Determination Of Trace Elements And Total Antioxidant Capacity İn Obese Iraqi Patients

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Abstract - *Obesity is one of the principle preventable reasons for death. extra than forty % of Iraqis be afflicted by weight problems (obesity). is that it is excessive weight gain with excess body fat. This causes the patient to be exposed to several diseases. (weight problems) is measured in lots of ways, the most crucial of which is referred to as (BMI - body mass index), that's a tool for calculating weight in relation to frame height. someone is overweight if this indicator has a fee of 30 or more.*

Methods: *The study included healthy natural subjects as a comparison group (control) and they were (61 samples) Including (32) females and (29) males, and their ages ranged (3_15) years, and Patients Group (59 blood samples) were obtained they range in age (2_17) years, Included (35) males, (24) females.*

Samples were collected from the patients reviewed at [Al Khayal Hospital].Level of antioxidants was assessed by estimation in the serum convergences of complete cancer prevention agents limit (TAC) by UV spectrophotometric strategy. also, Serum minor components (Zn, Cu and Fe) assessed by Atomic Absorption Spectroscopy (AAS .(

The Statistical Analysis System-SAS (2012) program was utilized to distinguish the impact of contrast factors in study boundaries. T-test was utilized to huge look at between implies. in this examination.

Result: *Our study observed significantly elevated concentrations of (TAC) (p < 0. 01)in the control than patient. Investigation of serum minor components (Zn, Cu and (Fe) found that the mean estimations of Zn, Fe, Cu, were (106.52 ± 0.76) and (70.44 ± 0.76), and (65.85 ± 1.97) µg/dl for the patient and (53.73 ± 2.11), (31.16 ± 0.87), and (91.12 ± 3.00) µg/dl for the controls, thusly. There was a significant contrast in minor components the patients and controls (p < 0.01).*

Kew words: *Obesity , Trace elements , antioxidant capacity , BMI*

1. INTRODUCTION

Obesity is some on the biggest preventable causes about death, and it is enormous fears for humanity. Wherever necessary research among the United States or Europe bear evolved of a decrease between the hazard on dying proviso the body stuff index levels among non-smokers among 22,5 or 25 kg / m2 yet between people who smoke into 24 or 27 kg / m2,Chance of increased risk of death in the streak Transition in both directions. (Calle et al., 1999). The body mass index of over 32 was correlated with a sixteen-year doubling of the

death rate among women. Obesity in the USA is estimated to have the multiple reason of death rates from 111,909 to 265,000 a year, while the cause of death within the European Union is attributed to weight gain for 1 million people (7.7%), on the average , obesity or obesity reduces the expected anticipation from approximately six to seven years: the typical body mass ranges from 30 to 35 reduces the anticipation by two to four years, while corpulence lessens the expected anticipation by ten years.(Whitlock et al., 2009). The oxidative strain causes severe and major damage to large organic biomolecules, natural metabolism and physiological imbalance due to improved manufacturing of independent roots and reactive oxygen species (Ozata et al., 2002). The oxygen roots are responsible for producing membrane peroxide and maldialdehyde membrane (mda), each of which strikes the cellular function. Peroxide increases the permeability of the membrane while mda can disable the membrane vectors, Such processes create a direct risk to cell viability by helping to form common bonds between molecules and other molecules, despite the fact that the carcinogenic results of mda. (Ozata et al., 2002).over the long time, may be extra unfavourable. there may be a complex antioxidant safety mechanism to mitigate set free radical damage. cells hold their important features in opposition to oxidative harm with the useful resource of a machine concerning glutathione reductase , trace elements, total antioxidant capacity (TAC) and vitamins c, e and a. (Ozata et al., 2002).

