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EFFECT OF OBESITY ON SOME SERUM ANTIOXIDANT PARAMETERS IN SAMPLE OF IRAQI MEN ≥ 40 YEAR

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ABSTRACT

Background: Obesity is an unhealthy condition that is considered a major condition due to its epidemic commonness many of which are also associated with many comorbidities. Obesity is not only weight gain, but it is seen as a state of metabolic dysfunction that results from the accumulation of remaining or excess calories from food in visceral fat, and thus many concentrations of free fatty acids are released in several parts of the body. This is considered a state of chronic oxidative stress. ***Aim:*** Body Mass Index (BMI) correlation was the goal of this investigation. With some serum antioxidants including enzymatic (Glutathione reductase (GR), Superoxide dismutase (SOD), and non-enzymatic (Glutathione (GSH) and Vitamin C (Vit-C)). ***Material and methods:*** There were 127 apparently healthy Iraqi men participating in this investigation. Ages 40 to 79 made up their group, and their body mass index also ranged from (18-39.9) kg/m2. GR, SOD, GSH, and Vit-C in serum were analyzed by colorimetric methods. ***Results:*** Men had a mean BMI of (29.308±4.77) kg/m^2. Four BMI categories for the men were created, including: There are no men underweight, 26 men (20.47%) were of normal BMI, other 47 men (37%), 33 cases (25.98%), and 21 case (16.53%) were overweight, obese, and morbidly obesity respectively. The mean of serum parameters GR, SOD, GSH, and Vit-C in all men under study were (mean ± SD) (39.469±9.602 U/l), (1.836±0.466 U/l), (4.240±1.312 µmol/l), and (1.427±0.303 mg/l) respectively. In Iraqi men, a higher BMI was substantially related with a decline in S.SOD and S.Vit-C, but not with a relationship between BMI, S.GR, and S.GSH (P 0.05). ***Conclusions****:* Men who have a higher body mass index are more liable to oxidant stress.

KEYWORDS: BMI, Obesity, Antioxidant, Iraqi men.

INTRODUCTION

In 2016, was more than 50% of all mortality in Iraq attributable to no communicable diseases (NCDs).[1] Most them was result from physical inactivity, poor diet, injurious alcohol, and tobacco use use leading to metabolic/physical changes, including diabetes, hypertension, overweight, and obesity.[2] Obesity is known to be an important problem of

health with a significant impact on mortality and morbidity of people of all ages. Moreover, obesity is considered to be a principal causative factor in the development of the metabolic syndrome (MS) and has been linked with increased cases of hypertension, hyperinsulinemia, diabetes II dyslipidemia, and cardiovascular disease.[2,3]

Oxidative stress seems to have a significant impact on the pathophysiology of various chronic diseases.[2] Oxidative stress mostly associated with reactive oxygen species (ROS) and happen under physiological conditions where it causes damages in different organs. It is related to various pathological processes such as diabetes, obesity, cardiovascular disease, and atherogenic processes.[4] ROS list includes the nitric oxide, hydrogen peroxide (H_2O_2), hydroxyl radical (OH-), lipid peroxides and superoxide.[5,6]

Antioxidants are the molecules that prevent cellular damage caused by oxidation of free radical. Antioxidants may keep cells by a variety of mechanisms, including the transformation of ROS to non-radical species (which are dependent on the antioxidant involved), fraction the auto-oxidative chain reaction initiated by ROS and decreasing centralize oxygen concentrations.[7] former studies have propose that adults with the MS have low concentrations of several antioxidants, which may partially explain their increased risk for cardiovascular disease and diabetes.[8,9]

Antioxidants can be classified into two major groups. Enzymatic antioxidants, which include different enzymes such as superoxide dismutase, catalase, glutathione peroxidase (GPX), glutathione reductase (GR) and non-enzymatic antioxidants that consisting of reduced glutathione (GSH), vitamin C, lipoic acid, selenium, zinc and the dietary supplements.[10]

The purpose of this study was to investigate whether BMI is effecting on some enzymatic serum antioxidant (Glutathione reductase (GR), Superoxide dismutase (SOD)) and some non-enzymatic antioxidant (Glutathione (GSH) and Vitamin C (Vit-C)).

