

A Comparison between the Effect of Shisha and Cigarette Smoking on Serum Lipid Profile of Males in Nasiriyah City

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Abstract

Objective: This study aimed to recognize the harm of shisha smoking compared to cigarettes smoking by measuring serum lipid profile in males in AL-Nasiriya city and association lipid profile change with increase of smoking per day. **Materials and Methods:** This study was conducted between June to December (2015) in Nasiriya city in Iraq, all samples were randomly selected. Spectrophotometer was used for biochemical analysis for each group of lipid profile. The subjects were divided into three groups, cigarette smokers ($n = 35$), shisha smokers ($n = 20$) and non-smokers groups ($n = 20$). Age ranged between (30 – 60) years and mean of duration smoking was (13.4 ± 1.3) years. **Results:** Results showed that the increased levels of total cholesterol (TC), triglyceride (TG), very low density lipoprotein (VLDL) and low density lipoprotein (LDL) were significant in all groups of smokers as compared to non-smokers. **Conclusion:** The study concludes that the danger of shisha impact on human health may be similar or even worse than cigarette smoking.

Keywords: Cholesterol, cigarette smoking, high-density lipoprotein, low-density lipoprotein, triglyceride

INTRODUCTION

Cigarette smoking is a serious health problem and most important avoidable cause of death in the world. Smoking causes atherosclerosis and deficiency of platelets and predominantly increases risk of cancer causing mutations which may appear until many years after man's first cigarette.

It is estimated that tobacco-related deaths will amount to 6.4 million in 2015, 8.3 million in 2030 and one billion deaths during the 21st century.^[1]

Shisha usage has a history which dates back to about 400 years with different names such as hookah, narghile, water-pipe, and argils,^[2] it comes in different flavors, such as chocolate, mint, cherry, apple, and coconut which are often linked with social activity where two or more people may share the same pipe. People use Shisha smoke (SH-S) throughout the world, and they are daily used by more than 100 million men and women in Africa, Asia had been smoked for at least 400 years.^[3]

Shisha use is widely perceived to be a safer alternative to cigarettes because the smoke is filtered through water but growing evidence which indicates that actively smoking shisha may be as or more harmful than smoking cigarettes.^[4,5]

The danger of smoking promotes free radicals which interact with the biological molecules to cause elevation of oxidative stress through the exchange of lipid peroxidation chain reactions in the membranes thus smoking leads to alteration their metabolites from burning tobacco per day.^[6] Free radicals (oxidizing chemicals highly reactive chemicals) which can damage heart muscles, blood vessels and also react with cholesterol leading to the build-up of fatty material on artery walls^[7] also tobacco smoke contains dangerous metals including arsenic, cadmium, and lead, several of these metals were carcinogenic.^[8,9]

Lipids are essential for body health which useful in digestion, providing energy storage, acting as functional and structural compounds in biomembranes and forming insulation to allow nerve conduction or to prevent heat loss. Increased number of cigarettes smoked per day lead to cardiovascular disease and increased morbidity and mortality.^[10]

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The aim of this study was to identify the harmful effects of smoking shisha by measuring lipid levels on healthy smokers and effect of increasing the number of cigarettes per day on lipid levels.

MATERIALS AND METHODS

The study involved 75 males, their age range being from groups of 30–60 years. The study was divided into three groups: SH-S (20), cigarette smoker (CS) (20), and nonsmokers (NS) (35) groups. A volume of 5 ml of venous blood samples were performed in dry tubes. After centrifugation, the sera were frozen at -8°C until analysis. Total cholesterol (TC), triglycerides (TGs), and high-density lipoprotein (HDL) were measured in all subjects after 12 h fasting. Biochemical parameters including serum for TC, TG, and HDL were determined by enzymatic methods using Randox kit.

All male subjects were selected randomly, evaluated and selected by detailed medical history, physical examination, systemic examination, and routine investigations to rule out any underlying diseases and excluded any diseases which influence the lipid levels. All the statistical analysis was done using Pentium 4 computer through the SPSS program (version-20) statistic software package (IBM Corp, 2011).

RESULTS

Table 1 shows the biochemical analysis for serum lipid profile TC, TG, HDL, very low-density lipoprotein (VLDL), and low-density lipoprotein (LDL) into three groups: NS, SH-S, and CS.