The term "antioxidant system" describes the various and responsible mechanisms of defense cells from free radical operations. This system includes: Water-soluble antioxidant vitamins including (diet C, uric acid, taurine and carnitine) for nutrients such as fat-soluble antioxidants (tocopherol, sretinoids, ubiquinones, carotenoids), and cancer prevention agent chemicals, for example, glutathione peroxidase (gsh-px), catalase (cat) and disutase superoxide (sod). (Surai, 2014). A actual new study analyzed levels of serum trace elements in children Blood copper, zinc and iron levels, Changes in serum trace element concentrations in obese patients Investigate the relationship between serum effects in future serum levels and their effects in obese children.(Skalnaya and Demidov, 2007)

2. MATERIALS AND METHODS
Samples collection :
 Group 1_Control
The study included healthy natural subjects as a comparison group (control) and they were (61 samples) Including (32) females and (29) males, and their ages ranged (3_15) years.
2_Patients Group
In this study, (59 blood samples) were obtained they range in age (2_17) years, Included (35) males, (24) females .
Samples were collected from the patients reviewed at [Al Khayal Hospital]
Collection and preservation of blood Samples :
The samples were collected by drawing (8)ml from the blood from the vein with a plastic syringe, Place the drawn blood into sterile (Plain tubes) plastic tubes made (Poly Styrene) and EDTA-free anticoagulant. Leave for (10) minutes at room temperature until it is coagulated after that in a device (Centrifuge) At a speed of 5000 rpm (10 rpm), then withdraw the clear serum then it is frozen at -20 ° C.
Measuring height and weight and calculating body mass factors (BMI)
Weight and height (for healthy) and (patients) were measured by measuring height in centimeters (cm) and weight using the Sensitive Person Balance in kilograms (Kg). The body mass index was calculated according to the law :
Body mass index (BMI) = weight (kg) / Length (m^2)
Measuring the level of(trace elements) in the serum

Estimation of (zinc) Concentration in serum

Zinc intervenes in the function and structure of more than 70 enzymes involved in different metabolic cycles, for example, union or debasement of starches, lipids, proteins and nucleic acids. Zinc deficiencies cause anemia, hepatosplenomegaly, delay in development, delayed healing of wounds and ulcerations, taste and smell alterations.

Decreases in zinc concentration can be observed in physiological conditions such as the last months of pregnancy, the use of oral contraceptives and in pathological conditions for example myocardial infarction, alcoholic cirrhosis, malabsorption syndrome, lung infections, carcinomas and lymphomas .

Procedure :

Kind of analysis: End point
Reading time: 5 minutes
Colour stability: 30 minutes
Wavelength: 578 nm (520-570)
Temperature: 20-25 C°
Lightpath: 1 cm
Zero: Blank Reagent

Reagents	Blank	Standard	Sample
Work Reagent	1 ml	1 ml	1 ml
Distilled Water	50 µl	….	….
Standard	….	50 µl	….
Sample	….	….	50 µl

blend and read the absorbance against clear at 578 nm .

Shading is steady for 30 minutes.

Calculation **:**

Zn **µ**g/dl = $[A_{(sample)} / A_{(standard)}] \underline{X} \ 200$

Zn **µ**mol/l = $[A_{(sample)} / A_{(standard)}] \underline{X} \ 30.6$

Estimation of (copper) Concentration in serum

Test Summary :

Copper (Cu) is an important component of many enzymes and is found mainly is plasma bound to ceruloplasmin .

Copper plays a fundamental role in iron metabolism, favoring intestinal absorption, mobilization and use by deposits.

Copper not absorbed and excess copper, derived from biliary excretion, is mainly eliminated by laces.

The concentration of free copper in the blood (cupremia) may register a reduction in correlation with a decrease of proteins in serum, then in the states of insufficient nutrition or malabsorption (celiac disease, sprue), ioss of proteins in the stool or with the urine (nephrotic syndrome) and in Wilsons disease.

An increase in the Cupremia can occur in the case of pregnancy, in various acute or chronic infections, in liver diseases, after surgery, in myocardial infraction, in myocardial infraction, in hyperthyroidism, Hodgkins disease, in neoplasms and in numerous diseases of haematological interest.

Procedure **:**

Kind of analysis: End point
Reading time: 10 minutes
Colour stability: 30 minutes

Wavelength: 580 nm (570-590)
Temperature: 20-25 C°
Lightpath: 1 cm
Zero: Blank Reagent

Reagents	Blank	Standard	Sample
Work Reagent	1 ml	1 ml	1 ml
Distilled Water	66 **µ**l	….	….
Standard	….	66 **µ**l	….
Sample	….	….	66 **µ**l

blend and hang tight for 10 minutes at that point read the absorbances against the clear at 580 nm .

