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Full Length Research Paper

Changes in Lipids Profile and Insulin Level in Obese Sudanese Women

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As obesity is rapidly becoming a major medical issue, it's associated with many cardiovascular risk factors and others public health problem, the aim of our present study is to investigate the concentration and evaluate potential role of insulin and lipids profile, total cholesterol (TC), Triglyceride (Trig), high density lipoprotein-cholesterol (HDL-C), low density lipoprotein- cholesterol (LDL-C) levels and insulin among obese Sudanese women. A prospective analytic, cross- sectional and hospital-based study included Sudanese women from Khartoum- State- Sudan, in period from March 2012 to May 2014. A total of 200 obese Sudanese women were compared with 100 healthy non obese women as control group, all of them were age-matched, Samples were taken after overnight fasting then serum insulin and lipids were analyzed using ELISA technique and colorimetric methods. The (mean ± SD) of serum insulin and (TC, Trig, HDL-C and LDL-C) in obese women were 11.06±6.21µlU/ml,166.95±46.94mg/dl, 89.89±33.36 mg/dl, 43.83±2075mg/dl, 104.55±52.29mg/dl respectively, while that of control group, the (mean ± SD) of serum insulin, TC, Trig, HDL-C and LDL-C were 4.52±1.60µlU/ml, 145.14±31.19mg/dl, 82.13±26.51mg/dl, 51.02±1481mg/dl, 72.62±30.04 mg/dl, respectively. Serum insulin, TC, Trig, LDL-Care significant elevated while HDL-Cis decreased in obese as compared with control group (P<0.05). Patients with obesity have significant increased levels of Serum insulin, TC, Trig, LDL-C and HDL-C is decreased in obese Sudanese women.

Keywords: Obesity, Total cholesterol, Triglyceride, HDL-C, LDL-C, Sudanese.

INTRODUCTION

Obesity can be defined as a disease of extensive fat accumulation and body fat distribution to the extent that health and well being are affected (WHO1997). However, the degree of excess fat, its distribution within the body and obesity duration is associated with heath consequences vary between obese individuals (WHO, 1997; Ishikawa-Takataet al., 2002). It is generally accepted that obesity, particularly, central obesity, is health hazard because it is associated with numerous metabolic complications such as hypertension, dyslipidemia, impaired glucose tolerance, diabetes

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mellitus, hyperuricamia, and cardiovascular diseases. These patients are more likely to present silent diseases and as cluster of metabolic syndrome. The most commonly recognized risk factors in metabolic syndrome are highly correlated with each other and presumed to reflect common metabolic

Pathway and they interact to increase risk in synergistic fashion (Kopelman, 2000; Reaven 1995). The adverse effect of excess weight tends to be delayed, sometimes fourteen years or longer (Nyholm et al., 2004). Obesity is one of the leading preventable causes of death worldwide (Barnesset al., 2007; Mokdad et al., 2004). Large-scale American and European studies have found that mortality risk is lowest at a BMI of 20–25 kg/m^2 (Whitlock et al ., 2009) in non-smokers and at 24–27 kg/m^2 in current smokers, with risk increasing along with changes in either direction (Pischon, 2008). In Asians risk begins to increase between 22–25 kg/m^2. (WHO Expert 2004). A BMI above 32 kg/m^2 has been associated with a doubled mortality rate among women over a 16-year period (Manson et al., 1995). In the United States obesity is estimated to cause 111,909 to 365,000 deaths per year, (Allison et al., 1999). While 1 million (7.7%) of deaths in Europe are attributed to excess weight (Fried et al., 2007). On average, obesity reduces life expectancy by six to seven years (Peeters et al., 2003). A BMI of 30–35 kg/m^2 reduces life expectancy by two to four years, (Whitlock et al., 2009). While severe obesity (BMI > 40 kg/m^2) reduces life expectancy by ten years (Whitlock et al.,2009). This information supports and justifies conducting this study to determine the factors behind biochemical abnormalities indicators of early stage of some chronic metabolic diseases in Sudan. It is important that these factors should be addressed in any coordinated strategy to tackle the problem of obesity and related diseases. The aim of this study was to investigate the concentration of serum triglyceride, cholesterol and cholesterol profile (HDL-C and LDL) in obese Sudanese women.

