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Lifestyle related factors & impact of metabolic syndrome on quality of life, level of functioning & self-esteem in patients with bipolar disorder & schizophrenia

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***Background & objectives*: Though studies have reported high prevalence rates of metabolic syndrome among patients with bipolar disorder (BPAD) and schizophrenia, there is lack of data on the impact of the same on the patients' life. This study was aimed to assess the lifestyle related factors associated with metabolic syndrome (MetS) and to study the impact of MetS on functioning and quality of life (QOL) in patients with BPAD and schizophrenia.**

***Methods*: A total of 102 patients with BPAD and 72 patients with schizophrenia attending the output unit of a tertiary care hospital in north India were evaluated for MetS. These patients were assessed on Health Promoting Lifestyle Profile scale II (HPLP II), World Health Organization QOL -Bref Version (WHOQOL-Bref), Impact of Weight on Quality of Life- Lite version (IWOQOL -Lite), Body weight, Image and Self-esteem Evaluation questionnaire (BWISE), Obesity-related Problem scale (OP scale) and Global Assessment of Functioning (GAF) scale.**

***Results*: MetS was associated with lower scores on domains of health responsibility and nutrition habit domain on HPLP-II scale in both groups, and additionally on physical activity and stress management domain in BPAD group. On WHOQOL-Bref, MetS was associated with lower scores on the domains of physical and psychological health in both groups. On IWQOL–Lite, scores on personal distress and self esteem domains were higher in those with obesity in both groups and also on physical activity domain in schizophrenia group. Those with MetS had lower level of functioning as measured by GAF in schizophrenia group. Fulfillment of higher number of criteria of MetS correlated with poorer quality of life and higher problems in both groups.**

***Interpretation & conclusions*: Many modifiable lifestyle factors increase the risk of MetS. MetS was found to be associated with poorer QOL in patients with BPAD and schizophrenia; in addition, obesity led to poor self-esteem and excessive personal distress.**

Key words Bipolar disorder - lifestyle - metabolic syndrome - quality of life - schizophrenia

Many studies have been conducted all over the world to evaluate the prevalence and correlates of metabolic syndrome (MetS) in various psychiatric disorders[1,2]. It has been realized that cardiovascular risk factors are in part responsible for increased morbidity and premature mortality in patients with major psychiatric disorders like schizophrenia and bipolar disorder (BPAD).

Studies on patients (without known psychiatric disorders) with MetS have shown that they experience

significant poor quality of life (QOL) and it is associated with various lifestyle factors like lack of exercise and dietary habits[3,4]. However, despite its high prevalence and the potentially disabling consequences, there has been little research on the impact of MetS on various domains of a patient's life, especially for those with BPAD an schizophrenia. Preliminary findings have suggested that obesity, an important component of MetS, has a negative impact on functioning and leads to a poor health-related quality of life in patients with BPAD[5]. Furthermore, patients with BPAD and comorbid diabetes mellitus have been found to have higher levels of disability and poorer levels of functioning, compared to those without diabetes mellitus[6]. In patients with schizophrenia, presence of MetS has been found to be associated with lower self-ratings of physical health in one study[7] while overweight and obesity have been associated with poor psychosocial adaptation, low self-esteem[8], and a poorer quality of life[9]. The present study was undertaken to evaluate the lifestyle related factors associated with MetS in patients with BPAD and schizophrenia and the impact of MetS on functioning and quality of life in patients with BPAD and schizophrenia.

