

Association between childhood adversity and metabolic syndrome in patients with mood disorder: In a tertiary healthcare center of North-East India

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Abstract

Introduction: Physical and mental health have a bidirectional relationship that influences one another. Several clinical studies have shown that metabolism and emotional state may share comparable pathways. Although metabolic syndrome and mood disorders often manifest themselves in adulthood, the likelihood of acquiring these illnesses is influenced by social and economic conditions in childhood, such as childhood maltreatment, neglect, and family dysfunctions.

Aim and objectives: To examine the association between childhood adversity and components of metabolic syndrome in patients with mood disorders and to test whether specific types of childhood adversity and type of mood disorder interact to worsen metabolic outcomes.

Material and Methods: A cross-sectional study was conducted at RIMS, Imphal's Department of Psychiatry. Out of a total of 100 participants, 50 were diagnosed with depressive disorder and 50 with bipolar affective disorder. The subjects' metabolic syndrome was assessed using International Diabetes Federation standards. The Adverse Childhood Experience self-report questionnaire was used to assess childhood adversity. The link between childhood adversity and metabolic consequences was investigated using univariate logistic regression. Interaction studies were performed to see whether certain forms of childhood adversity and mood disorders interact to impair metabolic outcomes.

Result: Among mental disorders, metabolic syndrome was shown to be substantially more prevalent in participants with parental divorce. Family substance misuse was linked to considerably higher systolic blood pressure. Specific types of childhood trauma and mental disorders did not interact to aggravate metabolic syndrome in interaction testing.

Conclusion: This research presents early evidence associating childhood experiences of

parental divorce/separation to metabolic syndrome and drug misuse in the household to higher systolic blood pressure in adults with mood disorders.

Keywords: Childhood adversity, chronic stress, mood disorder, metabolic syndrome

Introduction

A significant proportion of people suffering from mood disorders are at risk of acquiring obesity and the difficulties that come with it. The patients' genetic predisposition, disease-related dangerous behavioral habits (such as diet selection) and treatment medications are all factors that influence their health and wellbeing. Chronic non-communicable illnesses in adults were shown to have a substantial association with bad childhood experiences.

For example,

- a) Unpleasant childhood events may contribute to chronic stress, which can last into adulthood.
- b) Adverse childhood experiences can lead to depression later in life. ^[1,2]
- c) This chronic stress was exerted on the developing brain and body systems by persistent hypercortisolemia, proinflammatory cytokines and other stress responses;

Is a significant etiological factor for developing chronic non-communicating illnesses affecting both mental and physical health ^[3-6] Mood disorders are often co-morbid with components of metabolic syndrome ^[7]. Common comorbidity of mood disorders and metabolic disturbances may be due to a shared risk factor. It has been hypothesized that childhood adversity may mediate the association between mood disorders and metabolic disturbances ^[8]. The majority of the data demonstrating a relationship between childhood trauma and adult mental or physical health has come from research conducted in Western countries. In a culturally diverse context such as India, no research has yet looked at the link between particular kinds of early trauma and metabolic consequences in mood disorders. To investigate the relationship between childhood adversity and components of the metabolic syndrome such as blood pressure, waist circumference, triglycerides, fasting glucose, high-density lipoprotein cholesterol (HDL), and BMI in patients with mood disorders, as well as whether specific types of childhood adversity (e.g. abuse, neglect, and household dysfunction) and type of mood disorder (bipolar affective disorder or depressive disorder) interact to worsen metabolic outcomes; a study has.

Methods and Materials

It is a cross-sectional study carried out in the Department of Psychiatry, Regional Institute of Medical Sciences, and Imphal Between October 2015 to September 2017. 100 Patients fulfilling the criteria for mood disorders (bipolar affective disorder F-31 or major depression disorder F-32) according to ICD-10 (10th revision of the International Statistical Classification of Diseases and Related Health Problems) ^[9] were included; patients having comorbid medical or psychiatric illnesses were excluded. After informed consent subject's socio-demographic information was recorded on a semi-structured proforma.

Metabolic indices

The patient's height, weight, the abdominal circumference was measured. Body mass index (BMI) was calculated. Blood Pressure was measured. And blood sample was collected to estimate fasting blood sugar and lipid profile.

Childhood adversity questionnaire

Childhood adversity was measured using a modified 10-item childhood adversity questionnaire used in the Adverse Childhood Experiences (ACE) Study [10]. There were three types of childhood abuse considered: emotional abuse, physical abuse, and sexual abuse (as opposed to physical abuse). It was determined if someone had been neglected on two levels: emotionally and physically. The following five areas of family dysfunction were assessed: Parental divorce or separation, exposure to drug addiction, exposure to mental illness, and exposure to domestic violence directed towards the mother or stepmother, and exposure to criminal conduct in the household. Test-retest reliability analyses of the components of the ACE questionnaire showed moderate to the substantial agreement, with kappa coefficients ranging from 0.46-0.86.