MATERIALS AND METHODS

Reagents

All chemical reagents were purchased from Bio system company (Spine Company for Analytical material and chemical Reagents).

Subjects and study population

The present study was descriptive, analytic, cross-sectional and hospital-based study, carried out in Khartoum State educational hospital, Sudan. 200 hundred an obese women and 100 healthy women, all of whom were age. Blood samples were obtained after an overnight fast for measurement of serum insulin and lipid parameters levels.

Samples collection and preparation

The blood samples were drawn after overnight fasting in the morning (between 0800 and 1100 h). Five ml blood from each individual of study population, were collected from both cases and control, the blood was centrifuged at 3000 rpm for 10 minutes and serum was obtained insulin and lipid samples were stored in -20 C and were analyzed within 7 d of sampling. Using ELSIA technique and colorimetric methods to determine insulin and lipid levels.

Statistical analysis

Data were analyzed by computer program (SPSS) version IBM 20. Student T. test was used for the Calculation. P≤0.05 was considered significant.

RESULTS

In this study all participants were 20-45 years of age. Table 1 showed the baseline characteristics of patients with obesity and control group. Insulin, TC, Trig, LDL levels were higher ($P < 0{\cdot}01$) in obese women, while serum HDL was reduced as shown in Table 2. Figures (1, 2, 3,4 and 5) showed the correlations between body max index (BMI), insulin and Lipid parameters, respectively.

Serum insulin

Table 2 shows a highly significant difference between the means of serum insulin of the test group and the control group. Mean±SD: (11.06±6.21) versus (4.52±1.60) µIU/ml, P=0.001. Figure 1 shows insignificant, very weak positive correlation between the body mass index (BMI) and the serum levels of Insulin, (r=0.06, p = 0.38). In this study, 70 subjects obesity (35%) had abnormal high serum levels of Insulin.

Serum cholesterol

Table 2 shows a highly significant difference between the means of serum cholesterol of the test group and the control group. Mean±SD (166.95±46.94) versus (145.14±31.01) mg/dl, P=0.001. Figure 2 shows insignificant, very weak positive correlation between the body mass index (BMI) and the serum levels of cholesterol (r=0.04, p = 0.55). In this study 34 subjects with obesity (17%) had abnormal high serum levels of cholesterol.

Table 1. Baseline characteristics of obesepatients and control group

Variable	Test group	Control group
Age/years	29.61±5.41*	31.23±4.93*
Weight/Kg	72.83±10.88*	68.03±11.31*
Hight/Cm	160.00±6.00	162.60±5.52
BMI/Kg/m²	29.76±4.24*	24.14±3.76*

**The means is a significant difference between different values, (P<0.05).*

Table 2. Mean ± SD of serum insulin and lipids parameters in the test group and control group

Parameters	Test group	Control group
Serum insulinµIU/ml	11.06±6.21*	4.52±1.60*
Serum Cholesterolmg/dl	166.95±46.94 *	145.14±31.19*
Serum Triglyceridemg/dl	89.89±33.36*	82.13±26.51*
Serum HDL-CHmg/dl	43.83±20.75*	51.02±1481*
Serum LDL-CHmg/dl	104.55±52.29*	72.62±30.04*