Table 1 shows highly significant mean differences among three groups ($P < 0.00$) NS, SH-S, and CS on serum HDL, LDL, TG, TC, and VLDL. In applying the LSD *post hoc* test, we recorded the CS group compared to the SH-S group and NS.

As shown in Table 2, this study showed highly significant differences in TC between CS and SH-S impact to NS and nonsignificant difference between SH-S and CS.

Table 3 shows nonsignificant difference ($P = 0.09$) between CS and SH-S groups on serum TG while highly significant between CS, SH-S compared to NS groups ($P < 0.00$).

No significant difference in VLDL reports between CS and SH-S groups ($P = 0.086$) on Table 4 but highly significant in VLDL on CS, SH-S groups compared to NS groups ($P < 0.00$).

There was no significant difference in applying the LSD *post hoc* test in LDL in Table 5 between CS and SH-S groups and highly significant in CS, SH-S groups compared NS groups ($P < 0.00$).

The study [Table 6] confirms that the increasing number of cigarettes smoked per day lead to increase level of serum TC, LDL, HDL, TG, and VLDL.

DISCUSSION

The study showed differences in levels of serum lipid profile between smoking and nonsmoking groups. The current study included 75 smokers who was divided into CS, SH-S, and NS as control groups. The results showed biochemical analysis of serum TC, TG, LDL HDL, and VLDL. We found increased serum levels of TC, TG, LDL, VLDL in smoking group (shisha and cigarette) compared to nonsmoking group. The results suggested that cigarette and SH-S produce the same effect on lipid profile (in spite of SH-S was higher on serum level lipid profile than CS) compared to NS and this is in agree with the study by Al-Fayez and *et al.*^[11] Serum HDL levels were significantly lower in smokers (shisha and cigarette) group as compared to NS groups although the mean levels of TC, TG, VLDL, LDL, and HDL of both groups were within normal limits.

The results were in line with the work Kronenberger *et al.*^[12] The result demonstrates that smokers are predisposed to developing coronary heart disease earlier than their nonsmoking.^[13] This is due to the stimulation of the adrenal-sympathetic system by nicotine level which releases catecholamine which induces lipolysis in adipose tissue, thus increasing levels of serum free fatty acid, promoting cholesterol synthesis, and secretion in the liver.^[14] This mechanism may be due to impairment of lipoprotein metabolism reduces the ability of blood vessel walls.^[15]

Other contributing factor on normal lipid profile values in this study is the mean duration of smoking among the subjects. Majority of these smokers were heavy smokers (>20 cigarettes/day) shown by dyslipidemia condition in smoking group, which induces atherosclerosis.^[16] Cigarette smoking generates substantial quantities of oxidative stress, explained by that smoke inhaled by the smoking modes (shisha and cigarette) leads to increasing effects of nicotine and similar risks of alteration and inflammation by these two types of smoking methods. Smoking significantly increases biomarkers of oxidative damage to proteins, DNA, and lipids.^[17]

CONCLUSIONS

The harmful effect of SH-S on healthy lifestyle may be similar

Table 1: Biochemical analysis for serum lipid profile

Parameters	Mean $\pm$ SD			ANOVA	
	NS (20)	CS (35)	SH-S (20)	P	F
HDL (mg/dl)	42.9 $\pm$ 16.0	30.4 $\pm$ 2	34.6 $\pm$ 8.4	0.00	51.88
LDL (mg/dl)	127.0 $\pm$ 53	196.4 $\pm$ 72.0	238.9 $\pm$ 62.0	0.00	223.9
TG (mg/dl)	143.8 $\pm$ 65.6	255.8 $\pm$ 101.1	296.9 $\pm$ 71.2	0.00	17.66
TC (mg/dl)	130.3 $\pm$ 45.01	186.6 $\pm$ 55.45	213.3 $\pm$ 48.1	0.00	14.08
VLDL (mg/l)	28.0 $\pm$ 12.4	50.82 $\pm$ 20.2	59.15 $\pm$ 14.5	0.00	18.31

HDL: High-density lipoprotein, LDL: Low-density lipoprotein, TG: Triglyceride, TC: Total cholesterol, VLDL: Very low-density lipoprotein, NS: Nonsmoker, CS: Cigarette smoker, SH: Shisha smoker, SD: Standard deviation