Statistical analysis

In this study, data were analyzed using SPSS version 16.0, the open-source epidemiological statistics for public health software Open Epi: Open Source Epidemiological Statistics for Public Health Version 3.03a, and the Epi Info TM software version 7.1.5. The percentages were used to represent the proportions. When it came to the socio-demographic factors, descriptive statistical analysis was used. As tests of association for categorical variables, the Chi-square, the Chi-square for trend, and the Fisher exact test (where appropriate) were used, as well as the Pearson correlation coefficient. For each categorical risk factor, the odds ratio (OR) and 95 percent confidence interval (95 percent CI) were computed. For continuous variables, the Student-T test or the Mann-Whitney test were used, depending on whether the distribution was normal or not. Univariate logistic regression was applied to determine significance in predictors of metabolic syndrome. Linear regression analysis was conducted when examining the relationship between types of childhood adversity and metabolic indices.

Results

Out of 100 participants, 50 were diagnosed as bipolar affective disorder (BPAD) and 50 were diagnosed as depression disorder (DD) according to ICD-10 criteria. The average age of the participants was around 33 years (32.43 ± 9.75), ranging from 19 years to 56 years.

Out of 100 participants, metabolic syndrome was found in 23 participants. The distribution of metabolic syndrome according to socio-demographic characteristic was calculated. There was no significance difference in socio-demographic characteristics in the presence or absence of metabolic syndrome.

Among metabolic indices, there was a significant difference in serum TG level between BPAD and DD with higher serum TG levels in BPAD in comparison to DD. There was a significant difference in fasting blood sugar (FBS) between BPAD and DD with higher FBS in BPAD than in DD.

There was a three-fold difference in the proportion of participants with BPAD compared to DD who experienced physical abuse

Only parental divorce/ separation was found significantly associated with metabolic syndrome. Metabolic syndrome was found higher among subjects with parental divorce/ separation. There was almost 3 times the risk of developing metabolic syndrome in adults who had an adverse childhood experience of parental divorce.

Univariate logistic regression was applied to determine the interaction between childhood adversity and metabolic syndrome. There was no dose-response relationship between the total number of childhood adversities and metabolic syndrome.

Substance abuse in the family was associated with higher systolic blood pressure. There was

no significant difference in substance abuse and SBP interaction on the presence of mood disorder.

Notably, in interaction testing, the type of mood disorder did not modify the effect of childhood adversity on metabolic indices or metabolic syndrome.

Discussion

Concerning the prevalence of metabolic outcomes (23%) in our study, it was consistent with the literature [2]. In comparison, childhood adversity was highly prevalent in our sample, with 86% experiencing more than one category [11, 2]. However, these studies have been performed in the developed nations while research on childhood adversity in adult mental disorders from developing nations such as India is scarce. The rate of childhood adversity in mood disorders differs in different studies but the experience of emotional abuse usually remained the same in different studies [12, 13].

The rate of emotional abuse in the current research is comparable to prior studies. In terms of the link between the number of childhood adversities and metabolic outcomes, there was no dose-response relationship in this group. This is in contrast to what was predicted by Felitti *et al*, who found that the aggregate of childhood maltreatment exposures raised health risk factors in adulthood, which would be expected to alter metabolic indices. This research, on the other hand, looked at the association between childhood adversity and mood disorders in an adult population sample rather than a mood disorders sample. In terms of the relationship between childhood adversity and metabolic syndrome in mood disorders, metabolic syndrome was shown to be more prevalent in participants who experienced parental divorce or separation. As a result, no prior investigation discovered a link between metabolic syndrome and early adversity due to parental divorce/separation. However, prior research by Young *et al* indicated that parental divorce/separation was related to a higher BMI and that the relationship between parental divorce/separation and BMI was stronger in the presence of BP vs MDD. There was a link discovered between the sort of early hardship and metabolic indicators. Substance misuse in the family was related to higher systolic blood pressure among mood disorders in our research, and it was unlikely to be influenced by interview settings since blood pressure was taken before the interview. McIntyre *et al's* research [8], Individuals who reported any childhood hardship had greater systolic blood pressure.

Whether specific types of childhood adversity and type of mood disorder interact to worsen metabolic outcomes: Notably in interaction testing, a specific types of childhood adversity (eg: abuse, neglect, and family/household dysfunction) and type of mood disorder (either depression or bipolar) did not interact to worsen metabolic syndrome in our study. A study done by Young *et al*. [11] examined the interaction of childhood adversity and mood disorder on metabolic outcomes. This study it was found one interaction. Body mass index (BMI) was found greater in presence of parental divorce/separation and bipolar disorder than with parental divorce/separation and major depressive disorder.