** The means is a significant difference between different values, (P<0.05).*

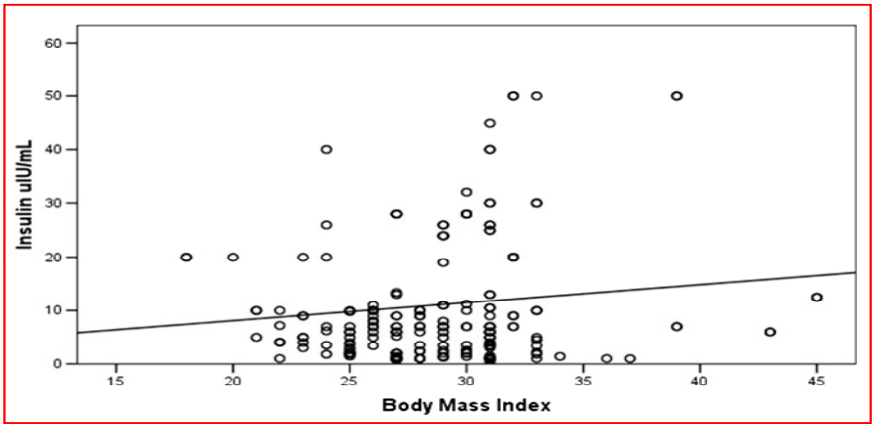

Figure 1. Ascatt plot shows correlation between Body Mass Index (IBM) and insulin in the study group (r = 0.06, p= 038)

Serum triglycerides

Table 2 shows a significant difference between the means of serum triglycerides of the test group and the control group. Mean±SD (89.89±33.36) versus (82.13±26.51) mg/dl, P=0.017. Figure 3 shows no correlation between the body mass index (BMI) and the serum levels of Triglycerides. (r=0.00, p=). In this study, 4 subjects with obesity (2%) had abnormal high serum levels of triglycerides.

Serum HDL

Table 2 shows a highly significant difference between the means of serum HDL of the test group and the control group. Mean±SD: (43.83±20.75) versus(51.02±14.81) mg/dl, P=0.001. Figure 4 shows insignificant, very weak positive correlation between the body mass index (BMI) and the serum levels of high density lipoprotein. (r=0.01, p = 0. 84). Density lipoprotein. (r= 0.27, p= 00). In this study 9 subjects with obesity (4.5%) had abnormal high serum levels of high density lipoprotein.

Serum LDL

Table 2 shows a highly significant difference between the means of serum LDL of the test group and the control group. Mean±SD: (104.55±52.20) versus (72.62±30.04) mg/dl, P=0.001. Figure 5 shows insignificant, very weak positive correlation between the body mass index (BMI) and the serum levels of low density lipoprotein, (r=0.04, p = 0. 56) density lipoprotein (r = 0.11, p =0. 13). In this study 35 subjects with obesity (17.5%) had abnormal high serum levels of low density lipoprotein.

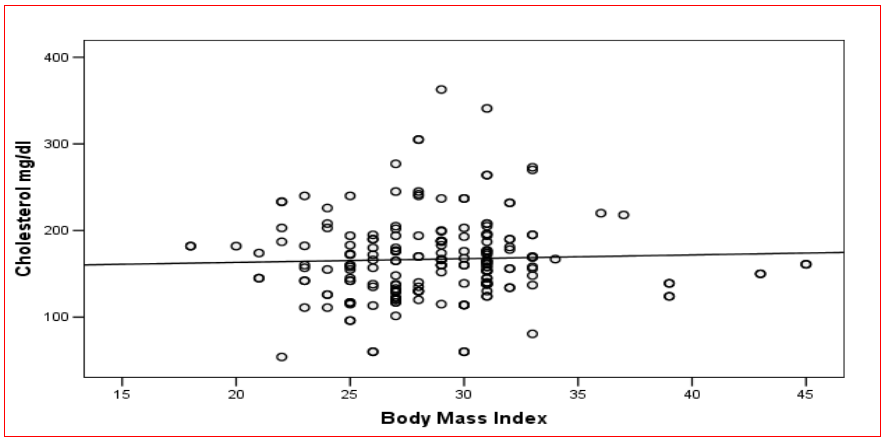

Figure 2. Ascatt plot shows correlation between Body Mass Index (IBM) and Cholesterol in the study group (r = 0.04, p= 0.55)

