Original Article

A Study on the Risk Assessment of the Lipid Profile and Fasting Blood Glucose in Antipsychotic Naïve Schizophrenic Patients

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ABSTRACT

Introduction: Schizophrenia is a severe form of mental illness affecting around 21 million people worldwide as of (about one of every 285) and about 7 per thousand of the adult population, mostly in the age group 15-35 years. Schizophrenia is one of the top 15 leading causes of disability worldwide. Though the incidence is low (3 per 10,000) but the prevalence is high due to chronicity. Schizophrenia is a multi-factorial disorder; investigators have not been able to identify a single factor that characterizes all patients with schizophrenia

Materials & Method: A total of 100 patients from Assam Medical College and Hospital in the age group of 15 – 65 years were included in the study. Independent t test, one way ANOVA is assessed to evaluate the linkage between different parameters in the study. A p value <0.05 is considered as statistically significant at 95% Confidence Interval. SPSS and GraphPad – Prism 5, software's will be used for all the statistical analysis.

Results: A total of 100 patients included in the study with mean age at diagnosis 30.9±9.2 (SD) years (Male 30.24± 8.858 and female 31.83±9.624, p=0.394), There is a significant difference observed between gender and marital status, it is found that Schizophrenia is more prevalent among unmarried male (74.1%), compared to unmarried female (33.3%), p<0.0001. Education found to be playing a significant role in developing Schizophrenia as 78.6% of all women registered cases were did not have any formal education whereas in male it is 50.0%, p=0.004. There is statistically significant difference in mean is observed in Fasting Blood Sugar, Total Cholesterol, Triglyceride, HDL-C, LDL-C, and VLDL-C among male and females of urban and rural patients.

Conclusion: Understanding the incidence and prevalence along with other correlated factors of Schizophrenia will give us the basis to understand the disease epidemiology in a better way. However, further long-term interventional studies needed for further in depth understanding. The parameters (HDL-Cholesterol, Triglycerides and fasting blood glucose) are components of the assessment criteria for metabolic syndrome. Determination of these parameters in antipsychotic naive schizophrenic patients may help in evaluating, if the patient has any risk factor of metabolic syndrome.

Key words: Lipid Profile, Fasting Blood Glucose, Antipsychotic, Naïve Schizophrenic

INTRODUCTION

Schizophrenia is a severe form of mental illness affecting around 21 million people worldwide as of (about one of every 285) and about 7 per thousand of the adult population, mostly in the age group 15-35 years.[1-2]. Schizophrenia is one of the top 15 leading causes of disability worldwide.[3] Though the incidence is low (3 per 10,000) but the prevalence is high due to chronicity.[4] Schizophrenia is a multi-factorial disorder; investigators have not been able to identify a single factor that characterizes all patients with schizophrenia.[5-6] Despite the challenges, the persistent efforts of clinical researchers have put many pieces into place. In most cases of the disorder are first diagnosed at a stage of life when people typically attain independence from parents, develop intimate romantic relationships, and/or begin to pursue work or career goals.[7] The illness can, have a profound, negative impact on the person's opportunities for attaining social and occupational success, and the consequences can be devastating for the adult life course. Further, the illness knows no boundaries; it occurs in all countries and within all ethnic groups.

The present study is conducted to determine the lipid profile and fasting blood glucose in antipsychotic naïve schizophrenic patients and to find out for any possible association between different socio-demographic factors with blood sugar and lipid profile in schizophrenia patients.

MATERIALS & METHOD

Data were collected from Assam Medical College and Hospital amongst the diagnosed cases of schizophrenia for the July 2012 to June 2013 period retrospectively. The patients were selected on the basis of detailed history and clinical diagnosis. All participants were free from any autoimmune, pulmonary, infectious disease or neoplasm. Patients with previous history of schizophrenia, patients having history of treatment with antipsychotic drugs and psychotropic drugs, patients under medication affecting serum lipid profile, patients under medication affecting blood glucose level and patients with history of diabetes mellitus and patients having history of any substance abuse were excluded.

A total of 100 patients, both male and female, in the age group of 15 – 65 years were included in the study. Independent t test, one-way ANOVA is assessed to evaluate the linkage between different parameters in the study. A p value <0.05 is considered as statistically significant at 95% Confidence Interval. SPSS and GraphPad – Prism 5, software's will be used for all the statistical analysis.