MATERIAL AND METHOD

A total of 127 men between the ages of 40 and 79 who appeared to be in good condition were studied in the Iraqi province of Anbar between October 2016 and the end of April 2017. The Department of Urology at Al-Ramadi Teaching Hospital provided the study's male subjects. Following the men's informed consent, the study's data were collected by distributing a questionnaire, collecting 10 mL of blood, and measuring the subjects' height and weight (both while they were wearing clothing and without shoes). The Al-Ramadi Teaching Hospital for Women and Children's laboratories received the serum after it had been separated. Until they were tested, serum samples were separated into 5 Eppendorf tubes and kept at - 20^{o}C.

$$\textbf{Body Mass Index (BMI)} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

Kg/m^2

By determining the weight and height, the body mass index was determined using the formula below.[11]

Eight groups of Iraqi men were formed for the study: four groups according to age (40-49), (50-59), (60-69) and (70-79) years, and other four groups according to BMI that including Normal BMI (18.5–24.9), other (25–29.9), (30–34.9),

and (35–39.9) were overweight, obese and morbidly obese, respectively this classification agrees with The WHO BMI classification.[12]

Utilized pre-made kits created by a Spanish business that specializes in linear biochemistry to assess all serum parameters, including urea[13], creatinine[14], uric acid[15], and gamma-glutamyl transferase[16] by using colorimetric techniques.

RESULT

The results of this study showed that the range age of men under study was 40–80 years. There were no underweight, 26 men (20.47%) were of normal BMI (18–24.9 kg/m2), other 47 men (37%) were overweight, 33 cases (25.98%) of obese, and 21 cases (16.53%) Morbidly obese.

Table 1 (Figs 1-3 in Appendix) shows the relationship between BMI, urea, creatinine, uric acid, and gamma-glutamyl transferase there is no significant relation between BMI and the levels of urea and creatinine, but there is a significant increase in levels of uric acid, and gamma-glutamyl transferase in men with high BMI (obese and morbidly obese groups) at P≤0.05.

Figures (1) and (2) of the results show scatter charts for all the males who were the subject of the study, and they demonstrate a significant positive correlation between BMI and both UA and GGT P0.05.

Table 1: Relation between BMI and some serum antioxidants in a sample of Iraqi men at P≤0.05.

Body Mass Index (BMI)				
Parameters	**Normal BMI**	**Overweight**	**Obese**	**Morbidly obese**
S.GR (U/l)	a 28.0-64.0* 42.15±8.761**	a 25.0-60.43 40.22±10.04	A 20.60-60.00 37.42±10.02	A 22.00-52.40 37.68±8.445
S.SOD (U/l)	c 1.42-3.45 2.095±0.580	bc 1.10-3.10 1.877±0.478	Ab 1.3-2.4 1.714±0.314	A 1.25-2.6 1.617±0.317
S.GSH (µmol/l)	a 2.45-7.00 4.591±1.405	a 2.30-7.00 4.284±1.309	A 2.40-7.87 3.940±1.276	A 3.00-6.84 4.179±1.226
S.Vit-C (mg/l)	b 1.10-1.92 1.561±0.236	ab 0.96-2.20 1.445±0.325	A 0.95-2.20 1.361±0.331	A 0.95-1.64 1.326±0.218
- Similar letters mean no significant differences at P≤0.05 -*Range - ** Mean ± SD				

DISCUSSION

There was no appreciable change in B. Urea and S. creatinine in Iraqi men as their BMI increased, which is consistent with the findings of Cancello et al. (2023)[17], who investigated the link between renal function and obesity in adults without hypertension. The findings of this study, which corroborate those from a five-year follow-up study by Ishizaka that included 3153 participants and found a strong correlation between S.UA change and BMI change, indicate a considerable rise in S.UA and S.GGT in Iraqi men with rising BMI this agree with carboni et al.[18] liu et al.[19] likewise observed a continuous transition from lower S.UA levels associated with the highest weight reduction to higher levels associated with maximum weight gain.

