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Evaluation of Serum Iron and Magnesium levels in Sudanese males Cigarette Smokers in Khartoum State - Sudan

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Abstract

Background

Smoking is an escalating health problem especially in Develop countries such as Sudan. Cigarette smoking lead to the uptake of many hazardous compounds and their metabolites extracted from burning tobacco. The aim of this study to measure the serum Magnesium and Iron levels in Sudanese Males Cigarette Smokers in Khartoum State.

Material and Methods

The study was designed as cross sectional study, this study was performed in national center for research, during period from April 2018 to August 2018. 75 Sample were collected from Sudanese males cigarette smokers as case group and 75 sample from Sudanese nonsmokers male as control group, the age of the population studied ranged between 20-45 years. Three ml of venous blood sample were collected from both smokers and nonsmokers group into plain containers, using sterile disposable plastic syringe. Data was analysis using SPSS Software version 20. Were measure the serum levels of Magnesium and Iron determined by atomic absorption spectrophotometer (manual part 0303- 0152, release Date September 1996 by the registered trademark of the PerkinElmer inc).

Results

The mean of serum Magnesium in smokers was (26.5 mg/dl ±3.6) with p-value (0.000), while the mean of serum magnesium in nonsmokers (19.9 mg/dl ±1.9) with p-value (0.000). While the mean of serum Magnesium in age of smokers (20-29 years old) was (26.6 mg/dl±3.7), and the serum Magnesium in age of smokers between (30-45 years old) was (26.3 mg/dl±3.5) with p-value (0.73). While the mean of serum Magnesium in duration of smoking (more than 10 years) was (27.7 mg/dl ±3.7), and the mean of serum Magnesium in duration of smoking (less than 10 years) with p-value (0.12). While the mean of serum Magnesium in number of cigarette per day (1-15 cigarette per day) was (26.4 mg/dl ±3.6), and the mean of serum Magnesium in number of cigarette per day (16-30 cigarette per day) was (27.5 mg/dl ±3.8) with p-value (0.51).

The mean of serum Iron in smokers was (0.24 mg/dl ±0.11) with p-value (0.000), while the mean of serum Iron in nonsmokers (0.73 mg/dl ±0.16) with p-value (0.000). While the mean of serum Iron in age of smokers (20-29 years old) was (0.24±0.11 mg/dl), and the mean serum Iron in age of smokers between (30-45 years old) was (0.18 mg/dl ±0.10) with p-value (0.45). While the mean of serum Iron in duration of smoking (more than 10 years) was (0.16 mg/dl± 0.10), and the mean of serum Iron in duration of smoking (less than 10 years) was (0.26 mg/dl ± 0.12) with

p-value (0.02). While the mean of serum Iron in number of cigarette per day (1-15 cigarette per day) was (0.24 mg/dl ±0.10), and the mean of serum Iron in number of cigarette per day (16-30 cigarette per day) was (0.14 mg/dl ±0.11) with p-value (0.01).

Conclusion

The study conclude that The serum level of Magnesium is high in the smokers group compared with nonsmokers group, and serum level of Iron is low in the smokers group compared with nonsmokers group. There was weak positive correlation between serum Magnesium and Iron with Age of smokers between (20-29 year) and with (30-45 year). There was weak positive correlation between serum Magnesium and Iron with duration of smoking between (more than 10 years) and (less than 10 year). There was weak positive correlation between serum Magnesium with smokers for (1-15 cigarette per day) and with (16-30 cigarette per day). And complete correlation between serum Iron with number of cigarette per day (1-15 cigarette per day) and with (16-30 cigarette per day) and weak positive correlation between serum Iron with number of cigarette per day (16-30 cigarette per day) in smokers group.

Keywords: Cigarette Smokers, Magnesium, Iron, Sudanese

Background

Smoking is a practice in which a substance, most commonly tobacco or cannabis smoke tasted or inhaled. The most common method of smoking today is through 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.[1] Minerals are very essential substances involved as catalysts in most cellular enzymatic reactions and assume a major role in metabolism.[2]

Iron and magnesium are examples of these essential minerals. Functions of iron include involvement in energy metabolism, gene regulation, cell growth and differentiation, oxygen binding and transport, muscle oxygen use and storage [3, 4], etc. Magnesium is a critical cation and cofactor in numerous intracellular processes. It is involved in more than 300 essential metabolic reactions, some of which are: energy production, synthesis of essential molecules, structural roles, ion transport across cell membranes, cell signaling, and cell migration. [5]

Literature survey showed that no sufficient work has been done to study the effect of cigarette smoking on serum minerals alterations, so this study was carried out to determine the influence of cigarette smoking on serum iron and magnesium levels among Sudanese smokers and to determine the relationship between the levels of serum iron and magnesium with age, 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 erythropoiesis and consequent increased production of erythropoietin[6] which enhances erythropoiesis 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. Chronic oxidative stress may modulate iron uptake and storage, leading to a self-sustained and ever increasing spiral of cytotoxic and mutagenic events.[8] Smoking causes magnesium deficiency due to decreased supply (lesser appetite) and reduced absorption caused by disturbances in the digestive system functions.[9] Minerals disturbances may lead to sever and even life threatening metabolic abnormalities such as coronary heart disease, liver disease, lung infection, kidney failure, and disorders of endocrine system.[7]

Materials and Methods

This study was designed as a cross sectional study, and this study was conducted in Khartoum state at national center for research.

This study was carried out during the period from April 2018 to August 2018. This study was included 150 blood samples. The study population was Sudanese cigarette smokers individual as case group, and nonsmokers individuals as control group in Khartoum state. 75 blood samples were collected from cigarette smokers as control group and they divided according to the age (20-29 years old) and (30-45 years old) and according of number of cigarette per day to (more than 10 cigarette per day) and (less than 10 cigarette per day) and according to duration of smoking to (more than 10 years) and (less than 10 years). 75 blood samples from nonsmokers as control group. Before collection a local antiseptic (70% alcohol) was used to clean the skin. 3ml of venous blood were collected from each volunteer by vein puncture technique, and were placed in Plain containers, and allowed to clot then centrifuged at 3000 rpm for 5 minutes to obtain serum which kept in Eppendorf tubes for measurements of Magnesium and Iron. And the serum levels of magnesium and iron determined by the use of atomic absorption spectrophotometer.

