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ASSESSMENT OF SERUM IRON LEVELS IN SUDANESE CIGARETTE SMOKERS

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ABSTRACT

Background: Smoking is one of the most common forms of recreational drug use through the world, most commonly the substance is the dried leaves of the tobacco plant which have been rolled into a small square of rice paper to create a small, round cylinder called a "cigarette". **Objective:** The aim of the present study is to assess serum iron level on Sudanese cigarette smokers. **Material & methods:** A clinical – based case – control study was conducted during the period from September 2017 to September 2019 in Sudan. 528 person; 397 smoker male (age 18- 35 years old) case, were classified into three groups according to the number of cigarettes per day and 131 non-smoker male (age 18-35 years old) control. Serum iron was analyzed for them. **Result:** the result shows a significant increase in mean of serum levels of iron in the three smoker groups compared with control group (p= 0.015), (p = 0.014) respectively, the levels of serum iron of smoker groups, the result were (17.90 +- 5.2), (17.51 +- 5.3) and (17.83+- 5.0) for the three smoker groups (1, 2 and 3) respectively compared the level of serum iron of control group (14.9+- 6.7) and as obviously indicated , there is no relation between the serum iron level and number of cigarettes per day p-value (0.274). Also no relation between serum iron and smoking duration p- value (0.844). **Conclusion:** cigarette smoking lead to significant increase in serum iron concentration. And there is no relation between serum iron concentration and cigarette number. Also no relation with smoking duration.

1.1 INTRODUCTION

Smoking is a practice in which a substance. Most commonly tobacco or cannabis is burned and the smoke tasted or inhaled The most common method of smoking today is through cigarettes.[1] Tobacco use leads most commonly to diseases affecting the heart and lungs.With smoking being a major risk factor for heart attacks strokes. Chronic obstructive pulmonary disease (COPD). Emphysema, and cancer. It also causes peripheral vascular disease and hypertension. All developed due to the exposure time and the level of dosage of tobacco.[2] Minerals are very essential substances involved as catalysts in most cellular enzymatic reactions and assume a major role in metabolism.[3]

Iron is example of these essential minerals. functions of iron include involvement in energy metabolism, gene regulation, cell growth and differentiation , oxygen and binding and transport, muscle oxygen use and storage.[4,5]

Literature survey showed that no sufficient work has been done to study the effect of cigarette smoking on serum minerals alteration, so this study was carried out to determine the influence of cigarette smoking on serum iron level among Sudanese smokers and to determine the relationship between the levels of serum iron and number of cigarettes per day, and duration of smoking.

Cigarette smoking causes minerals disturbances which lead to serious consequences, smoking leads to tissue hypoxia which leads to inadequate oxygenation of blood circulation that results in erythropoietin and consequent increased production of erythropoietin.[6] which enhances erythropoietin and increases red cell mass above normal level.[7] This leads to increase in the number of destroyed red cells in the normal turnover process which subsequently increases iron overload which causes hepatocellular damage.[8]

1.2 LITERATURE REVIEW

1.2.1 Smoking

Smoking is practicem which a substance is burned and the resulting smoke breathed to be tasted and absorbed into the bloodstream. Most commonly the substance is the dried leaves of the tobacco plant which have been rolled into a small square of rice paper to create a small, round cylinder called a " cigarette " smoking is primarily practed as a route of administration for recreational drug use because the combustion of the dried plant leaves vaporizes and delivers active substances into the lungs

where they are rapidly absorbed into the bloodstream and reach bodily tissue . In the case of cigarette smoking these substances are contained in a mixture of aerosol particles and gasses and include the pharmacologically active alkaloid nicotine.the vaporization creates heated aerosol and gas to form that allows inhalation and deep penetration into the lungs where absorption into the bloodstream of the active substances secures. Cigarettes are primarily industrially manufactured but also can be hand-rolled from loose tobacco and rolling paper. Other smoking implements include pipes, cigars bids, hookahs, vaporizers, and bongs. Smoking - related diseases have been shown to kill approximately half of long term smokers when compared to average mortality rates faced by non-smokers. A 2007 report states that, each year, about 4.9 million people worldwide die as a result of smoking.[1]

