ORIGINAL ARTICLE

Dyslipidaemia in Schizophrenia

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ABSTRACT

Background: Lipid neurochemistry is an important focus in schizophrenia research. Disorder of fatty acid metabolism within the brain tissue play an important role in the pathophysiology of schizophrenia.

Material & Methods: To evaluate the association of dyslipidaemia with Schizophrenia and compare the serum lipid profile with healthy individuals, a cross sectional analytical study was conducted between July 2011 and June 2012 in the Department of Biochemistry, Dhaka Medical College, following approval of a protocol. As per criteria, total 100 cases were included in this study and divided into two groups: Group-I (Diagnosed cases of schizophrenia) and Group-II (Healthy individuals). Written informed consent was taken from all cases. Serum lipid profile (Total Cholesterol, Triglycerides, HDL and LDL) was estimated from both groups by enzymatic determination.

Result: Fasting serum triglyceride ($p<0.03$), HDL cholesterol ($p<0.001$) and LDL cholesterol ($p<0.001$) between the groups are significantly related. In group-I mean serum HDL cholesterol is reduced, but LDL cholesterol and Triglyceride were elevated in comparison with group-II. No significant relationship was observed in fasting serum total cholesterol in between groups ($p>0.05$). Result indicates strong association between schizophrenia and dyslipidaemia. That association would increase the risk of developing coronary heart disease in those patients with schizophrenia compared with healthy individual.

Keywords: Dyslipidaemia, Schizophrenia, Risk factors

Introduction

Schizophrenia is a syndrome causing a major public health problem. The prevalence is similar worldwide at about 1% and the disorder is equally common in men and women. The children of one affected parent have approximately a 10% risk of developing the illness, but this rises to 50% if both parents are affected. Schizophrenia can present at any age but does so most commonly in young adults.[1]

Lipid neurochemistry is an important focus in schizophrenia research. Reports of abnormalities in brain lipids in schizophrenia appear widely in the medical and lay press. Disorder of fatty acid metabolism within the brain tissue play an important role in the pathophysiology of schizophrenia.[2] The increased rate of breakdown of phospholipids and the reduced rate of incorporation of highly unsaturated fatty acids into phospholipids are two abnormalities related to phospholipid metabolism in schizophrenia. Phospholipase A2 and fatty acid coenzyme A ligase-4 are two key enzymes involved in signal transduction processes following the activation of various receptors, including D2 and 5-HT2, which are involved in the pathophysiology and medical treatment of schizophrenia.[3]

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Individuals with schizophrenia have a life expectancy which is approximately 20% shorter than that of the general population.[4] A meta-analysis concludes that 60% of the excess mortality in patients with schizophrenia is attributable to physical illness.[5] The causes of death comprise a broad range of conditions, similar to the general population, but schizophrenic patients die at a younger age. Mortality from cardiovascular disease is increased in both men and women with schizophrenia.[4]

The rates of cardiovascular events and new-onset diabetes are higher than expected in patients with schizophrenia and on antipsychotic medication.[6] The major risk factors for cardiovascular disease include obesity, dyslipidemia, hypertension and hyperglycemia.[7]

The previous studies of serum lipid profile have shown that schizophrenic patients have lower total cholesterol (TC) levels than healthy people.[8,9] However, another study conducted by Ryan et al. did not find significant difference in triglyceride (TG) levels between schizophrenic patients and normal control subjects.[9]

In patient with early onset schizophrenia have high serum TG levels in comparison with late on set disease.[10] Another study also showed that schizophrenic patients had lower serum low-density lipoprotein (LDL) cholesterol levels than normal control subjects; however, there were no differences in high-density lipoprotein (HDL) cholesterol levels in the two groups.[9]

The net impact on mortality in the schizophrenia population can be seen in the results of large epidemiologic studies, which have noted a standardized mortality ratio from cardiovascular disease two fold greater for schizophrenia patients than the general population.[11]

Therefore keeping all such important points and views in mind, the focus and aim of this study is to evaluate and assess the serum lipid profile in patient with schizophrenia. So far, no such study has been conducted on this topic in Bangladesh. As such this study will fill the gap, open new forum of discussion and will provide knowledge and information regarding the medical workup of patients with schizophrenia.

Methods:

This is a cross sectional analytical study and was conducted between July 2011 and June 2012 in the Department of Biochemistry, Dhaka Medical College. As per selection criteria, total 100 cases were included in this study and divided into two groups: Group-I (Diagnosed cases of schizophrenia) and Group-II (Healthy individuals). All the schizophrenic patients attending in Psychiatry ward of Dhaka Medical College Hospital & National Institute of Mental Health and Research, Dhaka are included in group-I and Group-II included healthy hospital stuff and attendance of the patients. Written informed consent was toke from all cases. Data was collected in a predesigned data collection sheet including particulars of the patients, history and relevant investigations. Complete physical and relevant clinical examination was performed. Diagnosis of schizophrenia was determined on the basis DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition) diagnostic criteria for schizophrenia.

