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Study the effect of some biochemical variables on obese people

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Abstract

This research is involved conducting abiochemical study of some variables for overwight people, Blood samples have been collected from a total 100 persons, all individuals were randomly taken from private laboratories in Tikrit Governorate, and their ages were between 25-55years. Blood samples were divided into three groups according to BMI, Blood samples were divided into three groups according to BMI:group One: Control group (Normal weight): 30 individual (15males, 15females), BMI (18.5 - 24.9 kg/m^2). Group Two: Overweight group: 25 individual (15males, 10females), BMI (25.0 - 29.9 kg/m^2). Group Three: Obese group: 45 individual (20males, 25females), the results of this research was a significant increase in the concentrations of MDA, TC, TG, LDL-c, VLDL-c and glucose in obese and overweight individuals compared to control group for both genders. there was a significant decrease in the concentrations of GSH, Zn, Mg and HDL-c in obese and overweight individuals compared to control group.

Aims of the Study:

Estimate the concentrations MDA, GSH, Zn, Mg, Cholesterol, Triglycerides, HDL-c, LDL-c, VLDL-c, Glucose and BMI in all the study samples.

Key word: Obesity, lipid profile, Anti oxidant.

دراسة تأثير بعض المتغيرات الكيموحيوية على الأشخاص البدينين

الخلاصة :

تضمن هذا البحث إجراء دراسة كيميائية لبعض المتغيرات لدى الأشخاص الأفراد عشوائياً من المختبرات الخاصة في محافظة تكريت، وكانت أعمارهم تتراوح بين 25-55 سنة، وتم تقسيم عينات الدم إلى ثلاث مجموعات وفقًا لمؤشر كتلة الجسم: المجموعة الأولى: المجموعة الضابطة (الوزن الطبيعي): 30 فردًا (15 ذكور ، 15 أناث) ، مؤشر كتلة الجسم (18.5 - 24.9 كجم / م 2). المجموعة الثانية: مجموعة الوزن الزائد: 25 فردًا (15 ذكور ، 10 إناث) ، مؤشر كتلة الجسم (25.0 - 29.9 كجم / م 2). المجموعة الثالثة: مجموعة البدينين: 45 فرد (20 ذكور ، 25 إناث)، وكانت نتائج البحث زيادة كبيرة في تركيزات كل من (MDA ، TC ، TG ، LDL-c ، VLDL-c and Glucose) اللذين يعانون من السمنة المفرطة والوزن الزائد مقارنة مع مجموعة السيطرة لكلا الجنسين. وكان هنالك انخفاض كبير في تركيزات كل للافراد اللذين يعانون من (HDL-c و GSH ، Zn ، Mg) السمنة مقارنة بمجموعة السيطرة.

كلمات مفتاحية: السمنة ، الدهون ، مضادات الاكسدة .

Introduction

Overweight and obesity are increasing problems that lead to significant health and social difficulties for people. Commonly defined by a measurement of Body Mass Index, Obesity is characterized by abnormal or excessive fat accumulation that is the result of a chronic imbalance between energy intake and energy expenditure [1]. However, in obesity, there is an imbalance in adipokines production, a fact which, together with the inability to store fat in the adipocytes, results in a process of adipose tissue dysfunction, a known risk factor for developing obesity-associated metabolic disorders[2]. Obesity is an independent risk factor for cardiovascular disease and several other causes of morbidity and mortality. It is the fifth leading cause of mortality globally resulting in 5% of the deaths each year. GSH is the most abundant non-protein thiol and a multifunctional intracellular antioxidant in cells. It consists of a tripeptide of glutamate, cysteine and glycine characterized by a reactive thiol group and c-glutamyl bond [3]. Obesity is a multifaceted condition and represents a pandemic that needs urgent attention [4]. Obesity, both directly and indirectly, increases the risk for a variety of disease conditions including diabetes, hypertension, liver disease, and certain cancers, which in turn, decreases the overall lifespan in both men and women. Obesity has become a major global health challenge. It is influenced by various factors, including genetics, variations in nutrient intake, behavioral and environmental factors, and endocrine function [5]. So genetic factors alone cannot explain the epidemic obesity. It is widely agreed that obesity is a complex multifactorial disease involving genetic, environmental, and lifestyle factors.Obesity: is defined as excessive fat accumulation that may impair health and increase mortality [6]. While obesity has become a socioeconomic burden in industrialized countries over the last century, currently the prevalence is currently also increasing in developing countries with the spread of energy-dense food compounds and a sedentary lifestyle [7].And the Classification and Assessment of Obesity is based on the Body Mass Index (BMI), which is the weight (in kilograms), divided by the square of height (in meters). Definition of BMI "normal range" is based on Caucasian mortality data; a BMI of 30 kg/m^2 or more is an index of obesity, while a BMI over 25 kg/m^2 is an index of overweight [6]. Medical risk rises progressively with increasing degrees of obesity beginning with overweight, defined by BMI between 25.0 and 29.9 kg/m^2, through class I obesity (BMI, 30.0 to 34.9 kg/m^2), class II obesity (BMI, 35.0 to 39.9 kg/m^2), and class III or morbid obesity (BMI > 40 kg/m^2) [8]. Trace elements are essential nutrients with regulatory, immunologic, and antioxidant functions resulting from their action as essential components or cofactors of enzymes throughout metabolism. is Glutathione GSH is the most abundant non-protein thiol and a multifunctional intracellular antioxidant in cells[9].