Material & Methods

The study was carried out at the Psychiatry outpatient unit of Postgraduate Institute of Medical Education and Research, a multi-specialty, tertiary-care hospital in Chandigarh, north India. The Institute Research Review Board approved the study and all patients were recruited after obtaining written informed consent. Diagnosis of BPAD-I and schizophrenia was made as per the diagnostic criteria of DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, 4th edition)[10] by using the Mini-International Neuropsychiatric Interview (MINI)[11]. The study included a cross-sectional assessment of patients selected by purposive sampling from July 2010 to June 2011. Patients in either group were between 18-65 yr of age and had a minimum duration of illness of one year. Additionally, patients in the BPAD group were required to have at least two lifetime episodes. Those with mental retardation, organic brain syndromes, physical conditions/disorders (other than those included in criteria for metabolic syndrome), which could contribute to weight gain and/or metabolic disturbances and those on any medications (*e.g.* steroids) other than psychotropics, which could contribute to weight gain and/or metabolic disturbances, were excluded. Psychopathology was rated using Hamilton Depression Rating Scale (HDRS)[12] and the Young Mania Rating Scale (YMRS)[13] for patients with BPAD, and the Positive and Negative Syndrome Scale (PANSS)[14] for patients with schizophrenia. Level of functioning was assessed using Global Assessment of Functioning scale (GAF)[10]. Lifestyle patterns were assessed using the Health Promoting Lifestyle Profile scale II (HPLP II)[15]. HPLP-II is a self-report instrument with 52-items divided into six subscales, *viz*. physical activity, spiritual growth, health responsibility, interpersonal relations, nutrition and stress management. Information regarding diet was collected by 24 h recall method.

The Hindi version of the World Health Organization Quality of Life-Bref Version (WHO-QOL Bref)[16] was used as a measure of generic quality of life. This scale has 26 items clubbed into four domains of physical health, psychological health, social relationship and environment, with an additional measure for general well-being. The scale has shown good discriminant validity, concurrent validity, internal consistency and test-retest reliability. In addition, a specific measure of the weight-related quality of life was done using the "Impact of Weight on Quality of Life- Lite version (IWOQOL -Lite)"[17]. This is a self-report instrument with 31 items, which measures the impact of weight in the domains of physical function, self-esteem, sexual function, public distress and work. Reliability, validity and internal consistency of the scale have been reported to be high in the community samples[17].

Body weight, image and self-esteem evaluation questionnaire (BWISE)[18] and Obesity-related Problem scale (OP scale)[19] were used to assess body image and self-esteem; and problems related to obesity, respectively. BWISE is a self-rated 12-item questionnaire, which assesses the subject's personal appraisal of the changes in body weight and issues related to psychosocial adjustment in the preceding two weeks. Higher scores indicate better adjustment. OP scale is an 8-item scale which measures the degree to which one's weight interferes with routine activities. It has adequate psychometric properties.

Metabolic and anthropometric assessments: Two readings of blood pressure (BP) were recorded in supine position at 5-minute intervals, but in case of high blood pressure (≥140/90 mm Hg), a third reading was recorded after 30 min; the lowest of these readings was taken as the final BP. Waist circumference (cm) was measured midway between the inferior costal margin and the superior border of the iliac crest at the

end of normal expiration in standing position. Fasting venous blood sample (6 ml) was collected under aseptic condition to measure the blood glucose (FBS), triglycerides (TG) and high-density lipoprotein (HDL) levels.

MetS was diagnosed using the consensus definition[20], with adjustments made for Asian populations. Accordingly, a patient was considered to have MetS if he or she has three of the following five criteria: systolic blood pressure ≥ 130 and/or diastolic blood pressure ≥85 mm of Hg (or on treatment for hypertension), waist circumference >80 cm for females and > 90 for males, triglyceride levels >150 mg/dl (or on specific treatment for this abnormality), HDL cholesterol < 40 mg/dl for male and <50 mg/dl for females (or on specific treatment for this abnormality) and fasting blood sugar more than 100 mg/dl (or on treatment for diabetes mellitus). All patients found to have metabolic abnormalities (*i.e*. a syndromal MetS, or any specific abnormality like hypertension, raised blood sugar, dyslipidaemia) were informed and were educated about the need for proper diet and regular exercise, and were also referred for specialist care.

Statistical analysis: Frequencies with percentages were calculated for nominal and ordinal variables and mean and standard deviation were calculated for continuous variables. Non-parametric tests were used for data with non-normal distributions. Comparisons were done by using t test and Chi-square test. Correlations were studied by using Pearson's correlation coefficient.

Results

A total of 175 patients (102 with BPAD and 73 with schizophrenia) were included in the study. Majority of patients in both the groups were males in their early thirties. However, there were significantly higher numbers of females in the schizophrenia group. Significantly more number of patients with BPAD were married and employed compared to schizophrenia patients (P<0.001). The proportion of patients from non-nuclear families was significantly greater in the BPAD group compared to schizophrenia group (Table I).