The shading is steady for 30 minutes.

Calculation **:**

Cu **µ**g/dl =   [A $_{(sample)}$ / A $_{(standard)}$] X 200

Cu **µ**mol/l =   [A $_{(sample)}$ / A $_{(standard)}$] X 31.47

Estimation of (iron) Concentration in serum

Iron was measured in sucking in patients who were healthy and healthy in (Cobas C 111), Manufactured by the German company (Roch), And according to the manufacturer's directions for several work (kit) For this device and then follow the method of working in detail.

Procedure **:**

Blood was drawn for both groups, for obese and healthy patients, The blood was placed in special tubes and left at room temperature for (15) minutes to form the thrombus, it was then centrifuged in the centrifuge for a period of (5) minutes at (4000) rpm, after which the serum was separated, About 800 micro liters of the serum model were placed in small tubes for the device called (Cuvette).

This was controlled by estimating the expansion in concentration. (According to the manufacture)

Measurement of Triglycerides (TG)

Was used (TRIGIL) For quantitative measurement (TG) In the blood serum Using a device Cobas C111 .

The principle of quantitative analysis (Triglyceride) This way he is using an enzyme (Lipoprotein Lipase) Used from microorganisms For a complete quick analysis of (Triglycerides') to the Glycerol the oxidation process is followed by Glycerol to configure (Dihydroxy acetone phosphate) and (Hydrogen Peroxide H_2O_2), and surely (H_2O_2) The component in this process interacts with (4- amino phenazone) and (4-chlorophenol) With an enzyme (peroxidase) To create a red color compound. The color density of the formula formed is directly proportional to the concentration of triglycerides(TG), This is determined by measuring the increase in absorbance.

Measurement of (HDL) High-density lipoprotein

Was used HDL-C$_3$ (HDL - Cholesterol) In order to quantify it HDL In the serum of individuals Using a device Cobas C111 .

The basic principle of this measurement (Chromatic enzymatic method) The presence of magnesium particles Then (Dextran sulfate) It produces water dissolvable buildings with

(HDL) and (VLDL) It is assessed enzymatically by chemical (Cholesterol esterase) and (Cholesterol oxidase) Associated with (PEG).

And that cholesterol esters It is quantitatively broken by (Cholesterol esterase) to form cholesterol and fatty acids with oxygen, cholesterol is oxidized by an enzyme (Choli Oxidase) To configure Alchollstinon And hydrogen peroxide .

With an enzyme (POD Peroxidase) The hydrogen peroxide is formed From interacting with (4-amino antipyrine) and HSDA To configure blue the tincture The shading power of the color framed is straightforwardly relative to the focus (HDL).

3. STATISTICAL ANALYSIS :
The Statistical Analysis System- SAS (2012) program was utilized to identify the impact of distinction factors in study boundaries. T-test was utilized to critical look at between implies. in this examination.

4. RESULTS AND DISCUSSION
The results included the statistical values of patients with obesity That was measured in research in patients' serum and in the control group According to the methods of work described in the third chapter, the results were as follows :

Comparison between control and patients in Age and BMI

The results showed in the current study, as shown in Table (1), that there was a significant increase (P≤0.01) In patients' ages (10.99 ± 0.60) compared to healthy ones (9.87 ± 0.48)**.** And the results in the current study, as shown in Table (4-1), that there was a significant increase (P≤0.01) in BMI patients (33.99 ± 1.33) compared to healthy persons (18.64 ± 0.27).

Table (1) : Comparison between control and patients in Age and BMI.

Group	Mean ± SE	
	Age (year)	BMI (kg/m^2)
Control	9.87 ± 0.48	18.64 ± 0.27
Patients	10.99 ± 0.60	33.99 ± 1.33
T-test	1.539 NS	2.625 **
P-value	0.149	0.0001
** (P≤0.01) , NS: Non-Significant.		