RESULTS

A total of 100 patients included in the study with mean age at diagnosis 30.9±9.2 (SD) years (Male 30.24± 8.858 and female 31.83±9.624, p=0.394), of which 58.0% were male and 42.0% female patients. Among all patients 60.0% were Hindu religion followers followed by 23.0% Muslim, 8.0% Christian and 9.0% others. 57.0% of the studied patients were unmarried and 62.0% were did not have any formal education. High prevalence is observed in the urban areas (65.0%) and those who were unemployed (68.0%) (Table 1).

It is found that Schizophrenia is more prevalent among unmarried male (74.1%), compared to unmarried female (33.3%), p<0.0001. Education found to be playing a significant role in developing Schizophrenia as 78.6% of all women registered cases were did not have any formal education whereas in male it is 50.0%, p=0.004. There is no significant difference in developing Schizophrenia when religion is compare to gender; it is observed that Schizophrenia is more common in both male (62.1%) and female (57.1%) of Hindu religion followers, followed by Muslim (Male 20.7%, Female 26.2%), Christian (Male 10.3%, Female 4.8%) and Other (Male 6.9%, Female 11.9%), p=0.563, which suggest that in all religion schizophrenia effects equally irrespective of gender. Schizophrenia is found as more prevalent among unemployed & urban population; a majority of male (67.2%) and female (69.0%) were registered with Schizophrenia during the studied period were unemployed and also found that 63.8% males and were living in the urban area (Table 1).

The overall average mean fasting blood sugar level observed as 108.91 ± 15.672 (SD), total cholesterol 150.04 ± 28.381, triglyceride 150.56 ± 18.793, HDL_C 37.92 ± 8.814, LDL_C 82.01 ± 30.756 and VLDL_C is 30.11 ± 3.759 (Table 2). The fasting blood sugar mean is 109.29 ± 15.24 in males while in females it is 108.38 ± 16.42, p=0.776, cholesterol mean is 145.5 ± 28.459 in males and in females it is 156.31 ± 27.376, p=0.06, Triglyceride mean is 148.1 ± 18.029 in males and in females it is 153.95 ± 19.509, p=0.013, HDL-C mean is 38.21 ± 8.946 in males and in females it is 37.52 ± 8.721, p=0.704, LDL-C mean is 77.67 ± 28.712 in males and in females it is 88 ± 32.784, p=0.098 and VLDL-C mean is 29.62 ± 3.606 in males and in females it is 30.79 ± 3.902, p=0.125 (Table 2).

Table 1: Frequency (%) distribution of Socio Demographic Characteristic

Category	Male	Female	Total	Chi	Sig
Marital status					
Unmarried	43 (74.1%)	14 (33.3%)	57 (57%)	16.55	<0.0001
Married	15 (25.9%)	28 (66.7%)	43 (43%)		
Formal Education					
No	29 (50%)	33 (78.6%)	62 (62%)	8.44	0.004
Yes	29 (50%)	9 (21.4%)	38 (38%)		
Religion					
Hindu	36 (62.1%)	24 (57.1%)	60 (60%)	2.047	0.563
Muslim	12 (20.7%)	11 (26.2%)	23 (23%)		
Christian	6 (10.3%)	2 (4.8%)	8 (8%)		
Other	4 (6.9%)	5 (11.9%)	9 (9%)		
Family Type					
Joint	20 (34.5%)	17 (40.5%)	37 (37%)	0.375	0.54
Nuclear	38 (65.5%)	25 (59.5%)	63 (63%)		
Employment					
Employed	19 (32.8%)	13 (31%)	32 (32%)	0.037	0.848
Unemployed	39 (67.2%)	29 (69%)	68 (68%)		
Place of Residence					
Urban	37 (63.8%)	28 (66.7%)	65 (65%)	0.088	0.766
Rural	21 (36.2%)	14 (33.3%)	35 (35%)		

Table 2: Mean±SD of biochemical variables according to various socio-demographic indicators