Patients with schizophrenia had onset on illness at a significantly (P<0.01) earlier age, however, no difference was observed between duration of illness in the two groups. There was no difference between the two groups with respect to psychiatric comorbidities; however, medical comorbidities were higher in the bipolar group. In the BPAD group most of the patients were on either lithium or valproate. Half of the patients with BPAD were on antipsychotics while only about 17 per cent of the patients were receiving antidepressants. In the schizophrenia group olanzapine (36%), risperidone (29%) and amisulpride (12%) formed the bulk of antipsychotics. There were higher number of patients on antidepressants in BPAD group. Psychopathology ratings indicated minimal residual symptoms in the BPAD group and moderate levels of psychopathology in the schizophrenia group (Table I). The mean GAF score of patients with bipolar disorder was significantly higher (71.3±14.5) than that of schizophrenia group was 62.3±14.9 (P<0.001).

Metabolic profile of patients: Prevalence of MetS was 42.2 per cent in the BPAD group and 38.4 per cent in the schizophrenia group. No significant difference was noted in the prevalence rate of MetS between the two groups. As shown in Table II, the most commonly met criterion in both groups was that of abnormal waist circumference with 68.6 per cent patients with BPAD and 61.6 per cent patients with schizophrenia being obese. The least commonly met criterion in both groups was abnormal fasting blood glucose levels (24.5% of the BPAD group and 12.3% of the schizophrenia group). A significantly higher proportion of patients with BPAD met criteria for abnormal blood pressure and fasting blood sugar levels, as compared to patients with schizophrenia (P<0.05), whereas a significantly higher number of patients in schizophrenia had low HDL levels (P<0.05).

Lifestyle patterns: On HPLP-II scale, it was observed that in BPAD group patients with MetS had significantly lower scores on domains of health responsibility, nutrition habits, physical activity and stress management compared to those without MetS (Table III). In schizophrenia group (Table IV) such association was seen only with health responsibility and nutrition habit domain. No association was seen between MetS and other domains of HPLP-II in either group. In addition, there was significant negative correlation between number of criteria of MetS met and scores on health responsibility (r = -0.306, P<0.01), nutrition habits (r=-0.333, P<0.01), and stress management (r=-0.285, P<0.01) domains in BPAD group and nutrition habits domain (-0.304, P<0.05) in schizophrenia group. No difference was seen in number of calories consumed between those with and without MetS in either group. Level of functioning as measured by GAF was found to be lower in those with MetS as compared to those

Table I. Demographic characteristics of patients at intake

Variables	Bipolar disorder N=102	Schizophrenia N=73
Sociodemographic variables		
Age, yr - mean ± SD	35.6 ± 11.4	33.7 ± 8.8
Gender - N (%) - male	75 (73.5)**	38 (52.1)
Marital status - N (%) - married	77 (75.5)***	27 (37)
Education (yr) mean ± SD	11.9 ± 3.7	12.1 ± 3.7
Occupation - N (%) - employed	47 (46.1)***	12 (16%)
Family type - N (%) - nuclear	48 (47.1)***	54 (74)
Locality- N (%) - urban	63 (61.8)	50 (68.5)
Clinical variables		
Age at onset (yr) - mean ± SD	27.3 ± 9.7**	23.6 ± 7.6
Duration of illness (months) - mean ± SD	99.5 ± 91	120.3 ± 71
Medical comorbidities		
Mood stabilizers - N (%)		
Lithium	44 (43.1)	-
Valproate	46 (45)	-
Carbamazepine	2 (1.9)	-
Oxcarbazepine	1 (0.9)	-
None	9 (8.8)	-
Antipsychotics - N (%)		
Olanzapine	36 (35.2)	26 (35.6)
Risperidone	8 (7.8)	21 (28.7)
Quetiapine	7 (6.8)	7 (9.5)
Amisulpride	0	9 (12.3)
Clozapine	0	5 (6.8)
FGA	4 (3.9)	8 (11)
Antidepressants - N (%)	17 (16.6)	7 (9.5)
Positive and negative symptom subscale (PANSS) scores		
Positive subscale score	-	11.69 (5.0)
Negative subscale score	-	14.5 (5.6)
General psychopathology subscale score	-	21.49 (5.3)
Young mania rating scale scores	2.5 (5.1)	-
Hamilton depression rating scale scores	2.1 (5.1)	-
Global assessment of functioning scale score	71.3 (14.5)***	62.3 (14.9)

*P***<0.01 ***<0.001 compared with schizophrenia group
FGA, first generation antipsychotics

without MetS in schizophrenia group (Table IV), while no such association was seen in BPAD group.