Ethical Consideration

Permission to carry out the study will be taken from health administration and National University committee and the smokers will be informing for the purpose of the study before collection of samples and verbal consent will be taken.

Sampling Procedure

Before collection a local antiseptic (70% alcohol) was used to clean the skin. 3ml of venous blood were collected from each volunteer by vein puncture technique, and were placed in Plain containers, and allowed to clot then centrifuged at 3000 rpm for 5 minutes to obtain serum which kept in Eppendorf tubes for measurements of Magnesium and Iron.

Quality Control

The precision and accuracy of all methods use in this study were checked at each batch using commercially prepared control sera.

Statistical analysis

The data was analyzed by using the application of SPSS (statistical package for social sciences) version 20. Data were expressed as mean ± standard deviation [SD]. The means were compared using Independent sample T-test. Analysis was two tailed and a p-value ≤0.05 was considered as statistically significant.

Results

Table 1: Comparison between the means of serum Iron and magnesium levels in smokers and nonsmokers group.

Sample	Iron mg/dl		Magnesium mg/dl	
	Mean	Std. Deviation	Mean	Std. Deviation
Smokers	0.24	0.11	26.57	3.68
Nonsmokers	0.73	0.16	19.91	1.91
p. value	0.000		0.000	

Table 2: Comparison between the means of serum Magnesium and Iron levels in Age groups (20-30 years old) and in (29-45 years old) in smokers group.

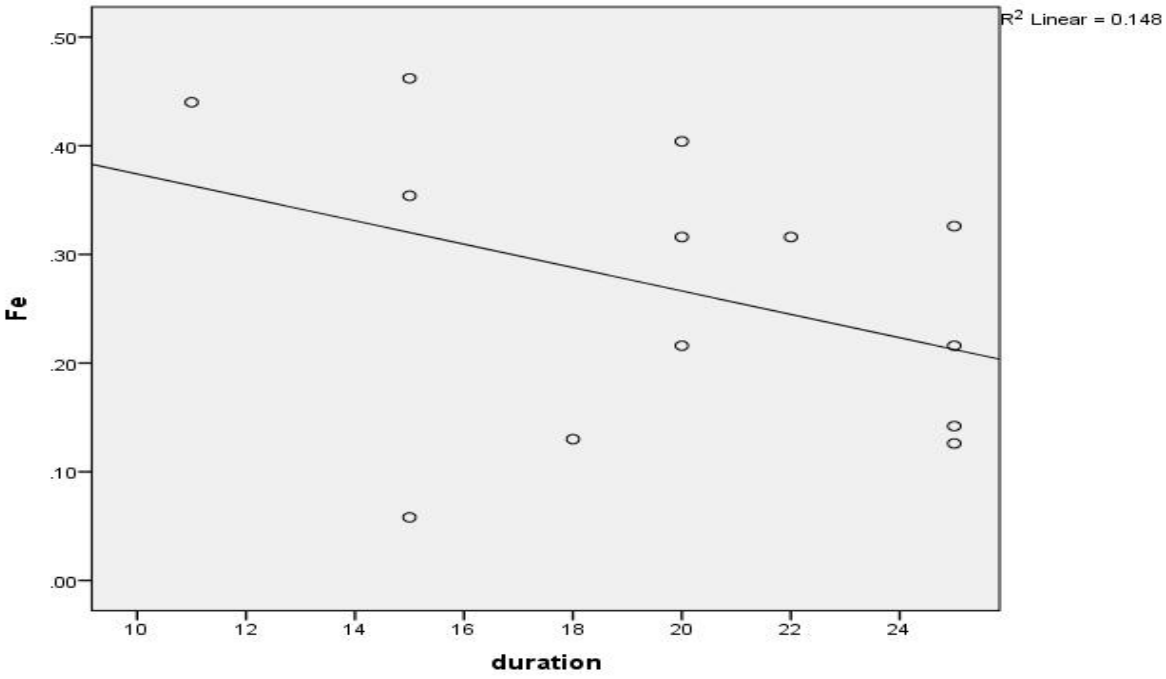
Sample	Iron mg/dl		Magnesium mg/dl		
	Mean	Std. Deviation	Mean	Std. Deviation	N
20-29 years	0.24	0.11	26.6	3.7	57 (76%)
30-45 years	0.18	0.10	26.3	3.5	18 (24%)
p. value	0.455		0.736		

Table 3: Comparison between the means of serum Magnesium and Iron levels in duration of smoking groups (more than 10 years) and in (less than 10 years) in smokers group.

Sample	Iron mg/dl		Magnesium mg/dl		
	Mean	Std. Deviation	Mean	Std. Deviation	N
Less than 10 years	0.26	0.12	26.2	3.5	54(72%)
More than 10 years	0.16	0.10	27.7	3.7	21(28%)
p. value	0.022		0.123		

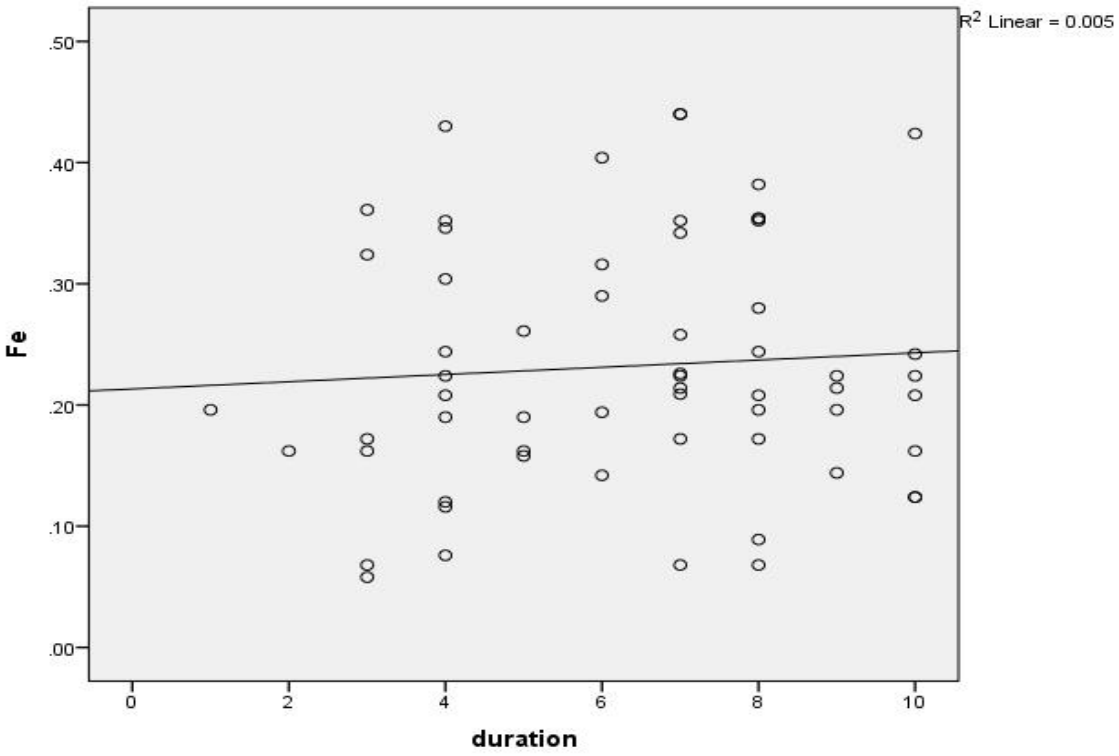
Table 4: Comparison between the means of serum Magnesium and Iron levels in number of cigarette per day group (1-15 cigarette per day) and in (16-30 cigarette per day) in smokers group.

