Original Article

Evaluation of Lipids And Lipoprotein Levels In Opium And Heroin Addicts In Punjabi Population

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Objective: The present study was conducted to assess lipid and lipoprotein levels in opium (50 subjects) and heroin-addicted men (50 subjects) against non-opium and non-heroin addicted men (25 healthy individuals) as control subjects from Punjabi population.

Material and Methods: The biochemical estimations: total lipids, total lipids, TC, TGs, HDL, LDL, VLDL and Chylomicron levels were carried out on fully automatic clinical chemistry analyzer on 12hour fasting blood samples. The variables for each group were presented as means± standard deviations. Results were considered statistically significant if $p \leq 0.05$ for the biochemical parameters.

Results: Our study concluded that the cholesterol, triglyceride and Very Low Density Lipoprotein levels were higher in opium addicts than heroin addicts. Total lipid levels were decreased significantly in heroin addicts as compared to control subjects. However, no significant difference in High Density Lipoprotein and Chylomicron levels was noted in heroin and opium addicts in comparison to controls.

Conclusion: It may therefore be suggested that opium addicts are at higher risk to develop atherosclerosis leading to Ischemic heart disease than heroin addicts.

Key words: Heroin, Opium, Ischemic Heart Disease, Hyperlipidemia.

Introduction

One of the causes of death between 15 to 45 years of age is Heroin and Opium addiction. The 2006 national assessment report on problem of drug abuse in Pakistan, estimated that there are 628,000 opiate users. Of these, around 482,000 (77 percent) are heroin users. This is an alarmingly high rate. This heroin consumption costs around $1.2 billion every year, according to the estimates given by United Nations Office on Drugs and Crime (UNODC). Although, pain relief is the primary and justified use of opioids, this usage comes with the risk of producing physical and sometimes psychological dependence. Drug addiction is defined as a state of psychological or physical dependence, resulting from the interaction between a living organism and a drug, which forces the person to take the drug on a continuous or periodic basis in order to experience the effects and to avoid the discomfort of its absence.[1] Opiates are drugs which cause severe physical and psychological dependence with tolerance. Opium is included in naturally occurring opiates but heroin is a semi-synthetic opiate.

Opium is the air-dried milky exudate obtained by incising the unripe capsules of *Papaver somniferum L* or its variety *album De Candolle* (Fam. *Papaveraceae*). Opium yields not less than 9.5 percent of anhydrous morphine. Powdered Opium is dried at temperature less than 70°C to reduce it to a very fine powder. Powdered Opium yields 10.0 to 10.5 percent of anhydrous morphine. It may contain any of the diluents permitted for powdered extracts, with the exception of starch.[2] Opium contains approximately 5-20 percent nonalkaloidal constituents such as water, about 20 percent various sugars, and several simple organic acids, including fumaric acid, lactic acid, oxaloacetic acid, and meconic acid.[3] Furthermore, it contains approximately 10-20 percent alkaloid constituents. While, more than 40 individual alkaloids have been isolated, only five of these alkaloids account for all of the quantitative alkaloid content in opium. These include the morphinans morphine (8-17 percent), codeine (0.7-5 percent), thebaine (0.1 - 2.5 percent); the benzylisoquinoline papaverine (0.5-1.5 percent) and the phthalideisoquinoline noscapine (narcotine) (1-10 percent).[4,5,6]

Heroin (also known as Diamorphine) is a compound synthesized by adding two acetyl groups to morphine. It is 3,6-diacetyl ester of morphine. Heroin is significantly more lipophilic than morphine and is therefore better transported and absorbed into the brain after injection. Heroin is rapidly hydrolyzed to 6-monoacetylmorphine, and then to morphine. Even the 6-monoester is more lipophilic than morphine, and thus better able to enter the brain.[3,7] Hence, heroin has a greater addiction potential than opium because of its euphoriant property and its rapid onset

