Evaluation of some biochemical and hematological changes caused by chronic cigarette smokers among men in Kut city

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تقييم بعض المتغيرات الكيموحياتية والدموية جراء تدخين السكائر المزمن لدى الرجال في مدينة الكوت

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المستخلص

أجريت هذه الدراسة لبيان تأثير تدخين السكائر المتواصل على بعض المكونات الكيموحياتية والدموية في دم المدخنين الذكور في مدينة الكوت، العراق. وشملت الدراسة مجموعتان تتراوح أعمارهم بين 18-60 عاما وتتكون المجموعة الأولى من 40 شخص سليم من الذين يدخنون 10 سيجارة يوميا ولمدة 3 سنوات على الأقل، في حين تتكون المجموعة الثانية من 42شخص من غير المدخين (مجموعة سيطرة) , بينت الدراسة وجود زيادة ملحوظة في مستويات نشاط انزيمي الكبد, مستويات الكولستيرول والدهون الثلاثية , اليوريا والكرياتنين ,مستوى السكر الصيامي , هيموكلوبين الدم ALTو AST وحجم الخلايا المضغوطة بينما لوحظ انخفاض معنوي في مستوى البروتين الكلي مقارنة مع الاشخاص غيرالمدخنين .

Abstract

The study was conducted to determinate the effect of continuous ciggarette smoking on some biochemical and hematological components of male smokers blood in Al-Kut city, Iraq. The study included two groups with age range between 18-60 years . The first group consists of 40 healthy male subjects, who smoked at least 10 cigarettes per day for at least 3 years , while the second group consist of 42 non-smokers (control group) .The study found that are a significantly increased in ALT and AST liver enzymes activities, increased cholesterol and triglyceride, increased urea and creatinine, increased fasting blood sugar and increase hemoglobin and packed cells volume decreased while, the serum total protein was significantly decreased in compares with non smoker group.

Keywords: Cigarette smoking; biochemical ; hematological.

Introduction

Cigarette smoke compose a mixture of organic and inorganic compound result from the burning of tobacco, and contains substances made up originally of about 4000 complex chemical compound (1), 60 of this compounds proved to be lead to incidence of cancer, others of those harmful compounds leads to the heart and lungs diseases.(2) Some of these harmful compounds as following : Nicotine causes significance changes in heart rate and blood circulation, and cause injury to the arterial lining(3) , Carbon monoxide in cigarette smoke binds to the hemoglobin in red blood cells. Thus, reducing the oxygen-carrying capacity of the blood(4). Cyanide compounds, benzene, Formaldehyde and Ammonia also toxic and harmful liver and kidney cells.(5)Methanol alcohol which damages the optic nerve and central nervous system.(6)

Cigarette smoking also contains oxidant agents such as oxygen free radicals, that are capable of attack lipids, nucleic acids, and proteins leading to cause oxidative injury .(7)

The most liver enzymes which use to detected the liver diseases, for example, inflammation and liver cell damage are aminotransferase(alanine aminotransferase (ALT) and aspartate aminotransferase (AST).(8)

Cholesterol and triglyceride represented the major lipid component of blood and have various role in body metabolism were cholesterol regard the precursor of steroid hormone manufacturing ,while triglyceride participate in provide the body with energy and fatty acids ,increased of this lipid over normal range cause various complication to body. (9)

Urea and Creatinine are metabolism waste product ,were urea produce by deamination of amino acid and creatinine produce by converted creatine to creatinine ,therefore this waste products filtrate through kidney ,so any disease affect kidney cause elevated of this waste product.(10)

Glucose is the major sugar found in blood, and the major source that provide the cells with energy, decrease level cause hypoglycemia while increase level cause hyperglycemia or Diabetes Mellitus disease (11).