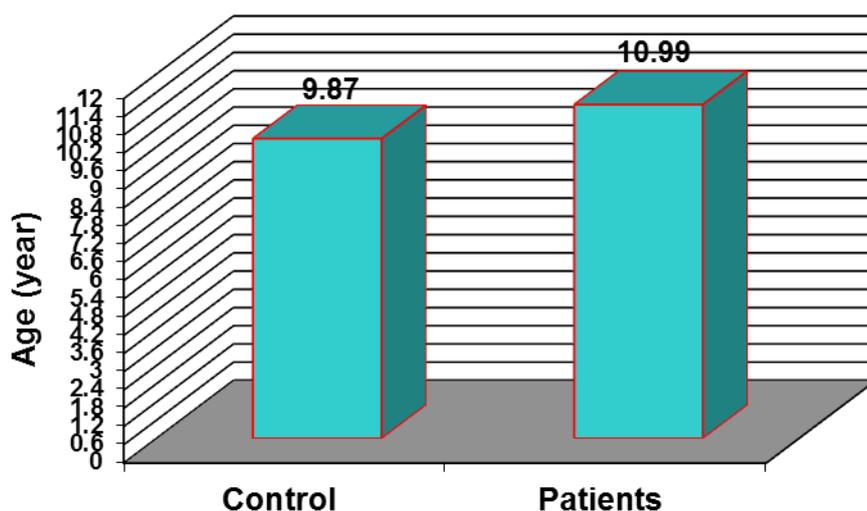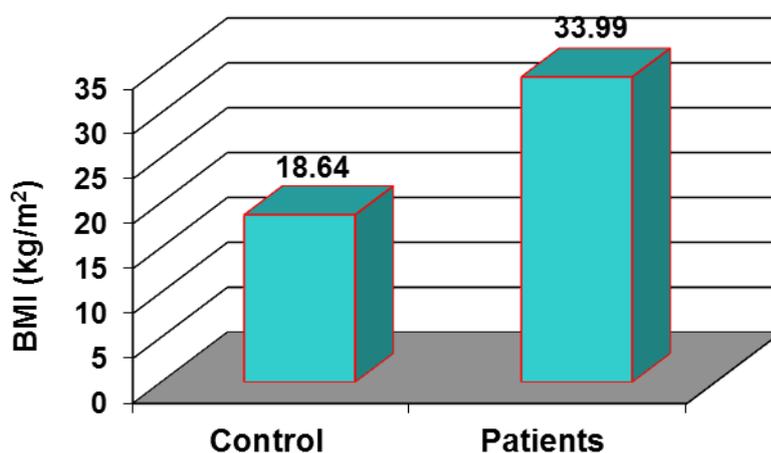Figure 1. Comparison between control and patients in Age.

Figure 2. Comparison between control and patients in BMI.

The level of concentration of (zinc, copper and iron) in patients' serum and control group

The results, as shown in Table (2), indicated a critical increment (P≤0.01) in (zinc) concentration in patients higher than healthy sample's, patients (106.52 ± 0.76) , control (53.73 ± 2.11).

It also indicated a critical increment (P≤0.01) in (copper) concentration in the disease group 70.44 ± 0.76 Higher than control group (31.16 ± 0.87).

As for the concentration of (iron), It indicated a critical increment (P≤0.01) In control gathering (91.12 ± 3.00) Greater than the patients group (65.85 ± 1.97)

Table (2) : Comparison between control and patients in Zinc, Copper and Iron.

Group	Mean ± SE		
	Zinc ( )	Copper ( )	Iron ( )
Control	53.73 ± 2.11	31.16 ± 0.87	91.12 ± 3.00
Patients	106.52 ± 0.76	70.44 ± 0.76	65.85 ± 1.97
T-test	4.579 **	2.316 **	7.232 **

P-value	0.0001	0.0001	0.0001
** (P≤0.01).			