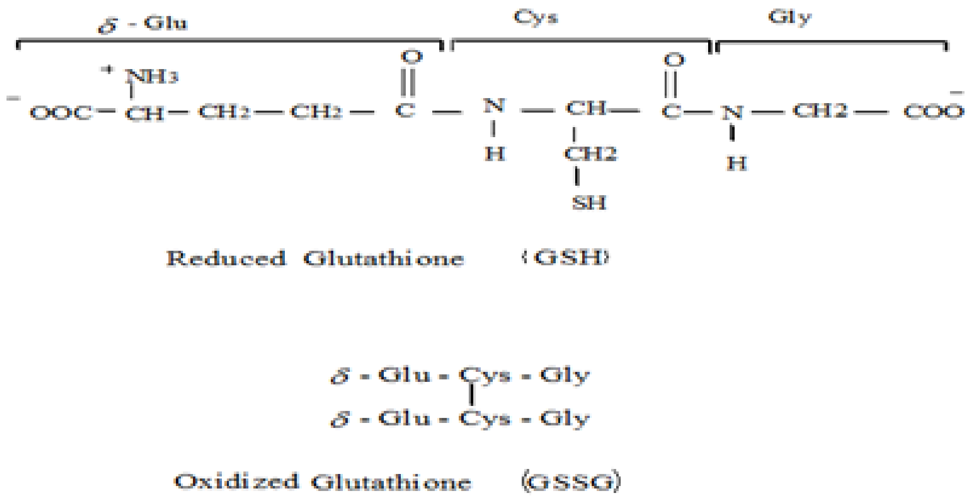

Figure (1-1): Structure of Glutathione [3]

Adipose tissue is the functional and morphological substrate of obesity and metabolic syndrome. Adipocyte endocrine dysfunction and adipose tissue inflammation triggers obesity development. At the same time, it has been supposed that altered adipose tissue trace element profile may aggravate metabolic disruption in obesity.and Magnesium acts as a cofactor in the regulation of various ATP-requiring enzymes, many of which are implicated in glucose metabolism [10].

Materal and method

We have been collected a Blood samples from a total 100 persons and their ages were between 25-55years, Blood samples were divided into three groups according to BMI, BMI was calculated as weight in kilograms divided by the square of height in meters [6].

BMI= weight (kg)/height (m) ^{2}.BMI Categories:

***Underweight = < (18.5) kg/m^2**

***Normal weight = (18.5-24.9) kg/m^2**

***Overweight = (25-29.9) kg/m^2**

***Obesity = BMI of (30) kg/m^2 or greater**

The collected blood was then allowed to clot in a plain tube at room temperature, after which the serum was separated by centrifugation at 3000 rpm for 10 min, and kept frozen at -20 °C to be analyzed later depending on A pre-made tool kit imported from the Bio maghre, and estimating the concentration of MAD using the method used by the researchers Guidet, Shah [11]. The level of malondialdehyde after activation with H_2O_2 and $CuSO_4$ and inhibition by deferoxamine and Molsidomine in the serum of patient with acute Myocardial infraction[6].