sample	Iron mg/dl		Magnesium mg/dl		
	Mean	Std. Deviation	Mean	Std. Deviation	N
1-15 Cig/day	0.24	0.10	26.47	3.61	64 (85%)
16-30 Cig/day	0.14	0.11	27.56	3.87	11 (15%)
p. value	0.014		0.510		



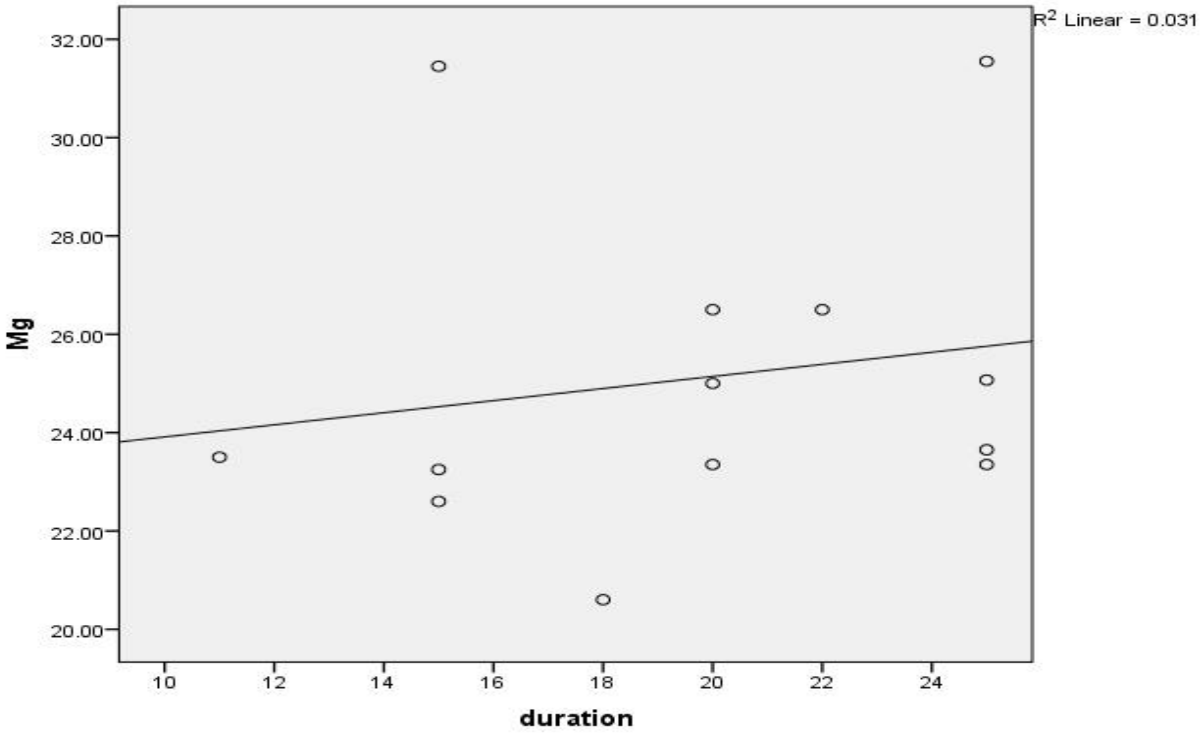
r =0.38
r^2=0.148

Figure 1: Correlation between the level of Iron and duration of smoking (more than 10 years) in smokers group.



