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Effect of tobacco smoking on serum lipid profile and renal function levels in Iraqi subjects.

Jinan Hussein Murtadha*.

Department of Chemistry, College of Science for Women, University of Baghdad, Iraq.

ABSTRACT

Tobacco smoking is one of the major modifiable cardiovascular risk factors. Nicotine is one of many components that may be obtained through active and non-active smoking of tobacco. The aim of this study was to find out the effect of cigarettes smoking ,period of smoking and number of cigarettes smoked per day on renal function levels by measuring creatinine , uric acid , urea and lipid profile levels by measuring total cholesterol (TC), Triglyceride (TG) and Low density lipoproteins(LDL) in serum. Sixteen subjects of Iraqi adults (males) were classified into three groups : 20 smokers subjects with duration of smoking (1-10 year) (group1) , 20 smokers subjects with duration of smoking (11-30) year (group2) and 20 healthy subjects as control group (group3) .The results indicate that serum creatinine and urea were highly significant in smokers group ($p \leq 0.01$) compared with non smokers (control group), while the level of uric acid was found significantly decreased ($p \leq 0.01$) compared with control group . The effect of duration of smoking on renal function was significantly bad effects particularly above 10 years smoking. Also, the results showed that values of TC,TG and LDL were significantly higher ($p \leq 0.01$) in smokers compared with non smokers (control group) and statistically affected by number of cigarettes smoke / day. When the lipid profile values were compared along with two period of smoking, there were statistically significant differences ($p \leq 0.01$) in TC, TG and LDL levels. The changes become more cleared with elevated of period and number of cigarettes smoked. This study concluded that, the kidney function levels and lipid profile levels were affected adversely in smokers subjects as indicated by the results obtained by renal function tests and lipid profile tests from two duration of smoking.

Keywords: Tobacco smoking**,** Lipid profile tests, Renal function tests

Corresponding author

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INTRODUCTION

Cigarette smoking is the main type of tobacco smoke and it continues to be the second leading of death in the world [1]. Smoking produces adverse effects on lipid profile and homocystein, thus increasing the cardiovascular disease risk in coronary heart disease patients [2]. Commercial tobacco smoke is a mixture of more than 5000 chemicals, according to the U.S department of Health and human service, they are known human carcinogens [3]. There are numerous harmful component found in tobacco and tobacco smoke, nicotine is one of these substance that may be acquired through active and passive smoking [4]. Nicotine moving rapidly in the blood stream and carbon monoxide binding to hemoglobin in red blood cells [5]. Cigarette smoking increases the risk of developing numerous cancers [6]. Tobacco represents a major source of exposure to cadmium and lead decided nephrotoxicants as relatively low levels of exposure [7]. Accumulation smoking amount could be correlated with severity of renal function damage and pathological injury , the kidney is one of the oranges that are adversely affected by smoking and kidney function tests are important to identify renal dysfunction [8]. The levels of urea , creatinine and uric acid in plasma are used to determine if a patient is suffering from kidney disease [9]. Lipids play an important role practically in all aspects of biological life .Cigarette smoking is recognized cause to change the lipoprotein values [10]. Several studies supply the results that tobacco is strongly related with changing the normal value of the lipid profile levels [11]. Nicotine induces oxidative stress, generates free radicals that attack on the membrane lipids resulting in the formation of mono dialdehyde, which causes peroxidative and tissues injury [12]. The purpose of this study is to determine the effect of cigarettes smoking, duration of smoking and the number of cigarette smoked \ day on renal function and lipid profile values in Iraqi subjects.

MATERIAL AND METHODS

This study was carried out over a period of three months in Iben -Al-Nafis Hospital in Baghdad City - Iraq. This study includs 40 males who had free from chronic disease , they were divided into two groups: each group includes 20 subjects as follow : group1,smokers with duration of smoking (1-10)years, age range between 25- 62 years , group2 , smokers with duration of smoking (11-30) years , age range between 38-70 years and males apparently healthy non smokers as control group (group3) , age range between 21-65 years . Five milliliters of venous blood was obtained from smokers and non smokers subjects and transferred into plain plastic tubes, left it at room temperature for 10 min to clot and then centrifuged at 3000 rpm for 10 min to obtain serum sample . The separated serum was used to determine serum creatinine Jaffe kinetic reaction [13]. Serum uric acid was determined by uricase method [14] and serum urea was determined by enzymatically method [15]. Measurement of TC was done using enzymatic kinetic method and triglyceride was done by using lipoprotein lipase method . Serum LDL was determine using the Friedwald method.

Statistical Analysis

The data from three groups were compared by using statistical analysis system –SAS (2012) program to study the effect of duration of smoking on parameters studied. Least significant difference –LSD test was used to compare among the mean values of the parameters in this study.”P” value was considered to indicate statistical significance [16].