Result and discussion

1-Body Mass Index (BMI) kg/m^2: The results of BMI were showed asignificant increase in the BMI levels in obese and overweight groups in comparison with normal weight group (control group), the Mean±SD of BMI were (34.867±3.538), (27.684±1.473), and (22.440±1.478) kg/m^2, respectively, as shown in Figure (1-2).

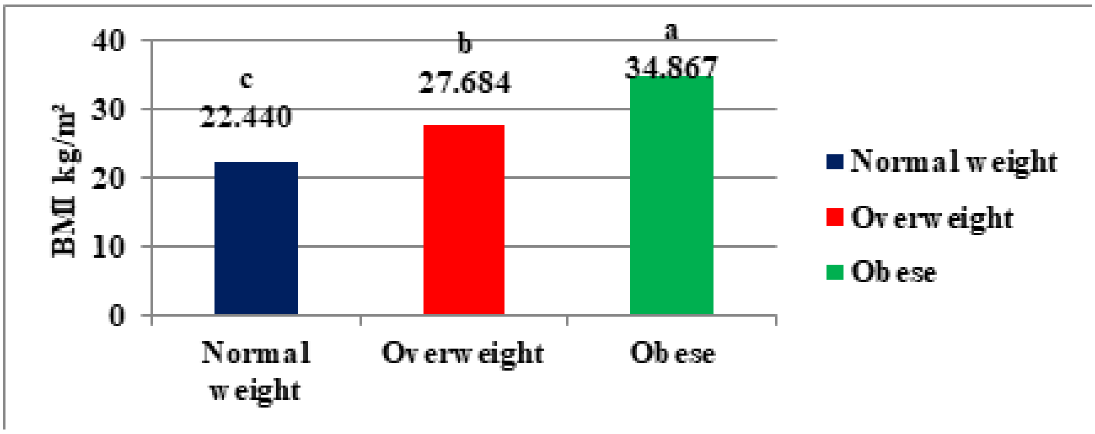

Figure (1-2): BMI (kg/m2) in the Total Study Population

2-Serum Glutathione (GSH): The results of GSH concentrations were showed a significant decrease in the GSH concentrations in obese and overweight groups in comparison with normal weight group (control group), the Mean±SD of GSH concentrations were (1.7932±0.5960), (3.1272±0.7709), and (4.3664±1.0720) μmol/l, respectively, as shown in Figure (1-3).

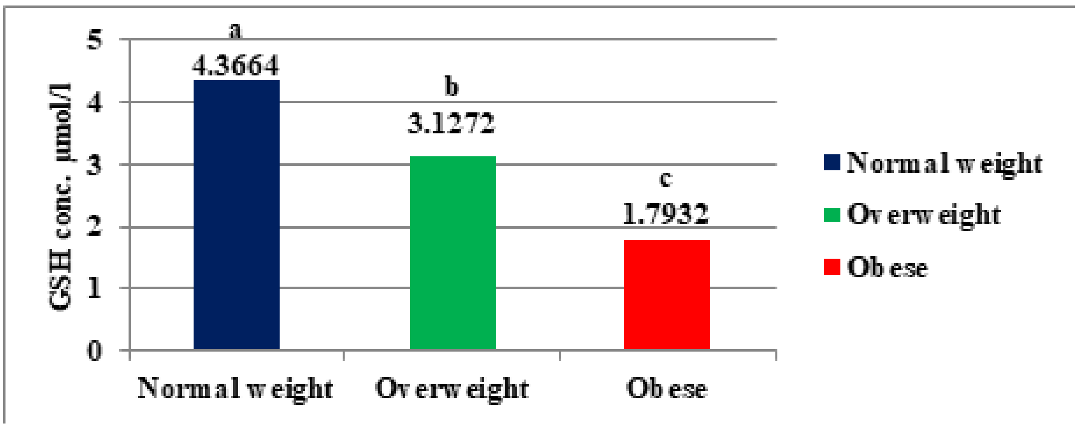

Figure (1-3): GSH Concentrations in the Total Study Population

These results were in agreement with Louise et al [12] and Alkinany [13]. And Ahmed[14]GSH plays multiple roles in the cell, being a free radical scavenger as a primary antioxidant defense; Glutathione protects the body organs against oxidative stress of ROS, either directly as an antioxidant or indirectly by maintaining other cellular antioxidants in a functional state [15].