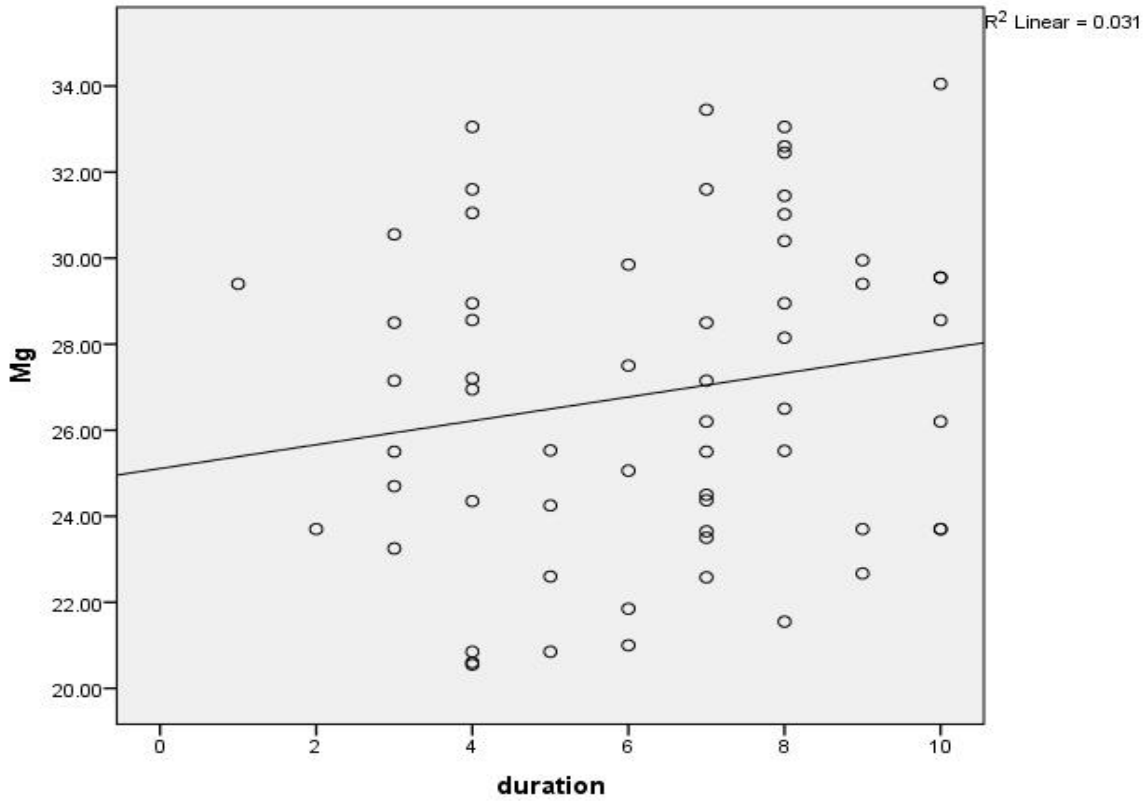
r =0.07
r^2=0.005

Figure 2: Correlation between the level of Iron and duration of smoking (less than 10 years) in smokers group.



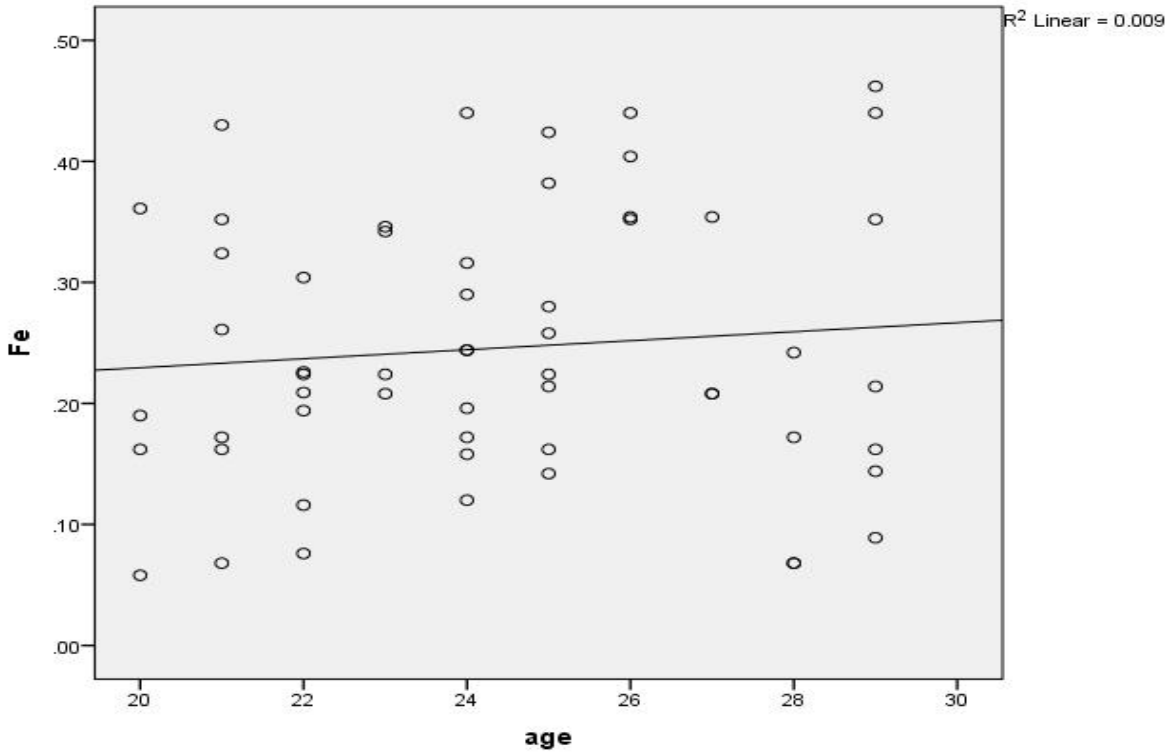
r =0.17
r^2=0.031

Figure 3: Correlation between the level of serum Magnesium and duration of smoking (more than 10 years) in smokers group.