With all aseptic precaution, 5 ml of venous blood sample was collected from each study subject after 10-12 hours overnight fasting. Then blood sample was allowed to clot and then centrifuged at 2000 rpm for 20 minutes and the separated serum was aspirated for biochemical assay. The serum was assayed immediately or was stored at -70°C if the analysis is delayed, to avoid loss of bioactivity and contamination. A serum lipid profile (Total Cholesterol, Triglycerides, HDL & LDL) was estimated from both groups.

After meticulous checking & rechecking all data was compiled and expressed as mean ± SD (standard deviation). Data was analyzed using Statistical Package for Social Science (SPSS) version 17.0. The p value <0.05 was considered as statistically significant.

Results:

As per selection criteria, total 100 cases were included in this study and divided into two groups: Group-I (Diagnosed cases of schizophrenia) and Group-II (Healthy individuals).

Table-1: Distribution of the Study subjects by Age.

Age groups	Group- I	Group-II	Total	Percentage
20-30 years	12	7	19	19%
30-40 years	31	27	58	58%
40-50 years	7	16	23	23%
Total	**50**	**50**	**100**	**100%**

Mean age of Group – I = 31.90 ± 6.71 years and Mean age of Group – II = 28.12 ± 6.72 years. Most of the people (58%) participated in the study was from 30 to 40 years, 19% were between 20 to 30 years and 23% was above 40 years of age. Chi-square=5.113 with 2 degrees of freedom. (p = 0.078)

The proportions of observations in different columns of the contingency table do not vary from row to row. The two characteristics that define the contingency table are not significantly related. (p = 0.078)

Table-2: Distribution of the samples by sex.

Sex	Group – I	Group – II	Total	Percentage
Male	27	21	48	48%
Female	23	29	52	52%
Total	**50**	**50**	**100**	**100%**

48% of the study population was male and 52% was female. In Group – I, there was 27 (54%) male and 23 (46%) female. In Group – II, there was 21 (42%) male and 29 (58%) female.

Chi-square=1.002 with 1 degrees of freedom. (p= 0.317).

The proportions of observations in different columns of the contingency table do not vary from row to row. The two characteristics that define the contingency table are not significantly related. (p = 0.317).

Table-3: Educational status of the samples.

Educational status	Group-I	Group-II	Total	Percentage
Illiterate	1	2	3	3%
Primary	17	14	31	31%
Secondary	16	21	37	37%
Higher Secondary	9	7	16	16%
Graduate & Above	7	6	13	13%
Total	**50**	**50**	**100**	**100%**

In this study 3% patient were illiterate, 31% have primary level, 37% secondary level, 16% have higher secondary level and 13% have graduate and above level of education.

Table-4: Socioeconomic status of the samples

Socioeconomic Status*	Group – I	Group – II	Total	Percentage
Lower	29	16	45	45%
Middle	16	27	43	43%
Higher	5	7	12	12%
Total	**50**	**50**	**100**	**100%**

*Based on monthly income:

1. < 10000 taka = Lower class
2. 10000 -50000 taka = Middle class
3. >50000 taka = Higher class

45% of the subjects were from the lower, 43% were from middle and 12% were from higher socioeconomic group. Among the cases 29(58%) are from lower, 16(32%) are from middle and 5(10%) are from higher socioeconomic group.

Chi-square= 6.903 with 2 degrees of freedom. (p = 0.032)

The proportions of observations in different columns of the contingency table vary from row to row. The two characteristics that define the contingency table are significantly related. (p = 0.032).

Table-5: Serum lipid profile in Group-I and Group-II.

Lipid Profile	Group-I		Group-II	
	Mean ± SD	Range	Mean ± SD	Range
Total Cholesterol	212.14 ±51.17	138-292	222.60±45.14	157-305
Triglyceride	148.08±41.19	92-263	131.30±30.07	88-227
HDL Cholesterol	38.18±5.11	30-46	43.08±7.51	33-63
LDL Cholesterol	127.90±32.64	81-194	106.04±21.34	76-152

These are the lipid profile expressed in mg/dl found in group-I and group-II, showing as Mean ± SD and range of different parameter of lipid profile.