3-Serum Zinc (Zn): The concentrations of Zn were showed a significant decrease in Zn concentrations in obese and overweight groups in comparison with normal weight group (control group), the Mean±SD of Zn concentrations were (121.15±7.93), (122.76±9.63), and (130.61±10.77) μg/dl, respectively, as shown in Figure (1-4).

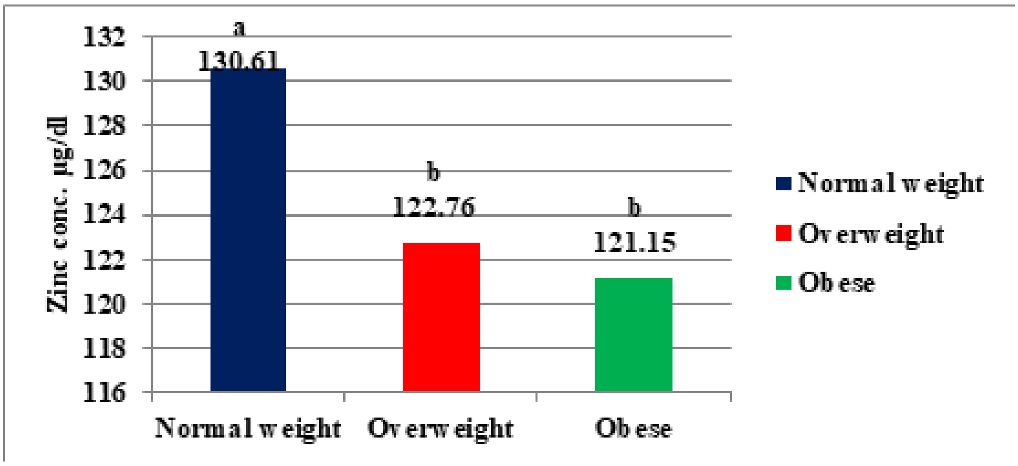

Figure (1-4): Zn Concentrations in the Total Study Population

These results were in agreement with Garcia et al [16],and Ahmed[14] Some studies have shown that obese individuals have low concentrations of zinc in plasma and erythrocytes, associated with alterations in the metabolism of the adipose tissue of these patients [17-18]. zinc supplementation has the potential to lower the risk of the progression of obesity to cardiovascular diseases [19].

4-Serum Magnesium (Mg): The results of Mg concentrations showed a significant decrease in the Mg concentrations in obese and overweight groups in comparison with normal weight group (control group), the Mean±SD of Mg concentrations were (1.2091±0.0317), (1.2861±0.0823), and (1.3684±0.0585) mg/dl, respectively, as shown in Figure (1-5):

