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Effects of Hatha Yoga on Flexibility of Shoulder, Core  
Back and Lower Back among Overweight College  
Students

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among Overweight College Students**

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***Abstract***

*Engaging in fitness for health purposes is a boon. It is the trait that allows an individual to do daily responsibilities effectively and proficiently. Flexibility is a crucial component of health-related fitness. The primary objective of this study was to assess the benefits of hatha yoga training on the lower back, core back extension, and shoulder flexibility in overweight college students. Twenty-five volunteers aged 20 to 24 were selected for the study using the PAR-Q. The sit-and-reach test, back extension, and shoulder elevation were employed to gather pre-test data on dependent variables. The participants underwent a ten-week Hatha yoga regimen, practicing three days each week on alternating days. Subsequent to therapy, post-test data on dependent variables were gathered utilizing the identical methods employed for pre-test data collection. The subjects' data from before and after collection were aggregated. The data was analyzed, employing the mean, standard deviation, and paired sample t-tests. A significance level of 0.05 was established. Data analysis and observations revealed that hatha yoga training markedly enhances flexibility in the shoulders, core back, and lower back among overweight college students. Overweight students are advised to engage in hatha yoga to enhance their overall health and fitness.*

**Key word:** *Hatha yoga, Shoulder, Core back, Lower back, Overweight*

## Introduction

The prevalence of obesity among college students has escalated into a significant public health concern in recent years. This group encounters numerous physical and mental health challenges due to dietary modifications, sedentary behaviors, and lifestyle changes that lead to weight gain (Ullah, Gul, Muhammad, & Usman, 2022). Employing Hatha yoga, which prioritizes physical postures, respiratory techniques, and mindfulness, is an effective method for addressing these issues. This study examines the impact of Hatha yoga on the lower back health, core back extension, and shoulder mobility flexibility in overweight college students (Gothe, Pontifex, Hillman & McAuley, 2023). Flexibility influences range of motion, injury prevention, and athletic performance, all of which are essential to overall physical health. Research indicates that increased flexibility might enhance posture and reduce muscle strain. These advantages are particularly significant for those with excess weight, as their biomechanics may be impacted (Behm et al., 2022). Moreover, for students who may be particularly vulnerable to postural issues due to prolonged sitting and inadequate ergonomic practices, core strength is crucial for maintaining stability and supporting the spine (Jung et al., 2023).

Hatha yoga combines pranayama, asanas, and meditation to improve mental and physical well-being. Research has shown that exercise improves strength, flexibility, and balance (Cramer et al., 2022). Recent research indicates that Hatha yoga can markedly enhance spinal flexibility and shoulder mobility, which are essential for reducing the prevalence of musculoskeletal disorders in overweight individuals (Büssing et al., 2023).

College students often suffer from lower back pain, which is exacerbated by obesity and a sedentary lifestyle. The focus of Hatha yoga on spinal alignment and extension helps alleviate pain and improve spinal health. Research indicates that daily yoga practice can substantially alleviate back discomfort and enhance functionality, rendering it an effective intervention for those with excess weight (Sherman et al., 2021).

Recent research indicates that Hatha yoga is advantageous for those with excess weight, as it enhances flexibility, core strength, and spinal health (Sharma et al., 2024). These findings are particularly relevant to collegiate environments, where stress alleviation and physical activity are essential for overall welfare and academic achievement. Overweight college students can enhance their mental and emotional resilience, alongside physical benefits, by including Hatha yoga into their routines. The integration of flexibility, core stability, spinal extension, and lumbar health through Hatha yoga presents a viable approach to address the challenges faced by overweight college students. It is essential to explore effective, comprehensive solutions that promote both physical and mental health as this demographic expands. This research aims to investigate the specific effects of Hatha yoga on these measures, providing significant new insights to the fields of physical education and health promotion.

## Objective of the Study

- To find out the effects of Hatha yoga on flexibility of shoulder, core back extension and lower back among overweight college students age group 20-24 years

- To prepare a list of recommendations for the enhancement of flexibility among overweight college students.

### Hypotheses

- There are significant effects of hatha yoga upon flexibility of shoulder, core back extension and lower back among overweight college students

### Delimitations

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 shoulder flexibility, core back flexibility and lower back flexibility
- BMI formula ( $\text{Weight in kg}/(\text{Height (cm)}/100)^2$ ) was applied to calculate the body

status

### Limitations

Following were the limitations of the study.

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

### Materials and Methods

#### Participants of the Study

The study's participants include all subjects, objects, or individuals who are directly related to the problem being addressed, as well as the gathering of necessary data (Ullah, Khan, Gul, and Ullah, 2022). This applies to experimental research. The research participants were male students aged 20 to 24 who were overweight and lived in the college hostel facilities.

