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ORIGINAL ARTICLE

Biochemical and Physiological Metabolic Pathways Effects of Obesity in Women. A Comparative Clinical Study

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ABSTRACT

Aims and Objectives: The objectives of this study were to identify the negative effects of obesity and provide health awareness to obese women for healthy and active life.

Methodology: This was a clinical study and 200 women were selected and divided them into different groups. BMI, systolic and diastolic blood pressure, random glucose levels, serum cholesterol, triglycerides, low density lipoprotein (LDL), high density lipoprotein (HLD) and uric acid levels were measured. The collected raw data of all women of group-A and group-B were represented bio-statistically by applying SPSS-version 2021. All the biomarkers were presented through mean standard deviation and significant ($p<0.005$) regression t-test of one way ANOVA.

Results: The results of present study were significant ($p<0.005$). The random blood serum levels of glucose, uric acid, cholesterol, triglycerides, low density lipoprotein and high density lipoprotein of group-B were (157.04± 10.12, 12.10±10.02, 220.14± 10.11, 180.10± 10.02, 150.20± 10.6, and 60.01± 1.10) which showed a remarkable changes than control group respectively.

Conclusion: Worldwide, the number of obese people is rising at an alarming rate. Present study described the negative effects of obesity in women. The findings of this study were an indication for obese women regarding life threatening medical complications because of their overweight.

Keywords: Obesity, Body mass index, Low density lipoprotein, High density lipoprotein

INTRODUCTION

Accumulation of excessive fat in body is referred as obesity. Obesity is a condition characterized by an overabundance of triacylglycerol in adipose tissue [10]. In other words deposition of fat can also be classified as obesity, which is a rise in body weight that exceeds one's physical requirements [12]. Hyperplasia and hypertrophy are the two processes by which adipose tissue differs from individual to individual [1]. Different studies claimed that adipose tissue not only the storage tissue for triacylglycerol, it also acts as an endocrine organ and released number of chemical messengers that communicate and effect on other tissues [11]. Many regulatory actions on energy homeostasis are correlated with adipocyte derived peptide [3].

Leptin is a hormone produced by fat cells and is secreted into our bloodstream. In those who are obese, leptin levels tend to be higher than in those who are normal weight because fat produces leptin. Insulin signals can be lost in obese individuals, resulting in tissues that are unable to regulate glucose levels [2]. The sex hormone levels of both men and women changes according to age which is associated with changes in body fat distribution [5]. A study showed that lack of estrogen leads to excessive weight gain. Obese persons have lower growth hormone levels than healthy weight individuals, according to research [4]. Obesity is also related with low-grade chronic inflammation within the fat tissue. Many ailments, including heart disease, stroke, and cancer, are made more likely in obese people. Obesity is also linked to a shorter lifespan and a lower standard of living [7].

There is a link between being overweight or obese and an increased risk for a wide range of diseases such as cardiovascular disease, stroke, and a variety of cancers, as well as a reduction in both longevity and overall well-being [6]. As a result of a good diet and exercise weight become reduce due to such reduction the chances of different life threatening diseases rate decrease [8]. With weight loss the quantity of insulin secretion become increased. Even though hyperuricaemia was originally linked to insulin resistance [14]. Due to a lack of lipase stimulation, obesity causes an increase in VLDL (triglycerides) synthesis and impaired clearance of triglyceride-rich lipoproteins [9]. Males and females of all ages and races are affected by obesity. Oxidation and glaciation of smaller, denser LDL particles can result in reduced LDL receptor recognition and clearance [13].

Osteoporosis and muscular atrophy can be caused by obesity. This is referred to as osteosarcopenic obesity develops weakness of the bones, which can increase the risk of fractures and other physical disabilities [15]. Most osteoporosis-related fractures occur in the hip, wrist, and spine. Bone is living tissue that is constantly being broken down and replaced. Muscle atrophy can result from a lack of physical exercise, bad nutrition, heredity, and certain medical problems. After a long period of inactivity, muscle atrophy can occur. The body will gradually break down a muscle if it is not used, in order to conserve energy [17]. The important indications of muscle atrophy are weakness in one arm and or one leg, trouble walking or balancing and facial weakness etc. Different researchers claimed that muscle atrophy with right nutrition, exercise, or physical therapy can be cured [18].