Table 2: Multiple comparisons (1: cigarette smoker), (2: shisha smoker), (3: nonsmoker) on serum total cholesterol; least significant difference

Multiple comparisons		Mean difference (I-J)	SE	Significant	95% CI	
					Lower bound	Upper bound
1.00	2.00	26.67143	14.2864	0.066	55.1509	1.8080
	3.00	56.42857*	14.2864	0.000	27.9491	84.9080
2.00	1.00	26.67143	14.2864	0.066	1.8080	55.1509
	3.00	83.10000*	16.1172	0.000	50.9708	115.2292
3.00	1.00	56.42857*	14.2864	0.000	84.9080	27.9491
	2.00	83.10000*	16.1172	0.000	115.2292	50.9708

*The mean difference is significant <0.05 level. SE: Standard deviation, CI: Confidence interval

Table 3: Multiple comparisons (1: cigarette smoker), (2: shisha smoker), (3: nonsmoker) on serum triglyceride; triglyceride; least significant difference

Multiple comparisons		Mean difference (I-J)	SE	Significant	95% CI	
					Lower bound	Upper bound
1.00	2.00	41.09286	23.94907	0.090	88.8345	6.6487
	3.00	112.00714*	23.94907	0.000	64.2655	159.7487
2.00	1.00	41.09286	23.94907	0.090	6.6487	88.8345
	3.00	153.10000*	27.01820	0.000	99.2402	206.9598
3.00	1.00	112.00714*	23.94907	0.000	159.7487	64.2655
	2.00	153.10000*	27.01820	0.000	206.9598	99.2402

*The mean difference is significant <0.05 level. SE: Standard deviation, CI: Confidence interval

Table 4: Multiple Comparisons (1: cigarette smoker), (2: shisha smoker), (3: nonsmoker) on very low-density lipoprotein

VLDL, LSD		Mean difference (I-J)	SE	Significant	95% CI	
					Lower bound	Upper bound
1.00	2.00	8.32143	4.78708	0.086	17.8643	1.2214
	3.00	22.82857*	4.78708	0.000	13.2857	32.3714
2.00	1.00	8.32143	4.78708	0.086	1.2214	17.8643
	3.00	31.15000*	5.40056	0.000	20.3842	41.9158
3.00	1.00	22.82857*	4.78708	0.000	32.3714	13.2857
	2.00	31.15000*	5.40056	0.000	41.9158	20.3842

*The mean difference is significant <0.05 level. SE: Standard deviation, CI: Confidence interval, LSD: Least significant difference, VLDL: Very low-density lipoprotein, LDL: Low-density lipoprotein

Table 5: Multiple comparisons (1: cigarette smoker), (2: shisha smoker), (3: nonsmoker) on serum low-density lipoprotein

Comparisons on serum LDL		Mean difference (I-J)	SE	Significant	95% CI	
					Lower bound	Upper bound
1.00	2.00	42.41429*	18.28961	0.063	78.8740	5.9546
	3.00	69.48571*	18.28961	0.000	33.0260	105.9454
2.00	1.00	42.41429*	18.28961	0.063	5.9546	78.8740
	3.00	111.90000*	20.63346	0.000	70.7680	153.0320
3.00	1.00	69.48571*	18.28961	0.000	105.9454	33.0260
	2.00	111.90000*	20.63346	0.000	153.0320	70.7680

*The mean difference is significant <0.05 level. SE: Standard error, CI: Confidence interval

or even worse than cigarette smoking. It is recommended that men who have a habit of shisha smoking as an alternative to cigarette smoking tobacco should be informed about the potential adverse effects of their habit on cardiorespiratory health.

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Conflicts of interest

There are no conflicts of interest.

Table 6: Influence of daily cigarette smoking on lipid profile in healthy male subject

Cigarette smoking (cigarettes/day)	Subject (n)	Lipid profile				
		TC (mg/dl)	LDL (mg/dl)	HDL (mg/dl)	TG (mg/dl)	VLDL (mg/dl)
1-10	6	131.1	136.6	37.4	130.9	26.8
11-20	13	199.6	204.4	40.8	257.6	51.4
≥20	16	210.8	221.7	42.9	299.6	59.6

TC: Total cholesterol, LDL: Low-density lipoprotein, HDL: High-density lipoprotein, TG: Triglyceride, VLDL: Very low-density lipoprotein

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