Quality of life and functioning: As shown in Tables III and IV, on a generic quality of life measure, WHOQOL-Bref, presence of MetS was associated with lower scores on the domains of physical health and psychological health in both groups. No difference was seen in scores on other domains of WHOQOL- Bref in either group. Similarly, negative correlation was observed between number of criteria of MetS and scores on the domains of physical health (r=-0.21, *P*<0.05; -0.26, *P*<0.5) and psychological health (r=-0.37, *P*<0.001; -0.24, *P*<0.01) of WHOQOL-Bref in both groups. When weight specific quality of life measure IWQOL –Lite was used to compare those with and without MetS, no

Table II. Distribution of components of metabolic syndrome (MetS) in the two study groups

	Bipolar disorder (N=102) N (%)	Schizophrenia (N=73) N (%)
Abnormal blood pressure (≥130/≥85 mm Hg) or diagnosed as hypertensive	45 (44.1)*	19 (26)
Triglyceride levels ≥150 mg or on lipid lowering agents	41 (40.2)	31 (42.5)
Lower HDL (<40 mg male, <50 mg female) or on lipid lowering agents	32 (31.4)*	36 (49.3)
Fasting blood glucose levels ≥100 mg per cent or diagnosed as diabetes mellitus	25 (24.5)*	9 (12.3)
Abnormal waist circumference (≥90 cm for males and ≥80 cm for females)	70 (68.6)	45 (61.6)

*P<0.05 compared with schizophrenia group

Table III. Lifestyle patterns, impact of metabolic syndrome (MetS) on quality of life and functioning and relationship with residual psychopathology in bipolar disorder group

Variables	MetS absent (N=59) Mean±SD/N (%)	MetS present (N=43) Mean±SD/N (%)
Health promoting lifestyle profile –II (HPLP-II)		
Health responsibility	19.5 ± 5.3	14.6 ± 4.8
Physical activity	16.15 ± 9.8	12.0 ± 5.0
Nutritional habit	22.3 ± 8.3	18.7 ± 4.0
Stress management	21.1 ± 7.4	18.1 ± 4.6
Interpersonal relations	20.6 ± 6.6	20.1 ± 5.1
Spiritual growth/self actualization	21.8 ± 6.7	20.4 ± 6.6
Mean calorie intake	2300 ± 249	2407 ± 237
WHOQOL-Bref		
General well being	7.0 ± 1.9	6.6 ± 1.4
Physical health	11.4 ± 2.1	10.3 ± 1.67
Psychological health	13.3 ± 2.64	11.6 ± 2.5
Social relationship	12.8 ± 10.4	11.4 ± 8.7
Environment	29.8 ± 10.9	28.0 ± 11.35
Impact of weight on quality of life (IWQOL)		
Physical activity	17.7 ± 9.01	22.1 ± 10.28
Personal distress	6.37 ± 3.2	8.32 ± 4.8
Work	5.81 ± 3.4	6.81 ± 4.3
Self-esteem	9.87 ± 5.8	13.89 ± 7.6
Sex	5.43 ± 3.5	6.42 ± 4.1
BWISE scale total score	20.53 ± 5.1	17.33 ± 6.6
OP scale	13.71 ± 7.01	13.33 ± 4.5
Global assessment of functioning score	71 ± 13	71.5 ± 15
Hamilton depression rating scale score	2 ± 4.5	2.2 ± 5.9
Young mania rating scale score - mean±SD	2.7 ± 5.6	2 ± 6.8
Diabetes mellitus (N %)	1 (1.6)	5 (12)
Hypertension (N %)	5 (8)	10 (23)
Thyroid disorder (N %)	1 (1.6)	3 (7)
Other co-morbidities	6 (10)	0 (0)