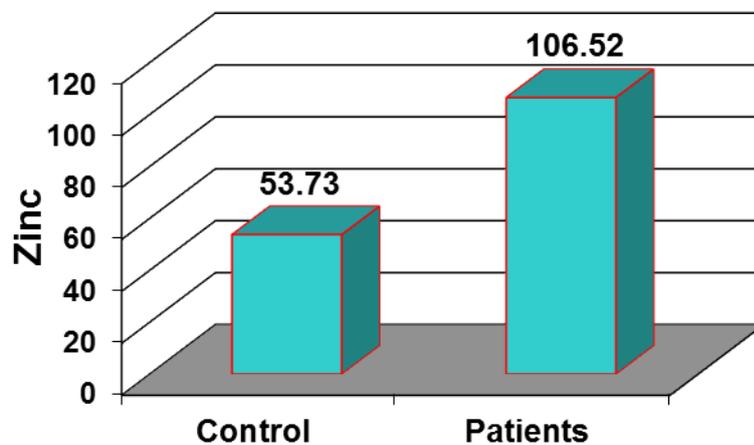Figure 3. Comparison between control and patients in (Zinc).

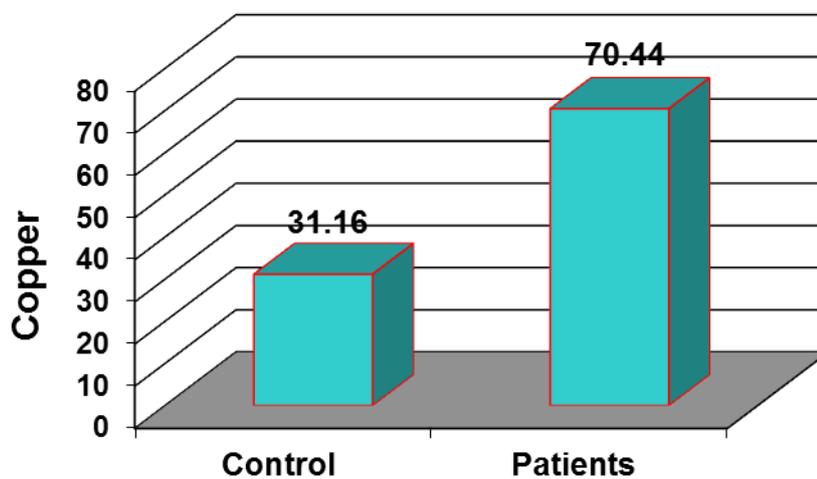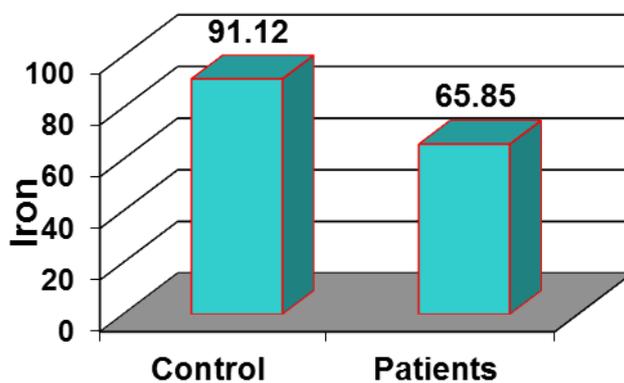Figure 4. Comparison between control and patients in (Copper).

Figure 5. Comparison between control and patients in (Iron).

The concentration level total antioxidants capacity (TAC) for patients and healthy persons

The results in table (3) demonstrated a significant increase ($P \leq 0.01$) of total antioxidants capacity (TAC) In the benchmark group It was higher than the patients gathering, control group (1.251 ± 0.02), patients group (0.930 ± 0.03).

Table (3) : Comparison between control and patients in total antioxidants capacity (TAC).

Group	Mean ± SE of TAC ( )
Control	1.251 ± 0.02
Patients	0.930 ± 0.03
T-test	0.0852 **
P-value	0.0001
** ($P \leq 0.01$).	