BMI is a substantial and changeable risk factor for hyperuricemia in the USA, Japan, and other nations Barrera et al.[20] Weight loss was thought to be a successful non-medical method in the Japanese population for lowering S.UA levels.[18] Agree with cho et al.[21], the author asserts that excessive fat accumulation in obesity can produce and secrete uric acid and is often associated with hyperuricemia of the overproduction variety. This might establish a theoretical basis for the relationship between BMI and SUA. Some research has shown that there may be a link between H. pylori infection and changes in body mass index, as the presence of H. pylori may affect the body's metabolism and nutrient absorption.[22,23]

These results are in line with those of Hassan et al.[21], who found that those with high BMI had significantly higher serum GGT levels and that serum GGT levels may be elevated. A decrease in the amount of oxidative stress, which has been associated with aging and central obesity.[24] Elevated GGT is closely linked to obesity and the accumulation of excess fat in the liver, a condition known as non-alcoholic fatty liver disease, which is hypothesized to lead to hepatic insulin resistance and the development of systemic insulin resistance as well as hyperinsulinemia.[25] These findings also suggest that high S.GGT might reflect metabolic alterations that naturally take place without regard to the effects of alcohol use and might function as a clinical marker for insulin resistance syndrome.[26]

But there are significant shortcomings to the study we undertook. Due to the observational nature of our work, we were unable to completely rule out the potential that additional, unmeasured factors may have contributed to the observed associations. The second issue is that we are unsure of the extent to which participants in our study will be impacted by alterations to their eating and lifestyle patterns. Last but not least, given the study was cross-sectional in nature, it is possible that it is challenging to explain how having a high BMI affected S.UA and other study characteristics. To determine the role of BMI and other Met.S components in patients with hyperuricemia in various sites in Iraq, long-term follow-up and studies are required.

CONCLUSIONS

However, people with higher BMI are more likely to have higher S.UA and S.GGT. In the study of Iraqi men, there is no correlation between body mass index (BMI) and the levels of blood urea and serum creatinine.

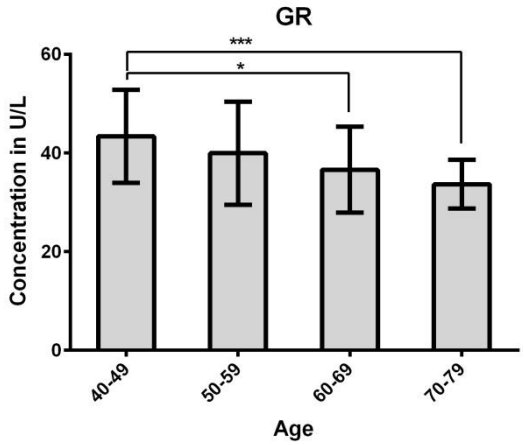
REFERENCES

1. World Health Organization (WHO). Iraq: Noncommunicable Diseases (NCD) Country Profiles. 2018. Available online: https://www.who.int/nmh/countries/irq_en.pdf?ua=1 (accessed on 10 October 2020).
2. Chrysohoou, C., Panagiotakos, D.B., Pitsavos, C., Skoumas, I., Papademetriou, L., Economou, M. and Stefanadis, C., 2007. The implication of obesity on total antioxidant capacity in apparently healthy men and women: the ATTICA study. *Nutrition, Metabolism and Cardiovascular Diseases*, *17*(8): 590-597.
3. Čolak, E., Pap, D., Nikolić, L. and Vicković, S., 2020. The impact of obesity to antioxidant defense parameters in adolescents with increased cardiovascular risk. *Journal of Medical Biochemistry*, *39*(3): 346.
4. Ali, I.M.M., Yenzeel, J.H. and Al-ansari, H.M.S., 2020. Evaluation of oxidative stress and leptinlevel in samples of Iraqi obese women. *Iraqi Journal of Science*, 1565-1570.
5. Halliwell, B. 2007. Biochemistry of oxidative stress. *Biochemical Society Transactions*, 35: 1147-1150.
6. Lobo, V., Patil, A., Phatak, A. and Chandra, N., 2010. Free radicals, antioxidants and functional foods: Impact on human health. *Pharmacognosy reviews*, *4*(8): 118.

