Section: Physiology

Original Research Article

# EFFECT OF YOGIC EXERCISES IN LIPID PROFILE OF OVERWEIGHT AND OBESE SUBJECTS

*Bittoo Kumar Surlya[1], Yogita Joshi[2], Avni Kulkarni[3], Mudasir Ahmad Wani[4], Rajat Prakash[5]*

[1]*Professor, Department of Physiology, S.S.S.U.T.M.S, SEHORE, M.P, India.*
[2]*Assistant professor, Department of Biochemistry, Shri Satya Sai College of technology and Medical Sciences, Bhopal, India.*
[3]*Tutor, Dept. Medical Biochemistry, Satya Sai Medical College, Bhopal, India.*
[4]*Assistant Professor, Physiology, Maharishi Markandeshwar College of Medical Sciences and Research, Sadopur, Ambala, Haryana, India.*
[5]*Assistant professor, Department of Microbiology, Maharishi Markandeshwar College of Medical Sciences and Research, Sadopur, Ambala, Haryana, India.*

***Received*** *: 05/06/2025*
***Received in revised form*** *: 24/07/2025*
***Accepted*** *: 12/08/2025*

**Corresponding Author:**
**Dr Rajat Prakash**
Assistant Professor, Department of Microbiology, Maharishi Markandeshwar College of Medical Sciences and Research, Sadopur, Ambala, Haryana, India.
Email: drrajatriprakash@gmail.com

**DOI:** 10.70034/ijmedph.2025.3.412

**Source of Support:** Nil,
**Conflict of Interest:** None declared

**Int J Med Pub Health**
2025; 15 (3); 2232-2237

ABSTRACT

**Background:** Obesity is a leading modifiable risk factor for dyslipidemia and cardiovascular disease. Yoga, an ancient mind-body practice, has shown potential in improving cardiometabolic parameters by promoting lifestyle modification, enhancing autonomic function, and reducing stress. However, limited evidence exists regarding its impact on lipid profiles among young overweight and obese individuals. **Objectives:** To evaluate the effect of a structured 10-week yogic intervention on anthropometric parameters and lipid profile in overweight and obese individuals aged 18–30 years.

**Materials and Methods:** A quasi-experimental, observational analytical study was conducted at Index Medical College under Malwanchal University between 2021 and 2023. A total of 150 overweight or obese participants (BMI ≥25 kg/m²), aged 18–30 years, were enrolled. Participants were divided into two groups: a yoga intervention group (n=75) and a control group (n=75). The yoga group underwent a 10-week program comprising physical asanas, pranayama, and meditation. Anthropometric parameters (weight, BMI, WC, HC), cardiovascular, respiratory parameters, and lipid profile (TC, TG, HDL, LDL, VLDL) were assessed pre- and post-intervention. Statistical analysis was performed using SPSS v20.0 with paired and unpaired t-tests; $p<0.05$ was considered statistically significant.

**Results:** Post-intervention, the yoga group demonstrated a significant reduction in mean weight (73.6±7.7 to 68.5±7.1 kg, $p<0.001$) and BMI (27.1±1.4 to 25.2±1.3 kg/m², $p<0.001$). Lipid profile improved significantly in the yoga group: total cholesterol (TC) decreased from 194.5±21.2 to 179.8±20.4 mg/dL ($p=0.000$), LDL from 116.1±21.3 to 102.9±22.5 mg/dL ($p=0.000$), and VLDL from 35.5±15.1 to 32.5±13.2 mg/dL ($p=0.011$), while HDL increased from 42.7±6.0 to 44.2±6.2 mg/dL ($p=0.004$). The control group showed no significant changes. Between-group comparisons post-intervention revealed statistically significant improvements in TC, LDL, and HDL in the yoga group ($p<0.05$).

**Conclusion:** Ten weeks of structured yogic practice led to significant improvements in body composition and lipid profile in overweight and obese young adults. Regular yoga intervention may serve as a complementary approach for cardiovascular risk reduction and lipid management in this population.