Conclusion

According to the findings of this research, childhood experiences of parental divorce or separation are associated with metabolic syndrome, and drug misuse in the family is associated with higher systolic blood pressure in adulthood. Despite the data shown above, the association between childhood trauma and metabolic syndrome in the context of mood illness is neither simple nor straightforward. To fully understand the complicated link between childhood trauma and aspects of metabolic syndrome in people with mood disorders, further research is needed.

Table 1: Metabolic Syndrome and its Components (Metabolic indices) in Mood Disorders

	Total (N=100) Mean (SD)	DD (N=50) Mean (SD)	BPAD (N=50) Mean (SD)	P value
Metabolic indices				
WC (cm)	84.29±7.64	82.26±7.24	86.32±7.56	0.070
SBP (mmHg)	126.28±14.27	123.80±16.42	128.76±11.36	0.082
DBP (mmHg)	81.88±11.8	79.60±12.74	84.16±10.41	0.053
TG (mg/dl)	114.60±29.90	107.82±24.44	121.38±33.40	0.023*
HDL (mg/dl)	51.81±8.47	52.92±8.82	50.70±8.04	0.191
FBS (mg/dl)	92.36±14.01	88.46±6.46	96.26±18.00	0.005*
BMI (kg/m ²)	23.33±2.44	22.72±2.58	23.94±2.15	0.052
Proportion meeting criteria of metabolic index				
	%	%	%	
WC	20	12	28	0.056
SBP	42	36	48	0.224
DBP	48	40	56	0.109
TG	14	8	20	0.084
HDL	21	26	16	0.072
FBS	12	4	20	0.014*
Metabolic syndrome	23	18	28	0.079
Total	n=100	n=50	n=50	

DD = Depressive Disorder. BPAD= Bipolar Affective Disorder. SD = Standard Deviation. WC= Waist Circumference. SBP= Systolic Blood Pressure. DBP= Diastolic Blood Pressure. TG= Triglyceride. HDL = High-Density Lipoprotein. FBS= Fasting Blood Sugar. BMI = Body Mass Index. * $p < 0.05$ (significant)

Table 2a): Prevalence of Childhood Adversity in mood disorders

Category of childhood adversity	Total (N=100) %	DD (N=50) %	BPAD (N=50) %	P value
Abuse, by category				
Physical	32	16	48	0.001*
Emotional	34	36	32	0.673
Sexual	9	12	6	0.295
Neglect, by category				
Physical	31	20	42	0.217
Emotional	46	52	40	0.229
Family/Household dysfunction by category				
Parental divorce/separation	26	22	30	0.362
Substance abuse	49	44	54	0.317
Mental illness	44	36	52	0.060
Domestic violence	19	18	20	0.799
Imprisoned house member	14	18	10	0.249
Presence of more than 1 ACE	86	84	88	0.399
Presence of 4 or more ACE	32	26	19	0.143
Total	n=100	n=50	n=50	

Note. MDD = Depressive Disorder. BPAD = Bipolar Affective Disorder.

* $p < 0.05$ (significant)

Table 3a): Association between specific childhood adversity and metabolic syndrome

	Odd ratio	95% CI	P-value
Physical abuse	0.368	0.114- 1.192	0.087
Emotional abuse	0.810	0.297- 2.211	0.681
Sexual abuse	0.338	0.188- 1.508	0.086

Physical neglect	0.734	0.258- 2.089	0.562
Emotional neglect	1.380	0.542- 3.510	0.498
Parental divorce/separation	2.933	1.088- 7.903	0.029*
Substance abuse	2.371	0.900- 6.248	0.076
Mental illness	1.222	0.480- 3.111	0.674
Domestic violence	0.870	0.258- 2.938	0.823
Imprisoned member	0.516	0.107- 2.494	0.403

CI= confidence interval. P< 0.05* (significant)

Table 2b): Interaction between childhood adversity and metabolic syndrome

	B	S.E.	Wald	Df	Sig.	Exp(B)	95% CI for exp (B)
ACE score	0.024	0.148	0.026	1	0.871	1.024	0.767- 1.368

ACE score (Adverse childhood experience score)

B=regression coefficient, S.E.=standard error of B, DF=degree of freedom, sig=significance, Exp B=Expert regression coefficient, CI=confidence interval.

Table 3b): Association between substance abuse in the family and systolic blood pressure

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pear. Chi-square	5.745	1	.017		
CC	4.826	1	.028		
Likelihood Ratio	5.801	1	.016		
Fisher's exact T				.027	.014
Linear by linear	5.688	1	.017		
OR	2.659				
95% CI	1.186- 5.964				

CC = Continuity Correction, CI= confidence interval, OR= odd ratio, DF= degree of freedom

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