RESULT AND DISCUSSION

Renal Function Tests

Table (1)shows a significant increases in serum creatinine and urea levels in the smoking groups than control group .As well as , the result evidence that a significant decrease in serum uric acid in the smokers ($p \leq 0.01$) compared with control .The mean value of creatinine reached (0.903 ± 0.04) mg/dl in group1 and (0.887 ± 0.03) mg/dl in group2 compared with control (0.655 ± 0.02) mg/dl and the mean value of urea in two smokers group were (31.28 ± 2.8, 32.90 ±1.27) mg/dl respectively . The mean value of uric acid was reached (3.77± 0.19, 3.94 ± 0.19) mg/dl respectively in two smokers groups compared with control (5.47 ± 0.16) mg/dl .Also , the results indicate that effect of two duration of smoking on renal function levels compared with non-smokers group, there is no significant differences between two duration of smoking .

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Table 1: Study the effect of two duration of smoking on creatinine, uric acid and urea levels.

Groups / parameters	Mean ± Standard Error (Mean ± SE)		
	Creatinine (mg/dl)	Uric acid (mg/dl)	Urea (mg/dl)
Control (Non -Smokers)	0.655 ± 0.02	5.47 ± 0.16	24.07±1.12
Duration of Smoking (1-10)years	0.903 ± 0.04	3.77 ± 0.19	31.28 ± 2.8
Duration of smoking (11-30)years	0.887 ± 0.03	3.94 ± 0.19	32.90 ± 1.27
LSD value	0.09**	0.511**	3.676**
(p≤0.01)**			

As shown in table (2) , there is no effect of age categories on creatinine , uric acid and urea levels in two smokers subjects and there are no significant difference between them.

Table 2: Effect of age categories on renal function levels

Age categories (year)	Mean ± Standard Error (Mean ± SE)		
	Creatinine (mg/dl)	Uric acid (mg/dl)	Urea (mg/dl)
25 -39	0.875 ±0.04	4.11 ± 0.22	30.23 ±1.41
40 -50	0.785 ± 0.05	4.82 ± 0.27	29.52 ±1.37
51-70	0.764 ± 0.04	4.41± 0.24	28.44 ±1.79
LSD value	0.118	0.697	4.48
Significant level	NS	NS	NS
NS (No significant)			

The results in the table (3) indicate that effect of number of cigarettes smoked (pack/day) on serum creatinine , uric acid and urea level . Heavy smokers (4 pack/day) had significantly increase creatinine and urea levels than the light smokers (1 pack /day) .

Table 3: Effect of number of cigarettes of smoked on creatinine, Uric acid and urea level

No. of Cigarettes (Pack /day)	Mean ± Standard Error (Mean ± SE)		
	Creatinine (mg/dl)	Uric acid (mg/dl)	Urea (mg/dl)
0	0.655 ± 0.02	5.47 ± 0.15	24.07 ±1.11
1	0.966 ± 0.06	4.0 ± 0.27	32.22 ± 2.26
2	0.862 ± 0.03	3.78 ± 0.16	31.32 ±1.11
3	0.846 ± 0.07	3.86 ± 0.37	33.73 ± 3.54
4	1.0 ± 0.10	4.35 ±1.15	40.40 ± 6.40
LDS Value	0.189**	1.257**	7.38**
(P ≤ 0.01)**			

In table (4) , there is a strong positive correlation between urea and creatinine (r = 0.37**, P≤ 0.01) , while there is a negative correlation between uric acid and (urea , creatinine) in smokers group .

Table 4: Study the correlation coefficient between creatinine, urea acid and urea smokers group.

Parameters	Correlation coefficient (r)	Significance Level	P. Value
Uric cid& Urea	- 0.14	NS	---------
Urea &Creatinine	0.37	**	≤ 0.01
Uric acid & Creatinine	- 0.40	NS	---------

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This study shows the effect of cigarettes smoked and duration of smoking on kidney function levels, as labelled by elevated of serum creatinine and urea levels in smokers subjects compared with nonsmokers(control) as noted in table (1).The results agree with the findings of other studies [17,18]. A number of filtered substance may be measured to evaluate of glomerular filtration rate (GFR) such as blood urea level and creatinine level [19]. GFR is traditionally used as a measure to characterize renal function in health and disease , the reduction in GFR will lead to decline in distal tubular flow rate and which leads to elevation of blood urea nitrogen re absorption [20].In this study, the value of uric acid in smokers subjects is significantly lower than non-smokers subjects , the result agree with Goraca et al [21], they were showed reduction of serum uric acid in regular smokers and decrease of antioxidants. A recent study indicates that effect of duration of smoking on kidney function levels may be attributed that ,the cigarette smoking increases kidney vascular resistance that lead to a significant reduction in glomerular filtration rate [22]. Multiple recent studies have shown association between smoking and hypertension with a higher daily number of .cigarette smoked and a longer duration of smoking [23]. Smoking of 20 cigarettes\day results in inhalation of approximately 3.0-6.0 µg of cadmium(cd) , which is accumulative renal toxicant [24].