MATERIALS AND METHODS

Study design: Current study was clinical and conducted in different medical institutes the time duration was from 10-10-2021 to 20-3-2022.

Sample size: In this study 200 women were selected and divided them into different groups.

Group-A: 50 normal women were in this group i.e. control group.

Group-B: 150 obese women were selected.

Age: In both groups the age was in between 25-40 years.

Body mass index (BMI): In group A the body mass index was 20-24 kg/m2. While in group B the BMI was 25-35 kg/m2.

Sampling technique: Venipuncture is very common method for blood collection in adult patients. Blood sample draw from superficial vein in the upper limb, generally the median cubital vein and this vein is situated very near to skin. 5ml blood sample of each individual was collected and store in vials.

Analysis methods: BMI, systolic and diastolic blood pressure, random glucose levels, serum cholesterol, triglycerides, low density lipoprotein (LDL), high density lipoprotein (HLD) and uric acid were levels measured. For lipid profile different kits were used in colorimetric method.

Collection of raw data: Raw data of all women of group-A and group-B were collected on proforma/ questionnaire according to their medical history.

Bio -Statistical analysis of raw data: The collected raw data of all women of group-A and group-B were represented bio-statistically by applying SPSS-version 2021. All the biomarkers were presented through mean standard deviation and significant (p<0.005) regression t-test of one way ANOVA.

RESULTS

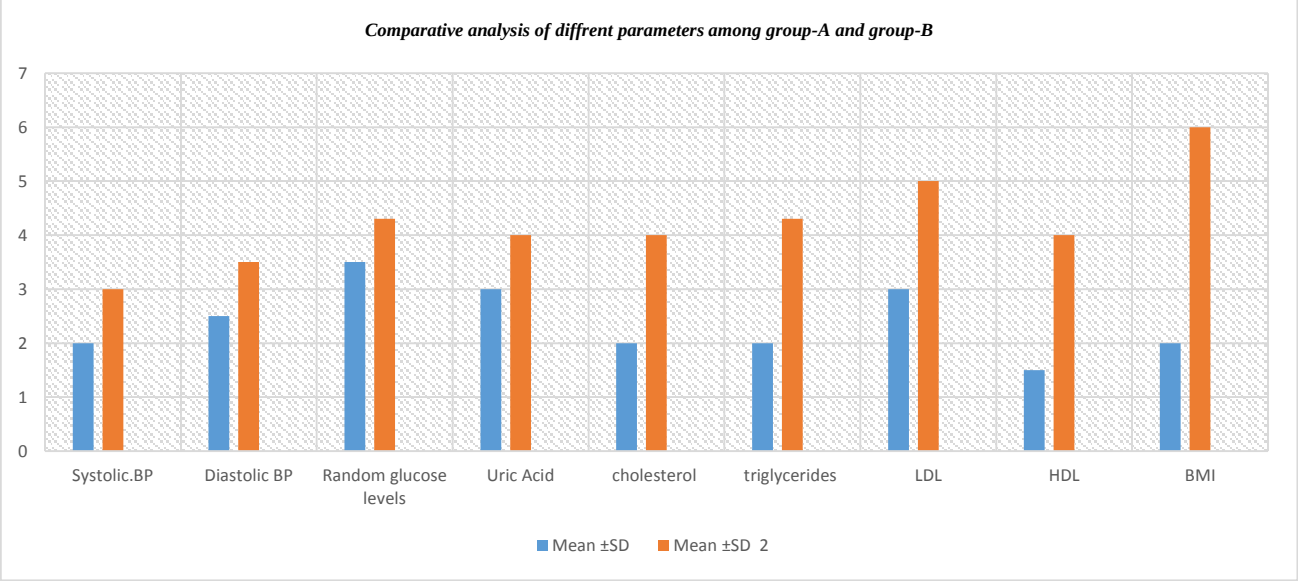
Group-A: 50 normal women with 25-40 years