Hemoglobin(Hb) and packed cell volume(PCV) are the most hematological screening tests which used to detect polycythemia and anemia .(12)

Smoking cigarette cause disorder in many biochemical blood continent and cause various diseases to smoker persons , were cause elevated blood lipid lead to heart disases(13), cause elevated liver enzyme (ALT,AST) and decrease total protein which indicate liver disease (14) , cause elevated urea and creatinine related with kidney disease(15) . Cigarette smoke affect the immune system and pancreas lead to increase blood sugar level(16),also cigarette smoking cause significance elevated in hematological parameters (Hb. and PCV) were cause polycythemia (17).Moreover, the effects of smoking on blood characteristics depend on the duration of smoking and age of smoker persons .(18)

Subjects and Methods

The present study was carried out in the department of medical laboratory techniques of Al-Kut technical institute, Iraq .Two groups of students and officers male participated in the study: The first included 40 continuous smoker persons who smoke at least 20 cigarettes per day for 3 years ago at least . The second included 42 non smoker as normal control persons , the two group age ranged (18–55). All participants were clinically investigated to exclude those who have chronic diseases such as kidney failure, diabetic, hypertension and cardiac diseases.

Venous blood were withdrawn from each group after at least 8 hr. fasting , EDTA anticoagulant were used to hematological investigation, while serum were used to

Biochemical-parameters .

Biochemical parameters glucose,cholesterol triglycerides serum alanine transaminase (ALT), aspartate aminotransferase (AST) and urea were determined by use enzymatic method (19) and total protein by Biuret method.(20)

Statistical analysis:

The results were statistically analyzed by using t-test by comparing parameters between smoking group and non smoking group. The results were expressed as mean ±SD. Variance (ANOVA) was used to find the significant between groups. The means were distinguished among statistical groups at $P < 0.05$, has been taken as statistically significant

Results

The results in table (1) showed there were a significant elevations ($P<0.05$) in serum alanine transaminase(ALT) and aspartate aminotransferase(AST)activities in smokers group, while serum total protein was lower comparing to non smokers. The results of serum total cholesterol and triglyceride showed significant elevation in smoker groups. The mean level of serum urea , creatinine and blood sugar was significantly higher in smoker group, also the study showed significant elevation in hemoglobin(Hb) and packed cells volume (PCV) when compared with non smokers group.

Table 1 : Biochemical and hematological parameters in comparison between smokers and non smokers persons .

Parameter	Non smokers N=45	Smokers N=47
ALT (IU/L)	33.36 ± 3.81	*51.03 ± 9.34
AST (IU/L)	38.36 ± 3.81	*65.03 ± 9.34
Total Protein (gm/dl)	7.31 ± 2.65	6.4 ± 1.34
Total Cholesterol (mg/dl)	169.8 ± 10.4	*263.8 ± 8.47
Triglyceride (mg/dl)	20.4 ± 7.3	*28.2 ± 12.8`
Urea (mg/dl)	22.4 ± 8.4	*30.6 ± 13.4
S.Creatinine (mg/dl)	0.7 ± 0.3	*0.9 ± 0.5
S.Glucose (mg/dl)	97 ± 8.46	*129.4 ± 11.4
PCV (%)	40 ± 5	*43 ± 9
Hb. (gm/dl)	13.5 ±1.8	*16. 9±2.4
Data are mean ± SD *P<0.05 comparison between smokers group and non smokers group		

Discussion

The study showed a significant increase in liver enzyme ALT, AST activity. This is due to damage of liver cells by cigarette smoke component such as lipid peroxidation, and nitrogen compound, such as nitrous oxide which cause liberating enzymes from liver cells into blood stream(21). The study showed a significant decreased in total protein, because cigarette smoke cause decrease protein synthesis or increased proteolytic activity (22). Also, The study triglyceride due to increased lipolysis activity which cause increase plasma free fatty acid (25 and26) , elevated levels of hemoglobin and packed cells volume due to increased numbers or sizes of RBCs.(27)

showed an elevated in serum urea and creatinine in smoker group in comparison with the control group, because cigarette smoking may be cause fall in glomerular filtration rate (GFR) result to increase of urea reabsorption (23). Increase smoker blood glucose due to smoking may cause weakness in response of receptors to insulin also smoking may affect the secretion of insulin hormone(24) . also the study showed elevate in level of serum cholesterol and

Recommendation

In conclusion, the study concluded that, smokers are at greater risk for kidney , liver ,heart and other organs disease.

Adverse effects of cigarettes smoke on body organs, physicians should advise persons who smoke cigarettes to quit smoking.

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