**Keywords:** Yoga, Lipid Profile, Obesity, BMI, Cholesterol, Pranayama, Weight Management.

## INTRODUCTION

Etymologically, the term yoga comes from the linguistic root "yuj," which implies "to bind together" or "to yoke." Numerous other things can also be denoted by it, such as "union," "star conjunction," "grammatical rule," "endeavour," "occupation," "equipment," "means," "magic," "aggregate," "sum," and so on.[1] It is believed that yoga is both a way of thinking or consciousness and an Indian philosophical system. When used to describe a state of being, the Sanskrit term "Yoga" most usually refers to the union of the individual self (jiva-atman) with the ultimate Self (Parama-atman). Yoga is simply defined by Patanjali as "the restrictions of the whirls of consciousness" (chitta vritti nirodha) in Yoga Sutras 1.2. In other words, yoga is the practice of concentrating all of one's attention on the object of contemplation.[2] Bhagawadgita, defines Yoga as Samatvam (equanimity) (2.48) and Karmasu kausalam (skillfull ness in action) (2.50).

The tradition of yoga was transmitted orally, or parampara as it is known in Sanskrit, from teacher to student. Much was left out or altered as time went on, and much was added. Soon, a large number of schools emerged that represented many traditions, including the significant Bhagavad-Gita offshoots. The major Indian epics, the Ramayana and the Mahabharatha, have also influenced yoga philosophy.[3] The most important yoga school, Patanjali Yoga, first appeared in the second century BCE and is regarded as the most systematic and structured body of work in all of yoga. Patanjali Maharishi's Ashtanga Yoga, also known as the Eight Limbed Yoga, is a more practical interpretation.[4]

Yoga offers positive effects on both preventing diseases and promoting health in the general population, not just in cases of illness. It has been found to be beneficial for enhancing heart rate variability measures such as the low frequency band (LF), high frequency band (HF), and LF/HF ratio in both healthy men and women. Additionally, it improves subjective indicators of fatigue, pain,[5] and sleep quality in both healthy individuals and those with health issues.[6]

Obesity is the most prevalent challenging risk factor in today's sedentary society. In the present era, obesity is a complex syndrome that has become one of the most common lifestyle problems, particularly in urban areas. Obesity is caused by a higher body mass index and is the fifth largest cause of death globally. Excessive body weight is linked to a number of disorders, the most common being cardiovascular diseases (CVD), type II diabetes mellitus, osteoarthritis, obstructive sleep apnea, and some types of cancer.[5,6] Obesity is characterized by an excessive accumulation of fat due to a positive energy balance, occurring when energy intake surpasses energy expenditure. Other signs of obesity include stress, inflammation, and adipocyte hypertrophy and hyperplasia inside the adipose tissue.[7] Thirty to sixty-five percent of Indians are overweight or obese. Based on epidemiological statistics, youth are more vulnerable to overweight and obesity, as well as a host of lifestyle problems, the prevalence of which is expected to rise annually across south Asia, including India.[6,7] Obesity can result in compromised health and an elevated risk of morbidity from various diseases.

## MATERIALS AND METHODS

It was a Observational & Analytical Quasi-experimental study for 3 years (2021 to 2023). One group Pretest posttest design with Control group. This investigation was carried out at the Department of Physiology, Index Medical College, under the Faculty of Medicine and Health Sciences at Malwanchal University. It is an observational case-control research. Approximately 150 overweight or obese participants aged between 18 and 30 were recruited for the study. Among them, 75 participants underwent a ten-week yoga program, which included standard yoga poses, under the supervision of a yoga instructor. The remaining 75 participants served as the control group. This study began after obtaining approval from the institutional ethics committee. Prior to enrollment, all participants were briefed about the study objectives, and the benefits and risks involved were explained thoroughly. Each participant was given sufficient time to review the information leaflet and have their queries addressed. They were informed of their right to draw from the study at any point and the importance of voluntary participation. Each participant provided informed consent by signing a form indicating their willingness to participate in the study.

A total of 150 samples will be included in the study. The sample size has been calculated using the formula:

$$\text{Sample size} = \frac{\frac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

n = 250*384.16/249 +384.16

n = 152

Where, n = size of sample, N = size of population, p = sample proportion, e = sampling mistake, z = critical value.