of action. euphoriant property and its rapid onset of action. Ischemic Heart Disease (IHD) is the single most common cause of death as of 2012,[8] placing a major economic and resource burden on health systems. There are many risk factors for IHD. Hyperlipidemia is one of the major risk factors that causes atherosclerosis and may lead to IHD.[9] Lipids are transported through the plasma compartment as lipoproteins. Major constituents of lipoproteins are triglycerides (TGs), cholesterol, cholesterol esters, phospholipids and apolipoproteins. The plasma lipoproteins are chylomicrons, very low-density lipoprotein (VLDL), low-density lipoprotein (LDL) and high-density lipoprotein (HDL).[10] Abnormal metabolism of some lipid fragments leads to various complications like atherosclerosis and coronary artery diseases (CAD).[11] The TG have been observed to be the major lipid content in atheromatous plaques supporting the preexisting view that a large number of myocardial infarction patients also exhibit hypertriglyceridemia.[12] Furthermore, raised serum concentration of cholesterol, low-density lipoprotein cholesterol (LDL-C) and low serum concentration of high-density lipoprotein cholesterol (HDL-C) are all associated with an increased risk of coronary atherosclerosis.[13,14] Similarly, evidence also suggests that dyslipidemia is one of the major risk factors of CAD. Dyslipidemia is constituted as high level serum total cholesterol (TC), LDL-C, TGs, and low levels of HDL-C.[15,16] The prevalence of dyslipidemia may vary across population groups according to nationality, ethnicity, genetics, and socio-cultural and economic factors. The lifestyle and diet changes also significantly influence dyslipidemia.[17] A notion appears to prevail that opium can reduce serum lipids and hence the risk of IHD is reduced in opium addicts.[18] The present study was conducted to compare the lipid and lipoprotein levels in opium and heroin-addicted men with lipid and lipoprotein levels in non-opium and non-heroin addicted men from Pakistani population. The biochemical factors evaluated were total lipids, TC, TGs, HDL, LDL, VLDL and Chylomicrons. This study was designed to evaluate and compare the levels of lipids and lipoproteins in opium and heroin addicts.

Materials and Methods

The study was conducted to assess changes in lipid profile in heroin and opium male addicts. Subjects were chosen from psychiatry wards of Mayo and Services Hospitals. Investigations were carried out on fifty subjects of each group i.e. Heroin and Opium addicts. Twenty five healthy males of the same age groups were enlisted as controls. Duration of their addiction ranged from one to ten years. After twelve hours overnight fast, 6-8ml of blood were drawn from the patients and controls by venipuncture, in 10 cc disposable syringes and allowed to clot. Serum was separated by centrifugation at 3000 5000rpm.The biochemical estimations: total lipids, total lipids, TC, TGs, HDL, LDL, VLDL and Chylomicron levels were carried out on fully automatic clinically chemistry analyzer. The variables for each group were presented as means±standard deviations. Results were considered statistically significant if $p \leq 0.05$ for the biochemical parameters.

Results

Values of lipid profile are same sized in following tables. **(Table-1)**

Discussion

The importance of present study is to evaluate and compare the levels of lipids and lipoproteins in opium and heroin addicts, and to elaborate their

Table-1:

Biochemical Paramerters	Heroin Addicrs (Mean Values)	Opium Addicts (Mean Values)	Control Subjects (Mean Values)	P-Value
a. Triglylerids	155±35	223±62	227±61	<0.05
b. Total Cholesterol	153±39	248±53	193±27	<0.05
c. Total Lipids	4.8±1.06	7.5±1.2	7.0±1.7	<0.05
d. High density lipoproteins	33±7	36±6.3	34±4	<0.05
e. Low density lipoproteins				
f. Very low density lopoproteins	239±94.2	262±98	165±73	<0.05
g. Chylomicrons	210±89.1	229±93	195±85	<0.05

effects on atherosclerosis, IHD, and therefore on the quality of life. Cholesterol and phospholipids are the major lipid constituents of atherosclerotic lesion. A number of studies in the past have shown atherosclerosis.[19,20] The biochemical factors evaluated from the sera of heroin addicted, opium addicted and control subjects are shown in table. The results suggest a significant difference in cholesterol values between both groups i.e. opium and heroin addicts ($P < 0.05$). It is quite evident from our results that the levels of cholesterol in opium addicts are significantly higher than levels of cholesterol found in controls. Our findings regarding higher cholesterol levels in opium addicts are consistent with the studies conducted on morphine-pelleted rats maintained on a normal diet.21 However, these findings were not in agreement with other reports.[22-25] These changes in serum cholesterol levels can be explained on the basis that the persons taking opium reside mostly within the walled city of Lahore. The high serum cholesterol levels may however be explained by the fact that this section of population is known for their high cholesterol diet. On the other hand, this increase in serum values of cholesterol may have been caused by lipolytic effect of opioids.[26] Therefore, the higher levels of cholesterol observed in opium addicts during this study may suggest atherosclerotic changes in opium addicts as compared to heroin addicts. In this study, cholesterol levels were observed to be significantly lower in heroin addicts than in controls, which are consistent with other reports in humans.[22-25] Lower serum cholesterol levels in the heroin addicts may be the result of anorexia that is observed in heroin addicts because of the euophoriant effect of heroin.