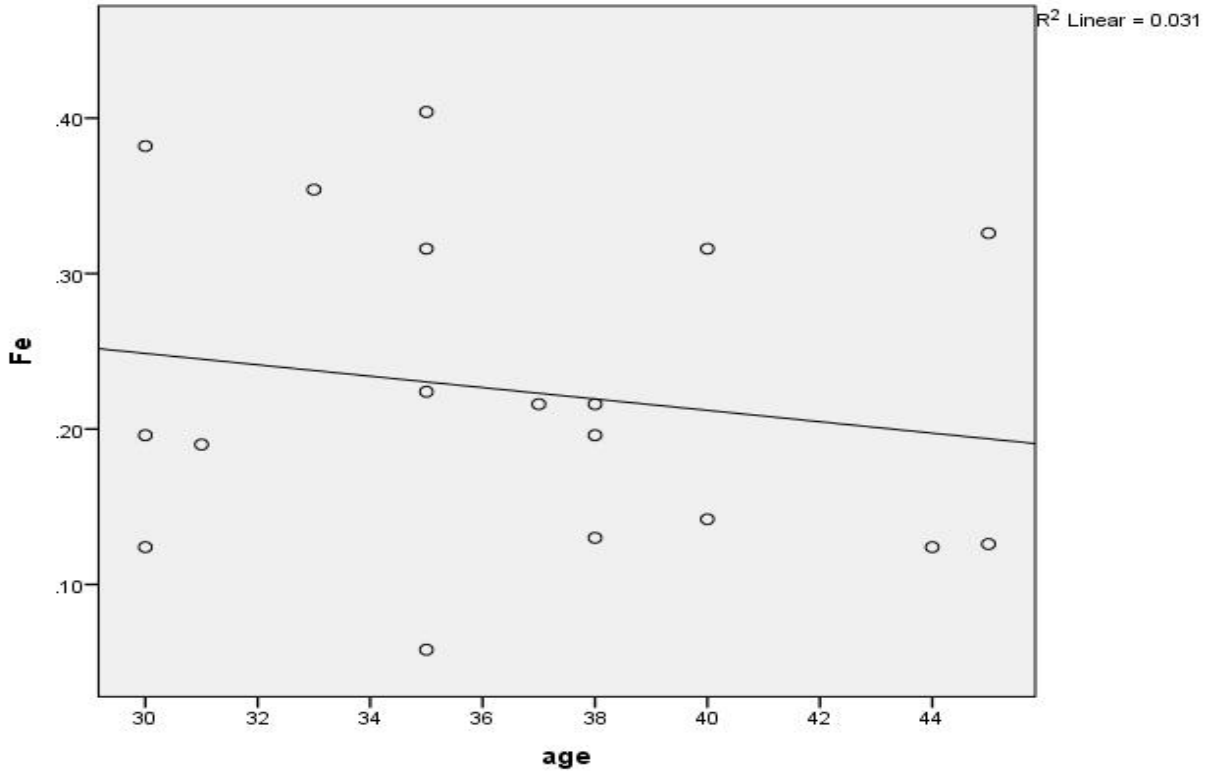
r =0.017
r^2=0.31

Figure 4: Correlation between the levels of serum Magnesium with duration of smoking (less than 10 years).



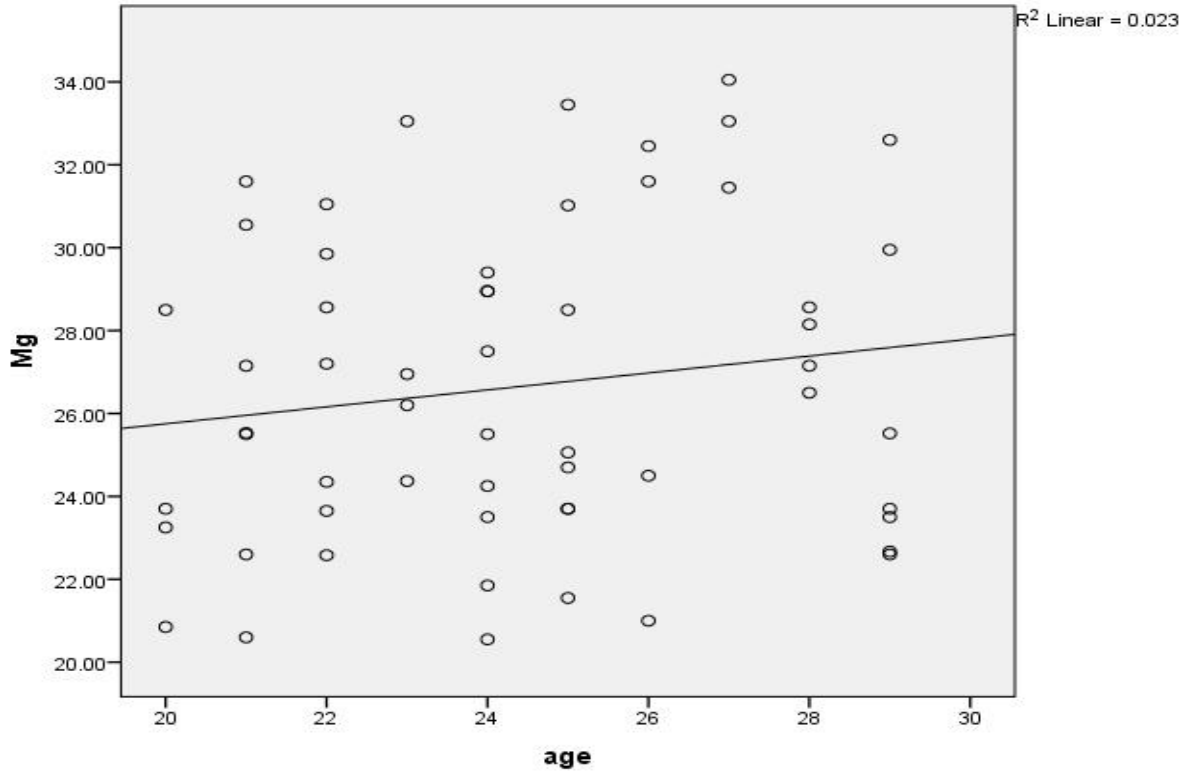
r =0.09
r^2=0.009

Figure 5: Correlation between the level of serum Iron and Age (20-29 years) in smoker group.



