Article

Study of Lipid Profile in Shift Workers

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Background: The present study was undertaken to evaluate the changes of serum lipid profile in apparently healthy shift workers and non shift workers to identify the possible high risk factors for developing atherosclerotic changes. Methods: Serum Total Cholesterol, Triglyceride, HDL-Cholesterol and LDL-Cholesterol levels were estimated and blood pressure was measured in apparently healthy adult shift worker and non shift worker participants. Total 60 subjects age ranged from 20-50 years were selected, of whom 30 were shift workers (Study) for at least one year and 30 were non shift workers (control). Height, weight and resting blood pressure of all the subjects were recorded before collection of blood. Blood samples were collected after over night fasting for estimation of serum lipid and lipoprotein levels and were measured by standard laboratory technique. Data were analyzed by unpaired 't' test. Results: The mean serum Total Cholesterol and LDL-Cholesterol levels were significantly higher in shift workers compared to those of non shift workers. Again mean serum Triglyceride and HDL-Cholesterol levels in the shift workers did not differ significantly from that of non shift workers. These changes may be related to internal desynchronization due to disruption of circadian rhythm. Conclusion: The changes in serum lipid and lipoprotein levels with the exception of HDL-Cholesterol and Triglyceride in the subjects engaged in shift work may put them at increased risk for coronary artery disease.

Keywords: Circadian Rhythm; Lipid Profile; Shift-work

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Introduction

The term shift work usually applies to fixed work at night, roster work, and specific shift patterns[1]

Because 24-hours operations are an inevitable component of numerous industries, night work or shift work is a necessary condition of employment for a significant segment of the work force. Critical 24 hours operations include police and fire protection, medical care, transportation, communication, and energy and water utilities .Other industries require continuous processing or operate around the clock to optimize capital investment in machinery and other production materials. Estimates of the number of person doing shift work range from 10% to 25% of all those employed. Almost all occupations or industries have employees engaged in shift work. The number of people doing shift work appears to be increasing.[2]

Because of the necessity of 24-hours operations, shift workers often live at variance with the conventional pattern of human activity, which is highest in the day and evening hours. These deviations from the daytime (or diurnal) activity pattern place the shift worker in opposition to many human functions that oscillate within a 24 hours period. Physiologic process (e.g. metabolic rate), psychological process (e.g. short term

memory), and social process (e.g. family interaction) all have demonstrated rhythmic increases and decreases in daily activity. These patterns are called circadian rhythm because they cycle about once a day. When working at night and sleeping during day these circadian rhythms move about even after weeks of night work no complete adjustment of the rhythms are made. The single rhythm moves at its own pace and several rhythms may come in disharmony with each other or the surrounding. This is labeled internal desynchronizatin.[3]

Working in irregular hours, including night work and shift work, has been found to be associated with higher levels of lipid. [4]

Dyslipidemia is recognized as the major coronary risk factor, which was defined as the presence of high total cholesterol (>200 mg/dl), high LDL cholesterol (>130 mg/dl), low HDL cholesterol (<40mg/dl) or high triglycerides (>150 mg/dl) according to the USAATP-11 guidelines. [5]

Lipid and Lipoprotein studies generally emphasized positive relationship of total cholesterol, Low Density Lipoprotein (LDL), Very Low Density Lipoprotein (VLDL) and triglyceride to the risk of coronary heart disease.

The higher the concentration of any one of these blood lipids, the greater the risk of coronary heart disease. On the other hand, the high density lipoprotein (HDL) appeared to have an inverse relation to the risk of coronary heart disease, the lower their concentration the greater the risk of coronary heart disease.[6]

High density lipoprotein (HDL) cholesterol has been implicated as a negative risk factor for coronary heart disease (CHD). Data from the different studies have shown that an inverse relationship exists between HDL cholesterol and CHD.[7]

The present study was undertaken to evaluate the changes of serum lipid profile in apparently healthy shift workers and non shift workers subjects to identify the possible high risk factor for developing atherosclerotic changes.

Methods:

In this cross-sectional study, serum total cholesterol, triglyceride, HDL-Cholesterol and LDL-cholesterol levels were estimated and blood pressures were measured in apparently healthy adult shift workers and non shift workers. Total 60 of subjects age ranged from 20-50 years were selected, of whom 30 were shift workers (study) who were engaged in shift work for at least one year and 30 were non shift workers (control) who did not have shift work at least in last five years.

out a questionnaire was filled by all subjects regarding working condition, smoking habits, diet, level of physical activity, and family history of hypertension, diabetes, dyslipidemia, and hypothyroidism. Height and weight of all the subjects were recorded before collection of blood. Subjects suffering from any endocrine, hepatic, diabetes mellitus, renal disease or cardiopulmonary diseases, persons with history of drugs intake such as â-blocker, lipid lowering drugs or steroid therapy, acute or chronic infectious diseases, obese (BMI more than 24) persons and subject who abusing alcohol were excluded.