	Age	Fasting Blood Sugar	Total Cholesterol	Triglyceride	HDL C	LDL C	VLDL C
Overall	30.91±9.17	108.91±15.67	150.04±28.38	150.56±18.79	37.92±8.814	82.01±30.756	30.11±3.759
Gender							
Male	30.24±8.85	109.29±15.24	145.5±28.45	148.1±18.02	38.21±8.946	77.67±28.712	29.62±3.606
Female	31.83±9.62	108.38±16.41	156.31±27.37	153.95±19.50	37.52±8.721	88±32.784	30.79±3.902
Sig.	0.394	0.776	0.06	0.0125	0.704	0.098	0.125
Religion							
Hindu	31.3±9.903	108.7±15.64	153.4±31.18	152.5±18.95	37.57±8.648	85.33±33.24	30.5±3.792
Muslim	30.91±8.51	109.43±13.85	148.74±23.01	145.13±18.48	37.3±8.093	82.41±26.119	29.03±3.697
Christian	30±6.392	111.62±20.80	147.12±29.55	154.88±16.90	38.88±12.264	77.27±32.984	30.98±3.381
Other	29.11±8.81	106.56±17.71	133.56±13.14	147.67±19.71	41±9.192	63.02±14.78	29.53±3.943
Sig.	0.914	0.926	0.263	0.367	0.711	0.23	0.367
Marital Status							
Unmarried	26.12±5.145	110.67±15.15	150.37±28.71	149.44±17.91	36.47±8.619	84.01±28.726	29.89±3.582
Married	37.26±9.527	106.58±16.22	149.6±28.26	152.05±20.02	39.84±8.802	79.36±33.42	30.41±4.004
Sig.	<0.0001	0.198	0.895	0.195	0.058	0.0457	0.495
Formal Education							
No	31.19±9.858	110.02±15.71	150.69±29.84	152.65±19.44	37.61±8.607	82.55±32.855	30.53±3.889
Yes	30.45±8.039	107.11±15.64	148.97±26.16	147.16±17.39	38.42±9.238	81.12±27.388	29.43±3.479
Sig.	0.695	0.37	0.77	0.157	0.659	0.823	0.157
Family Type							
Joint	30.95±10.622	110±16.39	143.3±28.68	153.62±19.08	38.24±8.738	74.33±31.113	30.72±3.817
Nuclear	30.89±8.299	108.27±15.33	154±27.66	148.76±18.53	37.73±8.923	86.52±29.876	29.75±3.707
Sig.	0.976	0.597	0.068	0.214	0.78	0.055	0.214
Employment staus							
Employed	35.31±7.575	110.03±14.43	157.06±29.17	148.12±18.30	37.94±7.291	89.5±32.464	29.63±3.661
Unemployed	28.84±9.176	108.38±16.29	146.74±27.59	151.71±19.04	37.91±9.497	78.48±29.508	30.34±3.809
Sig.	0.0001	0.626	0.09	0.377	0.989	0.095	0.377
Place of Residence							
Urban	30.02±8.701	110.49±15.42	148.98±28.96	148.78±18.51	37.89±8.651	81.34±30.306	29.76±3.703
Rural	32.57±9.909	105.97±15.93	152±27.57	153.86±19.13	37.97±9.237	83.26±31.986	30.77±3.826
Sig.	0.185	0.17	0.615	0.199	0.966	0.767	0.199

