

Research Article

Effect of 10-week Yoga Intervention on Obesity on Working Male Professionals

Amit Kumar¹, Udham Singh²

¹Research Scholar, ²Assistant Professor, Department of Yogic Science, Gurukula Kangri (Deemed to be University), Haridwar, Uttarakhand, India.

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Corresponding Author:

Amit Kumar, Department of Yogic Science, Gurukula Kangri (Deemed to be University), Haridwar, Uttarakhand, India.

E-mail Id:

ak3768235@gmail.com

Orcid Id:

<https://orcid.org/0009-0008-7598-6712>

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A B S T R A C T

Background: Yoga practices have been shown to be effective for obesity and its related anthropometric variables. Various kinds of research assessing the effectiveness of yoga practices on obesity are available. The present article measures the effect of 10 weeks of yoga practice including loosening exercises, *yogasanas*, *pranayamas*, *kriyas*, and *surya namaskar* among working male professionals suffering from obesity.

Materials and Methods: 75 males with ages varying between 35 and 55 years were screened for the study. Fifteen participants did not meet the inclusion criteria, and were thus excluded; therefore, 60 participants were selected for the study. The included adult males did not have any disease other than obesity. The participants of the yoga group received 10 weeks of yoga practice and the control group did not receive any intervention. Body weight (BW), body mass index (BMI), waist circumference (WC), and hip circumference (HC) of the participants were calculated at baseline and after 10 weeks. Informed consent was obtained from each participant prior to participation. The study was approved by the Institutional Ethics Committee, Gurukula Kangri (Deemed to University).

Results: Results reported that anthropometric variables, BW, BMI, WC, and HC ($p < 0.001$) had a significant reduction in the yoga group. Comparison between the group showed significant differences in BW, BMI, and WC ($p < 0.05$) except HC after a 10-week period.

Conclusion: Present study suggests that a 10-week yoga intervention would be beneficial for working male professionals with an obesity level of one. The study has also a few implications in hospitals for patients as yoga therapy and yoga consultation.

Keywords: Yoga, Obesity, Working Male Professionals

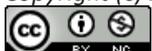
Introduction

Commonly, obesity is found to be a universal threat spreading in humans due to the detrimental lifestyle and is giving way to other impending diseases. The rapid lifestyle

has invited metabolic disorders. Obesity or overweight is a metabolic disorder and a lifestyle-related health problem increasing rapidly across the world.¹ It is characterised by excessive fat accumulated in the body which may have an

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adverse effect on health. Body mass index is a measure to classify overweight or obesity in people. The WHO considers a person to be overweight when BMI is found to be greater than or equal to 25, and obese when BMI is found to be greater than or equal to thirty.² Based on a report published by the World Health Organization, every one out of six adults falls prey to it while 2.6 million people lose their lives due to obesity and being overweight.³

In 2016, the global prevalence of obesity had nearly tripled since 1975. More than 1.9 billion adults, 18 years and over (~ 39% of the world's adult population wherein 39% of men and 40% of women), are overweight. Out of 1.9 billion people, almost 650 million (~ 13% of the world's population) were obese and approximately 2.8 million people were found to be dead due to being overweight or obese.⁴ Obesity is considered to be a lifestyle health disorder that the entire world is facing today. In current trends, it is estimated that by 2025, nearly one billion adults will be obese wherein 177 million adults will be suffering from severe obesity and almost it will affect 2.7 billion adults. In India, the prevalence of obesity is increasing rapidly in recent years with more than 135 million people being affected. The estimated prevalence rate of abdominal obesity and central obesity varies across age, gender, and geographical location, from 11.8% to 31.3% and 16.9% to 36.3% respectively.⁴ It is estimated that the prevalence of obesity will triple in India by 2040 wherein the prevalence of obesity and overweight will touch 9.5% and 30.5% among men, and 13.9% and 27.4% among women respectively.⁵ Other Indian studies have reported that the prevalence of obesity and overweight will increase by 5% and 27.8% respectively by 2030.⁶

Persons who suffer from obesity are seen to have high morbidity and fatality in comparison to those who are not overweight. Research done in various parts of India shows cases of the mounting predominance of obesity. The study also illustrates the inactive life of Indian people who work in the corporate sector and cannot allocate time for any physical activity to keep them healthy. The body fat that builds up might have an unconstructive impact on the fitness of a person. If the Body Mass Index (BMI) ranges from 25 to 29, the individual is known as overweight while if it crosses thirty, the condition is considered to be obesity.⁷ Yoga is considered to be an art as well as a science as it unites the corporeal self with the mind and the soul. The prime aim of this physical and mental engagement (yoga) is to help the person in utilising the breath and the body to cultivate consciousness as separate beings closely associated with the integrated world of conception. The most energetic series called '*surya namaskar*' has been considered to be an effective technique to decrease body fat.^{8,9}

