



Effects of Smoking on Triglyceride Level in Heart Patients in Islamabad Region, Pakistan

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ABSTRACT

Concentration of carbon monoxide increases due to smoking of tobacco and ultimately affects the heart by decreasing the ability of the blood to carry the oxygen. In the meantime, nicotine present in tobacco smoke causes an increase in heart rate and blood pressure. By time, the cardiovascular system faces unusual "wear and tear". Serious health issues such as heart attacks, high blood pressure, blood clots, strokes, hemorrhages, aneurysms, and other disorders of the cardiovascular system are experienced by the people who uses to smoke. The increased Triglyceride (TG) level in heart patients samples due to smoking were identified by Cobas 6000 potentiometric method, which is recommended by Clinical and Laboratory Standards Institute. Low Triglyceride level was observed in 20 smokers, moderate TG level in 30 smokers and 50 smokers had high TG level. With the increase in smoking/day, the risk for stroke increases. The research indicated that those smokers who do exercise/walk, were less affected, while non exercised smokers were affected more. Same data obtained for those smokers who also do heavy diet, increased TG level recorded in their serum. Our study support necessity of an educational programs about the risks of smoking associated to cardiovascular disease.

Keywords: HDL, LDL, TG, Smokers, Non-smokers, Potentiometric method

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INTRODUCTION

Cigarette smoke produces free radicals such as nitric oxide and hydrogen peroxide, promoting oxidative stress which induces endothelial damage. Atherosclerosis and coronary heart disease is due to cigarette smoking, a powerful risk factor. Cardiovascular morbidity and mortality is directly linked with number of cigarettes smoked. Smoking cigarette is considered to be the second cause of death in the world [1], as it causes 1/10 adult deaths or higher than 4.9 million deaths annually [2]. Nicotine present in tobacco smoke induces production of catecholamines which cause lipolysis and concentration of free fatty acids (FFAs) in plasma increases which sequentially results in increased level of triglycerides and secretion of hepatic FFAs along with very low density lipoprotein cholesterol (VLDL-c) in blood. Several major problems associated with smoking reported are fall in estrogen level which leads to decreased high-density lipoprotein cholesterol (HDL-c), hyperinsulinaemia in smokers leads to increased cholesterol, increased level of Low-density lipoprotein cholesterol (LDL-c), VLDL-c and triglyceride (TG) due to decreased activity of lipoprotein lipase [3]. Experimental and clinical data by Craig et al (1989) reveals that exposure to cigarette smoke increases oxidative stress which is definitely act as powerful risk factor for dysfunction of cardiovascular system [4]. The risk for stroke increases as the number of cigarettes smoked increases [5]. Low-density lipoprotein (LDL), transports cholesterol to all parts of the body and high-density lipoprotein (HDL), also called "good cholesterol," accumulates fatty deposits

and send back them to the liver [6]. According to the study of Reaven and Tsao (2003), frequency of heart attacks or stroke increased when there present higher concentration of oxidized LDL in the blood stream [7]. Every smoker gets the same toxins into the lungs during smoking, but the pattern of toxin's effects significantly vary among the smokers. It is suggested that risk of cardiovascular disease among smokers is greatly influenced by the genetic factors [8]. A study conducted at the University of Rochester found common genetic defect in the substance that keeps the proportion of HDL to LDL in 60% to 70% of the population [9]. The substance responsible for this work is the cholesteryl ester transfer protein (CETP), although its exact workings are not well understood but scientists believe CETP facilitates the transport of HDL to LDL cholesterol [10]. The risk of inflammation and build-up of WBC (white blood cells) which is considered as plaque (not the same as the teeth plaque) increase due to the presence of higher total cholesterol and LDL levels in a manner that arterial plaque buildup remains soft initially [11]. However, with passage of time, hard clots formed due to its hardening and rupturing. In this case when arteries contain high plaques and clotting, then it is very harder for blood to circulate all over the body parts which eventually force the heart to work harder and faster for obtaining oxygen and nutrients to the body for normal functioning [11]. Body experiences decreased blood flow due to the progression of clogged arteries a condition known as atherosclerosis [12].

Risk of death become triples in heart patients due to smoking. Cigarette smoking promotes formation of increase level of clotting factors in the blood, decreasing High density lipoprotein cholesterol (HDL) levels, increasing triglyceride levels (TG), and injuring the lining of blood vessels eventually results stroke. The present is focused to check the effects of smoking on triglyceride (TG) level and lipid profile in heart patients.