Table 3: Gender and religion wise mean±SD of bio-chemical variables

	Hindu			**Muslim**		
	Male	Female	sig	Male	Female	sig
Age	30.78±8.777	32.08±11.545	0.621	29.42±10.095	32.55±6.455	0.391
Fasting Blood Sugar	107.47±14.512	110.54±17.356	0.461	111.42±11.516	107.27±16.322	0.486
Total Cholesterol	149±30.739	160±31.313	0.183	143±27.012	155±16.727	0.219
Triglyceride	148.89±19.355	157.92±17.348	0.070	143.92±14.644	146.45±22.633	0.751
HDL_C	37.53±8.664	37.62±8.811	0.966	36±6.015	38.73±10.001	0.432
LDL_C	81.69±31.172	90.79±36.108	0.303	78.22±26.043	86.98±26.659	0.434
VLDL_C	29.78±3.871	31.58±3.47	0.070	28.78±2.929	29.29±4.527	0.751
	Christian			**Other**		
	Male	Female	sig	Male	Female	sig
Age	29±6.986	33±4.243	0.486	29.75±11.295	28.6±7.668	0.860
Fasting Blood Sugar	115±23.478	101.5±0.707	0.470	110.75±20.646	103.2±16.619	0.561
Total Cholesterol	134.83±21.977	184±8.485	0.025	137.5±20.008	130.4±4.159	0.458
Triglyceride	160±11.045	139.5±27.577	0.148	135.75±15.861	157.2±18.254	0.107
HDL_C	41.33±13.441	31.5±2.121	0.365	46.25±8.958	36.8±7.694	0.132
LDL_C	61.5±17.334	124.6±11.879	0.003	64.1±19.367	62.16±12.389	0.860
VLDL_C	32±2.209	27.9±5.515	0.148	27.15±3.172	31.44±3.651	0.107

There is no any significant difference in male and female among Hindu & Muslim religion followers; a significant difference in mean among Christianity followers in total Cholesterol is observe between male (134.83 ± 21.977) and female (184 ± 8.485), p=0.025 and LDL-C male 61.5 ± 17.334 Vs female 124.6 ± 11.879, p=0.003 (Table 3). Higher mean fasting blood sugar (114.79 ± 15.263), Total cholestoral (162.86 ± 22.045), Triglyceride (156.57 ± 14.659), LDL-C (96.67 ± 23.582) and VLDL-C (31.31 ± 2.932) is observed among female unmarried patients compared to male patients (Table 4). Females with no formal education is found as elevated mean age (32.61 ± 10.553), Total Cholesterol (154.42 ±

Table 4: Gender wise mean±SD Marital Status, Formal Education, Family type

Marital Status	**Unmarried**			**Married**		
	Male	Female	sig	Male	Female	sig
Age	26.30±5.28	25.57±4.847	0.648	41.53±7.18	34.96±9.942	0.029
Fasting Blood Sugar	109.33±15.049	114.79±15.263	0.245	109.2±16.324	105.18±16.287	0.445
Total Cholesterol	146.30±29.668	162.86±22.045	0.06	143.2±25.484	153.04±29.508	0.282
Triglyceride	147.12±18.404	156.57±14.659	0.086	150.93±17.194	152.64±21.659	0.793
HDL_C	37±9.309	34.86±6.024	0.424	41.67±6.966	38.86±9.618	0.324
LDL_C	79.88±29.276	96.67±23.582	0.056	71.35±26.969	83.65±36.132	0.255
VLDL_C	29.42±3.681		0.086	30.19±3.439	30.53±4.332	0.793
Formal Education	**No Formal Education**			**With Formal Education**		
	Male	Female	sig	Male	Female	sig
Age	29.59±8.91	32.61±10.553	0.232	30.9±8.914	29±4.213	0.544
Fasting Blood Sugar	110.28±14.849	109.79±16.664	0.904	108.31±15.825	103.22±15.254	0.401
Total Cholesterol	146.45±31.178	154.42±28.582	0.298	144.55±25.979	163.22±22.465	0.06
Triglyceride	148.66±19.077	156.15±19.368	0.131	147.55±17.237	145.89±18.891	0.806
HDL_C	36.66±8.2	38.45±8.99	0.416	39.76±9.523	34.11±7.061	0.11
LDL_C	80.06±31.993	84.74±33.935	0.58	75.28±25.353	99.93±26.417	0.016
VLDL_C	29.73±3.815	31.23±3.874	0.131	29.51±3.447	29.18±3.778	0.806
Family Type	**Joint**			**Nuclear**		
	Male	Female	sig	Male	Female	sig
Age	30.55±9.572	31.41±12.026	0.810	30.08±8.588	32.12±7.849	0.344
Fasting Blood Sugar	110.3±16.32	109.65±16.963	0.906	108.76±14.842	107.52±16.333	0.756
Total Cholesterol	134.8±25.884	153.29±29.317	0.049	151.13±28.447	158.36±26.391	0.314
Triglyceride	148.85±20.869	159.24±15.506	0.100	147.71±16.633	150.36±21.37	0.583
HDL_C	36.95±6.84	39.76±10.568	0.336	38.87±9.897	36±7.036	0.215
LDL_C	68.08±23.093	81.68±37.928	0.189	82.72±30.335	92.29±28.803	0.216
VLDL_C	29.77±4.174	31.85±3.101	0.100	29.54±3.327	30.07±4.274	0.583