A study illustrates that yogic intervention in routine life helps in arousing or restraining metabolic constraints and is a good treatment for obesity. It was found that after a successful eight-week session, body weight and body mass index were considerably reduced.¹⁰ The authors stated that life without good health is worthless. The goal of this study was to delineate the function of '*Asanas*' and '*Pranayama*' in plummeting fatness as it is considered the breeding ground for several diseases.¹¹ In a study, it was illustrated that obesity is an issue which arises from multiple factors and its cure differs from one to another. The outcome of this study proved that yoga is effective if implemented with other lifestyle changes and is therefore highly useful for obese people as a mode of constructive management of obesity.¹²

There is an availability of medications, but yoga can be a great complementary therapy that helps in the management of obesity.¹³ This treatment works well with a planned and appropriate diet, correct yoga poses, and proper inhalation methods. The yogic postures are effective on endocrine glands, advancing the circulation of blood, thereby having a better effect on the metabolism rate.¹⁴ A study mentioned that the advantages of yoga practice appreciably decrease the common corpulence of the body. The research reflects that there was a major diminution in the body mass index and the amount of cholesterol by yoga. A study elaborated on the consequences of '*shatkarma*' exercise on serum glucose and cholesterol level of the people demonstrating a major decrease in these pointers. Cholesterol is seen to lessen due to the higher rate of metabolism that is achieved from yoga.¹⁵

Owing to appropriate statistical data, yoga is not considered to be the only way of reducing weight, nonetheless, the conclusion of the research shows the usefulness of yoga as a cure to deal with obesity. The exploration, however, requires further scrutiny to be conducted in order to determine the success of yoga in adults.¹⁶ The above research studies have shown a positive influence of yoga therapy and yoga intervention on obesity and its related parameters. The present study is designed to use various yoga practices such as *shatkarma* (cleansing techniques), *surya namaskar* (sun salutation), *pranayama* (controlled breathing), and *yoga nidra* (for relaxation). Its aim is to find the efficacy of a 10-week yoga intervention on anthropometric measurements such as body mass index, weight, waist circumference, and hip circumference which are considered obesity measures.

Purpose of the Study

The central purpose of the current article is to evaluate the effect of a 10-week *yoga* intervention on obesity in working male professionals. In this regard, four obesity-related anthropometric variables - body weight (BW), body mass index (BMI), waist circumference (WC), and hip

circumference (HC) were measured during the pre-test and after a 10-week period. Based on the research evidence, we propose the following hypotheses:

H₁: There will be a significant reduction in the body mass index (BMI) of participants following a 10-week yoga intervention.

H₂: There will be a significant reduction in body weight (BW) of participants following a 10-week yoga intervention.

H₃: There will be a significant reduction in waist circumference (WC) of participants following a 10-week yoga intervention.

H₄: There will be a significant reduction in hip circumference (HC) of participants following a 10-week yoga intervention

Methods

Participants

Male subjects (age group 35-55 years) with obesity level-1 from a housing society (N = 75), who could speak and understand the Hindi language were screened for the study

sample (Figure 1). Participants having any chronic illness such as physical impairments, heart problems, neurological disorders, back pain, and inability to practice yoga were excluded from the study. The study was conducted between September and November 2019. A total of 75 participants with obesity level-1 from a housing society in the Northern part of India were included in the study based on pre-determined inclusion criteria. 15 participants, who do not meet inclusion criteria, were excluded from the study. Therefore, 60 subjects were selected as study samples. The details of inclusion and exclusion criteria are presented in Table 1. The accidental sampling method was used to recruit the subjects for the study. All the participants were educated about the parameters and intervention, and they had duly signed the informed consent form prior to the study. This study was approved by Institutional Ethics Committee (IEC), Gurukula Kangri (Deemed to be University), Haridwar. All the procedures were performed in accordance with the ethical standards of the committee and the 1964 Helsinki Declaration and its later amendments.