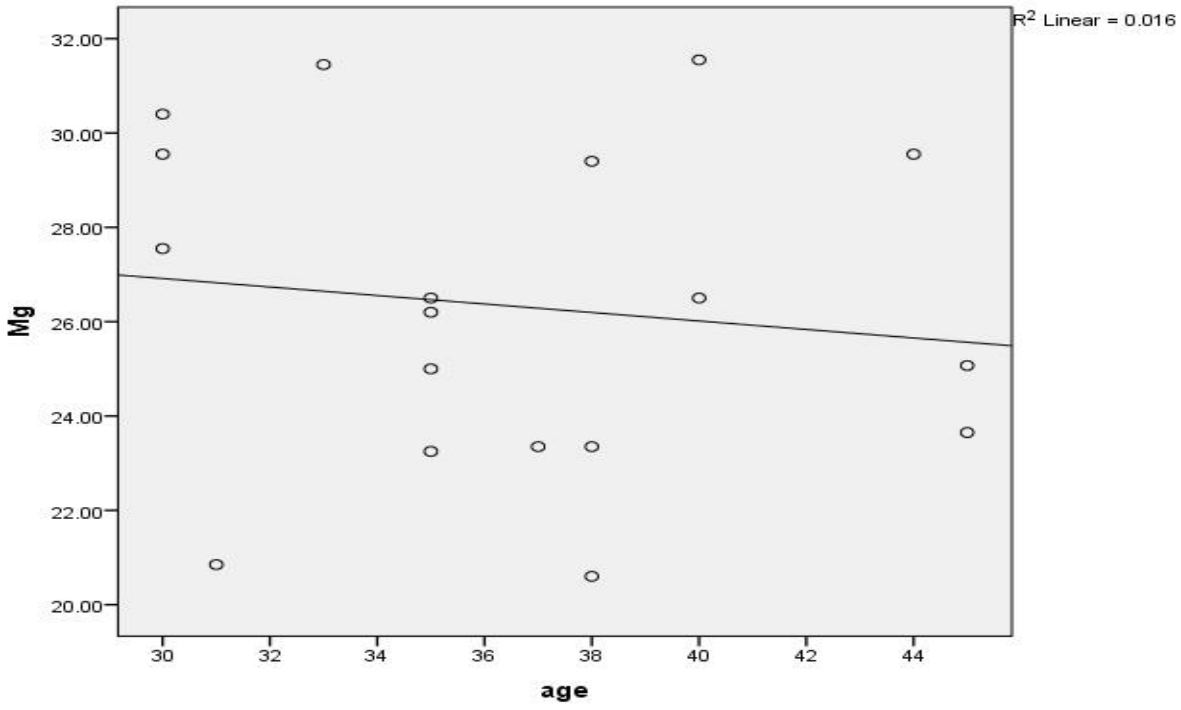
r =0.17
r^2=0.031

Figure 6: Correlation between the level of serum Iron and Age (29-30 years) in smoker group.



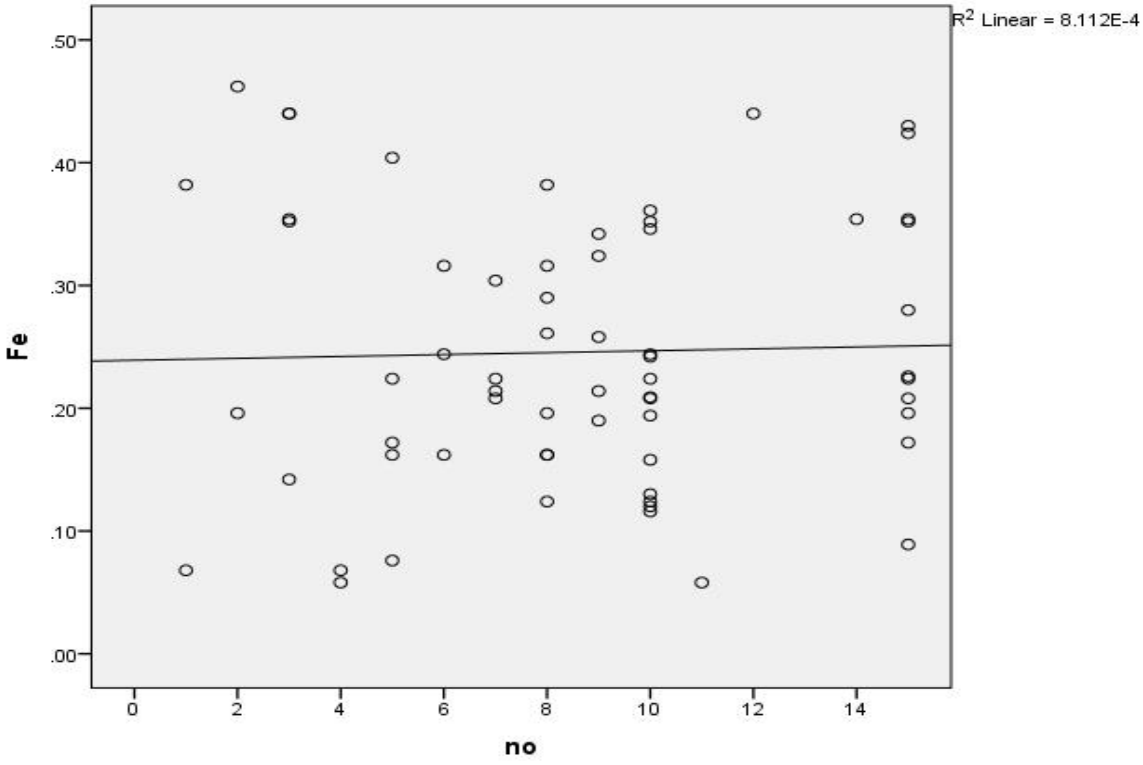
r =0.15
r^2=0.023

Figure 7: Correlation between the level of serum Magnesium and Age (20-29 years) in smoker group.



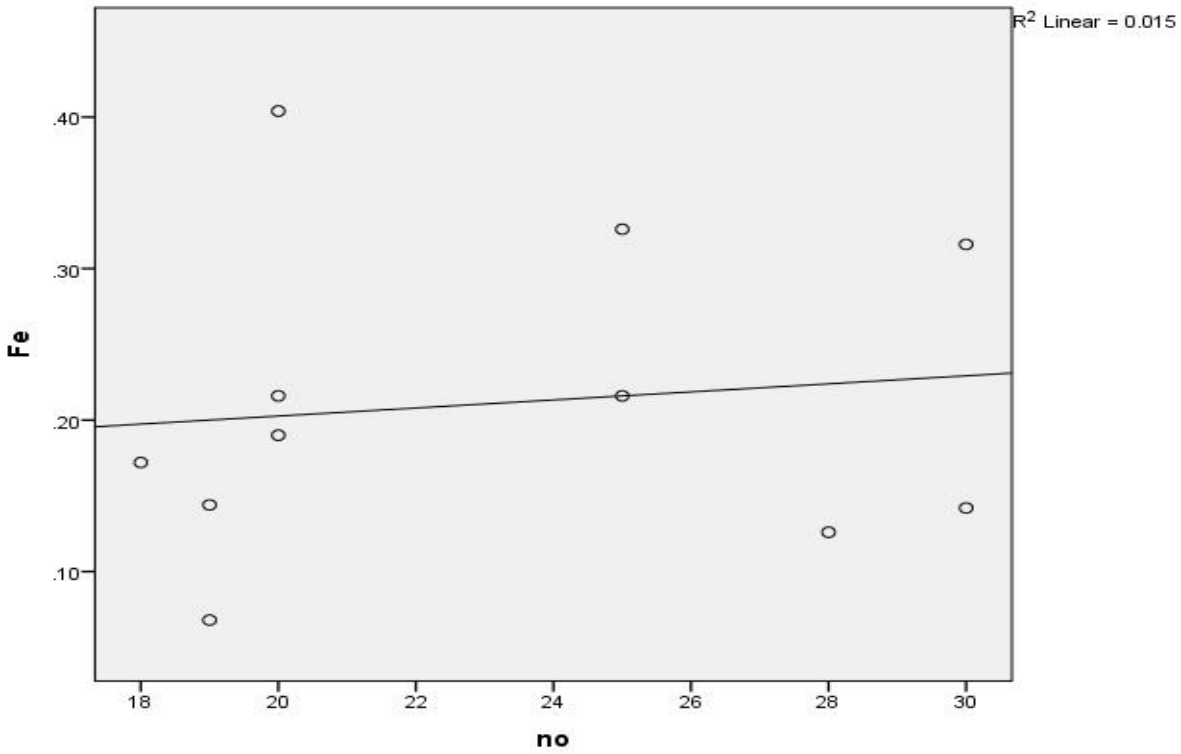
r = 0.13
r^2=0.016

Figure 8: Correlation between the level of serum Magnesium and Age (30-45 years) in smoker group.