Smoking is one of the most commonly forms of recreational drug use. Tobacco smoking is the most popular form, being practiced by over one billion people globally, of who the majority are in the developing world.[2] Less common drugs for smoking include cannabis and opium. Some of the substances are classified as hard narcotics. like heroin, but the use of these is very limited as they are usually not commercially available.[1]

Smoking is one of the leading causes of preventable death globally. In the United States about 500.000 deaths per year are attributed to smoking- related diseases and a recent study estimated that as much as 1\3 of Chinas male population will have significantly shortened life-spans due to smoking.[9] Male and female smokers lose an average of 13.2 and 14.5 year of life , respectively.[10] At least half of all lifelong smokers die earlier as a result of smoking.[11,12] The risk of dying from lung cancer before age 85 is 22.1% for a male smoker and 11.9% for a female current smoker, in the absence of competing causes of death the corresponding estimates for lifelong nonsmokers are a 1.1% probability of dying from lung cancer before age 85 for a man of European descant. and a 0.85% probability for a woman.[13] Smoking one cigarette a day results in a risk of heart disease that is halfway between that of a smoker and non-smoker. The non-linear does response relationship is explained by smoking's effect on platelet aggregation.[14]

Among the diseases that can be caused by smoking are vascular stenosis, lung cancer,[15] heart attacks.[16] and chronic obstructive pulmonary disease.[17] Smoking during pregnancy may cause ADHD to a fetus.[18] Also smoking is a risk factor in Alzheimer's disease.[19] While smoking more than 15 cigarettes per day has been shown to worsen the symptoms of Crowns' disease.[20] The incomplete combustion produced by burning plant material, like tobacco or cannabis produces carbon monoxide, which impairs the ability of blood to carry oxygen when inhaled into the lungs.[21] So smoking leads to tissue hypoxia which leads to inadequate oxygenation of blood circulation that result in erythropoietin and consequent increased production of erythropoietin.[7] each one milliliter of erythrocytes contains 1 mg of iron in a 70 Kg male.[22]

1.2.2 Iron

Iron is a key element in the metabolism; it is an essential component of hundred of proteins and enzymes . It is a mineral, functions primarily as a carrier of oxygen in the body. It also aids an immune function, cognitive development, temperature regulation, energy metabolism. and work performance. Normally, very small quantities of iron are present in most cells of the body, in plasma, and in other extracellular fluids.

1.2.2.1 Distribution of iron in the body

Body iron is distributed in to number of different compartments that include hemoglobin. storage iron (ferrite). Tissue iron ,hemoglobin and labile pool.[22]

Absorption and transport capacity can be increased in conditions such as iron deficiency anemia or hypoxia. Iron is lost primarily by desquamation and red cell loss to urine and faces, which each menstrual cycle, women lose approximately 20 to 40 mg of iron.[23]

1.2.2.2 Iron deficiency

Iron deficiency anemia is the most common case of anemia in the world, affects about 15% of the worldwide population. Those with a higher than average risks of iron deficiency anemia include pregnant women, young children and adolescents, and women of reproductive age. Increased blood loss decreased and dietary iron intake, or decreased release from ferrite may result in iron deficiency. Reduction in iron stores usually precedes both a reduction in circulating iron and anemia, as demonstrated by a decreased red blood cell count, mean corpuscular hemoglobin concentration. And microcytic RBCs.[23]

2.1 Rational and objectives

Smoking in different forms is a major risk factor for many diseases worldwide. We do this research to show how smoking affect on the serum iron level. The present study was undertaken to assess serum iron level in Sudanese cigarette smokers and compare it with non-smokers.

3. MATERIAL AND METHODS

3.1. Study population

The criteria of inclusion for study population base on healthy smokers individual. And criteria of exclusion base on excluding any individuals with diseases. The control group is non-smoker healthy individual.

3.2 data collection methods and tools

Data were collecting using structural interviewing questionnaire which design to collected and maintain all valuable information concerning case examined.