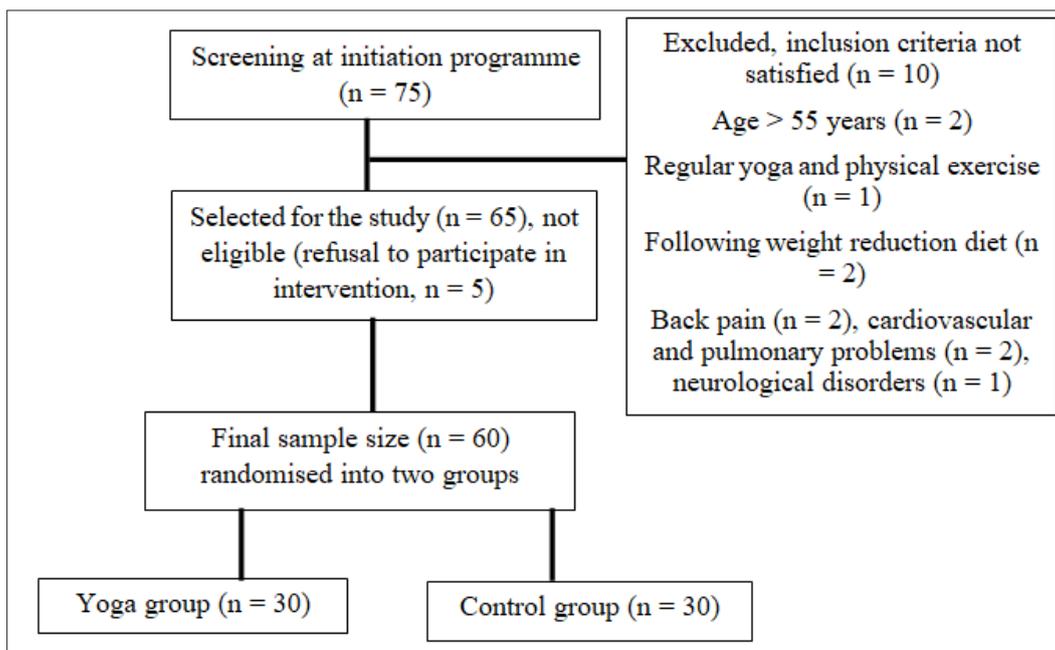


Figure 1. Flowchart of the Study

Table 1. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Male gender Participants not practising regular physical exercise Body mass index (BMI) first level Willingness to participate in a one-day pre-workshop or initiation programme Willingness to participate in assessment at baseline and post 10 weeks Waist circumference (WC) > 90 cm	Participants practising regular yoga and physical exercise The participants following a weight reduction diet Physical impairments, heart problems, neurological disorders, lungs problems Participants having back pain and not able to practice yoga

Design of the Study

This study has two groups pre-post design, and it was conceived as a randomised controlled trial (RCT). They were randomly allocated either into the yoga (n = 30) group or the control (CL, n = 30) group with the help of the lottery method. The randomisation method was set up by a statistician who was not involved in participant inclusion, intervention, data collection, and data analysis. The lottery method is the oldest method for the random allocation of the sample. A number was given to all participants and the numbers were drawn from the box randomly to allocate the participants into two groups. All the samples were informed about the study and the intervention. The participants were not given any other drug. An informed consent form was obtained from each of the participants prior to their participation in the study. The participants of the yoga group received structured yoga practices for 10 weeks and participants of the CL group were asked to follow their current lifestyle for an equal period of 10 weeks. The obesity measurement indicator BMI and other anthropometric variables BW, WC, and HC were recorded before and after. The obesity level of both the yoga group and control group was compared.

Intervention

Yoga Group

The yoga intervention consisted of 90 minutes of yoga practice for 6 days weekly for a 10-week period. The participants were made to practice yoga together. Personal sessions were not provided to them. Yoga intervention

included loosening exercises, a few *shatkarma* practices, *surya namaskar*, *pranayamas*, *kunjla kriya*, and *yoga nidra*. The yoga practice was an experimental setup for the included participants. The subjects were engaged in different yogic practices daily (except Sundays) from 6:00 am to 7:00 am for 10 weeks. The details of the intervention are shown in Table 2. Along with yoga intervention, the participants were also advised to observe a weight reduction diet (not standardised dieting) during the 10 weeks. Basically, it was advised not to consume a meal which is a rich source of carbohydrates and fats. Instead, the participants were advised to take fruits, salads, and fibrous foods for a period of 10 weeks.

Control (CL) Group

The males allocated to the control group did not receive any intervention and they were asked to follow their regular lifestyles.

Outcome Measures

The anthropometric measurements (outcome measures) such as body weight (BW), body mass index (BMI), waist circumference (WC), and hip circumference (HC) were recorded at baseline and after a 10-week period. The BMI and BW were considered primary outcome measures of the study, whereas WC and HC were considered secondary outcome measures.