MATERIAL AND METHODS

The study was conducted at Al-Maroo International Hospital Islamabad. Total 100 blood samples were obtained from the heart patients admitted in the hospital. In total 100 patients the male ratio were 85% while females were 15%. A confidential questioner form (asked about age, education, diet, exercise/walk, cigarettes smoke/day) was also filled by each patient. Gel Vacutainers were labeled with respective identities (IDs) of individuals. A visible peripheral vein was selected and the venipuncture site was made sterile by vigorously applying alcohol pads. Venous blood samples were collected from individuals using a sterile and dry needle/syringe and 5cc of blood was withdrawn from a suitable vein in the arm. The blood was transferred to Gel Vacutainer which contains a gel which separates serum from the form elements. All the samples were kept at room temperature to allow the blood to clot. Serum was obtained by centrifugation of the clotted blood sample. The clotted samples were centrifuged at 6000 RPM for 10 minutes. The gel present in gel vacutainer separated the serum and blood cells. The Roche/Hitachi Cobas 6000 analyzer series which is a fully automated, random-access, software-controlled system for immunoassay and photometric analyses intended for qualitative and quantitative *in vitro* determinations of a wide variety of tests, used for the estimation of Triglyceride level. The principle of the test is an enzymatic colorimetric method which depend on a lipoprotein lipase as central enzyme. This enzyme converted triglycerides to glycerol by rapid hydrolysis process and then glycerol oxidized to dihydroxyacetone phosphate and hydrogen peroxide. The produced hydrogen peroxide reacted with 4-aminophenazone and 4-chlorophenol in presence of peroxidase as biological catalyst to form a red dye. The triglyceride concentration is directly associated with color intensity of the red dye color formed which was measured photometrically at 500nm absorbance.

RESULTS

Among 100 patients who were smoking, mostly individuals were above teen age and above 60 years also. Out of the total, male smokers were 85% and female 15% only. Figure 1 illustrates all those patients who used to smoke on daily basis. Individuals with a TG level higher than 1.7 mmol/L are considered dyslipidaemic as per recommendations of World Health Organization. Table 1 shows that among 100 participants those patients who were used to smoke greater number of cigarettes/day, their TG level recorded high as compared to those who smoke few cigarettes/day as shown that patients who were smoked 20 cigarettes/day with TG level recorded upto 320 mg/dl, therefore in our study population, smoking looked to effect dyslipidaemia. According to the recommendation of the American Heart Association, to keep heart healthy and in correct functioning, blood level of LDL should be below 100 mg/dL, HDL levels must be above 40 mg/dL, and combined levels of LDL and HDL should be in rang of 200 mg/dL in blood. Corresponding to the findings of TG level of the 100 patients, they were grouped such as TG level of 30 smokers was moderate while 20 smokers had low TG level and 50 smokers possessed high TG level (Figure 2). Current study documented that there is a significant increase in levels of triglyceride and these results were analogous with the observations of [12]. Rise in serum total

cholesterol (TC), Low density lipoprotein cholesterol (LDL-c), Triglyceride (TG) and fall in High density lipoprotein cholesterol (HDL-c) due to smoking have been reported by many authors [13]. All the groups are then further categorized to evaluate the TG level on the basis of exercise/walk, education and diets. According to Figure 3, smoking ratio is high among the educated population. It is the reason that smoking is considered as a modern life style of the most high classes and secondly the interactions inside the institutes with the addicts. This study also indicated that those smokers who were used to exercise, were less affected as compared to non-exercised smokers were the major affected ones. Regular exercise/ walk (km/day) can lower down the TG values and the risk of heart diseases can be minimized (Figure 4). As shown in figure 5, those persons who taking heavy diet their triglycerides level will increased as compared to low diet individual. Proper diet is indispensable for the heart patients to control coronary heart attacks (Figure 5). A number of adversative effects have been described to be linked with smoking, affecting several of our physiological systems, including the cardiovascular systems, immunological systems [14]. Concentrations of cholesterol, triglyceride and LDL were detected to increase among the smokers patients. This study provide a precious data on preventing smoking and heart disease. This data conducted a retrospective analysis of laboratory data (2017) to assess the trend of smoking have effects on TG level in our country.