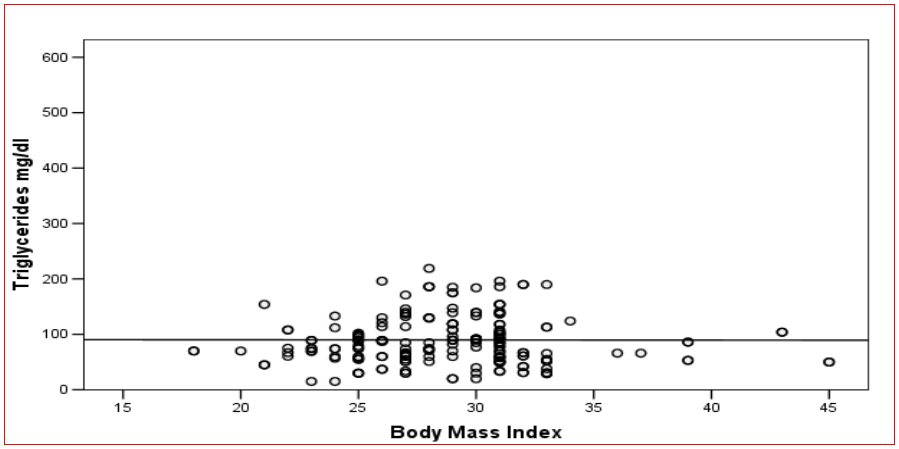

Figure 3. Ascatt plot shows correlation between Body Mass Index (IBM) and Triglyceride in the study group (r = 0.00, p= 00)

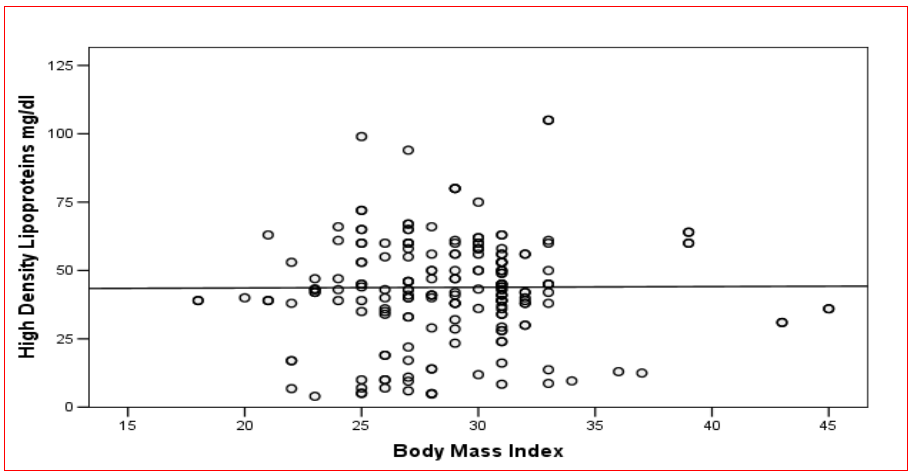

Figure 4. Ascatt plot shows correlation between Body Mass Index (IBM) and HDL-Cholesterol in the study group (r = 0.01, p= 0.84)

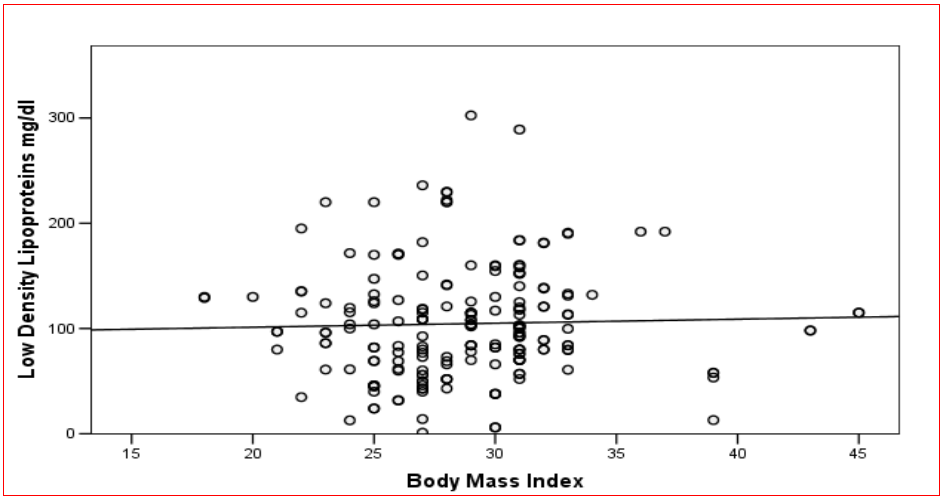

Figure 5. Ascatt plot shows correlation between Body Mass Index (IBM) and LDL-Cholesterol in the study group (r = 0.04, p= 0.56)

DISCUSSION

Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on health, leading to reduced life expectancy and/or increased health problems (Haslam et al., 2005).