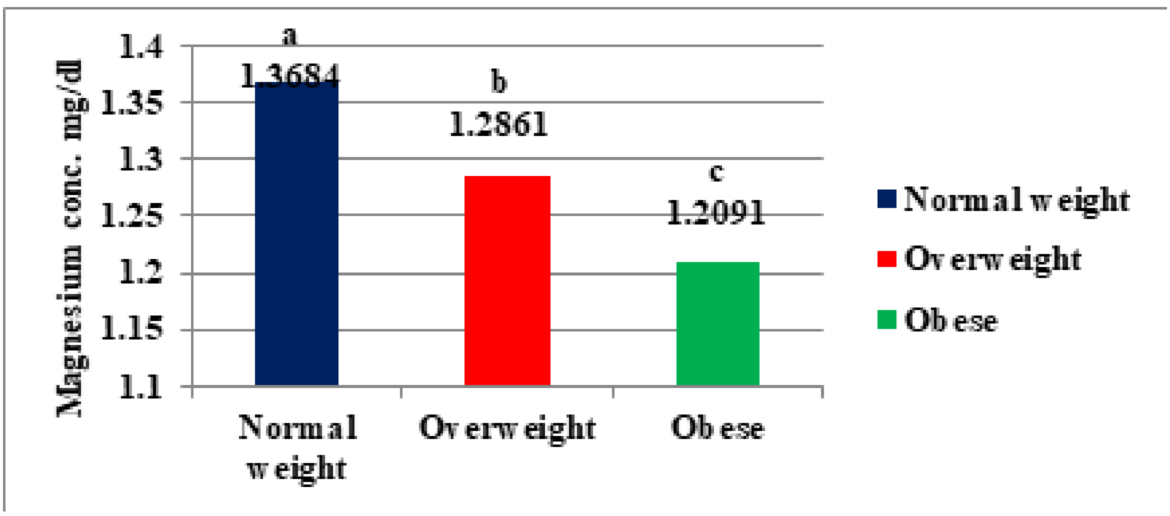

Figure (1-5): Mg Concentrations in the Total Study Population

Lower Mg concentration in people related with overweight and obesity, and suggest that Mg does not protect against disorders of lipid metabolism but may have a beneficial effect on blood pressure, carbohydrate metabolism, and reduce the risk of abdominal obesity [20]. Mak et al indicated that Mg supplementation improves the lipid profile and thus helps to reduce the risk of cardiovascular disease [21].a strong correlation between low magnesium intake and BMI in women also exists, suggesting that magnesium may help regulate women body weight[22].

5- Serum Malondyaldehyde (MDA): The results of MDA concentrations were showed a significant increase in the MDA concentrations in obese and overweight groups in comparison with normal weight group (control group), the Mean±SD of MDA concentrations were (13.735±2.311), (11.775±1.498), and (8.883±1.569) µmol/l, respectively, as shown in Figure (1-6).

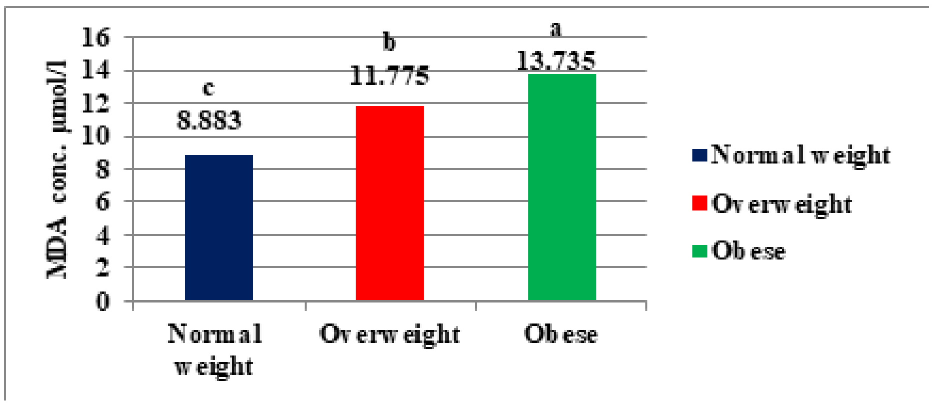

Figure (1-6): MDA Concentrations in the Total Study Population

The results of MDA were in agreement with Selvakumar et al[23]. Lipid peroxidation is thought to be a component of obesity-induced pathology. The accumulation of oxidative modified macromolecules has been demonstrated in obese adults. The Malondialdehyde (MDA) and oxidized low-density lipoprotein (ox-LDL), which were considered the most reliable oxidative biomarkers [24].

6-Glucose: The results of glucose concentrations were showed a significant increase in the glucose concentrations in obese and overweight groups in comparison with normal weight group (control group), the Mean±SD of glucose concentrations were (6.0952±0.9464), (5.5010±0.8200), and (4.8865±0.8341) mmol/l, respectively, as shown in Figure (1-7).