Figure 1: Show different age groups of the patients

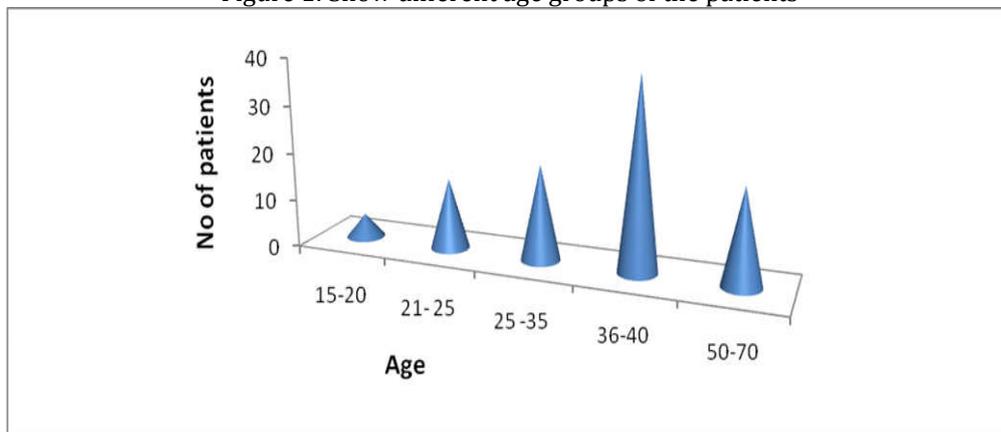


Table 1: Shows Cigarettes effects on TG level

Smokers	TG level
3 cigarettes/Day	150 mg/dL
5 cigarettes/Day	180 mg/dL
10 cigarettes/Day	220 mg/dL
15 cigarettes/Day	250 mg/dL
20 cigarettes/Day	320 mg/dL