In Western countries, people are considered obese when their body mass index (BMI) (Haslam et al., 2005). a measurement obtained by dividing a person's weight by the square of the person's height, exceeds 30 kg/m^2, with the range 25-30 kg/m^2 defined as overweight. Some East Asian countries use stricter criteria. Obesity increases the likelihood of various diseases, particularly heart disease, type 2 diabetes, obstructive sleep apnea, certain types of cancer, and osteoarthritis (Haslam et al., 2005).

The degree of obesity is most often evaluated using BMI value of 25 cut- off value most used. Values of 25-29.9 characterize on overweight individuals, while ≥30 classified obese according to the classification of WHO (Kamble et al., 2002). These results revealed to increase obesity with increasing BMI. The higher BMI in women can cause insulin levels to increase. According to the results in this study, there is an elevation in the level of total cholesterol, triglyceride, and LDL, while there was decreased in HDL in obese participants as compared to control group, this is due to hyperlipidimia, life style, genetic factors and this elevation is a risk factor of coronary heart diseases. These results were in agreement with several researchers which found a higher level of cholesterol associated with obesity (WHO, 2000). This leads to hypercholesterolemia and increases susceptibility to cardiovascular diseases. These results were in agreement with that achieved by (WHO, 1997). Also these findings agreed with that obtained by (Balasubramanian, 2003; Modan et al., 1987), who reported: accumulation of fat is associated with hypercholesterolaemia as see in the metabolic syndrome or hibernation. Triglycerides level was greater in obese women serum when compared to non obese ones. Justification of that might be due to increasing adiposity, lead to increase cell size in addition to insufficient receptors found in cell surface that cause glucose intolerance, which reflects as hyperglycemia and Insulin resistant syndrome (Sometimes with normal insulin level or even hyperinsulinaemia). This result agreed with that achieved by (Kopelman, 2000) and (Reaven, 1995; Ko et al., 1999; Ishikawa-Takata, et al., 2002; Nyholm et al., 2004; Lin et al., 2002). Who documented: A higher level of body mass index is associated with risk of having insulin resistance, hyperglycaemia, hyperlipidaemia and diabetes mellitus HDL-cholesterol level revealed no significant difference between non-obese and obese women. This result might be due to direct effect of age, dietary habits, life style, and lack of physical activity among study participants. This result also agreed with that achieved (Jeb et al., 1995), who cite that in the modern affluent society, energy-sparing devices had reduced energy Expenditure and may enhance the tendency to become fat. In epidemiological studies the highest frequency of overweight is found in with sedentary occupations. Also this finding was similar to that obtained by (Bener et al., 2004), who reported Obesity and physical inactivity is more prominent among women than among men. In spite of obese participants showed, higher levels of lipids profile, but they could not be clinically diagnosed as dyslipidaemia or cardiovascular patients, that means disease was in silent stage these results agreed with that obtained by (Kopelman, 2000) and (Raven, 1995).

CONCLUSION

In conclusion, Results of the present study showed that insulin and lipid play a crucial role in obese women. This study confirmed hyperinsulinemia was observed in women suffering from obesity, hypercholesterolemia increased with increase BMIin obese women. Elevated lipid levels may contribute, to the risk of cardiovascular disease; Obesity is a leading preventable cause of death worldwide, with increasing rates in adults and children. Authorities view it as one of the most serious public health problems of the 21st century (Barnesset al., 2007). Healthy food and good exercise may reduce these complications.

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