3.3 Collection of sample

Under a septic condition about 3 ml of venous blood were collected from each volunteer by venipuncture technique (after overnight fasting 10-12 hours, and in the morning to a void diurnal variation of iron) and placed in anticoagulant free containers, and allowed to clot, then centrifuged at 3000 rpm for 10 minutes to obtain serum which kept in ependorff tubes for measurements of iron.

3.4 Methods

Indicates cobas c systems on which reagent can be used roche \Hitachi cobas systems. The method is based on the ferrozine method without deproteinization.

3. 5 Statistical analysis

Statistical package for social science (SPSS version 17) was used for data analysis. Independent T – test and person correlation were used.

4. RESULTS

In the present study a total of 528 male volunteers were enrolled, 397 were smokers (67.25%) as cases, and 131 were non-smokers (32.75%) as control, the concentration of serum iron was measured and the result appears follows:

Table (1): Showing serum iron concentration (ug\ dl) in smokers and control group and its statistical significance.

Subject	N	No. of Cigarettes/day	Mean	Std. Deviation	p-value
Non-smokers	131	0	14.9	+- 6.4	**0.014**
Group 1	133	4 -7	17.90	+- 5.2	**0.017**
Group 2	136	8-12	17.51	+- 5.3	**0.014**
Group 3	128	>13	17.83	+- 5. 0	**0.013**

Table (2): Showing serum in relation to number of cigarettes/ day.

Cig. No	Pearson correlation	p-value
Serum iron	**0.159**	**0.274**

Table (3): Showing serum iron in relation to smoking duration.

Diuration	Pearson correlation	p-value
Serum iron	**0.029**	**0.844**

The study aimed to assess serum iron level in Sudanese smokers. This study involved male volunteers rather than female as smoking in a shameful for them in our society, although it appears to increase in recent days. Also the study participants were youth as the smoking become more spread among this age group. In the present study a total of 528 volunteers were enrolled; 397 were smokers and 131 were non-smoker. Our results showed that serum iron was significantly increased in smokers when compared to non smokers with p-value 0.015^0.05, and insignificant correlation between serum iron and smoking duration and cigarette number.

study carried out by Abdulla S,A, Ahmed S.M and Hassan B.A in Sudan-Khartoum state showed that, there was a significant difference in the mean of serum iron between smokers and non-smokers (140+-52) ug\dl versus (90+-22) ug\dl, p value 0.00 while there were no correlation between the cigarette number, smoking duration and serum iron level.

Also Arvind Rao HT and Suchetha Kumari agree with us in their study which carried out in India to compare copper, zinc, and iron in the serum of chronic cigarette smokers versus non-smokers. They were found an increase in mean of serum iron in smoker group in comparison with control group and this difference is highly significant (P=0.005); and those studies agree with our study.

5. CONCLUSION

Cigarette leads to significant increase in serum iron concentration, and there is no relation between serum iron concentration cigarette number and smoking duration.

6. RECOMMENDATIONS

- Construction of other researches on serum iron and iron profile with a larger sample size for more explanations.
- Educational programs are necessary to increase people awareness about serious health effects of smoking and the importance of minerals to the body.

7. REFERENCES

1. Robert and Shiffman, Saul Fast Facts: Smoking Cessation. Health Press Ltd., 2007; 28. ISBN 978-1-903734-98-8.
2. "Tobacco fast sheet N 339". May 2014.Retrieved 13 May, 2015.
3. John AK Disorders of acid-base balance. Crit. Care Med, 2007; 35: 2630-2636.
4. Provan D Mechanisms and Management of iron deficiency anaemia. Br J Haematol, 1999; 105: 19-26.
5. Beard JL Iron biology in immune function, muscle metabolism and neuronlfuctioning. J Nutr, 2001; 131: 568S-579S.
6. El -Zayadi AR Heavy smoking and liver. World J Gastroenterol, 2006; 12: 6098-6101.
7. Balcerzek SP, Bromberg PA Secondary polycythemia. Semin. Hematol, 1975; 12: 339-351.

