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Original Research Article

Effect of Pranayama on Body Mass Index in Young Medical Students

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ABSTRACT

Background: Association between Body Mass Index (BMI) and cardiovascular diseases has been consistently observed, but yet it is not clearly understood, possibly because of interactions with other influencing factors. One unresolved question is whether there is a linear relationship.
Aim: The aim of the study was to investigate the effect of pranayama on BMI in young medical students.
Materials & methods: A comparative cross sectional study was conducted on 60 young volunteers (42- male, 18- female) of age group 17-20years, to study the effect of pranayama on BMI.). Anthropometric parameters like height (cm), weight (Kg) were recorded. BMI was calculated using formula, BMI = Wt (kilograms)/Ht 2 (meters) before and after 4th, 8th, & 12th week of pranayama practice. ANOVA and Post hoc Tukey's test was applied for statistical analysis and p-value <0.05 was considered the level of significance.
Results: Mean BMI Before pranayama practice was 21.657 ± 3.01. There was significant decrease in BMI (20.998 ± 2.76) after 12th week of pranayama practice. There was no significant change in BMI observed after 4th week of pranayama practice But significant decreased in BMI occur after 8th & 12th week of pranayama.
Conclusion: Short term pranayama have reducing impact on BMI and also have positive and useful effect on weight reduction in young adults.

Key words: Pranayama, Height, Weight, Body Mass Index.

INTRODUCTION

Over thousands of years asanas, pranayama, and meditation are three main techniques of yoga practiced in India, to attain functional harmony between the body and mind. With increased awareness and interest in health and natural remedies, yogic techniques including pranayama are getting importance and becoming increasingly acceptable to the scientific society. [1] Obesity is the newer chronic non-communicable disease, though is increasing in an epidemic proportion is one of the today's most neglected public health problems according to the World Health Organization. [2] A number of clinical measurements for obesity have been used to determine susceptibility to different

diseases. [3] These include anthropometric indices such as body mass index (BMI), waist-hip ratio (WHR) and waist circumference (WC). Body Mass Index (BMI) is considered to be one of the most useful indices for obesity in adults. BMI is determined by dividing weight (wt) in kilograms by height (ht) in meters square.

Nowadays Obesity is considered as global epidemic. It cause a large number of health problems. Other than the genetic predisposition, favorable environment for development of obesity due to sedentary life style, inappropriate intake of caloric rich easily available junk food and automated working profile. Various measures with variable results are used to reduce weight like dieting, hydrotherapy, steam bath, pharmacological therapy, surgical therapy, etc.

Hence present study was conducted to find out the effect of short term pranayama on weight reduction & body mass index in young medical students which will scientifically contribute to identify at-risk population well in advance and will also help to implement necessary action to obtain desired physical fitness in the form of optimum body composition and thereby to prevent / delay future health hazards in young adults.

MATERIALS AND METHODS

A cross sectional study was carried out on healthy 1st year M.B.B.S. students in Dept. of Physiology G.M.C. Miraj (Maharashtra). Students were evaluated as per standard proforma, which included a questionnaire. The students with, past or present history suggestive of cardiovascular or respiratory illness or any other systemic illness, any family history of asthma or allergic diseases, were not included in the study. Only nonsmoker students were enrolled. Only 60 students were eligible to whom the experimental protocol was explained and written informed consent was obtained from them. 0ut of sixty students 42 were male and 18 were females.

In the beginning itself the institutional ethical committee approval was obtained for the study. Anthropometric measurements: Height (in meters) - using a stadiometer, weight (in kilograms) - using a digital weighing scale (precision of 100 grams), were measured. Body mass index (BMI) was calculated using the formula,

$$BMI = Wt\ (kilograms)/Ht^2\ (meters)$$

After recording the above parameters, students were trained by yoga instructor. They Performed the Pranayama practice daily in the evening for one hour (5.15 pm - 6.15 pm), Six days in a week for three months under experts' supervision. The Pranayama practice consisted of prayer, Nadishuddhi, Anulom-vilom, Savitri, Sitakari, Sadanta, shawasan Bhastrika, Omkar recitation, each done for a period of 5 min. followed by Bhramari, Kapalbhati for a period of 10 min.

All the parameters were recorded After 4 weeks, 8 weeks and 12 weeks of Pranayama practice & Results were presented as Mean SD. Repeated measure ANOVA test was used to find the significance of study parameters by using SPSS 16.0 version. P value less than 0.05 was considered statistically significant.