Biomarkers	Units	Mean ±SD	p<0.005
Systolic blood pressure	mm.Hg	120.02± 0.04	0.000
Diastolic blood pressure	mm.Hg	80.02± 0.01	0.000
Random glucose levels	mg/dl	137.04± 10.12	0.000
Serum levels and uric acid	mg/dl	6.12±11.02	0.000
Serum cholesterol levels	mg/dl	195.04± 10.1	0.000
Serum triglycerides levels	mg/dl	134.14± 0.02	0.000
Serum levels of LDL	mg/dl	130.01± 0.06	0.000
Serum levels of HDL	mg/dl	55.01± 12.10	.000
BMI	kg/m2	21.07± 0.15	0.000

The results of present study were significant (p<0.005). A remarkable changes in all parameters were seen in the individuals of group-B as compared with group-A. The random blood serum levels of glucose, uric acid, cholesterol, triglycerides, low density lipoprotein and high density lipoprotein of group-B were (157.04± 10.12, 12.10±10.02, 220.14± 10.11, 180.10± 10.02, 150.20± 10.6, and 60.01± 1.10) which have a significant (p<0.005) changes as compared with the group-A respectively. The mean standard deviation levels of BMI of women in group-B (35.17± 11.15) showed a significant (p<0.005) difference as compared with group-A (21.07± 0.15).

Group-B: 150 obese women of age 25-40 years

Biomarkers	Units	Mean ±SD	p<0.005
Systolic blood pressure	mm.Hg	150.02± 0.04	0.000
Diastolic blood pressure	mm.Hg	95.02± 0.01	0.000
Random glucose levels	mg/dl	157.04± 10.12	0.000
Serum levels and uric acid	mg/dl	12.10±10.02	0.000
Serum cholesterol levels	mg/dl	220.14± 10.11	0.000
Serum triglycerides levels	mg/dl	180.10± 10.02	0.000
Serum levels of LDL	mg/dl	150.20± 10.6	0.000
Serum levels of HDL	mg/dl	60.01± 1.10	0.000
BMI	kg/m2	35.17± 11.15	0.000



DISCUSSION

The findings of present study showed close correlation with previous studies. All the parameters of group-B individuals represented a remarkable changes as compared with control group which are the similarities of this study with other studies conducted by different researchers. Bhaskaran et al., (2014) described in their study that due to high BMI levels different metabolical abnormalities are originated in biological system which may develop various life threatening diseases. Different studies stated that the blood serum levels of cholesterol, triglycerides, LDL and HDL become increased in obese people which is very dangerous for cardiac health [6]. In another study the findings were very clear about increased levels of lipid profile regarding cardiac complications [17]. Systolic and diastolic blood pressure is also directly proportional to the BMI, and it has proved by different studies that abnormal blood pressure caused very serious medical complications like brain hemorrhage, kidney failure and paralysis etc. [12].

Obesity, BMI, intra-abdominal and overall obesity are not associated with fat accumulation in the liver, which is defined by a number of symptoms of insulin resistance in normal weight and normal BMI [19]. Even if a person's weight is near to normal but little changes in weight might lead to a rise in liver enzymes. The clinical adage fat, female, fertile, and forty states that gallstone incidence is higher in the overweight and in fact highly high in obesity in the medical community [2]. Risk of coronary artery disease (CAD) is increased by any weight gain from a baseline BMI. The link between BMI and coronary artery disease (CAD) may be most significant in terms of dyslipidemia [7]. There is a correlation between high fasting triglyceride levels and the presence of tiny dense LDL in both diabetics and non-diabetics [15].

Sodium reabsorption is increased with high fat diets and stimulate the levels of blood pressure. Obesity-related focal segmental glomerulosclerosis can be caused by renal hyper-filtration, glucose intolerance, hyperlipidemia, and hypertension [11]. Growth hormones (GH) levels decline as a person becomes obese. This rhythm is maintained, but GH responsiveness decreases and there are less pulses of lower amplitude from the hormone than before. Because of obesity's higher metabolic rate,

the levels of cortisol and ACTH at rest are still within normal range [9]. There have been reports of pituitary adrenal axis dysfunction. Worldwide, the number of obese people is rising at an alarming rate [18]. In the future decades, environmental changes in both industrialized and developing countries will have huge consequences for global morbidity and mortality. Therefore further studies in this segment is required for the better health of people.