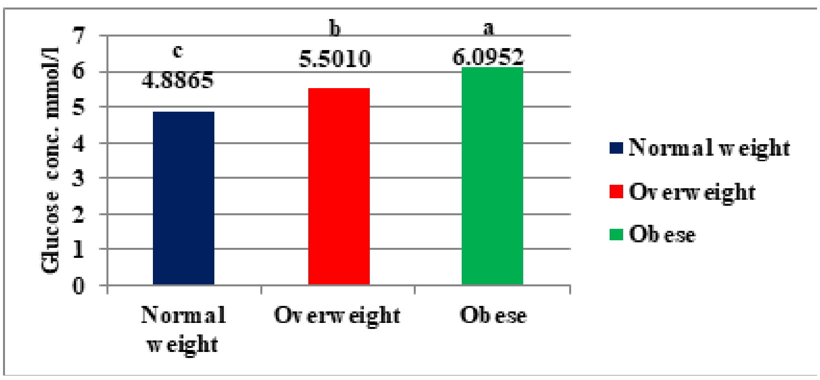

Figure (1-7): Glucose Concentrations in the Total Study Population

These results were in agreement with Ahmed,2016 [14] As glucose represents tissue energy It has a direct relationship with many metabolic agents [25] As for obesity, it causes an imbalance in the glucose metabolism process, so people who suffer from obesity are at risk of developing type 2 diabetes, since obesity causes insulin resistance, The likelihood and severity of type 2 diabetes are closely linked with body mass index (BMI) [26].

7- Lipid Profile:

7-1: Serum Cholesterol: The results of cholesterol concentrations were showed a significant increase in the cholesterol concentrations in obese and overweight groups in comparison with normal weight group (control group), the Mean±SD of cholesterol concentrations were (5.9153±1.1027), (5.2258±0.8281), and (4.1671±0.7946) mmol/l, respectively, as shown in Figure (1-8):

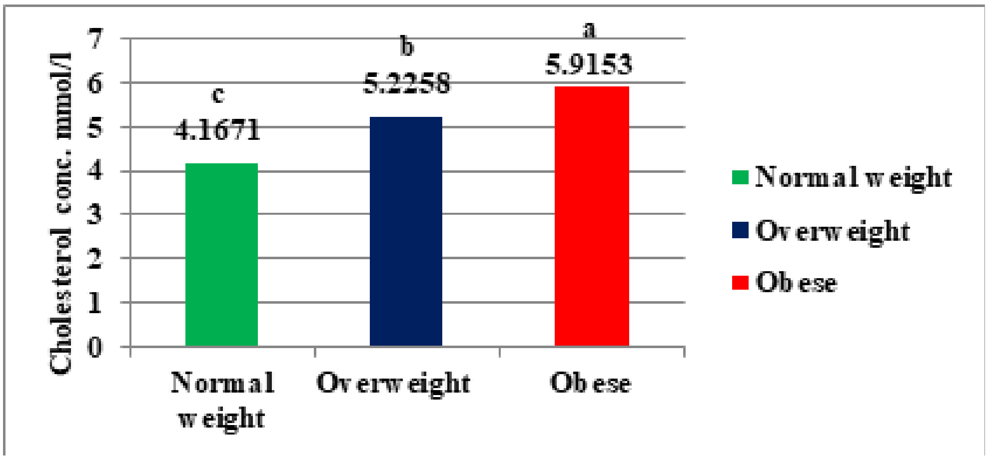

Figure (1-8): Cholesterol Concentrations in the Total Study Population

7-2-Serum Triglycerides(TG): The concentrations of triglycerides were showed a significant increase in the triglycerides concentrations in obese and overweight groups in comparison with normal weight group (control group), the Mean±SD of triglycerides concentrations were (2.9202±0.7261), (2.2348±0.6279), and (1.6839±0.5763) mmol/l, respectively, as shown in Figure (1-9).