Approximately 150 no. of samples

Taking the subjects who are satisfying the following inclusion criteria

**Inclusion Criteria**

- Age: 18 to 30 years
- Both sexes
- BMI ≥25 Kg/m2
- non smoker
- Participants who are ready to give their consent

**Exclusion Criteria**

- Subject with a medical history of any disease known to affect the autonomic cardiac function, neurological diseases, metabolic disorders, or endocrine disorders
- Active athletes
- Subjects on any type of medication such as hypolipidemic drugs, hormonal therapy, or steroids
- The subjects who were already practicing in any type of relaxation technique/Yoga or physical exercise.
- Smokers

**Methodology:** In this investigation, a single group pre-post study design was used. All the recruited subjects of Yoga group were given 5-minute session of Sharir Sanchalan. Subsequently, various asanas, including Halasana, Chakrasana, Bhujangasana, Sarvangasana, Ardha Paschimottan asana, Vajrasana, Matsyasana, Dhanurasana, and Padmasana, was performed for a total of 30 minutes. This was followed by a 20-minute session of Pranayam including Kapal Bhati, Bhastrika, Alternate Nostril Breathing, Right Nostril Breathing and concluding 5-minute of Meditation.

At the start of their course, the initial round of parameter recording was completed. The second phase of the recording was done after 10 weeks of the regular pranayama practice. This routine was span for duration of 10 weeks. They were carefully examined to look the changes in anthropometric measurements, lipid profile, cardiac and respiratory parameters due to the effect of 10 weeks various asanas. Assessments of Cardiac Autonomic Rhythm such as Resting Heart Rate (HR), Resting Systolic and Diastolic Blood Pressure (SBP & DBP) and Heart Rate Variability (HRV) were determined in both groups before and after the intervention. Both groups had their respiratory measurements taken, encompassing assessments of Respiratory Rate, Tidal Volume, Forced Vital Capacity and Breath-Holding Time.

**Statistical analysis:** Excel (Microsoft 17) and the SPSS, Chicago, IL, USA version 20.0 were utilized for the data examination. The difference for all normal quantitative measures between each measurement period, i.e., before and after yoga intervention, was studied using a paired t-test. The difference between the yoga and control groups for all normal quantitative indicators was analyzed using the Impaired T-test. The mean ± standard deviation was used to represent all parameters. P-values less than 0.05 were deemed statistically significant.

## RESULTS

100 patients of acute pancreatitis were recruited in this study. Their mean age was 35.60±6.3 years. All patients were male. Among these 50 patients were having mild acute pancreatitis based on ATLANTA and BISAP scores; their mean age was similar to entire study population. BISAP SCORE of entire population ranged from 0 to 5 with mean score of 2.40±1.4; while that in mild cases was 1.20±0.8.

**Table 1: Baseline Characteristics of Anthropometric parameters of Yoga and control over weight and Obese subjects.**

| Parameters | Yoga (Baseline) (N=62) | | | Control (Baseline) (N=69) | | |
|---|---|---|---|---|---|---|
| | Max. | Min. | Mean ± SD | Max. | Min. | Mean ± SD |
| Weight (Kg) | 89.50 | 59.00 | 73.6±7.7 | 87.00 | 58.00 | 72.1±7.9 |
| BMI (Kg/m$^2$) | 30.48 | 25.01 | 27.1± 1.4 | 30.86 | 25.34 | 26.7±1.6 |
| Waist circumference (cm) | 114.00 | 81.00 | 94.2±6.8 | 107.00 | 80.00 | 92.9±6.1 |
| Hip circumference (cm) | 127.00 | 91.00 | 103.0±7.3 | 123.00 | 91.00 | 102.7±7.4 |
| Waist Hip Ratio | 1.14 | .81 | .9±.06 | 1.14 | .81 | .9±06 |

**Table-1:** showing baseline Characteristics of anthropometric parameters between yoga and control group. The mean values of height, weight, waist circumference hip circumference in cases were slightly higher than that of controls

**Table 2: Characteristics of Anthropometric parameters of Yoga and control over weight and Obese subjects after 10 weeks**

| Parameters | Yoga (10 Weeks) (N=62) | | | Control (10 Weeks) (N=69) | | |
|---|---|---|---|---|---|---|
| | Max. | Min. | Mean ± SD | Max. | Min. | Mean ± SD |
| Weight (Kg) | 84.00 | 56.50 | 68.5±7.1 | 88.50 | 60.50 | 72.4±7.7 |
| BMI (Kg/m$^2$) | 29.10 | 23.30 | 25.2±1.3 | 31.00 | 25.20 | 26.8±1.6 |
| Waist circumference (cm) | 108.00 | 80.00 | 90.7±6.4 | 110.00 | 82.00 | 92.9±6.4 |
| Hip circumference (cm) | 123.00 | 82.00 | 100.6±7.4 | 125.00 | 85.00 | 101.9±8.2 |
| Waist hip ratio | 1.05 | .80 | .9±.05 | 1.06 | .80 | .9±.06 |

**Table 2:** shows minimum value, maximum value and mean ± SD of anthropometric parameters in yoga and control after 10 weeks. The mean level of weight, BMI, WC and HC is lower in yoga group as compared to control group.

