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To Estimate the Level of Bilirubin in the Blood of Male Cigarette Smokers

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Abstract: A study was carried out to prove the association of smoking, number of cigarettes and concentrations of bilirubin in male smokers of different age groups. Blood samples were collected from a population of 760 males in Quetta city. Blood samples were analyzed by Jendrassik and Grof method photometric system (micro lab) for the determination of bilirubin concentration. High serum bilirubin concentration was observed in male subjects smoking filter cigarettes compare to smokers of cigarettes without a non- filter. The higher serum bilirubin concentration in male former smokers compared to current may indicate that bilirubin concentration are restored after a period of high free radical exposure due to tobacco smoke.

Key words: Cigarette Smoke · Serum Bilirubin · Non-Filter · Free Radical

INTRODUCTION

Tobacco has been widely used all over the world and it has adverse effect on the human health. In modern times smoking is the most common addiction. Smoke of cigarette contains about 4000 compounds among which at least 200 are toxicants, 80 compounds suspected carcinogens, large quantities of free radicals and oxidants that cause oxidative stress [1]. Cigarette smoke produce many compounds which are toxic carcinogenic, harmful to the health, such as hydrogen cyanide, nicotine and nitrogen oxides, carbon monoxide [1]. Serious public health risks are associated with cigarette smoking. Cigarette smoking in U.S leads to over 440,000 deaths annually. Studies showed that numerous diseases like pulmonary disease, Ischemic heart disease atherosclerosis, hepatitis caused by cigarette smoking [2]. Cigarette smoking is considered to be a major risk for cardiovascular disease. It is suggested by the clinical and experimental studies that the oxidants in cigarette smoke are the major contributors that induced changes in vascular and endothelial function. The most reactive elements present in the cigarette smoke induce the lipoprotein and lipid oxidation. It has been analyzed and proved that serum Bilirubin having antioxidant property [3].

Bilirubin is a bile pigment and is a primary degradation product formed during the catabolism of hemoglobin and other proteins.[1-4] Bilirubin is a toxic metabolite and regarded as a key factor for the liver and blood disorders.[3-4] The breakdown of heme in red blood cells involve several steps leading to the formation of bilirubin. Biliverdin the intermediate product produced by the heme-oxygenase mediated oxidation of heme and is followed by the reduction of biliverdin by an enzyme known as Biliverdin reductase to bilirubin.[2-4] Bilirubin prevailed in the body in two forms, Unconjugated (Indirect) and Conjugated (Direct). Unconjugated bilirubin is insoluble in water. [5] The elevated unconjugated concentration in blood develops due to the hemolysis and also due to the enzyme activity is diminished to which it was conjugated. Hyperconjugated bilirubin in serum develops due to the resistance of bile flow. Hyperconjugated bilirubin in serum is responsible for neurological injuries in infants and gallstones pigmentation in adults.

Elevated bilirubin in serum decreases the risk of cardiovascular diseases [6].

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The normal value of total bilirubin in serum is found to be 3.42-17.10 µmol / l (0.2-1.0 mg/dl) [3]. Despite of its adverse effects, Bilirubin has antioxidant and anti-inflammatory properties. [2,3]. Increase concentration of serum bilirubin has been recommended act as antioxidant reducing the risk of coronary artery disease(CDA) [7].

Lower concentration of bilirubin was associated considerably with cigarette smoking which decrease the protective effect of Bilirubin. Low concentrations of Bilirubin are usually found in individuals with coronary artery disease (CAD). [6-7] High concentrations might be protective against deterioration of glucose metabolism. Serum Bilirubin concentrations to be found high in men than in women. It has been found that smokers having lower serum Bilirubin concentrations. Tanaka *et al.* conducted a study and concluded that smoking is positively associated with alcohol while negatively associated with Bilirubin concentration. In this study we examined the relation between smoking and Serum Bilirubin concentrations in smokers.

MATERIALS AND METHODS

Study Population: A total of 393 blood samples were collected randomly from male cigarette smokers and 367 blood samples were collected from male non smokers with difference of age and financial status during the months of Dec to Feb (2014-2015) from Quetta.

Measurement: All subjects filled with a standardized questionnaire which included questions about age, educational level and smoking. The smoking questionnaire contained detailed information on history of tobacco smoking (average number of cigarettes, numbers of years of smoking, age at which they began or stopped smoking, use of cigarette with or without filter). Blood were collected and analyzed for a number of biochemical parameters.

Total serum bilirubin concentration was measured with Jendrassik and Grof method by photometric system (micro lab). This method uses a blank channel which turns together with the sample channel to correct for endogenous factors in the sample interfering with total bilirubin concentration. Serum bilirubin concentration is given in mg/dl.