*P *<0.05, **<0.01, ***<0.001 compared to those without MetS
BWISE, body weight, image and self-esteem evaluation questionnaire; OP scale, obesity-related problem scale

Table IV. Lifestyle patterns, impact of MetS on quality of life and functioning and relationship with residual psychopathology in schizophrenia group

Variables	MetS absent (N=45) Mean ± SD	MetS presetn (N=28) Mean ± SD
Health promoting lifestyle profile -II (HPLP-II)		
Health responsibility	17.3 ± 5.7	14.8 ± 4.7*
Physical activity	13.5 ± 6.5	11.6 ± 5.4
Nutritional habit	20.8 ± 4.9	17.7 ± 2.9**
Stress management	20.3 ± 5.4	19.2 ± 4.3
Interpersonal relations	19.2 ± 6.6	18.8 ± 4.7
Spiritual growth/self actualization	20.3 ± 6.7	20.5 ± 5.4
Mean calorie intake	2287 ± 245	2390 ± 254
WHOQOL		
General well being	6.48 ± 1.4	6.5 ± 1.7
Physical health	11.26 ± 2.3	10.3 ± 1.4*
Psychological health	12.8 ± 4.18	10.84 ± 1.7*
Social relationship	9.2 ± 2.77	9.8 ± 2.12
Environment	27.3 ± 10.1	24.9 ± 4.8
Impact of Weight on Quality of Life (IWQOL)		
Physical activity	17.37 ± 11.4	21.33 ± 10.44
Personal distress	6.5 ± 4.7	9.9 ± 4.7**
Work	6.07 ± 4.6	7.1 ± 4.5
Self-esteem	9.64 ± 7.3	13.3 ± 5.6**
Sex	5.64 ± 4.4	6.4 ± 3.9
BWISE scale total score	18.4 ± 5.3	20.9 ± 5.2*
OP scale	11.7 ± 5.7	13 ± 4.9
Global assessment of functioning score	68.2 ± 14.4	58.6 ± 14.2**
Positive subscale score	11.8 ± 4.9	11.5 ± 5.3
Negative subscale score	15.8 ± 5.6	12.7 ± 5.2
General psychopathology subscale score	24.8 ± 6.0	20.7 ± 6.0**
Total PANSS score	52.4 ± 12.9	44.9 ± 14.3*

*P *<0.05, **P<0.01 compared with those without MetS
BWISE, body weight, image and self-esteem evaluation questionnaire; PANSS, positive and negative symptoms scale; OP scale, obesity-related problem scale

difference was observed in either group. However, the number of criteria of MetS met correlated positively with scores on physical activity domain of IWQOL – Lite in schizophrenia group (r=0.324, P<0.05), while no such correlations were observed in BPAD group. Similarly, no association was seen between presence of MetS and scores on BWISE or OP scale, however, scores on both correlated positively (r = 0.302, P<0.05; 0.307, P<0.05), with higher number of criteria of MetS met in schizophrenia group, but not in BPAD group.

Significant differences were seen on various domains of IWQOL-Lite and BWISE when those meeting waist circumference criteria of MetS (*i.e*. with central obesity) were compared with those not meeting waist circumference criteria. OP scale did not show any differences in these two groups.

When the relationship of MetS was evaluated with residual psychopathology, no significant difference was seen between those with MetS and without MetS in the bipolar disorder group in terms of residual

psychopathology in the form of HDRS and YMRS scores. No difference was noted in terms of level of functioning assessed on GAF and prevalence of various co-morbid disorders, except for the significantly (P<0.05) higher prevalence of hypertension in those with MetS (Table III).

In the schizophrenia group, no significant difference was seen in the positive and negative symptom score of PANSS. However, those without MetS had higher residual general psychopathology and total PANSS score (Table IV). Similarly, those without MetS had higher GAF score (P<0.01) compared to those with MetS.

