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Bipolar disorder: Impact of anthropometric and socio-demographic variables among females

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Abstract

Bipolar Disorder is a chronic brain disorder which involves repeated episodes of manic and depressive episodes separated by period of normal moods. The present study explores the relationship between socio-demographic and anthropometric variables with bipolar disorder as there has been a paucity of literature about the role of these variables in the population of Punjab (India). A cross-sectional study was conducted among 101 female cases diagnosed with bipolar disorder and 103 female controls. The information was collected regarding the demographic variables, psycho-social variables, anthropometric variables and the clinical variables via a self-prepared information sheet and statistical analysis was done using Statistical Package for Social Sciences Ver. 26. Family history, occupation, physical exercise, meditation, negative life events, familial conflicts, suicidal ideation, sleeping pattern, climate change, appetite change, height, weight and BMI were found to be highly statistically significant ($p \leq 0.05$). It revealed the association of these variables in the health outcomes of bipolar disorder patients. The revealed association highlighted the importance of considering these factors in the occurrence and management of bipolar disorder in females. It also elucidated the necessity of a comprehensive approach to diagnosis and therapy that considers the physical, social, and cultural circumstances in which the condition arises in addition to the psychological and pharmaceutical components of care.

Key words : Bipolar disorder, suicidal ideation, trauma, mood disorder, psycho-social variables.

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Bipolar Disorder (BD), previously known as manic-depressive illness, is a chronic brain disorder which leads to an unusual shift in mood, energy, activity levels as well as impairs daily functioning. It consists of periods of normal mood interspersed with recurrent manic and depressed episodes. Additionally, it is observed that the depressive phase (of both major depressive disorders and contemporary bipolar illnesses) tends to increase in prominence at older ages and is typically longer than the manic attack phases, which can occasionally last for years.[19] With a lifetime prevalence of roughly 3% in the general population, bipolar disorder is regarded as the sixth most common cause of disability globally. The World Health Organization (WHO) reports in 2024 that approximately 1 in 150 adults (40 million people, or 0.53% of the global population) live with bipolar disorder.[8] An average onset of Bipolar I disorder is at 18 years and bipolar II disorder at 22 years.[9] According to the National Comorbidity Study, rates were greater between 18 and 34 than between 35 and 54, with onset usually occurring between 18 and 44.[10] The frequency of bipolar disorder varies by country, ranging from 0.4% to 4% worldwide. Because of inadequate reporting and diagnosis, the numbers in India are quite hazy. According to Diagnostic and Statistical Manual for Mental Disorders (DSM-IV) criteria, BD has been categorized into four types. Bipolar disorder type I consists of at least one episode of full manic episode or mixed episode (alternating manic and depressive symptoms) and it usually has at least one depressive episode. Bipolar disorder type II consists of many prolonged depressive episodes and at least one hypomanic episode and mostly there is no manic episode throughout the life. Cyclothymic disorder consists of several periods of hypomanic and depressive symptoms but depressive symptoms do not meet criteria for depressive episodes. Bipolar disorder not otherwise specified type has depressive and hypomanic-like symptoms and episodes might alternate rapidly, but do not meet the full diagnostic criteria for any of the mentioned types of bipolar disorders.[16]

The period with elevated mood is termed as mania or hypomania according to the severity and duration. Its symptoms include: Abnormal elevated mood, mostly associated with an increased tendency to irritability, increased energy in various activities in daily life, reduced need for sleep (insomnia), grandiosity, impulsive or uncontrolled behaviour (increased sexual drive, increased spending, make overly frank comments about others), more talkative and speaks more loudly, reduced ability to focus and problem in completing tasks. Whereas, the depressive phase has symptoms of different pole i.e., increased need of sleep, increased appetite, hopeless about life, talking too less, feeling low.