#### Exclusion and Exclusion Criteria

The Physical Activity Readiness Questionnaire (PAR-Q) was utilized to establish the criteria for inclusion and exclusion. The PAR-Q is recognized as a screening instrument. Prior to initiating an exercise regimen, fitness instructors utilize it to select appropriate participants and mitigate potential health risks (Venkataraman et al., 2024). It frequently comprises queries that preclude open-ended answers. After distributing and collecting the PAR-Q from two hundred eighty students, sixty-five students were identified as eligible to participate in the study

endeavor. Random selection was employed to choose twenty-five out of sixty-five overweight students as subjects.

### **Research Design**

McKenney and Reeves (2021) assert that a study design constitutes a method for addressing a problem. The present investigation was experimental and employed a design featuring both a pre-test and a post-test. Each subject underwent a pre-test concerning the dependent variables (shoulder flexibility, core stability, and lower back strength) before to starting intervention. The pre-test comprised a sit and reach assessment, a shoulder elevation and a back extension examination respectively. The scores of every participant were documented. The experimental group underwent hatha yoga treatment for ten weeks, three days each week on Monday, Wednesday, and Friday. The intervention was provided subsequent to the pre-test. A post-test of each subject's dependent variables was conducted following the pre-test protocol after the 25 overweight subjects underwent therapy for ten weeks. The post-test results of each subject were documented for the dependent variables.

### **Orientation of Subjects**

The purpose of the orientation is to acquire reliable information. An introductory class was conducted to enhance participants' excitement and engagement in the selected training and assessment activities. The researcher elucidated the aim and importance of the present study, along with the participants' contributions to the investigation. All subjects received instructions on conducting the assessment, and the researcher elucidated the technique for evaluating dependent variables. Besides the orientation class, the researcher convened with the subjects throughout three distinct sessions. The objective of these sessions was to familiar the participants to the techniques and procedures necessary for executing the exercises of each training regimen. This was implemented to ensure that the participants could do the exercises accurately and without any risk of health complications or injury. The researcher directly exhibited each activity before the subjects.

### **Instrument for Collection of Data**

Instruments are tools that are employed for measurement. An instrument is a tool that researchers use to collect data during the course of research initiatives, as per Kola (2022). It is crucial to consider the nature of the research being conducted when selecting an instrument from the numerous available options, such as questionnaires, interviews, and assessments. More specifically, the objective of this study was to examine the impact of Hatha yoga on the flexibility of the shoulders. This encompasses the core and the lower back. In this specific case, the shoulder elevation test, the back extension test, and the sit and reach test were implemented as criterion measures to acquire satisfactory data regarding the dependent variables under investigation, according to the existing body of research.

### **Test Administration**

Throughout the dissemination and collection of the PAR-Q among study participants, the height (in centimeters) and weight (in kilograms) of each subject were assessed to determine

their overweight status. A stadiometer was employed to measure height (without footwear) and a digital scale to ascertain weight. All candidates stepped onto the weight scale barefoot and clad in minimal attire. The three weight measurements concurred that they were accurate on average. The overweight status was assessed using the body mass index (BMI) calculation, which is derived from weight in kilograms divided by height in centimeters squared (height in centimeters divided by 100)\*\*2, along with the subsequent data.

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

Flexibility measurements was made by shoulder elevation, and back extension and sit and reach test and all attempt three times and average value use in our work.

**Ethical Consideration of the Study**

The researcher must ensure that subjects are not exposed to circumstances that may jeopardize their physical or psychological well-being due to their involvement in the study. Consequently, each participant was provided with comprehensive information regarding the study's aims and methods. The participants were chosen by the PAR-Q method, ensuring they were free from various medical conditions. All participants provided written consent, which was duly obtained. Likewise, the person overseeing the organization issued a letter of consent.

**Protocol of Hatha Yoga**

A ten-week program of self-administered hatha yoga instruction was scheduled, consisting of 50-minute sessions that included warm-up and cool-down periods. The warm-up and cool-down durations were each ten minutes. The cool-down session comprised static stretching activities, while the warm-up involved active stretching exercises and walking. Exercise intensities varied between 55% and 65% of the maximal heart rate. Yoga training sessions comprised static postures referred to as asanas. Multiple asana positions, 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 practiced for designated durations. Each volunteer executed tasks under the oversight of an individual who provided ten weeks of intervention every other day. With the exception of the warm-up and cool-down phases, each workout session was designated to endure for 30 minutes.