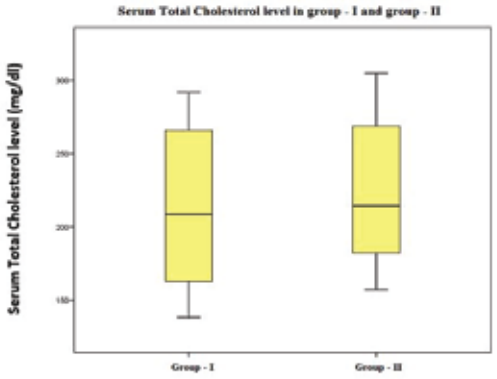

Figure-1: Serum Total Cholesterol level in group-I and group-II.

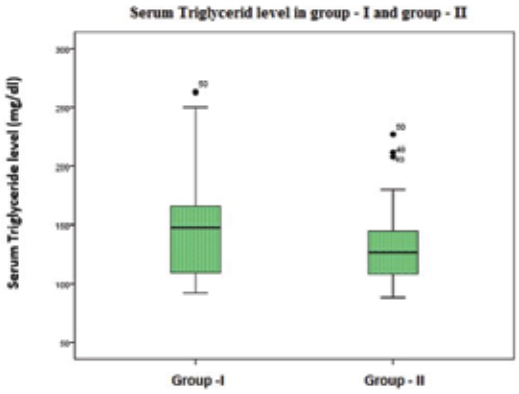

Figure 2: Serum Triglyceride level in group-I and group-II

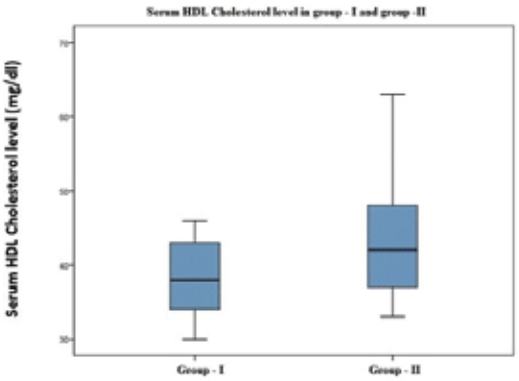

Figure 3: Serum HDL Cholesterol level in group-I and group-II

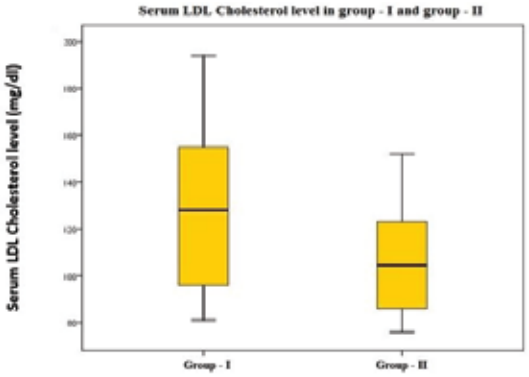

Figure 4: Serum LDL Cholesterol level in group-I and group-II

Table-6: Comparison of lipoid profile in between two groups.

Lipid Profile	Group-I (Mean ± SD)	Group-II (Mean ± SD)	Result of "t"test	*p* value
Total Cholesterol	212.14 ±51.17	222.60±45.14	-1.08	0.28
Triglyceride	148.08±41.19	131.30±30.07	2.33	0.02
HDL Cholesterol	38.18±5.11	43.08±7.51	-3.81	0.0002
LDL Cholesterol	127.90±32.64	106.04±21.34	3.96	0.0001

These results showed that, there were significant difference of serum triglyceride (t=2.33, p<0.03), HDL cholesterol (t=-3.81, p<0.001) and LDL cholesterol (t=3.96, p<0.001) in between groups but serum total cholesterol (t=-1.08, p>0.05) in between the groups was not significantly different.

In group-I, LDL cholesterol and Triglyceride were elevated and mean serum HDL cholesterol was reduced in comparison with group-II.

These findings indicate that dyslipidaemia present in group-I in comparison with group-II.

Discussion

Schizophrenia is a severe mental disorder that affects 0.5–1% of the population worldwide. It is also life-shortening illness with mortality rates twice as high as in general population. Patients with schizophrenia are at risk of developing hyperlipidaemia and its consequences due to unhealthy lifestyle and poor dietary habit. Thus hyperlipidaemia in these patients have a negative prognosis on somatic health.

Dyslipidaemia is a broad term that refers to a number of lipid disorders. Most (80%) lipid disorders are related to diet and lifestyle, although familial disorders (20%) are important as well. The basic categories of dyslipidemias include: elevated plasma triglyceride (≥150 mg/dl), and/or low high-density lipoprotein (HDL) cholesterol (< 40 mg/dl). Many studies have emphasized that, individuals most at risk to develop coronary heart disease (CHD) are those with combined dyslipidemia.12 Schizophrenic patients have abnormal fatty acid metabolism within the brain tissue, which play an important role in the pathophysiology of schizophrenia.