The combined effect of socio-economic, genetic and environmental factors contributes to mental health and wellbeing. The factors often interact with each other and cannot be considered as an individual trait or exposure.[18] Stressful life event or a negative life event are evidently known to be the causing factor of various psychological disorders or mental illnesses; but it is less common in bipolar disorder than unipolar depression.[20] Maltreatment (emotional abuse or emotional neglect) during childhood is considered as a major risk factor with high-quality evidence that further

increases the risk for later development of bipolar disorder.[2] The interaction between a genetic predisposition and environmental factors plays an important role in modulating the early negative childhood experiences in the clinical course of bipolar disorder. The appearance and progression of the condition are influenced by gender. Bipolar I disorder affects both men and women equally. However, bipolar II appears to be more common among women. About 80-90% of patients with malignant rapid-cycling bipolar disease are females. Additionally, women are more likely to have mixed mania and manic swings when using antidepressants. Somatic and mental disorder comorbidity is more common in women than in men.[1]

The aim of the present study was to explore the relationship between different socio-demographic and anthropometric variables with bipolar disorder and compare the variation in the impact among bipolar female cases and controls as there has been a paucity of literature about the role of these variables in the population of Punjab (India).

For the present study, a total 204 females were included as participants ranging in age from 18 to 65 years and residing in Punjab (India) by birth, from which 101 females had bipolar disorder and 103 age-sex matched females were recruited as controls by taking a written consent from each individual. A self-prepared information sheet consisting of the personal information along with the socio-demographic and anthropometric data was used for all the subjects. It included demographic variables (age, physical activity, meditation), family functioning (marital status, type of family, familial conflicts), socio-economic variables (education, occupation, total income per month), anthropometric variables (height, weight, body mass index) and clinical features (family history, early adversity or trauma, negative life events, suicidal ideation, climate influence, change in sleeping pattern, change in appetite). The status of all these variables were recorded through a personal interview session and compiled in the excel sheets for further statistical analysis. The differences for all the variables among cases and controls were analyzed by calculating chi-square value and the t-test was used to determine the differences among quantitative variables. Moreover, the risk of occurrence of the disease was analyzed by calculating odd's ratio with 95% confidence interval by using SPSS 26.0.

The aetiology of bipolar disorder is unknown, and it is considered to be a complex illness. Clinicians identify patients who are at a higher risk of developing bipolar illness by acknowledging probable risk factors. This information guides more research, follow-up and cautious prescribing.

Demographic Variables : The mean±SD of age for both cases and controls were almost similar as the criteria of the study was to include age matched groups. The mean±SD of age at diagnosis for bipolar disorder was observed to be 32.17±10.22. Sedentary lifestyle has also been observed to be influencing the population as both physical activity and meditation were found to have statistically significant differences among cases and controls ($p < 0.0001$ and 0.0041, respectively). It was observed that only 25.75% cases were physically active whereas, 80.58% controls were physically active (Table-1).

Socio-economic Variables: Under socio-economic category, the differences were assessed for education level, occupational status and total monthly income (p.m.). Non-significant differences were found for educational status (p=0.147) and total monthly income (p=0.102) whereas, occupational status has been observed to have statistically significant differences with p value <0.0001. A major difference was seen for the frequencies of cases and controls as higher number of individuals were employed (professionals, skilled and agricultural workers and self-employed) among controls and higher number of female cases were unemployed *i.e.*, 77.22% (Table-1).

Family functioning Variables: The influence of family functioning on bipolar females was evaluated by assessing the frequencies for marital status, type of family and presence of familial conflicts and then compared with control group peers. A major difference was observed in the frequency for the presence of familial conflicts as higher number of bipolar females (38.6%) had familial conflicts as compared to controls (6.9%) with statistically significant differences (p <0.0001). Both marital status (married vs. unmarried vs. divorced/widow) and type of family (joint family vs. nuclear family) had non-significant differences (Table-1).

Anthropometric Variables: Height(m) and weight(kg) were measured and body mass index(kg/m^2) (BMI) was calculated by using a formula as: weight(kg)/$height^2$(m). All these three variables were compared among both the groups and differences were determined by using t-test. Statistically significant differences were found for height and weight among cases and their control counterparts, with p value <0.001 and 0.0018 respectively (Table-1).