Blood samples were collected after over night fasting for estimation of serum lipid and lipoprotein levels and measured by standard laboratory technique.

The study was conducted on an outpatient basis according to the principles of the Declaration of Helsinki and was approved by the medical ethics review board of the Dhaka medical College. Informed consent was obtained from all volunteers after oral and written information had been given.

Data was entered in computerized SPSS program version of 12.0 .For statistical analysis un paired ‘t’ test was used.

Results

Mean (±SD) of age, height, weight and BMI of the study subjects are shown in Table-I. No Statistical significant difference of age, height, weight and BMI were observed between the two groups.

Table – I : Shows mean ± SD of age, height, weight and BMI in different groups of subjects.(n=60)

Groups	Age (Years)	Height (cm)	Weight (Kg)	BMI Kg/sqm
Study (n=30)	32.17 ± 8.96	159.81 ± 8.53	58.00 ± 9.99	22.63 ± 3.20
Control (n=30)	31.07 ± 9.22	159.60 ± 6.09	57.03 ± 8.07	22.31 ± 2.36

In both study and control group, male and female sex distribution is equal (Table-II).

Table – II: Sex distribution in different groups (n=30)

Sex	Study group		Control group	
	Frequency	Percent	Frequency	Percent
Male	13	43.3	13	43.3
Female	17	56.7	17	56.7

Results of biochemical parameters are shown in table-III

The mean serum total cholesterol level($p<0.01$) and LDL-Cholesterol levels ($p<0.05$)were significantly higher in study group compared to that of control group.Though, mean serum Triglyceride level and mean HDL-cholesterol level were higher in study group compared to control group but it was not statistically significant ($p>0.05$).

Table – III : Mean± SD serum lipid and lipoprotein levels in the two groups of subjects.(n=60)

Parameters (mg/dl)	Study (n=30)	Control (n=30)	P value
Total cholesterol	200.33 ±41.73	170.47 ±43.15	<0.01
TG	154.00 ±56.91	150.83± 52.59	>0.05
LDL-C	128.47 ±60.00	105.47 ±52.00	<0.05
HDL-C	36.40 ± 4.88	34.30 ± 5.03	>0.05

Discussion

In the present study significantly higher mean serum total cholesterol level in shift workers compared to non shift workers was observed. This finding is in agreement with those reported by Ghiasvand et al.[2] Lennernas, Akerstedt and Hambraeus also made similar observation.[8]

But Knutsson (1989) in his study has shown that there was no difference in serum total cholesterol levels between shift workers and day workers. [9]

A recent thorough review of such investigation concluded that shift workers might have somewhat higher levels of cholesterol.[4] The observed significantly higher ($P<0.01$) mean serum LDL-Cholesterol level in shift workers is in agreement with those reported by Lennernas, Akerstedt and Hambraeus .[8] But some other studies reported no difference in serum LDL-Cholesterol levels between shift workers and day workers.[9]

According to Bøggild, the amount of carbohydrates ingested in the night hours was related to cholesterol levels and it was suggested that this was due to an internal desynchronizatin between eating and metabolism.[10]

Absence of significant change in the mean serum triglyceride level and HDL-Cholesterol level in shift workers in comparison to non shift workers

is consistent with those reported by Ghiasvand et al.[2] Iandano and Shinozaki [11] Knutson [10]and Ghiasvand et al. [2]. But Some studies have shown higher prevalence of high serum triglyceride level and low HDL-cholesterol level among shift workers than among day workers.[12-13]

Lennernas, Akerstedt and Hambraeus documented lower dietary intake during night shift than during morning and afternoon shifts. According to them, the alteration in food intake from diurnal to nocturnal eating is related to increased serum LDL cholesterol in shift workers. Therefore redistribution of food intake during the night hour may be associated with metabolic disturbances in lipid metabolism.[8]

Even if the dietary quality and intake are similar in both day workers and shift workers, there are still differences in eating habits that might attribute to differences in levels of serum lipids.[8]

Conclusion

From the results in the present study and their comparison with those of published reports, it may be concluded that, changes in serum lipid and lipoprotein levels, with the exception of HDL-Cholesterol and triglyceride, may occur in shift workers which may put them at increased risk to coronary artery disease.

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