**Table 3: Baseline Characteristics of Lipid Profile in Yoga and control over weight and obese subjects.**

| Parameters | Yoga (Baseline) (N=62) | | | Control (Baseline) (N=69) | | |
|---|---|---|---|---|---|---|
| | Maximum | Minimum | Mean ± SD | Maximum | Minimum | Mean ± SD |
| TC (mg/dl) | 248.00 | 120.00 | 194.5±21.2 | 249.00 | 144.00 | 193.0±20.5 |
| TG (mg/dl) | 310.00 | 58.00 | 177.7±75.5 | 340.00 | 86.00 | 170.1±62.8 |
| HDL(mg/dl) | 55.17 | 28.79 | 42.7±6.0 | 68.00 | 33.00 | 41.1±7.9 |
| LDL(mg/dl) | 161.00 | 50.65 | 116.1±21.3 | 153.60 | 16.00 | 117.1±23.4 |
| VLDL (mg/dl) | 62.00 | 11.60 | 35.5±15.1 | 68.00 | 17.20 | 34.0±12.5 |

**Table 3:** Showing minimum value, maximum value and mean ± SD of lipid profile in yoga and control group at baseline. There is no significant difference in mean levels of total cholesterol, triglyceride, 'HDL', 'LDL', 'VLDL' in these two groups.

**Table 4: Characteristics of Lipid Profile in Yoga and control Overweight and Obese subjects after 10 weeks.**

| Parameters | Yoga (Baseline) (N=62) | | | Control (Baseline) (N=69) | | |
|---|---|---|---|---|---|---|
| | Maximum | Minimum | Mean ± SD | Maximum | Minimum | Mean ± SD |
| TC (mg/dl) | 226.00 | 113.00 | 179.8±20.4 | 259.00 | 151.00 | 192.3±22.2 |
| TG (mg/dl) | 292.00 | 55.00 | 162.8±66.4 | 350.00 | 80.00 | 171.8±63.0 |
| HDL(mg/dl) | 58.00 | 31.20 | 44.2±6.2 | 68.00 | 30.00 | 40.4±8.21 |
| LDL(mg/dl) | 144.57 | 46.77 | 102.9±22.5 | 166.20 | 48.00 | 117.5±22.8 |
| VLDL (mg/dl) | 58.40 | 11.00 | 32.5±13.2 | 70.00 | 16.00 | 34.3±12.6 |

**Table 4:** showing minimum value, maximum value and mean ± SD of lipid profile in yoga and control group after 10 weeks. There is a significant improvement in lipid profile after yoga practice.

**Table 5: Comparison of mean values of lipid profile in Yoga and control at baseline and after 10 weeks in over weight and obese subjects.**

| Study Subjects | Parameters | Baseline Mean ± SD | After 10 weeks Mean ± SD | Paired t Test (P value) |
|---|---|---|---|---|
| Case (N=62) | TC (mg/dl) | 194.5±21.2 | 179.8±20.4 | .000 |
| Control (N=69) | | 193.0±20.5 | 192.3±22.2 | .594 |
| **Unpaired t test (P value)** | | .671 | .001 | |
| Case (N=62) | TG (mg/dl) | 177.7±75.5 | 162.8±66.4 | .011 |
| Control (N=69) | | 170.1±62.8 | 171.8±63.0 | .600 |
| **Unpaired t test (P value)** | | .522 | .416 | |
| Case (N=62) | HDL(mg/dl) | 42.7±6.0 | 44.2±6.2 | .004 |
| Control (N=69) | | 41.1±7.9 | 40.4±8.21 | .001 |
| **Unpaired t test (P value)** | | .424 | .002 | |
| Case (N=62) | LDL(mg/dl) | 116.1±21.3 | 102.9±22.5 | .000 |
| Control (N=69) | | 117.1±23.4 | 117.5±22.8 | .765 |
| **Unpaired t test (P value)** | | .800 | .000 | |

| | | | | |
|---|---|---|---|---|
| Case (N=62) | VLDL (mg/dl) | 35.5±15.1 | 32.5±13.2 | .011 |
| Control (N=69) | | 34.0±12.5 | 34.3±12.6 | .600 |
| **Unpaired t test (P value)** | | .522 | .416 | |