Table 5. Gender and Employment Type wise Mean mean±SD with Employment Type

Employment	**Employed**			**Unemployed**		
	Male	Female	sig	Male	Female	sig
Age	37.42±7.841	32.23±6.22	0.055	26.74±7.089	31.66±10.906	0.028
Fasting Blood Sugar	109.84±15.557	110.31±13.231	0.930	109.03±15.284	107.52±17.81	0.709
Total Cholesterol	152.95±28.592	163.08±30.115	0.343	141.87±28.043	153.28±26.037	0.092
Triglyceride	150.05±16.057	145.31±21.554	0.481	147.15±19.042	157.83±17.548	0.021
HDL_C	38.16±7.456	37.62±7.332	0.840	38.23±9.68	37.48±9.398	0.751
LDL_C	84.78±30.726	96.4±34.922	0.328	74.21±27.419	84.23±31.68	0.168
VLDL_C	30.01±3.211	29.06±4.311	0.481	29.43±3.808	31.57±3.51	0.021
Residence	**Urban**			**Rural**		
	Male	Female	sig	Male	Female	sig
Age	29.92±9.543	30.14±7.614	0.919	30.81±7.692	35.21±12.38	0.202
Fasting Blood Sugar	110.35±14.799	110.68±16.481	0.933	107.43±16.191	103.79±15.871	0.516
Total Cholesterol	145.3±29.428	153.86±28.116	0.241	145.86±27.374	161.21±26.133	0.107
Triglyceride	144.86±18.088	153.96±18.091	0.049	153.81±16.848	153.93±22.815	0.986
HDL_C	38.78±9.229	36.71±7.831	0.344	37.19±8.548	39.14±10.406	0.548
LDL_C	77.54±29.042	86.35±31.729	0.249	77.9±28.83	91.29±35.796	0.231
VLDL_C	28.97±3.618	30.79±3.618	0.049	30.76±3.37	30.79±4.563	0.986

28.582), Triglyceride (156.15 ± 19.368), HDL-C (38.45 ± 8.99), LDL-C (84.74 ± 33.935), VLDL-C (31.23 ± 3.874) compared to male with no formal education (Table 5).

From the study it is found that those were employed have higher mean Fasting Blood Sugar (109.84 ± 15.557), Total Cholesterol (152.95 ± 28.592), Triglyceride (150.05 ± 16.057), HDL-C (38.16 ± 7.456), LDL-C (84.78 ± 30.726) and VLDL-C (30.01 ± 3.211) in males compared to unemployed males Fasting Blood Sugar (109.03 ± 15.284), Total Cholesterol (141.87 ± 28.043), Triglyceride (147.15 ± 19.042), HDL-C (38.23 ± 9.68), LDL-C (74.21 ± 27.419) and VLDL-C (29.43 ± 3.808) (Table 5).

it is observed that both male and female living in the urban areas have an early age of onset of the disease the mean age at diagnosis in urban Male is 29.92 ± 9.543, female 30.14 ± 7.614 and in rural male is 30.81 ± 7.692, female is 35.21 ± 12.38. There is statistically significant difference in mean is observed in Fasting Blood Sugar, Total Cholesterol, Triglyceride,

HDL-C, LDL-C, and VLDL-C among male and females of urban and rural patients (Table 5).

DISCUSSION

Schizophrenia is a severe mental disorder which accounts for much suffering of those affected and their families, in addition to a cost to society estimated as 1.1% of the total burden of disease (in terms of DALYs – disability adjusted life-years) and 2.8% of the total YLDs (years lived with disability).[8] There are a number of factors that influence schizophrenia and it is important to understand them to successfully treat the illness. Schizophrenia is equally prevalent in men and women. However, the onset is earlier in men than in women.