Lipid Profile Tests

As represented in table (5) , the effect of duration of smoking on total cholesterol (TC), triglyceride (TG) and low density lipoproteins (LDL) levels. The mean value of TC reached (206.5±12.78) mg/dl in group1 and (213.5 ± 9.61) mg/dl in group2 compared with control (169.70±9.78) mg/dl , while the mean value of TG in two groups were (170.95± 17.55, 180.5 ±16.41) mg/dl respectively compared with control (104.25 ± 5.53)mg/dl .The mean value of LDL reached (125.0 ± 6.95)mg/dl in group 1 and (124.75 ± 6.84)mg/dl in group2 compared with control (95.45 ± 4.05) mg/dl.

Table 5: Study the effect of two duration of smoking on lipid profile levels

Groups / parameters	Mean ± Standard Error (Mean ± SE)		
	TC (mg/dl)	TG (mg/dl)	LDL (mg/dl)
Control (Non - Smokers)	1.69.70 ± 9.78	104.25 ±5.53	95.45 ± 4.05
Duration of Smoking (1-10) years	206.9 ±12.78	170.95 ±17.55	125.0 ± 6.95
Duration of smoking (11-30) years	213.5 ±9.61	180.5 ±16.41	124.75 ± 6.84
LSD value	30.651**	39.135**	17.5**
(P ≤ 0.01)**			

Data in table (6) shows, there is no effect of age categories on TC, TG and LDL levels in smokers subjects and there are no significant differences between them .

Table 6: Effect of age categories on TC, TG and LDL levels.

Age categories (year)	Mean ± Standard Error (Mean ± SE)		
	TC (mg/dl)	TG (mg/dl)	LDL (mg/dl)
25-39	183.26 ±14.65	153.4 ±13.83	112.06 ±8.99
40-50	192.28±12.32	132.0 ±12.90	119.35 ±7.59
51-70	205.03 ± 9.14	163.32 ±15.17	114.58±5.29
LSD value	32.63	41.70	18.66
Significant level	No Significant	No Significant	No Significant

Table (7) indicates that heavy smokers (4 pack / day) had significantly high in TC and LDL levels than the light smokers (1pack/ day) and heavy smokers (3 pack / day) had significantly high in TG level than the light smokers (1 pack / day) .

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Table 7: Effect the number of cigarettes smoked on serum lipid profile.

No. of Cigarettes (Pack/day)	Mean ± Standard error (Mean ± SE)		
	TC (mg/dl)	TG (mg/dl)	LDL (mg/dl)
0	169.70 ±9.78	104.25 ±5.53	95.45 ± 4.05
1	211.12 ±12.18	187.75 ± 4.70	143.50 ±12.39
2	207.07 ± 10.55	174.18 ±12.55	117.78±5.34
3	212.67 ±32.36	191.0 ±27.4	122.33 ±11.83
4	242.50 ±34.50	174.5 ±5.50	150.0 ± 25.0
LDS Value	37.58**	80.74**	41.80**
(P ≤0.01)**			

Table (8) represented the correlation coefficient between (TC,TG) and LDL level in smokers . There is a strong positive correlation between TC and LDL (r =0.31**, P ≤ 0.01) and with TG (r =0.37**, p ≤ 0.01) , while there is a negative correlation between TG and LDL level .

Table 8: Correlation coefficient between TC, TG and LDL in smokers group

Parameters	Correlation coefficient (r)	Significance Level	P. Value
TG,LDL	0.12	NS	---------
TC,LDL	0.31	**	P≤ 0.01
TC,TG	0.37	**	P≤ 0.01

The lipid profile levels were statistically significant (p≤ 0.01) in two smokers groups. Cigarette smoking causes alteration of lipid profile which includes increasing the level of TC,TG and LDL and increasing intensity of smoking has led to more increase in atherogenic lipoprotein without a further decrease in anti - atherogenic lipoprotein (high density lipoprotein) [25] . Afshan et al [26] were showed increase the level of atherogenic lipoproteins notably LDL and Intermediate density lipoprotein (IDL) in association with increased intensity of smoking. In the present study , the results in smokers as compared with non smokers agree with earlier reports [27,28] .Also, The levels of serum TC,TG, and LDL were significantly higher in heavy smokers than in light smokers in table (7) , this findings are accordance with other studies [29]. Conclusion: smoking produces adverse effect on renal function lipid profile levels in two duration of smoking and effect of number of cigarettes smoked per day on lipid profile level in smokers people.

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