Clinical features : While analysing the frequencies for various clinical features (family history of BD, early adversity or trauma, negative life events, suicidal ideation, climate influence) and the variation in impact (changed sleeping hours, change in appetite) among cases and controls, the differences have been evaluated using chi-square value (p value) (Table-2). From the total studied bipolar females, 20.7% cases had positive family history of bipolar disorder whereas, only one female was found to have bipolar family history in control group. Hence, positive family history has shown highly statistically significant differences with p value <0.0001. Early adversity or trauma and negative life events were prevalent in both cases and controls but higher number of bipolar females had early adversity (21.7%) and negative life events (56.4%) as compared to controls showing the statistically significant differences (early adversity p=0.002 and negative life events p <0.001). A total of 66 (65.3%) bipolar females used to have recurrent suicidal thoughts and none of the controls had any suicidal thoughts, resulting in highly statistically significant differences (p <0.001). The influence of climate or climate change was also observed among cases only, as 32.6% bipolar females experienced adverse mood changes with the change of weather or in winter season (p < 0.001). The change in sleeping hours (insomnia or longer sleeping hours) and change in appetite (fad diet or extreme diet) were also more prevalent among cases as 79.2% cases had change in sleeping hours and 38.61% had change in appetite too. Comparatively, only three to four control individuals had change in sleep and appetite, showing highly statistically significant differences (p < 0.00001) (Table-2).

Table-1. Comparison of various demographic, socio-economic, family functioning and anthropometric variables among BD females and controls

Variables		Cases Frequency (%)	Controls Frequency (%)	p value
Demographic Variables				
Age (at present)	Mean ± SD	41.17±12.15	42.90±11.96	0.310
Age at diagnosis	Mean ± SD	32.17±10.22	-	-
Physical Activity	Yes	26 (25.75)	83 (80.58)	<0.0001*
	No	75 (74.25)	20 (19.42)	
Meditation Status	Yes	8 (7.92)	23 (22.23)	0.0041*
	No	93 (92.08)	80 (77.67)	
Socio-economic Variables				
Education	Professionals	20 (19.80)	33 (32.03)	0.147
	Diploma/Graduate	44 (43.56)	44 (42.72)	
	Primary/Middle/ High School	33 (32.67)	22 (21.36)	
	Illiterate	4 (3.97)	4 (3.89)	
Occupation	Professionals	18 (17.83)	38 (36.89)	<0.0001*
	Skilled and Agricultural Workers	3 (2.97)	17 (16.50)	
	Self-employed	2 (1.98)	6 (5.83)	
	Unemployed	78 (77.22)	42 (40.78)	
Total monthly income (Rs.) (p.m.)	40,000 or above	17 (16.83)	30 (29.12)	0.102
	Less than 40,000	82 (81.19)	72 (69.91)	
	20,000 or less	2 (1.98)	1 (0.97)	
Family Functioning				
Marital Status	Married	69 (68.32)	76 (73.79)	0.54
	Unmarried	21 (20.79)	20 (19.42)	
	Divorced/Widow	11 (10.89)	7 (6.79)	
Type of family	Joint Family	22 (21.79)	30 (29.13)	0.22
	Nuclear Family	79 (78.21)	73 (70.87)	
Familial conflicts	Yes	39 (38.61)	7 (6.9)	<0.0001*
	No	62 (61.39)	96 (93.21)	
Anthropometric Variables				
Height (m)	Mean ± SD	1.62±0.042	1.69±0.083	<0.0001*
Weight (kg)	Mean ± SD	70.95±10.42	75.45±9.87	0.0018*
Body Mass Index (kg/m^2)	Mean ± SD	27.02±4.23	26.23±3.41	0.145

Table-2. Comparison of various clinical features and their impact factors among BD females and controls.