**Analyses of Data**

Data was obtained from the selected subjects through tests before and after the intervention of 10 weeks. In this context, the Paired sample-test was employed for empirical results once the recorded data was evaluated. The tables and figures on the following pages display the full test findings in their complete.

**Demographic/anthropometric measurement of Hatha yoga group before treatment**

Variable	Age	(years)	N	Weight	Std
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mean				
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 Shoulder Flexibility of the Hatha Yoga Subjects**

Variable	Test	N	Mean	Std Dev	Mean Diff	Df	Sig.
Shoulder flexibility	Pre	25	9.00	3.24	1.85	23	.000
	Post	25	10.85	3.02			

The table illustrates the subjects' shoulder flexibility. The study found a significant difference ( $.000 < \alpha = 0.05$ ) in shoulder flexibility in inches between pre-test and post-test after ten weeks of Yoga Asana practice. The gain in shoulder flexibility in inches was attributed to a particular workout protocol administered to participants during the trial. The mean value before the test was 9.00 inches, and after ten weeks of Yoga Asana, it increased to 10.85 inches, resulting in a mean difference of 1.85 inches.

**Pretest and Posttest Comparison of Core Flexibility Back Extension of the Subjects**

Variable.	Test	N	Mean	Std. Dev	Mean Diff	Df	Sig.
Core Back extension flexibility	Pre test	25	19.05	2.69	1.91	23	.000
	Post test	25	20.96	2.55			

In the accompanying table, you will find the measures of back extension flexibility that were taken of each individual subject both before and after the test. The back extension flexibility of twenty-five patients was seen to have a statistically significant difference ( $.000 < \alpha = 0.05$ ) between the pre-test and post-test measurements. The difference was 19.05 inches, which was less than 20.96 inches, resulting in an improvement of 1.91 inches. According to the data, there are considerable changes occurred in the back extension flexibility of people, which was measured in inches. The participants in this study followed a predetermined yoga routine for a period of ten weeks, which resulted in an increase in back extension flexibility assessed in inches. As a result of this, the situation became more serious.

**Pretest and posttest comparison of lower back extension of the subjects**

Variable.	Test	N	Mean	Std. Dev	Mean Diff	Df	Sig.
Lower Back extension flexibility	Pre test	25	.194	4.15	2.25	23	.000
	Post test	25	2.41	4.02			

The table compares all individuals' lower back extension flexibility before and after the test. There was a significant difference ( $.000 < \alpha = 0.05$ ) in lower back extension flexibility between the pre-test and post-test of 25 patients (.194 inch < 2.41 inch, Improvement = 1.91

inch). The statistics show a substantial variation in the subject's lower back extension flexibility. Participants in this study followed a unique hatha yoga training plan for ten weeks, resulting in an increase in hamstring and lower back extension flexibility assessed in inches.

### **Finding of the Study**

It was expected that there would be significant effects of Hatha yoga on the flexibility of the shoulder, core back, and lower back in people aged 20 to 24 years old, taking into consideration the material that was already available. As a result of the analysis of the data, it was determined that Hatha yoga has a substantial impact on the flexibility of the shoulder, core back, and lower back ( $P < 0.05$ ). As a result, the hypothesis H1 is accepted.

### **Conclusion**

One of the primary goals of the study was to investigate the impact that Hatha yoga had on the flexibility of the shoulders, core, and lower back in college students who were between the ages of twenty and twenty-four. In college students who were overweight and between the ages of 20 and 24, the results of a study of the data showed that ten weeks of hatha yoga greatly improved the flexibility of the shoulders, core, and lower back.

### **Recommendations**

1. The findings of the study demonstrated that practicing Hatha yoga led to improvements in health-related fitness as well as improvements in the flexibility of the shoulder, core, back extension, and lower back in students who were overweight. Students who are overweight should therefore make yoga workouts a regular part of their routine.
2. A nation's citizens are its most valuable asset. When they are in good health, they are able to carry out the tasks that have been entrusted to them in an efficient and effective manner. In order to raise awareness among the general public about the significance of hatha yoga exercises, it is recommended that seminars, workshops, and conferences be established.
3. Students are the nation's next generation, and they are the future. The incorporation of hatha yoga exercises into the curriculum of all educational institutions is recommended for the purpose of enhancing the students' health-related fitness.
4. The physical trainers should also recommend and incorporate the hatha yoga exercises into the protocols for the purpose of improving the health-related fitness of the trainees, particularly their flexibility in the shoulder, core back, and lower back. This will pave the way for the trainees to improve their performance in sports activities.

### **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 flexibility of shoulder, core back extension and lower back 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 yoga 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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