**Table 5:** Showing comparison of lipid profiles of yoga and control group at baseline and after 10 weeks. Significant decreased mean value of total cholesterol, triglyceride, VLDL and LDL and significant increased mean value of HDL were observed in yoga group after 10 weeks. Baseline mean values were not different significantly when yoga group compared with control group but after 10 weeks significant reduction in TC and LDL and significant elevation in HDL were seen in yoga group. Significant elevated mean value of HDL was seen in yoga group after 10 weeks when compared with control group.

## DISCUSSION

Urbanization is not solely responsible for overeating. The underlying reason of overeating in adolescents and adults is stress brought on by demanding circumstances in their personal and academic lives. Regular practice of yoga can help mitigate the risk of overeating. Meditation, a component of yoga, trains the mind to seek happiness internally rather than relying on external sources, potentially reducing the tendency to overeat. It also encourages enjoying wholesome food in the mind. Mind control reduces desires for junk and quick food, allowing one to consume a healthy, low-fat, high-fiber diet. Therefore, the goal of this study was weight management in current generation by altering the sedentary lifestyle through yoga practices. To achieve this goal the current research was planned to know the outcome of integrated yoga practice on anthropometric, cardiovascular and respiratory parameters and lipid profile in patients with obesity.

Our study's significant reduction in body weight and BMI is consistent with previous research showing that a 6-day yoga program was accompanying with lesser levels of total cholesterol, high-density lipoprotein, fat-free mass, waist and hip circumference, BMI, and fasting serum leptin. Following 12 weeks of yoga practice, there was a general decrease observed in food consumption, eating speed, and food choices.[8] Chauhan et al, also showed a substantial reduction in BMI within one month after yoga asanas and suggested that efficacy of yoga practice may have direct impact to combat diseases due to obesity.[9] It has been demonstrated that practicing Hatha yoga for 12 weeks lowers the body's overall fat content, leading to notable weight loss and an increase in bone density. As a result, it aids in the control of adult obesity. A study's findings indicate that patients who practice yoga lose overall body weight. Bending both forward and backward during suryanamaskara increases trunk activity, which in turn decreases the superfluous fat deposition in the suprailiac section. Reductions in suprailiac area lead to a considerable drop in waist and hip circumference.[10] In our study, we saw improvements in the various lipid profile indicators after 10 weeks of yoga practice. Following ten weeks of yoga practice, there is an increase in HDL and a decrease in triglycerides, LDL, VLDL, and total cholesterol. There is statistical significance in this outcome ($p \leq .05$). Following six months of yoga practice, a research by Sahay et al. similarly found a substantial rise in HDL and a decrease in FFA, LDL, VLDL, and TC.[11] Study of Gadham et al found insignificant improvement in lipid profile after 3 months of yoga intervention.[12] On the other hand, a three-month yoga intervention trial found that both male and female obese patients' oxidative stress indicators and lipid profiles significantly improved.[13] Prior research revealed that practicing yoga reduced TC, TG, LDL, VLDL, and elevated HDL, although the results were not statistically significant.[14]

By assisting in the removal of LDL cholesterol from the bloodstream, HDL cholesterol lowers the chance of artery plaque formation. The reduction in TG and total cholesterol indicates that yoga may lessen the risk of obesity-related CVD.[15] Consistent with our results, a different research found that following a yoga intervention, all the variables of the lipid profile significantly improved.[16] Yadav et al.'s study found that limited time yoga-based lifestyle interventions improved the general standard of living and health of bulky individuals. Comparably, other research[17] also discovered a statistically significant improvement in the lipid profile, as evidenced by a rise in HDL-C and a decrease in TC, TG, LDL, and VLDL. Obesity and excess body weight are significant risk factors for dyslipidemia and cardiovascular diseases. Yoga with its focus on relaxation, mindfulness and stress reduction techniques can help lower stress hormone levels such as cortisol which is helpful in weight management and reduction of body fat. By reducing stress and promoting weight loss, yoga indirectly contributes to the improvement of lipid profile. Lipid profiles have been linked to lifestyle factors such age, intra-abdominal adiposity, obesity, and BMI.[18] This study has unequivocally demonstrated that there is a considerable benefit on the three major coronary risk factors—dyslipidemia, hypertension, and obesity. Therefore, if correctly implemented for a long enough period of time, this kind of Indian lifestyle adjustment will significantly reduce the risk of coronary heart disease.