The levels of TGs are higher in opium addicts than in the heroin addicts. The mean values of TGs are 223±62 in opium addicts, 155±35 in heroin addicts corresponding with 227±61 values of control subjects. Comparing the TG values in opium addicts and control subjects, no significant difference in TG levels is noticed and this trend is consistent with other studies.[18,22] However, it is quite evident from our results that the TG levels in heroin addicts are significantly lower than the TG levels found in control subjects and this contrasts sharply with another study which showed higher values of serum TGs in heroin addicts.[27] However, the low levels of TGs in heroin addicts as compared to opium addicts may be explained by the observation that heroin addicts are of relatively lean built as compared to opium addicts. Therefore, these obese subjects have more adipose tissue deposition than the lean built heroin addicts.[28,29] The higher adipose tissue deposition therefore appears to be an indication of high serum TG levels. In another study, it was further confirmed that lipoprotein lipase activity in a single fat cell was significantly higher in obese persons than lean control subjects, suggesting that the TG levels are high in obese persons.[30] In conclusion, eating habits, paucity of physical exercise and excessive somnolence in this particular class of opium addicts may be responsible for higher levels of TGs.

The mean values of both TC (248±53) and TGs (223±62) are higher in opium addicts than the heroin addicts in whom the mean TC levels are 153±39 and mean TGs levels are 155±35. It has been documented previously that hyperlipidemia is one of the major risk factors causing atherosclerosis and may lead to IHD.[9] In conclusion, opium addicts are more likely to develop atherosclerosis and IHD than heroin addicts based on the higher levels of both TC and TGs in opium addicts.

VLDL is assembled in the liver from TGs, cholesterol, and apolipoproteins. VLDL is converted in the bloodstream to LDL. VLDL functions as body's internal transport mechanism for lipids. Since VLDL depicts mostly the levels of TGs so the changes in VLDL levels are expected to reflect the changes in serum TG levels of these patients. The levels of VLDL in opium addicts are the highest (mean values 262±98), followed by VLDL levels in heroin addicts (values 239 ± 94.2) and lowest in the control (values 165±73) subjects.

The role of high plasma VLDL cholesterol level has been established beyond controversy, in atherosclerosis in both mice[31] and humans.[32] Increased VLDL levels in this study point towards higher incidence of atherosclerosis in cases of opium addicts. The possibility of formation of atherosclerosis in heroin addicts is less due to lower levels of VLDL whether it is due to dietary habits or increased activity after taking the drug.

However, it is reported that difference in LDL-C as well as in VLDL-C between opium addicts and control groups were not significant in both, men[33] and normolipidemic mouse[34] which is in contrast to our results. The preventive role of HDL levels in the development of IHD has already been established. In our study HDL levels are highest in opium addicts (36±6.3) as compared to heroin addicts (33±7) and controls (34±4). However, these changes are not consistent with previous studies.[18,25]

The mean serum levels of total lipids in opium addicts (7.5±1.2) are higher than mean serum levels of total lipids in heroin addicts (4.8±1.06) and mean serum levels of total lipids in controls (7.0±1.7). It is evident from our results that total lipids levels are decreased significantly in heroin addicts as compared to control subjects in accordance with other studies.[35] which may be explained by anorexia and lean frame that is characteristic of heroin addicts. The mean chylomicron levels are higher in opium addicts (229±93) as compared to heroin addicts (210±89.1) and controls (195±8). Although this is not a significant difference but these minor elevations in the levels of chylomicrons in opium taking group may be due to intake of diet high in lipids.

Conclusion

In conclusion, our findings showed that opium had an impact on the serum levels of TC, TGs and VLDL that are higher in opium addicts than heroin addicts. The total lipid levels were decreased significantly in heroin addicts as compared to control subjects. Furthermore, the changes in the levels of HDL and Chylomicrons in heroin and opium addicts were not significant in comparison to control subjects during this study. Therefore, it may be suggested that opium addicts are at a higher risk of developing atherosclerosis and Ischemic heart disease than heroin addicts.

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