Body mass index (BMI): The obesity level i.e., BMI of each participant was recorded through the following equation:

$$\text{BMI} = \text{weight}/\text{height}^2$$

Table 2. Time Schedule and Selected Yoga Practices (6:00 am to 7:00 am)

Name of Practices	Rounds/Day	Time Taken/Day
Starting prayer	Everyday	1 minute
Loosening exercises	Everyday	10 minutes
<i>Shatkarma-kunjla kriya</i>	Once in a week	Complete one hour (No other practices)
<i>Shatkarma-laghu shankha prakshalana</i>	Once in two weeks	Complete one hour (No other practices)
<i>Shatkarma-agnisar kriya</i>	Everyday	3 minutes
<i>Shatkarma-kapalbhati</i>	Everyday	5 minutes
Sun-salutation	Everyday	12 minutes
<i>Nadisuddhi pranayam</i>	Everyday	5 minutes
<i>Bhastrika pranayam</i>	Everyday	5 minutes
<i>Ujjyayi pranayam</i>	Everyday	3 minutes
<i>Yoga nidra</i>	Everyday	12 minutes
Counselling	Frequently-according to need	2 minutes
Fasting	Once in a week	Entire day with practices
Closing prayer	Everyday	1 minute

The measurement unit of weight and height was in kilogram (kg) and meter (m) respectively. BMI is used for classifying people into obesity groups.

Waist Circumference (WC) & Hip Circumference (HC):

WC and HC were measured through a narrow non-stretch tape in adults in the standing position, wearing minimal clothes. WC is measured around the widest portion of the stomach, just midway through the belly button or between the lower ribs and iliac crest. The tape should be positioned correctly on the belly, then the measurement should be taken after exhalation. HC is measured at the widest and largest portion of the buttocks. It is the distance around the largest circumference of the hip region.^{17,18}

Assessment Tool: A weighing machine is used to determine the weight or mass of an object or person. The weight of a person is commonly measured using units in grams (g) and kilograms (kg). However, other metric units are also used such as pounds (lbs) and ounces (oz). The metric unit 'kg' was used to determine the BMI level.

Statistical Analysis

This study was designed to test the hypotheses, that is, whether there is a significant reduction in anthropometric measures (e.g., BW, BMI, WC, and HC) of obese males following 10 weeks of yoga intervention. Average scores

of anthropometric measures for both groups have been reported in the result section. We checked for the normality of the data and equality of variances. We found that data were normally distributed ($p < 0.05$) at baseline for the outcome measures. Therefore, a parametric test was employed to analyse the data. All statistical analysis was computed by SPSS version 20.

Results

To test the hypotheses, we performed the paired sample t-test. In the within-group analysis, the paired sample t-test showed that there was a significant reduction in anthropometric variables of males after 10 weeks of yoga practice among the experimental group's participants, wherein, no reduction was seen in anthropometric variables of the control group's participants. We also checked the reduction of BMI, weight, WC, and HC in terms of percentage. The percentage decrease in average BMI score, weight score, WC score, and HC score was 5.01%, 8%, 9%, and 7% respectively in the experimental group (Table 3). In the comparison between groups, the baseline score was statistically matched for all anthropometric measures. Results showed that there was no significant difference between the measures at baseline, whereas, after 10 weeks of yoga intervention there was a significant difference in anthropometric variables except for HC (Table 4).

Table 3. Within Group Statistics (Mean ± SD) of both Yoga Group and Control Group

Variables	Group	Pre (Mean ± SD)	Post (Mean ± SD)	95% CI; LB to UB		p Value	t Value	df
BW	Yoga	97.46 ± 6.99	92.70 ± 7.15	4.04	5.48	0.000	13.52	29
	Control	97.05 ± 4.49	97.19 ± 4.44	-0.29	-0.00	0.27	1.73	29
BMI	Yoga	33.09 ± 1.29	28.21 ± 1.77	4.43	5.33	0.000	22.34	29
	Control	33.18 ± 1.12	33.10 ± 1.16	-0.08	0.24	0.351	0.94	29
WC	Yoga	108.29 ± 9.05	104.18 ± 8.69	3.87	4.33	0.000	36.54	29
	Control	108.16 ± 7.28	108.22 ± 7.28	-0.13	0.01	0.11	1.62	29
HC	Yoga	115.46 ± 9.73	113.13 ± 9.75	2.13	2.53	0.000	23.62	29
	Control	114.43 ± 7.12	114.43 ± 7.10	-0.04	0.05	0.88	0.14	29

CI: Confidence Interval, LB: Lower Bound, UB: Upper Bound, BW: Body Weight, BMI: Body Mass Index, WC: Waist Circumference, HC: Hip Circumference, df: Degree of Freedom.