Variables		Cases Frequency (%)	Controls Frequency (%)	p value
Family history	Yes	21 (20.79)	1 (0.97)	<0.0001*
	No	80 (79.21)	102 (99.03)	
Early adversity or trauma	Yes	22 (21.78)	7 (6.79)	0.002*
	No	79 (78.22)	96 (93.21)	
Negative life events	Yes	57 (56.44)	13 (12.62)	<0.001*
	No	44 (43.56)	90 (87.34)	
Suicidal Ideation	Yes	66 (65.35)	0 (0)	<0.001*
	No	35 (34.65)	103 (100)	
Climate influence	Yes	33 (32.67)	0 (0)	<0.001*
	No	68 (67.33)	103 (100)	
Change in sleeping hours	Normal	21 (20.79)	99 (96.12)	<0.00001*
	Changed	80 (79.21)	4 (3.88)	
Change in appetite	Normal	62 (61.29)	100 (97.09)	<0.00001*
	Changed	39 (38.61)	3 (2.91)	

To analyse the risk of the included variables, the OR (95%CI) has been calculated to determine the association of these variables with the extend of outcome of disease (BD), (Table-3) and the variable with p value <0.05 is considered as statistically significant to be interpreted as associated with the occurrence of the disease. A positive association was observed with the presence of familial conflicts in BD females as the OR=0.116 (95% CI=0.275-0.49) was statistically significant with p value <0.0001. The occurrence of early adversity (childhood trauma) and negative life events throughout the adulthood were found to have an impact on an individual's mental health, and could be considered as one of the leading causes for triggering BD with statistically significant differences (p=0.0015 and p <0.0001) among cases and controls. The recurrent suicidal thoughts were only observed in BD females and it was concluded that having suicidal thoughts increased the risk of having BD by 2.886 times (OR=2.886, 95%CI= 2.208,3,772, p Â0.0001). The drastic change in mood or worsening of mood was also observed in BD females only *i.e.*, 32.6% as none of the control females faced such changes according to the weather. Further, the importance of having good sleep, normal quantity of diet, being physically active and meditating has also been revealed for good mental health and all of these were found to have many times protective role for the occurrence of disease with highly statistically significant differences (p <0.0001). Non-significant differences were observed for body mass index and type of family (joint family vs. nuclear family) among cases and controls.

Table-3. Disease association analysis of various risk factors for the occurrence of BD in females

Variables	Input Parameters	OR (95% CI)	p value
Family History	Yes vs. No	0.037 (0.004-0.283)	0.0015*
Type of family	Joint vs. Nuclear	1.476 (0.782-2.786)	0.230
Familial conflicts	Yes vs. No	0.116 (0.275-0.49)	<0.0001*
Early adversity or trauma	Yes vs. No	0.262 (0.106-0.645)	0.0048*
Negative life events	Yes vs. No	0.112 (0.055-0.225)	<0.0001*
Suicidal Ideation	Yes vs. No	2.886 (2.208-3.772)	<0.0001*
Climate influence	Yes vs. No	1.485 (1.297-1.701)	0.0013*
Change in sleeping hours	Normal vs. Changed	94.286 (31.101-285.840)	<0.0001*
Change in appetite	Normal vs. Changed	20.968 (6.212-70.759)	<0.0001*
Physical activity	Yes vs. No	11.971 (6.179-23.192)	<0.0001*
Meditation Status	Yes vs. No	3.342 (1.417-7.884)	0.0059*
BMI (kg/m^2)	>30 vs. ≤30	1.491 (0.742-2.997)	0.261

The lifetime prevalence and current mental morbidity was found to be 17.9% and 13.4%, respectively.[4] Depending on whether bipolar disorder is identified by the first onset of functional impairment, the first presentation of symptoms, the first interaction with health services, or the first formal diagnosis and/or start of treatment, there are differences in the age of onset. In a study conducted by Garg et al.[7] in Punjab (India), out of 387 patients diagnosed to be suffering from mental morbidity, only 20.4% were on treatment, concluding the treatment gap to be 79.5%. The median treatment lag was found to be atleast 6 months. Unfortunately, this treatment lag was only for the first-ever consultation but not for the first psychiatric consultation. This lag to the first psychiatric consultation seemed to be even higher. The lifetime prevalence of BD was reported to be 0.33 (0.27-0.39) and current prevalence to be 0.14 (0.10-0.18) which was higher than the previously mentioned data in literature.[7] The lack of awareness was also reported in the present study as most of the participants including both cases and controls were not aware of the bipolar disorder. Surprisingly, most of them were not familiar with the term "bipolar disorder". Moreover, many individuals suffering from BD were also unaware of their own medical condition as the frequency in question about "insight about BD" was observed to be negligible in cases group.