8. Bacon BR, Britton RS The pathology of hepatic iron overload: A free radical-mediated process? Hepatology, 1990; 11: 127-137.
9. Inverson L, Why do we smoke?: the physiology of smoking, 320.
10. Center of disease control and prevention (CDC) annual smoking attributable mortality, years of potential life lost, united states, 2002; 51(14): 300-3. PMID 12002168.
11. Doll R, Peto R, Boreham J, Sutherland I, Mortality in relation to smoking: 50 years observations on male British doctors BMJ, 2004; 328(7455).
12. Than MJ, Day-Lally CA, Calle E, Flander WD, excess mortality among cigarette smokers; changes in a 20 years interval; Am Health, 85(9): PMC 1615570.
13. Thun MJ Hannan LM, Adams-Campbell LL, Boffetta P , Buring JE, Feskanich D, Flanders WD, et al "Lung cancer occurrence in never-smokers: An analysis of 13 cohorts and 22 cancer ggregistry studies". PLOS Med 5(9):e185. doi: 10 .1371\ journal. pmed. 0050185. PMC 2531137. PMID 18788891, 2008.
14. Law MR, Morris JK, Wald NJ; Morris Wald "Environmental tobacco smoke exposure and ischaemic heart disease: an evaluation of the evidence ". BMJ, 1997; 315(7114): 973- 80. doi: 10. 1136\bmj. 315. 7114. 973 PMC 2127675. PMID 9365294..
15. American Legacy Foundation factsheet on lung cancer;their cited source is :CDC (Centers for Disease control) The Health Consequences of smoking: A Report of the Surgeon General, 2004.
16. Nyboe J, Jensen G, Appleyard M, Schnohr p; Appleyard; Schnohr "Risk factors for acute myocardial infarction in Copenhagen. I: Hereditary, educational and socioeconomic factors. Copenhagen City Heart Study". Eur Heart J, 1989; 10(10): 910-6. PMID 2598948.
17. Devereux G. ABC of chronic obstructive pulmonary disease. Definition, epidemiology, and risk factors. BMJ, 2006; 332: 1142-1144. doi: 10.1136\bmj. 332.7550 1142 PMID 16690673.
18. Braun Jm, Kahn RS, Froehlich T, Auinger p , Lanphear BP; Froehlich; Auinger; Lanphear, "Exposures to environmental toxicants and attention deficit hyperactivity disorder in U .S. children "Environ. Health Perspect, 2006; 114(12): 1904- 9. Doi:10. 1289 \ehp. 10274. PMC 1764142. PNID 17185283.
19. Cataldo JK, prochaska JJ, Glantz SA; cigarette smoking in risk factor of Alzheimer's disease. Journal of Alzheimer disease: JAD, 19(2): 465-480: PMC 2906761.
20. Cosnes J, Carbonnel F, Carrat F, Beaugerie L, Cattan S, Gendre J; Carbonnel; Carrat; Beaugerie; Cattan; Gendre "Effects of current and former cigarette smoking on the clinical course of Crowns' disease". Aliment pharmacol. Ther, 1999; 13(11): 1403- 11. doi: 10.1046\ j . 1365-2036.1999.00630.x.PMID 10571595.
21. Model D (1985). "Smokers face: an underrated clinical sign?". Br Med J (Clin Res Ed) 291(6511): 1760 1762 doi: 10.1136\bmj.291.6511.1760PMC1419177.PMID 3936573
22. Burtis C.A ashwood E.R, bruns D.E Sawyer B.G, Tietz, fundmental of clinical chemistry, 6th ed, copyright, 2008.
23. Bishop M.L, Fody E.P, Schoeff L.E, Clinical chemistry: principles, techniques, and correlation, 6th ed, copyright, 2010.
24. Abdalla S.A, Ahmed S.M and Hassan B.A, Assessment of the levels of serum iron and magnesium in Sudanese cigarette smokers, IOSR Journal of pharmacy (e)-ISSN: 2250-2013, (P)-ISSN: 2319-4219, 2013; 4: 26-30 26.
25. Arvind Rao HT, and Suchetha Kumari, acomparison of copper, zine, and iron in the serum of chronic cigarette smokers versus non-smokers, research journal of pharmaceutical, biological and chemical sciences, ISSN: 0975-8585, January – February 2014; 5(1): 41.