Table 4. Analysis between Groups (Mean ± SD) done using Independent Sample t-test

Variables	Time	Yoga Group (Mean ± SD)	Control Group (Mean ± SD)	95% CI; LB to UB		p Value	t Value	df
BW	Pre	97.46 ± 6.99	97.05 ± 4.49	-2.62	3.45	0.785	0.274	58
	Post	92.70 ± 7.15	97.19 ± 4.44	-7.57	-1.41	0.005	2.924	58
BMI	Pre	33.09 ± 1.29	33.18 ± 1.12	-0.71	0.54	0.783	0.277	58
	Post	28.21 ± 1.77	33.10 ± 1.16	-5.66	-4.11	0.000	12.641	58

WC	Pre	108.29 ± 9.05	108.16 ± 7.28	-4.11	4.37	0.951	0.061	58
	Post	104.18 ± 8.69	108.22 ± 7.28	-8.17	0.11	0.046	1.947	58
HC	Pre	115.46 ± 9.73	114.43 ± 7.12	-3.37	5.43	0.642	0.468	58
	Post	113.13 ± 9.75	114.43 ± 7.10	-5.71	3.11	0.558	0.590	58

CI: Confidence Interval, LB: Lower Bound, UB: Upper Bound, BW: Body Weight, BMI: Body Mass Index, WC: Waist Circumference, HC: Hip Circumference, df: Degree of Freedom.

Discussion

We followed up the analysis with short discussions in terms of hypotheses' acceptance and rejection, justification of findings, and then compared the results with the outcome of previous research studies. The present study aimed to examine the impact of structured yoga intervention on obesity. Changes in BW, BMI, WC, and HC were assessed in 60 obese male participants before and after a 10-week time. Out of 60, 30 participants received yoga intervention for 10 weeks. There was a significant reduction in the outcome measures of the yoga group's participants. Based on the literature review, we had hypothesised that body mass index (hypothesis 1), body weight (hypothesis 2), waist circumference (hypothesis 3), and hip circumference (hypothesis 4) would reduce significantly in participants. Our results showed the anthropometric variables reduced significantly after ten weeks of yoga intervention. We thus found that hypotheses 1 to 4 were proved and accepted. We then continued the discussion to understand the significant mean difference of anthropometric variables between the two groups at ten weeks. The findings showed a significant difference in outcome measures - BMI, BW, and WC (except HC) (hip circumference) between the two groups. The reason the hip circumference did not undergo a significant reduction was because of extreme values. Few participants in the control group showed high values in the hip circumference measure.

The findings of the current study are mostly in line with the previous studies wherein the obesity level came to normal including other anthropometric variables as a result of yoga intervention.^{19,20} The previously published research papers provide the notion that obesity-related anthropometric variables can be reduced by long-term yoga practices and inculcation of intense yoga and cleansing techniques. The proper body weight along with waist circumference and hip circumference is achieved through balanced nutritional/vegetarian foods with minimum carbohydrates and fats. Considering these factors, the yoga interventions (e.g., loosening exercises, *shatkarma*, *surya namaskar*, *pranayama*, and *yoga nidra*) were employed in the present study. The participants were also advised to take vegetarian and weight reduction diets.

Implications, Limitations, and Future Direction

The findings of this study have implications for therapy in

hospitals. This study has been done on healthy participants with the age range of 35-55 years and has shown positive overweight-related outcomes. The positive outcome of yoga intervention advocates its implication as therapeutical practice and consultation in hospitals for patients with various ailments. The implication of yoga therapy and yogic consultation may reinforce life force, quality of life, health, and happiness by reducing obesity. The techniques could be applied as alternative and complementary therapy for the treatment of heart problems, diabetes, thyroid, and associated obesity-related non-communicable diseases. However, intense yoga practices could not be applied to these categories of patients.

A few yoga practices such as pranayama, loosening exercises, and *kriya* can be beneficial and applied to patients in hospitals. Future studies should evaluate the efficacy of yoga therapy on obesity compared with physical education, sports, and complete nutritional programme. The findings of the current study cannot be generalised to other yoga programmes. Future studies should also investigate the generalisability of patients and other populations. The physiological impact of *yogasanas*, *pranayamas*, and *kriyas* on anthropometric variables has not been discussed and evaluated in this study. Future studies may focus on evaluating the underlying physiological mechanism of yoga.

Conclusion

As yoga consists of safe and effective mind-body practices, therefore, it is suggested to promote yoga among men to reduce obesity. However, it is noted that other factors like standardised diet, sleep cycle, mental contentment, and appropriate body posture are needed along with yogic intervention to achieve a healthy body type and structure.

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Conflict of Interest: None

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