Bipolar disorder and obesity may have a complex association that includes biological processes like inflammation and metabolic dysregulation, both of which are more common in people with higher BMIs.[21] Obesity in particular can exacerbate mood instability by causing dysregulation of cortisol and other neuroendocrine systems[13] and similar findings were observed in the present study too. Chavan *et al*.[4] stated that individuals with lower household income were comparatively more sufferers for mental morbidity but the differences were statistically non-significant.

In contrast, the present study results didn't reveal much difference in income among cases and controls but it should be noticed that most of the cases and controls were unemployed, so the mentioned income was family income. Socio-economic status has been found to have a bidirectional relationship with bipolar disorder as on one hand, individuals experience higher levels of stress with lower socio-economic backgrounds which could trigger the onset or exacerbation of bipolar episodes.[15] While on the other hand, individuals with bipolar disorder also have to struggle to maintain stable employment or relationships due to the disability or co-morbidity due to occurrence of bipolar disorder.[11] According to Lund *et al*.[12], the economic burden of managing bipolar disorder can create significant barriers to assessing mental health services, medications, and other forms of care. Specifically, financial constraints may delay diagnosis and prevent individuals from seeking necessary psychiatric care, which can worsen symptomology and lead to a more severe course of the illness. This finding is consistent with the growing body of literature linking low SES with worse mental health outcomes in individuals with bipolar disorder. Many studies had already reported that poor family dynamics, including frequent familial conflicts, lack of emotional support, and dysfunctional communication patterns, associated with an increased risk of developing bipolar disorder or its recurrence[14] and similar results were observed in the present study too as the individuals with nuclear family and having familial conflicts were observed to be higher in cases as compared to the control group. Untreated or treatment-refractory bipolar patients frequently have tumultuous marriages. Suicide threats and attempts are the most concerning characteristics of depression, while violence is the most concerning symptom of mania, according to patients and their spouses. According to psychological autopsy investigations, people with mood disorders were involved in 50 to 66 percent of all suicides.[3] According to a different study, 53% of people who committed suicide during a depressive episode were diagnosed with major depressive disorder, and 47% with bipolar illness. Up to 60% of bipolar patients reported of attempting suicide at least once in their lives, and up to 19% of them were thought to have died by suicide.[17] Likewise, the present study also revealed that 65.3% of BD females had suicidal thoughts or had suicidal attempts and none of the control females had ever experienced suicidal thoughts. It has been already stated by Dome *et al*.[5] that the risk was 10 30 times greater (in attempting suicide) in bipolar disorder patients than the general population. A positive family history and seasonal mood changes has been found be significantly associated with cases and moreover, Fico *et al*.[6] has also concluded that women with bipolar disorder II, and those with a family history of bipolar disorder may be more likely to exhibit the seasonal pattern. The largest association was reported for emotional abuse by Rowland and Marwaha in 2018 which made an individual four times more likely to have bipolar disorder than controls and similar risk factors were reported to be positively associated in BD subjects in the present study too.

The present study highlights the important influence of sociodemographic and anthropometric factors on the experience of bipolar illness in Punjabi women. The findings

elucidate the necessity of a comprehensive approach to diagnosis and therapy that considers the physical, social, and cultural circumstances in which the condition arises in addition to the psychological and pharmaceutical components of care.

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Recommendations

Healthcare professionals can enhance the mental health and quality of life of women with bipolar illness in this region by addressing these variables. Cultural norms around gender roles and family dynamics may make women feel even more alone and stressed, which makes it harder for them to effectively manage bipolar disorder. Therefore, in order to lessen stigma and improve knowledge and access to care, future interventions should focus on addressing these cultural and social barriers.

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