Figure 6. Comparison between control and patients in TAC
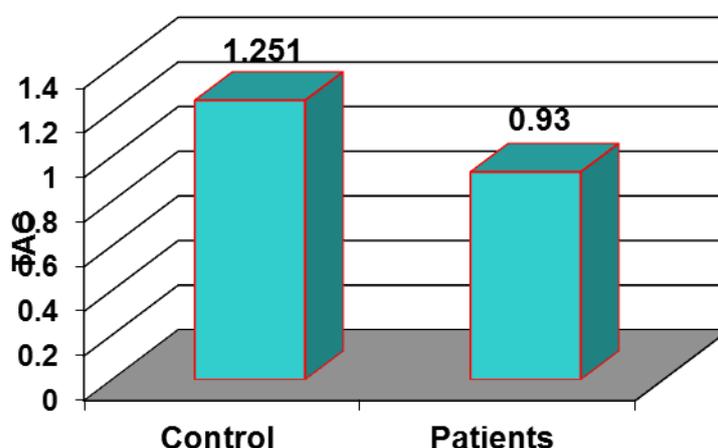
The level of high density lipoprotein (HDL) in patients and control.

The results showed as shown in Table (4) there is a critical increment ($P \leq 0.01$), As the group of patients have a greater serum (HDL) concentration than the control group, patients group (48.41 ± 2.26) , control group (23.50 ± 0.87) .

Table (4) : Comparison between control and patients in (HDL)

Group	Mean ± SE				
	Cholesterol	**HDL**	LDL	Triglyceride	VLDL
Control	75.22 ± 2.50	**23.50 ± 0.87**	37.19 ± 1.77	71.70 ± 2.47	14.33 ± 0.49
Patients	192.11 ± 9.02	**48.41 ± 2.26**	115.66 ± 6.35	144.16 ± 5.05	28.80 ± 1.01
T-test	18.094 **	**4.707 ****	12.761 **	10.969 **	2.194 **
P-value	0.0001	**0.0001**	0.0001	0.0001	0.0001
** ($P \leq 0.01$).					

Figure 7. Comparison between control and patients in HDL
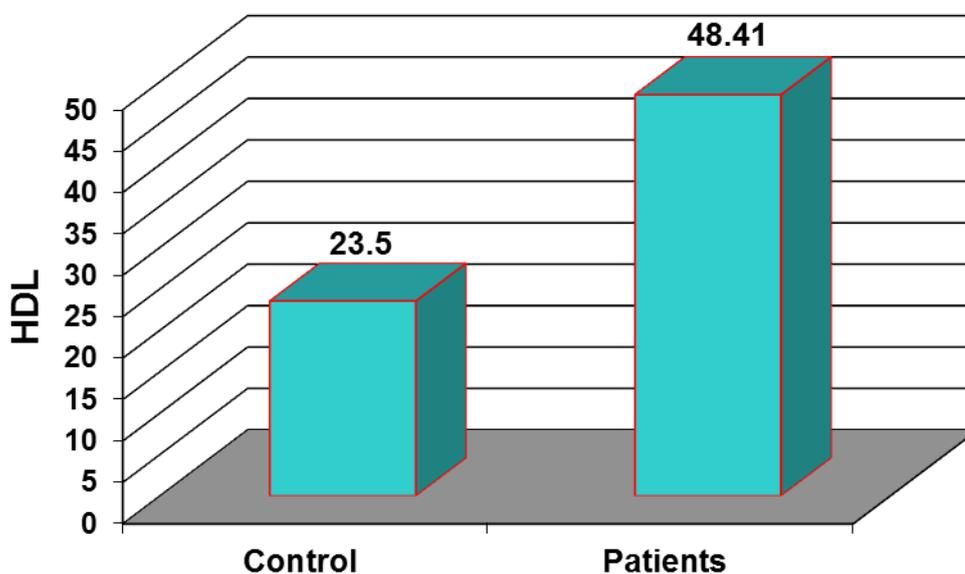
Discussion

This study found that low serum fixations of Zn and Cu In the control group and it was higher in patients, As for iron(Fe)and total antioxidant capacity (TAC), its concentration in the benchmark group was higher than that of patients. (Zinc) is the most important element to a variety of researchers. This is particularly involved in the synthesis of hormones that are engaged with the pathophysiology of stoutness.Zinc is a basic minor component for people and different creatures, plants, and microorganisms. zinc is vital for the feature of extra than three hundred enzymes and 1000 transcription elements, and is saved and transported in metallothionine.(Russell et al., 2001).zinc plays a position in the metabolism of fat tissues, in the law of leptin secretion and within the storage of mind lipids. it additionally improves the unfastened release of fatty acids and glucose healing and also calls for glucose manipulate, and those consequences are close to our findings, which confirmed a full-size lower in zinc degrees in obese people (p < 0.01).(Adnan et al., 2019) zinc has important function inside the hexagonal launch of insulin and inside the attention of hormones within the pancreas. an efficient antioxidant is known. (Błażewicz et al., 2013b). There is also a study, with low serum focuses of Zn, Cu and a strongly related rise in Na level with obese people. (Adnan et al., 2019). This study found that low serum focuses of Zinc (Zn) In the benchmark group and it was higher in patients.

