
<18.5	Under weight
18.5-24.9	Normal weight
25.0- 29.9	Over weight
30.0-34.9	Class I obesity
35.0- to 34.9	Class II obesity
> 40	Class III obesity

Before beginning the intervention procedure, a tape measure was used to measure the circumference of the calf, thigh, and hip respectively. Using a measuring tape, measurements were taken from the right side of the body, specifically the hip, the thigh, and the calf. Measurements were taken of the hips of the subjects when they



were wearing lightweight trousers. When the hip was at its widest point, the measurement was taken in inches. Inches were used to measure the thigh, and the measurement was taken six inches above the patella. The circumference, measured in inches, was determined by taking the measurement of the broadest point of the calf.

Ethical Consideration of the Study

The researcher must ensure that individuals are not subjected to any circumstances that may lead to physical or psychological injury as a result of their participation in the study. Consequently, all participants were apprised of the study's aims and procedures. The subjects were ensured to be devoid of various diseases by the utilization of PAR-Q for selection. Written consent was acquired from each participant. A consent letter from the head of the institution was also acquired.

Protocol of Hatha yoga

The program comprised 10 weeks of self-made hatha yoga protocol, with each session lasting 50 minutes, inclusive of warm-up and cool-down phases. The warm-up and cool-down segments each endured for ten minutes. The cool-down session included static stretching activities, whereas the warm-up comprised active stretching exercises and a stroll. The exercise intensity ranged from 55% to 65% of the maximum heart rate. The hatha yoga training sessions predominantly consisted of asana (static) exercises. Multiple asana poses, such as the cow face stance, adept's pose, spinal twist pose, auspicious pose, tortoise pose, cockerel pose, stretching tortoise pose, bow pose, back stretching pose, and spinal twist pose, were executed for designated periods. The tasks were executed by each volunteer under the oversight of the researcher who administered intervention every other day for ten weeks. Each workout session was designated to endure for 30 minutes, excluding the warm-up and cool-down time.

Analyses of Data



For the purpose of data collection, assessments were carried out with the selected individuals both before and after the intervention that lasted for ten weeks. Following the completion of the analysis of the recorded data, the paired sample test was carried out in order to obtain empirical results. All of the results of the test are presented in the tables and figures that are located on the following pages.

Demographic/anthropometric measurement of Hatha yoga group before treatment

Variable	Age (years) mean	N	Weight	Std
Pre test weight		25	70.33	13.29
Pre test Body Mass index	22.81	25	27.79	5.64

The above table shows the mean age, weight and Body Mass Index of the twenty five subjects of Hatha yoga group. The mean age, weight and BMI are 22.81 years, 70.33 and 27.79 respectively.

Pretest and Posttest Comparison of Hips Circumference of the Subjects

Variable	Test	N	Mean	Std Dev	Mean Diff	df	Sig.
Hips Circumference	Pre	25	42.42	4.2077			
	Post	25	40.41	3.5192	2.01	23	.000

The Table shows the hip circumference of the subjects. Data shows prominent changes in the hip circumference of the participant, and indicates a Significant difference ($.000 < \alpha = 0.05$) in hip circumference between the pre-test and post-test



effect of ten weeks of hatha Yoga on hip in inches. The decrease in the hip inches was due to a special exercise protocol that was applied to participants during the course of study. In the pre-test mean value was 42.42 inches and after ten weeks of hatha Yoga mean value decreased to 40.41 which paved the way to mean difference 2.01 inches.

Pretest and Posttest Comparison of Thigh Circumference of the Subjects

Variable.	Test	N	Mean	Std. Dev	Mean Diff	Df	Sig.
Thigh Circumference	Pre test	25	18.85	2.28			
	Post test	25	18.40	2.11	0.45	23	.000

The table shows the pretest and posttest thigh circumference of all participants. Data shows prominent changes in the hip inches of the participant, and indicates there is significant difference ($.000 < \alpha = 0.05$) in thigh circumference between the pre-test and post-test of twenty-five subjects (18.85 inch > 18.40-inch, Improvement = 0.45 inch). The reduction in thigh inches was due to a special exercise protocol of hatha yoga that was adopted by the participants for ten weeks involved in this study.

Pretest and Posttest Comparison of Calf Circumference of the Subjects

Variable.	Test	N	Mean	Std. Dev	Mean Diff	Df	Sig.
Calf Circumference	Pre test	25	14.70	1.54			
	Post test	25	14.13	1.40	0.57	23	.000

The table shows the pretest and post test calf circumference of all participants. Data shows prominent changes in the calf inches of the participant, and indicates there is significant difference ($.000 < \alpha = 0.05$) in thigh circumference between the pre-test and post-test of twenty-five subjects (14.70 inch > 14.13-inch, Improvement = 0.57 inch).



The reduction in calf inches was due to a special exercise protocol of hatha yoga that was adopted by the participants for ten weeks involved in this study.

Finding of the Study

It was found that those between the ages of 20 and 24 who practiced Hatha yoga would experience a significant reduction in the circumference of their hips, thighs, and calves. Based on the analysis of data, it was found that Hatha yoga had a substantial impact on the circumference of the hip, thigh, and calf muscles, ($P < 0.05$). It follows that the first hypothesis, H1, is accepted.

Conclusion

The purpose of the study was to investigate the impact that Hatha yoga has on hip circumference, thigh circumference, and calf circumference of college students between the ages of 20 and 24. According to the findings of the study, a ten-week hatha yoga program had a substantial impact on hip, thigh, and calf circumferences of college students who were overweight and between the ages of 20 and 24.

Recommendations

1. As the study showed that hatha yoga exercises enhance the health-related fitness and reduce the circumference of hip, thigh and calf among overweight students. Thus, the overweight students should take part in hatha yoga exercises regularly.
2. Citizens are the asset of a nation. They may perform the assigned tasks efficiently and effectively when they are healthy. In order to create awareness among citizen about the role of hatha yoga exercises, seminars, workshop and conferences should be held.



3. The students are future generation of a nation. For the enhancement of health-related fitness of the students, hatha yoga exercises should be the part of curriculum in all educational institutions.
4. The physical trainers should also recommend and include the hatha yoga exercises in the protocols for the enhancement of trainees' health related fitness.

The implications for future researchers

1. The current study was conducted in college. The future researchers should extend their studies to schools and universities.
2. The subjects' age range was 20 to 24 years in the in-hand study. The future researchers may extend their studies to other age groups.
3. In the current study only, male students were selected as subjects. The future researchers may conduct studies on female students.
4. Besides hatha yoga training, the future researchers may conduct the studies with other trainings as independent variables
5. The dependent variables of the current study were the circumference of hip, thigh and calf while in future the researchers may take psychological, physiological and sociological aspects as dependent variables.
6. In the in-hand study, the duration of the training was 10 weeks with 60 to 70% intensity of maximum heart rate of 60 minutes each session for three days per week. In future the researchers may conduct the studies with different duration of training, intensity of exercises and session per week

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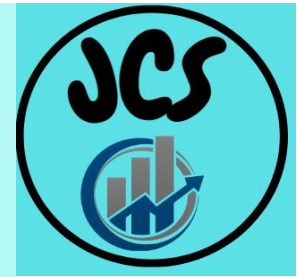
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Journal for Current Sign

Online ISSN (3006-1504)

Print ISSN (3006-1490)



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