RESULTS

Table No- I Percentage distribution of students according to BMI

Sr. No.	BMI (kg/m^2) category	Prevalence (%)
1	Under weight BMI < 18.5	8.3
2	Normal weight BMI 18.5-24.9	83.3
3	Over weight BMI 25 to <30	5
4	Obese BMI 30 & above	3.3

Table No- II Comparison of Mean ± SD Values Height and weight before and after 4th, 8th & 12th week of Pranayama practice using Repeated measure ANOVA.

Parameters	Before pranayama Mean ± SD	After 4th week of pranayama Mean ± SD	After 8th week of pranayama Mean ± SD	After 12th week of pranayama Mean ± SD
Height (cm)	165.30±7.046	165.30±7.046	165.30±7.046	165.30±7.046
Weight (Kg)	59.25±9.502	59.07±9.331	58.46±9.401	58.26±9.341

Table No.-III Comparison of Mean ± SD Values of BMI before and after 4th, 8th & 12th week of Pranayama practice using Repeated measure ANOVA.

Parameters	BMI(kg/m^2) Mean ± SD	F Value	'P' Value
Before pranayama	21.657 ± 3.01	16.36	0.001*
4th week of after pranayama	21.597 ± 2.98		
8th week of after pranayama	21.383 ± 3.07		
12th week of after pranayama	20.998 ± 2.76		

Table No.-IV Between group Comparison of BMI before and with 4th, 8th & 12th week of after Pranayama practice using Post hoc tukeys' test.

Parameters	After 4th week of pranayama		After 8th week of pranayama		After 12th week of pranayama	
	Mean difference	'P' Value	Mean difference	'P' Value	Mean difference	'P' Value
BMI	0.060	0.319 (NS)	.274	0.006*	0.659	0.001*

*-significant, NS- Not significant

DISCUSSION

The pattern of body fat distribution is recognized as an important predictor of the health risks of obesity. Individuals with more fat on the trunk, especially abdominal fat, are at increased risk of obesity related health problems compared with individuals who are equally fat, but have more of their fat on extremities.

In present study, we observed that body weight & body mass index decreased significantly. Decrease in body weight causes change in body fat distribution. [4,5] Mauro Zamboni *et al* reported that weight loss is associated with changes in regional fat distribution. [6]

In the present study as shown in table no. II before pranayama practice BMI was 21.657(kg/m^2) and, when compared BMI after 4th, 8th, & 12th week of pranayama practice it was 21.597(kg/m^2), 21.383 (kg/m^2) & 20.998 (kg/m^2) respectively. In this study we found that after 8th & 12th week pranayama practice BMI was significantly decreased (P=0.001). But there was no statistically significant decrease in BMI was observed after 4th week of pranayama practice.

The results of this study are coincide with Manchanda *et al.,* (2000), [7] they had observed weight reduction–6.8±8.2% (P=0.0019) after yogic lifestyle intervention in coronary atherosclerotic patients. Similarly Schmidt *et al;* (1997) [8] studied cardiovascular risk factors and hormones during comprehensive residential 3 months kriya yoga training and they observed that significant reduction in body mass index. Calle–Pascual *et al.* (1991) [9] studied behaviour modification in obese subjects with type–2 diabetes mellitus and observed that BMI reduced from 34.2±0.8 kg/m2 to 30.6±1.1 kg/ m2 (P=0.05).

Our study also coincide with various other studies, they have shown that effect of pranayama on obesity in the form of weight reduction. Nirmala N. Nayak *et al (2004)* [10] studied that various yoga asanas including Kapalbhati seem to have a positive effect in reducing obesity. Swami Ramdev mentioned that Kapalbhati is helpful in reducing obesity (2005). [11] Dinkar R. Kekan (2013) reported that Kapalbhati has reducing impact on Body mass index and abdominal skinfold thickness in overweight individuals. [12]

The possible reason for the reduction of weight and BMI in present study may be due to pranayama involves abdominal muscle contractions with forceful exhalation and natural inhalation. It is a form of abdomino-respiratory-autonomic exercise. Due to this, respiratory, abdominal and gastrointestinal receptors get stimulated. Also afferents, centres in brainstem, cortex and effectors get stimulated. This leads to synchronous stimulation of autonomic nervous system, hypothalamus, pineal gland and other associated brain structures increases synchronous discharge to all parts of the body including endocrine and metabolic processes. This is responsible for the effect of pranayama on fat metabolism. This causes increase in basal metabolic rate, and because of this there is increase in calories consumption and decrease in fat deposition and so reduction in weight. This

might be the possible reason behind reduction in BMI in present study.

CONCLUSION

It is concluded that the short term pranayama have positive and useful effect on certain cardiovascular risk factors like obesity and weight reduction.

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