REFERENCES

1. Amir LH, Donath S. A systematic review of maternal obesity and breastfeeding intention, initiation and duration. BMC Pregnancy Childbirth 2007; 7.
2. Aviram A, Hod M, Yogev Y. Maternal obesity: implications for pregnancy outcome and long-term risks – a link to maternal nutrition. Int J Gynaecol Obstet. 2011; 115:S6.
3. Baker JL, Michaelsen KF, Sorensen TIA, Rasmussen KM. High prepregnant body mass index is associated with early termination of full and any breastfeeding in Danish women. Am J Clin Nutr 2007;86:404 –11.
4. Bennett WL, Gilson MM, Jamshidi R, et al. Impact of bariatric surgery on hypertensive disorders in pregnancy: retrospective analysis of insurance claims data. BMJ 2010;340:c1662.
5. Bhaskaran K, Douglas I, Forbes H, et al. Body-mass index and risk of 22 specific cancers: a population-based cohort study of 5·24 million UK adults. Lancet. 2014;384:755–765.
6. Chu SY, Bachman DJ, Callaghan WM, et al. Association between obesity during pregnancy and increased use of health care. N Engl J Med 2008;358: 1444 –53.
7. Guelinckx I, Devlieger R, Beckers K, et al. Maternal obesity: pregnancy complications, gestational weight gain and nutrition. Obes Rev. 2008;9:140–150.
8. Kaaks R, Lukanova A, Kurzer MS. Obesity, endogenous hormones, and endometrial cancer risk: a synthetic review. Cancer Epidemiol Biomarkers Prev 2021;11:1531– 43.
9. Kim SY, Dietz PM, England L, Morrow B, Callaghan WM. Trends in pre-pregnancy obesity in nine states, 1993–2003. Obesity 2007;15:986 –93. 52.
10. Kristensen J, Vestergaard M, Wisborg K, Kesmodel U, Secher NJ. Pre-pregnancy weight and the risk of stillbirth and neonatal death. BJOG 2005; 112:403– 8.
11. Liu J, Smith MG, Dobre MA, Ferguson JE. Maternal obesity and breast-feeding practices among white and black women. Obesity 2010;18:175– 82.
12. Maggard MA, Yermilov I, Li Z, et al. Pregnancy and fertility following bariatric surgery: a systematic review. JAMA 2008;300:2286 –96. 50. Callaway LK, Prins JB, Chang AM, McIntyre HD. The prevalence and impact of overweight and obesity in an Australian obstetric population. Med J Aust 2006;184:56 –9.
13. Norman RJ, Noakes M, Wu R, Davies MJ, Moran L, Wang JX. Improving reproductive performance in overweight/obese women with effective weight management. Hum Reprod Update 2004; 10:267–80.
14. O'Reilly JR, Reynolds RM. The risk of maternal obesity to the long-term health of the offspring. Clin Endocrinol (Oxf) 2013;78:9–16.
15. Rasmussen KM. Association of maternal obesity before conception with poor lactation performance. Annu Rev Nutr 2007;27:103–21.
16. Robker R. Evidence that obesity alters the quality of oocytes and embryos. Pathophysiology 2008;15: 115–21. 46.
17. Stothard KJ, Tennant PW, Bell R, Rankin J. Maternal overweight and obesity and the risk of congenital anomalies: a systematic review and metaanalysis. JAMA 2009;301:636 –50.
18. Weintraub AY, Levy A, Levi I, Mazor M, Wiznitzer A, Sheiner E. Effect of bariatric surgery on pregnancy outcome. Int J Gynaecol Obstet 2008;103:246 –51. Yilmaz N, Kilic S, Kanat-Pektas M, Gulerman C, Mollamahmutoglu L. The relationship between obesity and fecundity. J Womens Health (Larch