(Copper) The study showed that the level of copper concentration in patients with obesity was higher than in the benchmark group.
copper is considered an vital detail in knowing a number of illnesses including (weight problems), copper is a part of the antioxidant enzymes that shield the frame from unfastened radical formation, and the imbalance in copper metabolism contributes to hypercholesterolemia and oxidative disorders.. (Błażewicz et al., 2013b) the awareness of cu in erythrocytes became lower than that during plasma. the findings located via the authors indicate that excess weight related to lipid metabolism problems can also predispose to modifications in plasma concentrations of cu in weight problems, which is greater obvious in males, suggesting the viable system of this mineral, adding to peroxidation or going about as

a cell reinforcement. (Błażewicz et al., 2013a).The middle convergence of Cu in the blood in stout kids was lower in this example, yet altogether higher in the plasma than in the benchmark group. There were no significant varieties between the two classes of pee. Iron has increased a ton of consideration and has been demonstrated to be poor in large patients.iron has obtained a staggering arrangement of consideration and has been found to be low in fat patients. notwithstanding, the etiology of the hypoferremia in weight issues has stayed uncertain. (Błażewicz et al., 2013a).

(**Iron**) The iron (Fe) concentration in the results was that the benchmark group was higher than the gathering of obese patients.A grown-up human body contains around 4 grams (0.005 percent body weight) of iron, principally in hemoglobin and myoglobin. These two proteins assume a key part in vertebrate digestion, i.e. in the transfer of oxygen by blood and in the conservation of oxygen in the muscles. Human iron digestion requires a base measure of iron in the eating regimen to sustain the required amounts. Iron is also a mineral that is found in the vital and key role of many essential redox enzymes involved in the cellular respiratory system and oxidative stress in plants and animals. (Almaari and Aljbban,2018). Iron (Fe) is likewise a basic component that goes about as a cofactor found in significant macromolecules identified with energy age, metabolic movement, and DNA blend. (Adnan et al., 2019). Fe insufficiency is identified with heftiness. Hepcidin is a peptide hormone released by the liver that plays a role in iron haemostasis. (Adnan et al., 2019). These perceptions are comparative with our findings that introduced significant diminished degree of Fe in stout people ($p < 0.01$). (Adnan et al., 2019).

Total antioxidant capacity (**TAC**): is an analyte as often as possible used to assess the cell reinforcement popularity of natural examples and might assess the cancer prevention agent response against the free extremists delivered in a given illness, assay measures the overall antioxidant capacity of biomolecules from a diffusion of samples thru a set mechanism. in studies, shows that prepubertal youngsters with weight problems as of now have a more noteworthy intensification of oxidative strategies estimated with the guide of (TOC) focuses and (OSI) values while at the same time brought down cell reinforcement safeguard estimated by methods for (TAC) fixations as looked at with non obese kids in overall oxidant potential willpowerr. (Tatzber,2003). Our study indicates It was higher in the control group compared to the obese group, The presence of antioxidants, which we get from vitamins and some elements such as zinc, iron and selenium found in some foods are important in the human body because they prevent the formation of free radicals and they cause many problems, including diseases such as obesity.

Lipid profile is a blood test panel that acts as an initial screening system for lipid abnormalities., including ldl cholesterol and triglycerides. the consequences of this test can pick out sure genetic sicknesses and might decide approximate dangers for cardiovascular ailment, positive sorts of pancreatitis, and different illnesses. It is natural that the percentage of fat in obese people is higher than that of healthy people That is, the (lipids profile) [Cholesterol, HDL, LDL, Triglycerides ,VLDL] in our study was all higher in large patients contrasted with solid individuals.

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