Figure 2: Shows Relation of TG and Smokers

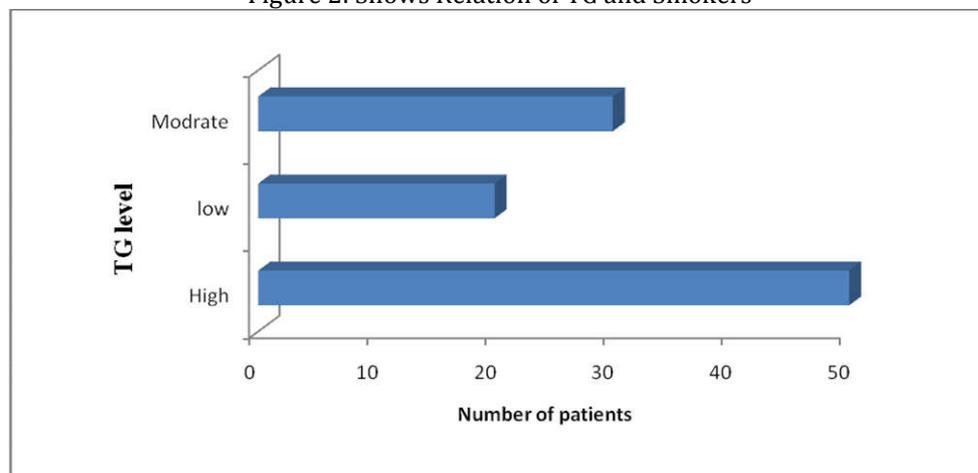


Figure 3: Show relation of smoking to literacy

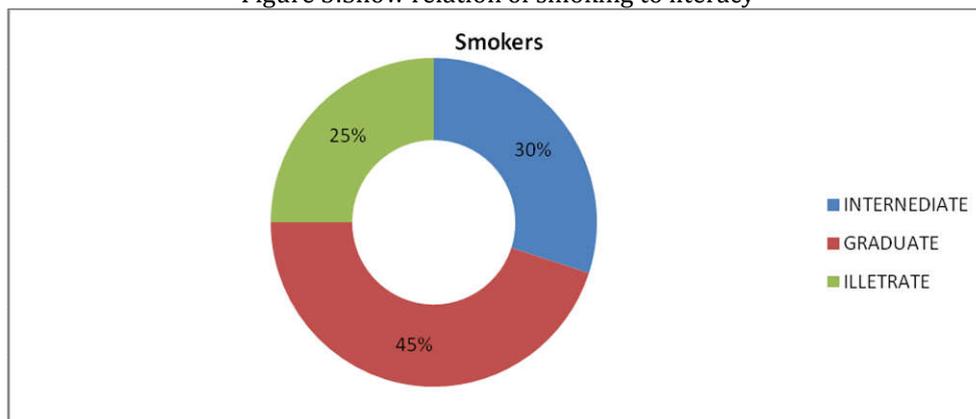


Figure 4: Shows TG level and Exercise Relation

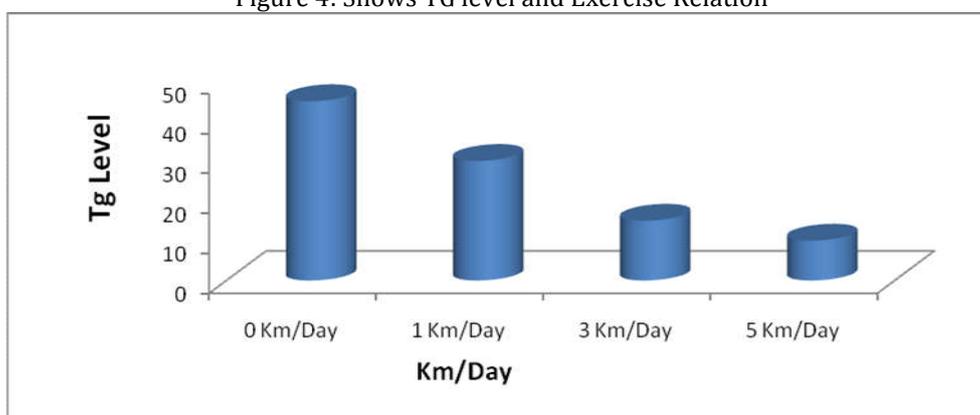
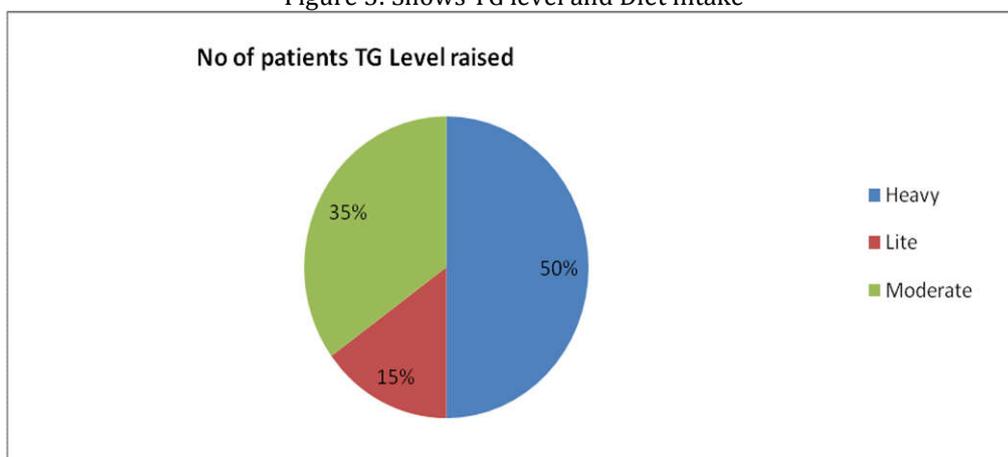


Figure 5: Shows TG level and Diet intake



CONCLUSION AND RECOMMENDATION

All of the above findings support a need of an educational program about the risks of cigarette smoking. This recent study also indicated that the TG level is directly concerned with exercise. In addition, the health policy-makers should take an active role in planning strategies to increase the awareness of the health risk of smoking and to illustrate the role and risk of smoking in atherosclerosis and applying the suitable smoker quitting programs. Applying an effective strategy for quitting of smoking is important for reducing the risk of CHD (Coronary Heart Disease) among smoker.

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DECLARATION

Author(s) declare that there is no any king of conflict of interest or any kind of king financial involvement.

AUTHORS CONTRIBUTION

Author 1& 2: Draft, setting, data preparation, revision Author 3: Sampling and data analysis, Author 4:Data analysis Author 5:Revision.and Author 6:Revision

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