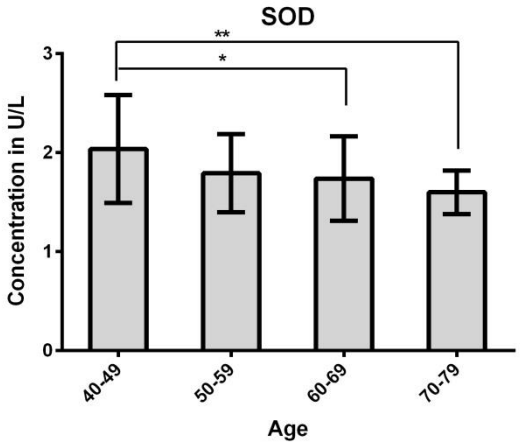
7. Chaudhary, P., Janmeda, P., Docea, A.O., Yeskaliyeva, B., Abdull Razis, A.F., Modu, B., Calina, D. and Sharifi-Rad, J., 2023. Oxidative stress, free radicals and antioxidants: potential crosstalk in the pathophysiology of human diseases. *Frontiers in chemistry*, *11*: 1158198.
8. Serafini, M. and Del Rio, D., 2004. Understanding the association between dietary antioxidants, redox status and disease: is the total antioxidant capacity the right tool? *Redox report*, *9*(3): 145-152.
9. Ibrahim, M. S., Abd, Z. H., & AL-Rawi, K. F. (2018). Effect of age on some renal function tests, uric acid, and gamma glutamyl transferase (GGT) in sample of Iraqi men over 40 years. Journal of University of Anbar for Pure Science, 12(1).
10. Ghudhib, K.K., Mohsen, F. and Mohammed, H.S., 2018. Evaluation of Antioxidant Levels in Blood Sera of Iraqi Patients with T2DM.
11. Mosteller RD (1987). Simplified calculation of body surface area. *N Engl J Med*, 317: 1098.
12. WHO expert consultation (2004) "Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies." *Lancet*, 363: 157-63.
13. Talke, H., and Schubert GE (1965). Ezymatic urea determination in the blood and serum in the Warburg optical. Klin. Wochenschr, 43: 174.
14. Jaffe M. (1886). Ueber den Niederschlag welchen Pikrinsa¨ure in normalen Harn erzeugt und u¨ber eine neue reaction des Kreatinins. *Z Physiol Chem*, 10: 391-400.
15. Barham, D. and Trinder, P. (1972). Improved Color Reagent for the Determination of Blood Glucose by the Oxidase System. *Analyst*, 97: 142-145.
16. IFCC (1983). Methods for the measurement of catalytic concentration of enzymes, Part 4. IFCC method for-γ-glutamyl transferase. Clin Chem Biochem, 21: 643-646.
17. Cancello, R., Brunani, A., Brenna, E., Soranna, D., Bertoli, S., Zambon, A., ... & Capodaglio, P. (2023). Phase angle (PhA) in overweight and obesity: evidence of applicability from diagnosis to weight changes in obesity treatment. *Reviews in Endocrine and Metabolic Disorders*, *24*(3): 451-464.
18. Carboni, J., Basalely, A., Singer, P., Castellanos, L., & Sethna, C. B. (2023). Association Between Dietary Fiber Intake and Cardiometabolic Risk Factors in Adolescents in the United States. *The Journal of Pediatrics*, *262*: 113616.
19. Liu, T., Zuo, R., Song, J., Wang, J., Zhu, Z., Sun, L., ... & Wang, B. (2023). Association of Serum Uric Acid Level with Risk of Abdominal Aortic Calcification: A Large Cross-Sectional Study. *Journal of Inflammation Research*, 1825-1836.
20. Reyes-Barrera, J., Medina-Urrutia, A. X., Jorge-Galarza, E., Osorio-Alonso, H., Arellano-Buendía, A. S., Olvera-Mayorga, G., ... & Juárez-Rojas, J. G. (2022). Uric acid is associated with morpho-functional adipose tissue markers in apparently healthy subjects. Clinica Chimica Acta, 531: 368-374.
21. Cho, E. J., Jeong, S. M., Chung, G. E., Yoo, J. J., Cho, Y., Lee, K. N., ... & Yu, S. J. (2023). Gamma-glutamyl transferase and risk of all-cause and disease-specific mortality: a nationwide cohort study. *Scientific reports*, *13*(1): 1751.
22. Kadhim, A. S., & Al-Karawi, A. S. (2023). Insights into the Pathogenesis, Virulence Factors, and Diagnosis of Helicobacter pylori: A Comprehensive Review. American Journal of Bioscience and Bioinformatics, 2(1): 31-37.