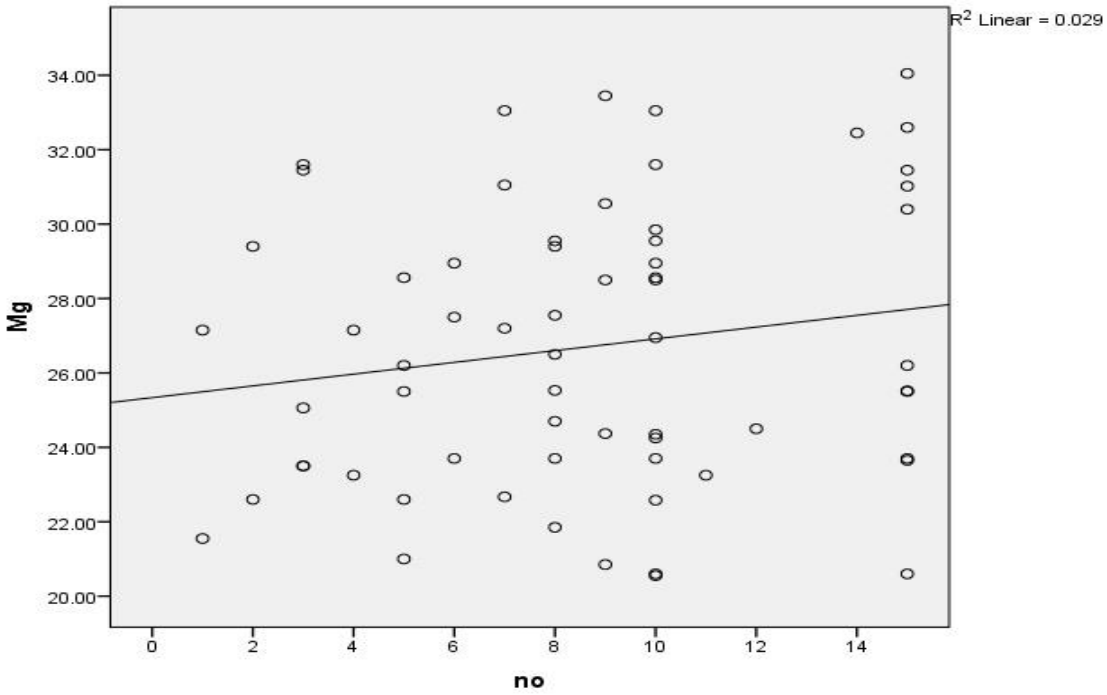
r =2.84
r^2=8.11

Figure 9: correlation between levels of serum Iron with number of cigarette per day (1-15 cigarette per day).



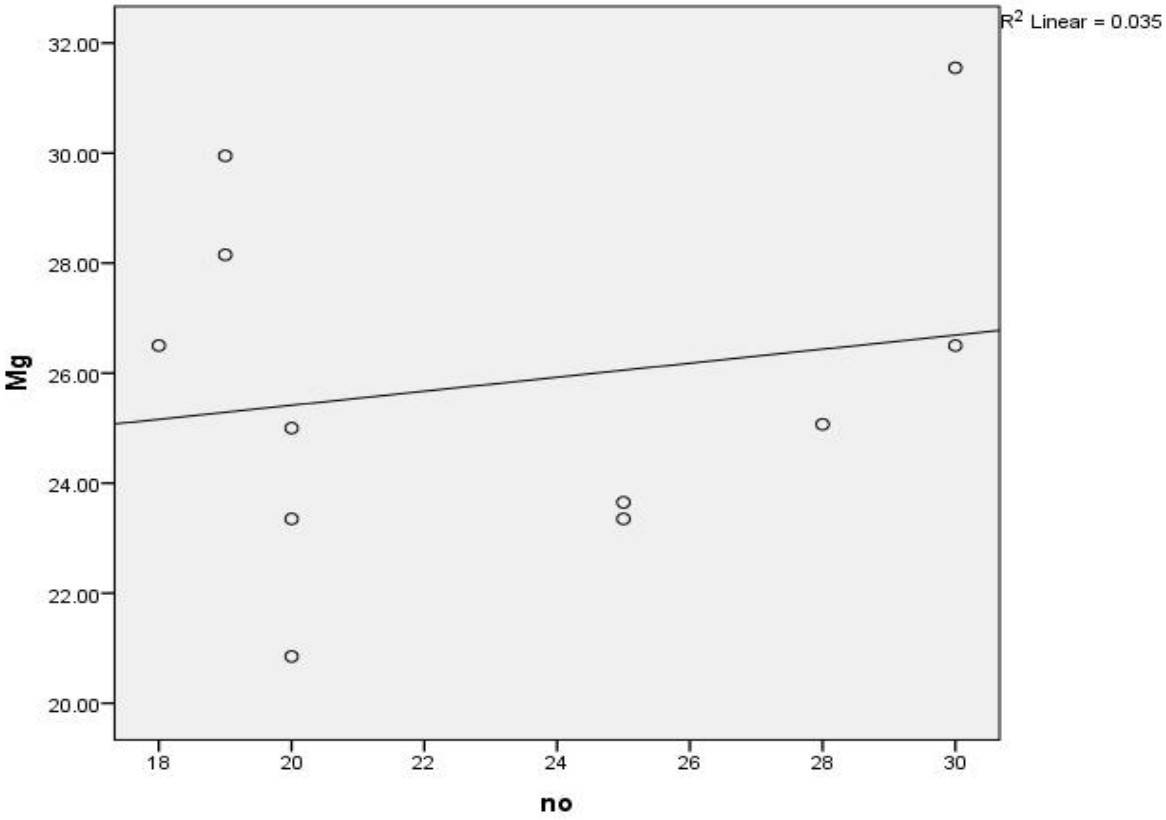
r =0.12
r^2=0.015

Figure 10: correlation between levels of serum Iron with number of cigarette per day (16-30 cigarette per day).



r =0.17
r^2=0.029

Figure 11: correlation between levels of serum Magnesium with number of cigarette per day (1-15 cigarette per day).



r =0.18
r^2=0.035

Figure 12: correlation between levels of serum Magnesium with number of cigarette per day (16-30 cigarette per day).