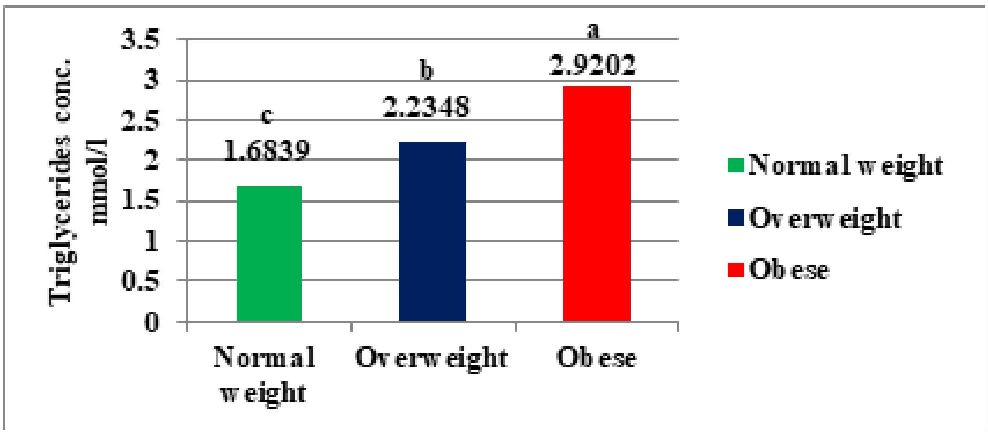

Figure (1-9): Triglycerides Concentrations in the Total Study Population

7.3: Serum High Density Lipoprotein (HDL): The results of HDL concentrations were showed a significant decrease in the HDL concentrations in obese and overweight groups in comparison with normal weight group (control group), the Mean±SD of HDL concentrations were (1.0712±0.2482), (1.5468±0.5548), and (2.1476±0.7186) mmol/l, respectively, as shown in Figure (1-10).

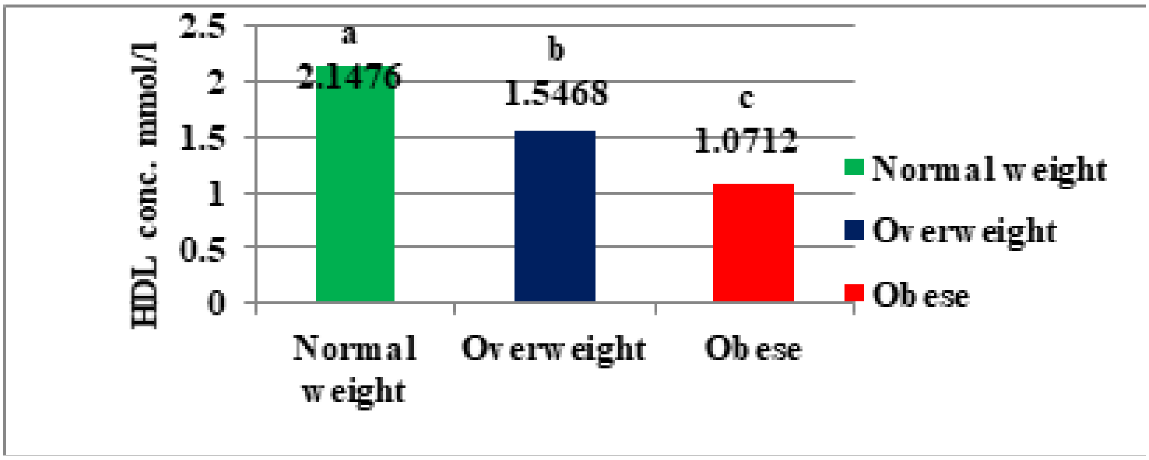

Figure (1-10): HDL Concentrations in the Total Study Population

7-4: Serum Low Density Lipoprotein (LDL): The results of LDL concentrations were showed a significant increase in the LDL concentrations in obese and overweight groups in comparison with normal weight group (control group), the Mean±SD of LDL concentrations were (3.5211±1.1815), (2.6686±0.9170), and (1.2586±0.6922) mmol/l, respectively, as shown in Figure (1-11).