23. Al-Karawi, A. S., Rasool, K. H., Atoom, A. M., & Kadhim, A. S. (2023). Correlation between H. pylori infection and serum levels of inflammatory markers: A retrospective study. Al-Salam Journal for Medical Science, 2(2): 20-24.
24. ul Hassan, A., Haroon, Z.H., Kirmani, S.I., Anwar, M., Younas, M. and Munir, M.U., 2023. Association of Serum Gamma-Glutamyl Transferase and C-Reactive Protein as a Biomarkers of Oxidative Stress in Patients of Type 2 Diabetes Mellitus: GGT & CRP: Biomarkers of Oxidative Stress. *Journal of Islamic International Medical College (JIIMC)*, *18*(2): 93-97.
25. Akshatha, M. V., Krishna, V., Thampan, A., & Mallesh, N. (2020). Solving dental amalgam dilemma: An integrated toxicology and its management strategies–A systematic.
26. Sheng, S., Yan, S., Chen, J., Zhang, Y., Wang, Y., Qin, Q., ... & Tang, L. (2022). Gut microbiome is associated with metabolic syndrome accompanied by elevated gamma-glutamyl transpeptidase in men. *Frontiers in Cellular and Infection Microbiology*, *12*: 946757.

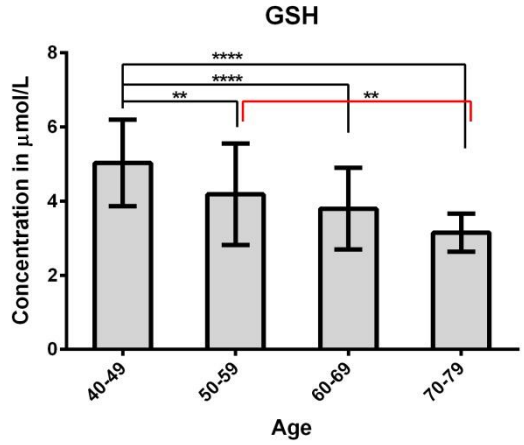
Appendix:



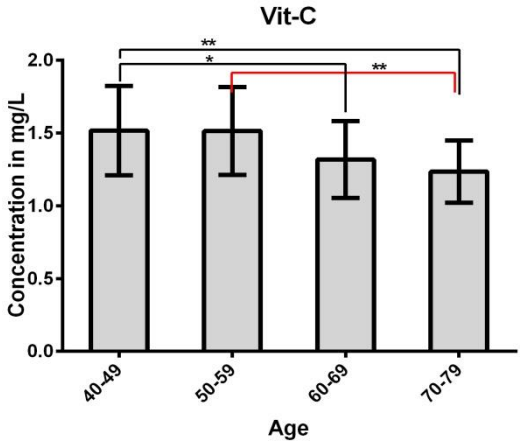
Appendix (1): The S.GR levels in all age groups under study.