## CONCLUSION

This investigation was made to know the impact of integrated yoga on lipid profile. Participants engaged in a 10 weeks integrated yoga program and various measurements were analyzed before and after the intervention. The results indicated substantial improvements in anthropometric measurements such as body weight, BMI, WC and HC including decline in total cholesterol, triglyceride, LDL-C, VLDL-C and an increase in HDL-C levels. These findings suggest that integrated yoga can positively influence body composition and lipid profile potentially contributing to overall well-being and cardiovascular health. Yoga might serve as a warm-up or intro before more strenuous physical exercises. Additionally, the discipline and dedication of consistent yoga practice, together with the camaraderie and encouragement of group courses, may better prepare a person for dietary and exercise adjustments.

## REFERENCES


1. Fuerestein G. Yoga Tradition. Arizona: Hohm Press: 1998. Chapter 1, Building Blocks; p.3-25.
2. Kaushal V. Patanjali 's Yoga Asanas: a Remedial Measure to cope with Stress. Hill Quest.2016;3(2).
3. Olivier SB, Machliss B. Applied Anatomy and Physiology of Yoga. NSW: Yoga Synergy Pty Limited: 1995. Chapter 1, Introduction to the applied anatomy and physiology of Hatha yoga; p.20-70.
4. Fuerestein G. Yoga Tradition. Arizona: Hohm Press: 1998. Chapter 18, Yoga as spiritual alchemy: The philosophy and practice of Hatha Yoga; p.381-426.
5. Stephens M. Yoga Therapy. California. North Atlantic Books: 2017. Chapter 4, Integrating the healing Arts and Sciences; p 51-69.
6. Stephens M. Yoga Therapy. California. North Atlantic Books: 2017. Chapter 4, Integrating the healing Arts and Sciences; p51-69.
7. Bowman AJ, Clayton RH, Murray A, et al. Effects of aerobic exercise training and yoga on the baroreflex in healthy elderly persons. Eur J Clin Investig 1997;27:443–449.
8. McIver S, McGartland M, O'Halloran P. "Overeating is not about the food": women describe their experience of a yoga treatment program for overeating. Qual Health Res 2009; 19:1234-45.
9. Chauhan A, Semwal DK, Mishra SP, Semwal RB. Yoga practice improves the body mass index and blood pressure: A randomized controlled trial. International journal of yoga. 2017 May 1;10(2):103-6.
10. Bera TK, Rajapurkar MV, Ganguly SK. Effect of yogic training on body density in school going boys. NIS Sci 1990 ; 13:23-35.
11. Sahay BK. Yoga and diabetes. Novo Nordisk Diabetes. 1994;1:159-67.
12. Gadham J, Sajja S, Rooha V. Effect of yoga on obesity, hypertension and lipid profile. Int J Res Med Sci. 2015 May;3(5):1061-5.
13. Shetty B, Shetty GB, Manjunath NK, Shantaram M. Effect of integrated yoga practices on anthropometric measures, serum lipid profile and oxidative stress status in obese adults. Indian J Appl Res. 2017;7(1):942-4.
14. Telles S, Naveen VK, Balkrishna A, Kumar S. (2010). Short term health impact of a yoga and diet change program on obesity. HYPERLINK
15. Ebong IA, Goff DC Jr, Rodriguez CJ, Chen H, SibleyCT, Bertoni AG. (2013). Association of lipids with incident heart failure among adults with and without diabetes mellitus:Multiethnic study of atherosclerosis. Circ Heart Fail. 6: 371–378.
16. Gokal R, Shillito L, Maharaj SR. Positive impact of yoga and pranayam on obesity, hypertension, blood sugar, and cholesterol: a pilot assessment. J Altern Complement Med. 2007; 13(10): 1056–1057.
17. Bijalani RL. Coronary Atherosclerotic reversal potential of yoga life style intervention. 2000; JAPI 48(7) 687-689.
18. Shamai L, Lurix E, Shen M, Novaro GM, Szomstein S, Rosenthal R, et al. Association of body mass index and lipid profiles: evaluation of a broad spectrum of body mass index patients including the morbidly obese. Obes. Surg. 2011; 21(1):42-47.