The peak ages of onset are 10 to 25 years for men and 25 to 35 years for women.[9] Early onset of the disease was found among men as compared to women, in our study the average age at diagnosis is for men is 30 years and for female 32 years.[10] Highest prevalence of schizophrenia is found to be highly correlates with place of residence as in the study it is seen that maximum cases were from urban area (65.0%). The findings of the study were also in accordance with the previous studies in relation to education, marital status, type of family to which the patients belonged and employment. Educational status found to be play a significant role in developing Schizophrenia as among women 78.6% of all registered cases were unmarried whereas in male it is 50.0%, p=0.004.

The highest percentage is seen in Hindus both males (62.1%) and females (57.1%). Current research indicates many potential benefits of integrating issues of religion and spirituality into psychotherapy for individuals with schizophrenia with regards to promoting motivation, wellbeing, resilience, and cultural aspects of one's identity.[11-12], when compared with place of residence (rural or urban area), it is seen that the highest prevalence is seen in case of urban schizophrenic patients amongst both male and female; 63.8% in males and 66.7% in females. In a recent study of 4.4 million men and women in Sweden found a 68%–77% increased risk of psychosis (a broader term that includes schizophrenia) for people living in the most urbanized environments, a significant proportion of which is likely to be accounted for by people who have schizophrenia.[13].

Marital status plays significant role in development of the disease; highest prevalence is seen in unmarried male population (75.4%). This finding is consistent with other studies single male patients with schizophrenia report more symptoms and lower quality of life than single female patients.[14] It is also consistent with other findings for patients with schizophrenia that females had higher rates of marriage.[15] Schizophrenia was also found as associated with significantly lower educational attainment than bipolar disorder.[16], this study shows that highest percentage of schizophrenic patients were unemployed males (67.2%) and females (69.0%). A study done between 1990 and 1993 by Perkins et al found that employment rates among schizophrenics fell from 12.0% to 7.7%.[17] In our study we have also finds that higher percentage of schizophrenic patients belong to nuclear families than joint families in both males (65.5%) and females (59.5%). Study by Sateesh R et al also observed that 70% schizophrenics studied recently belonged to nuclear families.[18] The mean value of fasting blood sugar in the present study higher than other studies.[19] HDL- C has an adaptive influence on certain brain structures such as the hippocampus and low HDL-C levels, in turn, are a risk factor for metabolic syndrome. Hypertriglyceridemia has been observed to be associated with cognitive impairment in patients, and may be attributed to the dietary habits of schizophrenic patients. The mean levels of HDL-C were observed similar in both males and females; which is also observed in previous studies,[20-22] The mean value of total cholesterol in the present study is 150.04± 28.24 and have similar findings to other studies.[23]. The levels of Triglycerides were high (more than 150 mg/dl) in55% patients and the levels of High Density Lipoprotein-Cholesterol were low(less than 50 mg/dl in females, less than 40 mg/dl in males) in 71% patients. The mean value of serum triglycerides in the present study among the male schizophrenic patients is lowers those female patients and which is also in accordance with previous study.[21-23]

An accurate understanding of the etiology and pathogenesis of the condition is not yet clear. A combination of genetic and environmental factors may play a role in the development of schizophrenia.[24] Schizophrenia is a complex disorder; and the greatest risk factor is a positive family history while the lifetime risk in the general population in just below 1%, it is 6.5% in first degree relatives of patients.[25] Studies have suggested the role of cytokines such as interleukins, which may modulate do paminergic metabolism and schizophrenic symptomatology in schizophrenia. These cytokines are also significantly elevated and actively responsible for the tissue destruction in periodontal disease.[26-29]

Understanding the incidence and prevalence along with other correlated factors of Schizophrenia will give us the basis to understand the disease epidemiology in a better way. However, further long-term interventional studies needed for further in depth understanding.

CONCLUSION

The parameters (HDL-Cholesterol, Triglycerides and

fasting blood glucose) are components of the assessment criteria for metabolic syndrome. Determination of these parameters in antipsychotic naive schizophrenic patients may help in evaluating, if the patient has any risk factor of metabolic syndrome. Thus the levels of these parameters will be of help in choosing the initial therapy on diagnosis of schizophrenia because antipsychotic medications are known to alter the serum lipid profile and blood sugar unfavourably and also serve as a predictor that the patient may be predisposed to have metabolic syndrome.

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