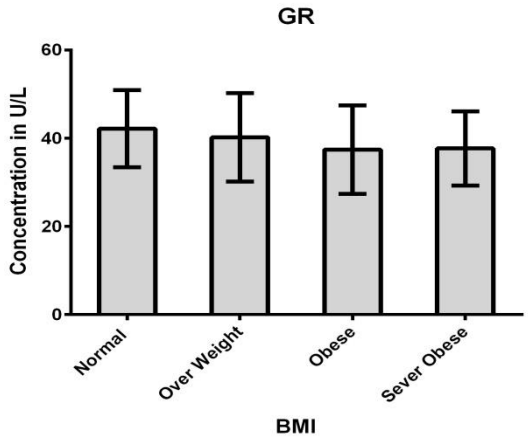
Appendix (2): The S.SOD levels in all age groups under study.



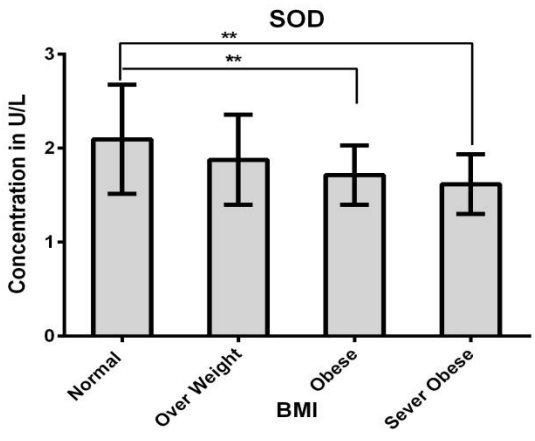
Appendix (3): The S.GSH levels in all age groups under study.



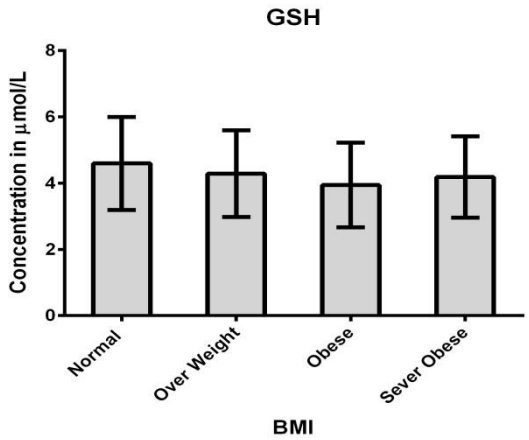
Appendix (4): The S.Vit C levels in all age groups under study.



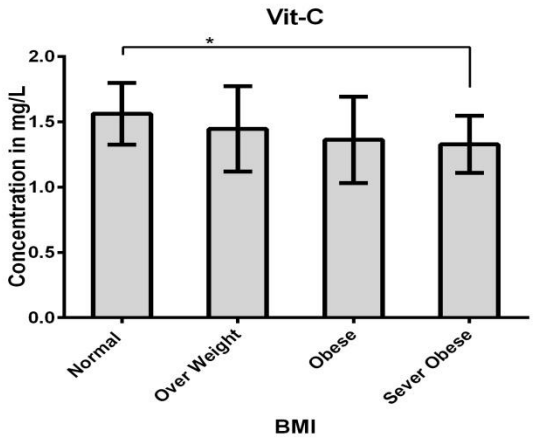
Appendix (5): The S.GR levels in all BMI groups under study.



Appendix (6): The S.SOD levels in all BMI groups under study



Appendix (7): The S.GSH levels in all BMI groups under study.



Appendix (8): The S.Vit-C levels in all BMI groups under study.

*significant at P≤0.05 ** at P≤0.01 *** at P≤0.001