Discussion

The present study was carried out to measurement of serum (Magnesium and Iron) among Sudanese males cigarette smokers in Khartoum state in the Sudan during period from April 2018 to August 2018, 150 blood samples were collected, 75 from these samples were collected from Sudanese male smokers as case group, and 75 samples were collected from health Sudanese nonsmokers as control group.

In the present study shown statistically significance difference between the means of the serum levels of Magnesium and Iron of the smokers group compared with nonsmokers group. The serum level of Magnesium is increase in smokers compared nonsmokers group this result is agreement with previous studies [10], and the serum Iron is decrease in the smokers group compared with nonsmokers group this result is agreement with previous studies [11]. This result is in agreement with previous studies [12]. Also there was significance difference between serum Iron in smokers and nonsmokers group, and insignificance difference between serum Iron in age group (20-29 years old) and in (30-45 years old) in smokers group, and weak positive correlation between serum Iron with age group (20-29 years old) and in (30-45 years old) in smokers group. There was significance difference between serum Iron in duration of smoking (more than 10 years) and in (less than 10 years) and weak positive correlation between serum Iron with duration of smoking group (more than 10 years) and with 9 less than 10 years) in smokers group. There was significance difference between serum Iron in number of cigarette per day (1-15 cigarette per day) and in (16-30 cigarette per day) and complete correlation between serum Iron with number of cigarette per day group (1-15 cigarette per day) and with (16-3 cigarette per day) in smokers group. Also there was significance difference between serum Magnesium in smokers

and nonsmokers group, and insignificance difference between serum Magnesium in age group (20-29 years old) and in (30-45 years old) in smokers group, and weak positive correlation between serum Magnesium with age group (20-29 years old) and in (30-45 years old) in smokers group. There was significance difference between serum Magnesium in duration of smoking (more than 10 years) and in (less than 10 years) and weak positive correlation between serum Magnesium with duration of smoking group (more than 10 years) and with (less than 10 years) in smokers group. There was significance difference between serum Magnesium in number of cigarette per day (1-15 cigarette per day) and in (16-30 cigarette per day) and weak positive correlation between serum Magnesium with number of cigarette per day group (1-15 cigarette per day) and with (16-3 cigarette per day) in smokers group.

Conclusion

The level of serum Iron is decreased in cigarette smokers, where it is not affected by age (20-29 years old) and (3-45 years old) .where it is affected by number of cigarette per day (1-15 cigarette per day) and (16-30 cigarette per day), and duration of smoking (more than 10 years) and (less than 10 years). Level of serum Magnesium is increase in cigarette smokers, it is not affected by age (20-29 years old) and (30-45 years old) and number of cigarette per day (1-15 cigarette per day) and (16-30 cigarette per day) and in duration of smoking (more than 10 years) and (less than 10 years).

There was weak positive correlation between serum Magnesium and Iron with the age (20-29 years old) and with (30-45 years old) in smokers group. And weak positive correlation between serum Magnesium and Iron with group of the smoking duration (more than 10 years) and with (less than 10 years) in smokers group. And weak positive correlation between serum Magnesium with number of cigarette per day (1-15 cigarette per day) and (16-30 cigarette per day) and complete correlation between serum Iron with number of cigarette per day (1-15 cigarette per day) and with (16-30 cigarette per day) in smokers group.

References

1. Nichter ME, Cartwright (1991) Saving the children for the tobacco industry. Med Anthropol Q 5: 236–256.
2. John AK (2007) Disorders of acid-base balance. Crit. Care Med 35: 2630-2636.
3. Provan D (1999) Mechanisms and Management of iron deficiency anaemia. Br J Haematol 105: 19-26.
4. Beard JL (2001) Iron biology in immune function, muscle metabolism and neuronal functioning. J Nutr 131: 568S-579S
5. Rude RK, ShilsME.Magnesium. In: Shils ME, Shike M, Ross AC, Caballero B, Cousins RJ, eds. Modern Nutrition in Health and Disease.10th ed. Baltimore: Lippincott Williams & Wilkins; 2006:223-247.
6. El -Zayadi AR (2006) Heavy smoking and liver. World J Gastroenterol 12: 6098-6101.
7. Balcerzek SP, Bromberg PA (1975) Secondary polycythemia. Semin. Hematol 12: 339-351.
8. Emrit J, Beaumont C, Trivin F (2001) Iron metabolism, free radicals, and oxidative injury. Biomed. Pharmacother 55: 333-539.
9. Winiarczyk AU, Bagniuk A, Lalkowska KG, Szubartowska E (2008) Calcium, Magnesium, Iron, Zinc and Copper Concentration In the Hair of Tobacco Smokers. Biol Trace Elem Res 128: 152-160
10. Hassan, Eslam Sabri Bushra, Supervisor, Tarig Ahmed Hassan Karar (2014) Evaluation of Serum Levels of Copper, Magnesium and Zinc Among Sudanese Smokers.
    URI: http://repository.sustech.edu/handle/123456789/10775. Date: 2014-09-01

11. Sulafa Ali Abdalla Mudawi, Samia Mahdi Ahmed, Dr Badr Aldeen Hassan Al- Abd (2013) Assessment of the Levels of Serum Iron and Magnesium in Sudanese Cigarette Smokers. IOSR Journal Of Pharmacy. 3(4): 26-30
12. Rida Mohammed Ahmedabdelrhma Influence of Smoking on Serum Iron and Total Iron Binding Capacity among Sudanese Male Smokers in Khartoum State. URI: http://repository.sustech.edu/handle/123456789/11814. Date: 2015-09-16

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