RESULTS

The graphs show that men in the never smokers group had high bilirubin concentration than men former smokers and current smokers. Subjects with low education level predominated in the current smokers groups in contrast to never smokers where an intermediate educational level was more prevalent.

In this study it was found that 100% were non-filter cigarette smokers of age group between 30-35.5 having 0.2m /dl bilirubin concentration, 40% age group between 35.5-40.5 were non-filter cigarette smokers and 60% were filter cigarette smokers, with a bilirubin concentration of 0.2to 0.3 mg /dl. 100% age group between 40.5 -45.5 were filter cigarette smokers and having a concentration of 0.3mg /dl. 45.5-50.5 age group having least concentration of bilirubin i.e. 0.1 mg /dl and 100% were filter cigarette smokers.

Smoking Type: According to categories of smoking type in the tables have been shown that filter cigarette smokers constituted the largest group of smokers than non-filter cigarette smokers.

Only the duration of smoking effects the bilirubin concentration in men but not the cigarette smoked per day.

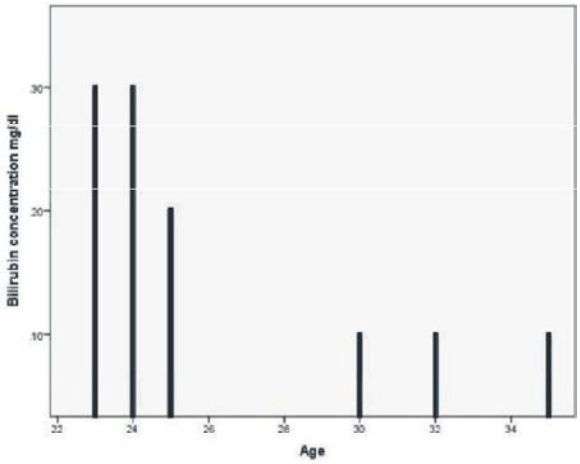

Fig. 1: Showing concentration of Bilirubin in mg/dl

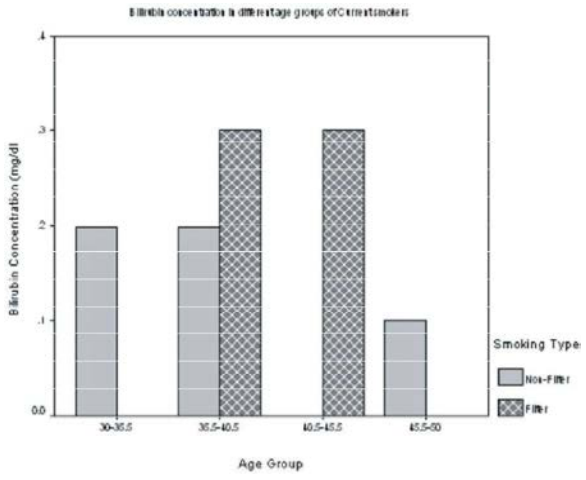

Fig. 2: Showing concentration of smoking

Table 1: Showing smoking variation among the smokers

Sample	Average Age	Total period of smoking on the date of sample Withdrawal (years)	Smoking status/day	Smoking type	Result mg/dl
Chain Smoker	32-50	15-35	30-40	Non-filter	0.1-0.3
Normal to low smoking	23-36	2-3	4-6	Non filter	0.4-0.6
Non-smokers	23-52	-	-	-	0.6-0.8

DISCUSSION

In this study the serum bilirubin concentration was significantly lower in young male smokers compared with adult male smokers. Among the male smokers, those smoking with filter cigarettes had the highest serum bilirubin concentration than non-filter cigarette smokers. The observed low bilirubin concentration will be the result of an over consumption of bilirubin by free radical species related to cigarette smoke. Cigarette smoke contains a large variety of compounds, including many oxidants and free radicals that are capable of causing an antioxidant in balance in the blood and tissues of smokers.

The higher serum bilirubin concentration in male former smokers compared to current may indicate that bilirubin concentration are restored after a period of high free radical exposure due to tobacco smoke [8]. The second aim of this study was to investigate the type of cigarette smoked in a relation of serum bilirubin concentration. High serum bilirubin concentration as observed in male subjects smoking filter cigarettes compare to smokers of cigarettes without a non- filter.

This may be due to antioxidant properties of the cigarette smoke tar compound, the gas phase of cigarettes smoke contains small oxygen and carbon - centered radicals that are much more reactive than tar- phase radicals [8].

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