In the present study 52 were male and 48 were female among the total of 100 subjects. In group-I, 27 (54%) were male and 23 (46%) were female; in group-II, 21 (42%) were male and 29 (58%) were female. The mean age (Mean ± SD) of the group-I was 31.90 ± 6.71 years, ranging from 21-47 years and in group-II, it was 28.12 ± 6.72 years, ranging from 24-41 years. No statistically significant difference was found among the study subjects by age and sex. Regarding socioeconomic condition the subjects are significantly related, that indicate schizophrenia is more prevalence in lower socioeconomic group (p < 0.05).

This study found statistically significant difference of serum triglyceride in group-I and group-II. The serum mean triglyceride level in group-I was higher in comparison with group-II. This study found, serum triglyceride level in group-I was (Mean ± SD) 148.08 ± 41.1 mg/dl and group-II was (Mean ± SD) 131.3 ± 30.07 mg/dl. The result of the "t"- test shown t = 2.33, p<0.03. So the result of the "t" test showed that statistically significant difference in between groups. This result is consistent with studies other studies.[13,14] Triglycerides are the body's storage form of fat in the adipose tissue. The body uses triglycerides for energy supply when food intake is inadequate for the demand of the body. Raised triglyceride level indicates the breakdown or mobilization of stored fat.

The statistically insignificant difference of serum total cholesterol was found in between group-I and group-II, though the serum mean cholesterol level lower in group-I. The total cholesterol level in group-I was (Mean ±SD) 212.14 ± 51.17 mg/dl and in group-II was (Mean ± SD) 222.60 ± 45.14 mg/dl. The result of the "t"-test shown t=-1.08, p>0.05. So the result of the "t" test is statistically insignificant. This result is consistent with studies other studies.[8,15,16] Low cholesterol levels have been widely considered to increase the risk of depression because of neuronal dysfunction resulting from changes in the microviscosity of cell membranes or signal transduction dysfunction.[17,18]

The result has shown statistically significant difference of serum HDL cholesterol in between group-I and group-II. Here the serum HDL cholesterol level was lower in group-I in comparison with group-II. The HDL cholesterol level in group-I was (Mean ± SD) 38.18 ± 5.11 mg/dl and in group-II was (Mean ± SD) 43.08 ± 7.51 mg/dl. The result of the "t"- test shown t = -3.81, p<0.001. Therefore, the result of the "t" test is statistically significant. This result is consistent with studies other studies.[14,19] Low serum HDL cholesterol level is associated with increased risk of cardiovascular disease. It is considered to be beneficial because it removes excess cholesterol from the blood, prevent fatty build up and the formation of plaque in blood vessels.

This study has found statistically significant difference of serum LDL cholesterol between group-I and group-II. The serum LDL cholesterol was higher in group-I in comparison with group-II. The LDL cholesterol level in group-I was (Mean ± SD) 127.90 ± 32.64 mg/dl and in group-II was (Mean± SD) 106.04 ± 21.34 mg/dl. The result of the "t"- test shown t = 3.96, p<0.001. Therefore, the result of the t test is statistically significant. This result is consistent with other studies.[9,19] The high serum LDL cholesterol level is associated with increased risk of cardiovascular disease, because it can form plaque within the walls of arteries throughout the body. Such deposits can narrow arteries and limit blood flow.

The impact on mortality in the schizophrenia population can be seen in the results of large epidemiologic studies, which have noted a standardized mortality ratio from cardiovascular disease two fold greater for schizophrenia patients than the general population.[11] As the schizophrenia patient with dyslipidaemia and other metabolic syndrome are in greater risk of cardiac disease, so they should get extra care regarding cardiovascular disease.

From above discussion, it may be concluded that serum dyslipidaemia developed in group-I in comparison with group-II. This dyslipidaemia is related to increased risk of cardiovascular disease in those patients. Therefore, serum lipid profile should be investigated in all schizophrenia patients regardless of duration of illness to detect dyslipidaemia and should start lipid lowering agent.

Conclusion:

Schizophrenia a major psychiatric illness has strong association with dyslipidaemia. This association would increase the risk of developing diabetes and coronary heart disease in those patients and standardized mortality ratio from cardiovascular disease is two fold greater forschizophrenic than the general population. So, they should undergo regular screening with lipid profile for the early detection of dyslipidaemia and should be treated accordingly to prevent further complications and that would reduce their morbidity and mortality.

Conflict of interest: none.

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