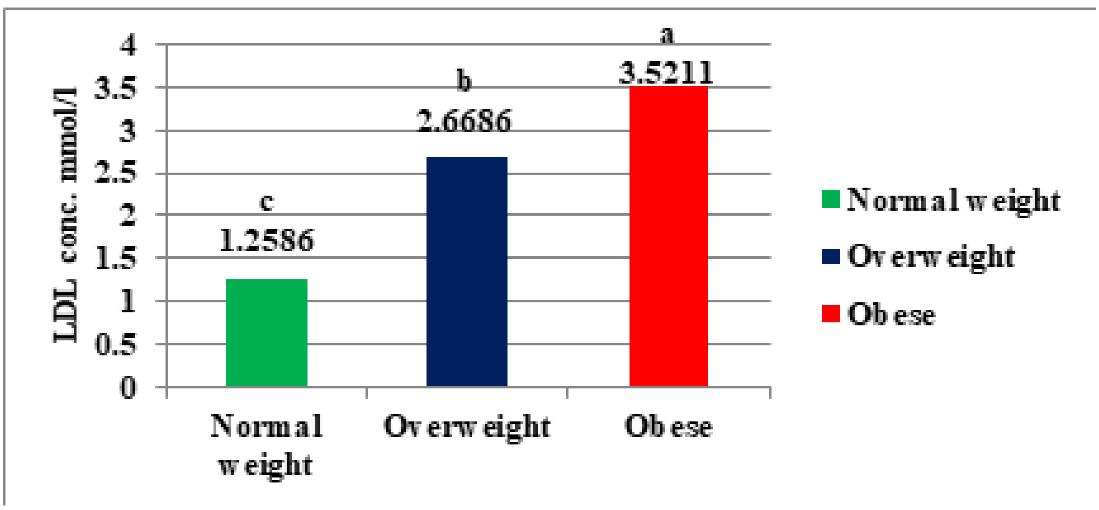

Figure (1-11): LDL Concentrations in the Total Study Population

7-5-Serum Very Low Density Lipoprotein (VLDL): The concentrations of VLDL were showed a significant increase in the VLDL concentrations in obese and overweight groups in comparison with normal weight group (control group), the Mean±SD of VLDL concentrations were (1.3230±0.3305), (1.0104±0.2857), and (0.7609±0.2614) mmol/l, respectively, as shown in Figure (1-12).

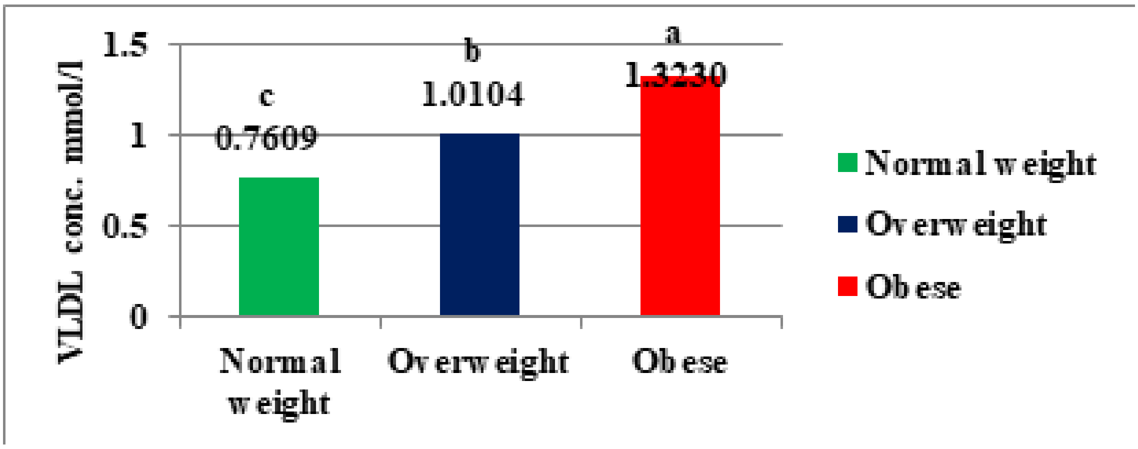

Figure (1-12): VLDL Concentrations in the Total Study Population

The results of cholesterol, triglycerides, HDL, VLDL, and LDL concentrations were presented in figures (1-8)(1-9),(1-10), (1-12),(1-11). In the present study, there was a significant increase in the concentrations of cholesterol, triglycerides, LDL-c and VLDL-c in obese and overweight individuals compared to control group for both genders. While there was a significant decrease in HDL-c concentration in obese and overweight individuals compared to control group for both genders. These results were in agreement with Garcia et al [16], Louise et al [12], and Eda Becer et al [27]. Plasma triacylglycerols are the major source of endogenous and exogenous fatty acids for the synthesis of complex lipids. The type of fatty acids in adipose tissue might exert a direct influence on serum lipids and the abnormality of serum lipids can affect the incidence of atherosclerosis, metabolic syndrome (MS), and other chronic diseases. Therefore, adipose tissue region has an important role in the development of diseases. It has been suggested that intra-abdominal fat has a higher turnover rate than subcutaneous fat [28], and it may have a greater influence on the plasma lipid profiles. Abdominal fat has been associated with insulin resistance, hyperlipidemia and hypertension, certain types of cancer and osteoporosis, Obesity is associated with derangements in the lipid profile, which further increases the risk of coronary heart disease, diabetes mellitus, stroke and certain cancers[29].

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