Discussion

In the present study MetS was observed in 42.2 per cent patients in the BPAD group and 38.4 per cent patients with schizophrenia. This was within the range of 17 to 67 per cent found among different ethnic groups in earlier studies of BPAD[1] and 4 to 68 per cent among patients with schizophrenia[21]. No significant differences were obtained in the rates of MetS in BPAD and schizophrenia in the current study. This was akin to the findings of several previous studies[22-24], but unlike others, which have reported higher rates either in BPAD[25,26] or in schizophrenia[27-29]. The discrepant findings of these studies probably resulted from differences in the composition of patient samples; hence it would be premature to derive any conclusions. Various components of MetS present in both the groups of the current study were within the range reported in the literature[23,27,30].

Lifestyle patterns like lack of physical activity and poor stress management were found to be associated with presence of MetS in BPAD group. In addition, lack of responsible health behaviour was associated with MetS in both BPAD and schizophrenia. This suggests that modification and improvement in lifestyle can prevent development of MetS. An important finding of this study was that though the patients with and without MetS in both groups did not differ with respect to mean calorie intake, they showed a lower score on nutritional habit domain of HPLP-II. Thus, limiting number of calories should not be the only focus to prevent MetS in patients with BPAD and schizophrenia but emphasis should be laid on eating food with proper nutrients and balanced diet.

In the current study patients with MetS had poor quality of life as indicated by significantly lower score on physical health and psychological health domain of WHOQOL - Bref in both BPAD and schizophrenia groups. The presence of MetS has been shown to be associated with poor physical health in patients with schizophrenia[9]. Considering the fact that MetS is characterized by a cluster of cardiovascular risk factors like diabetes, obesity, hypertension and dyslipidaemias; it is not surprising for those with MetS to have a poorer physical health compared to those without MetS. Another important finding of this study was the fact that presence of MetS not only led to a decline in physical health but also showed a negative impact on psychological health of patients with BPAD and schizophrenia. A study in patients with obesity (without known severe mental disorder) also suggests that obesity has a significant impact on the psychological state of patients and can lead to low self-esteem and psychological morbidity[31]. In addition, patients with MetS in schizophrenia group had lower GAF scores indicative of poor overall functioning.

When patients with and without MetS were compared using IWQOL-Lite, BWISE and OP scale, nothing significant emerged. On the other hand, in both patient groups significant differences were noted between those with and without obesity on these scales. Patients with BPAD who were obese had greater limitation of their physical activity, higher personal distress and lower self-esteem, while obese patients with schizophrenia had greater personal distress and lower self-esteem compared to non-obese patients. In addition, obese patients in both the groups had problems with body image which led to poor self-esteem as indicated by lower scores on BWISE. These results suggest that obesity has a significant adverse impact on the life of patients with MetS. The fact that obesity happens to be the most visible and most common among all the metabolic abnormalities, its presence should alert the psychiatrists to pay more attention to the psychological health of patients and make necessary actions to improve their quality of life.

The major limitation of present study was its small sample size. Moreover, patients were not drug naïve when they were included. The lack of population controls was another major limitation. It is well known that prevalence of MetS increases with age[1,2]. Our study population was only in mid-thirties and resultantly this could have influenced some of the findings of the study. As the study was done in the outpatient setting of a tertiary care centre, the findings cannot be generalized to patients with schizophrenia and bipolar disorder attending other treatment setting or living in the

community. We also did not evaluate other side effects of psychotropics. Some of the scales like IWOQOL, BWISE and OP scale, which were used in this study have not been validated in Indian population. We also did not study the relationship of QOL and other outcome variables with socio-demographic variables.

To conclude, this study showed that presence of obesity leads to problems in self-image and self-esteem. These problems worsen if greater numbers of criteria of MetS are fulfilled. MetS is associated with certain lifestyle patterns like inactivity, lack of health responsibility, poor nutritional habits and problems with stress management. These are easily modifiable factors, and if modified can possibly prevent MetS. MetS can be identified at an early stage if waist circumference and blood pressure are monitored on a routine basis, and laboratory investigations are also undertaken at appropriate time. These simple measures can possibly go long way to improve psychological and physical health, as well as may improve the outcome of BPAD and schizophrenia.

***Conflicts of Interest*:** None.

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