

Factors associated with bipolar disorder among married adult males in Rajshahi city, Bangladesh: A household study

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ABSTRACT

Bipolar disorder (BPD) affects personal and social functioning and creates huge economic burden. This type of study is poorly documented in Bangladesh. This study was designed to determine the prevalence and investigate the associated factors of BPD among married adult males in Rajshahi city, Bangladesh. For collecting data for this household cross-sectional study, multistage stratified systematic sampling and a semi-structured questionnaire was used. Frequency distribution, chi-square test and binary logistic regression model were used to determine the prevalence, and investigate the associated factors of BPD respectively. The prevalence of BPD and probable BPD was found to be 1.1% and 5.1% respectively. After controlling the effect of other factors it was found that married adult males with no education (AOR=6.300, 95 % CI: 1.863-21.307; $p<0.01$), under nutrition (AOR=7.692, 95 % CI: 1.959-30.201; $p<0.01$), hard work (AOR=4.105, 95 % CI: 1.360-12.394; $p<0.05$), poor relationship with partner (AOR=0.097 95 % CI: 0.022-0.436; $p<0.01$), substance abuse (AOR=0.086, 95 % CI: 0.034-0.215; $p<0.01$), mental disease (AOR=0.258, 95 % CI: 0.068-0.984; $p<0.05$), blood-relative's mental disease (AOR=0.069, 95 % CI: 0.017-0.278; $p<0.01$), stress/anxiety (AOR=0.166, 95 % CI: 0.048-0.571; $p<0.01$), suicidal thought/attempt (AOR=8.583, 95 % CI: 2.679-27.495; $p<0.01$), blood-relative's suicide/suicidal attempt (AOR=0.093, 95 % CI: 0.030-0.285; $p<0.01$) and chronic disease (AOR=0.187, 95 % CI: 0.075-0.466; $p<0.01$) were more likely to get BPD than their counterparts. In this study, we determined risk factors of BPD among Bangladeshi married adult males all of which are modifiable. Health professionals may consider these factors while giving treatment.

Keywords: Bipolar disorder, Married adult males, Logistic regression, Rajshahi, Bangladesh

INTRODUCTION

Bipolar disorder (BPD) is a serious and chronic mental ailment. It is characterized by shifts of mood from extreme lows, i.e., major depression to extreme highs, i.e., mania/hypomania with an intervening period of almost normalcy (APA, 2013). It disrupts personal and social life and causes huge economic burden for the family. The prevalence of BPD is different in different populations that ranges from 0.2% to 6% (Baldessarini et al., 2012; Saarni et al., 2010; Pini et al., 2005; Hakkaart-van Roijen et al., 2004; Mitchell et al., 2004). A study estimated the prevalence to be 2.6% to 7.8% in bipolar spectrum disorder (BSD) form of American population (Tohen and Angst. 2002). Another study that was conducted with samples from 11 countries of the Americas, Europe and Asia, found that lifetime prevalence of BPD was 2.4% (Merikangas et al., 2011). It is the ninth leading cause of years of healthy life lost due to premature mortality and disability (WHO, 2008). An estimated 0.9% of the total global burden of disease was due to BPD in 2004 and affected an estimated 29.5 million people worldwide (WHO, 2008). It also accounted for 9.9 million disability-adjusted life-years (DALYs) in 2013, 0.4% of total DALYs and 1.3% of total years lived with disability (Ferrari et al., 2016).

It is found that BPD has a hereditary connection (Tohen, Bromet, Murphy et al., 2000) and the first-degree blood-connected relatives are highly vulnerable (APA, 2010). BPD patients have significant relationship with hypertension, dyslipidemia and diabetes (Bora et al., 2018). Environmental factors influence its severity and clinical course (Fanny and Thomas, 2017). Stressful life events, both in childhood and adulthood, and substance abuse affect onset, recurrence and severity of BPD (Agnew-Blais and Danese, 2016; Lex et al., 2017). Its incidence is increased by viral infection and trauma (Marangoni et al., 2016). The common mental comorbidities of BPD include anxiety, substance abuse, conduct disorders, eating disorders, abnormal sexual behavior, attention-deficit/hyperactivity, impulse control, autism spectrum disorders etc., and the medical comorbidities are migraine, thyroid illness, obesity, type II diabetes and cardiovascular diseases (McElroy, 2004). The usual age of onset of BPD is 18-22 years and is common in both males and females (Hirschfeld et al., 2002; Suominen et al., 2009). Usually, males show predominance of mania, both at onset and throughout their lifetime, and substance abuse is a common comorbidity among them (Saioa López-Zurbano, 2014).

In Bangladesh, a few numbers of studies investigated prevalence of clinically diagnosed BPD among mental patients (Karim et al., 2006; Rabbani et al., 2009; Mandal et al., 2007). There are also some other studies that had been conducted on specific mental diseases like

depression (Billah SMB and Khan FI, 2014; Nasima Selim, 2010), schizophrenia (Mahmud et al., 2015), anxiety disorder (Sultan-E-Monzur et al., 2015), substance use disorder (Shazzad et al., 2017; Islam and Hossain, 2017), obsessive compulsive disorder (Ahmed et al., 2015) etc. To the best of our knowledge, no study has yet been done in Bangladesh exclusively on bipolar disorder neither among general population nor married males.

Usually, in Bangladesh, married males play the vital role in earning livelihood for the family. If they fall sick, they cannot perform the duties efficiently thereby pushing the family into unbound sufferings, and ultimately creating a great public health concern for the country.

In perspective of the above-mentioned situations, this study was aimed to determine the prevalence of bipolar disorder among married adult males in Rajshahi city, Bangladesh, and investigate the associated risk factors.

MATERIALS AND METHODS

This was a household-based cross-sectional study. The married adult males of at least 18 years and currently living with their partners in the same households in Rajshahi city area were included as samples. The subjects of less than 18 years, not living with their wives and seriously sick were excluded. The age of the respondents ranged from 18 to 82 years.

Sample size determination

The total number of households in Rajshahi city is 99,222 (BBS, 2017). To determine the sample size for this study, the mathematical formula $n=N/(1+Nd^2)$ was used, where n =sample size, N =population size and d =margin of error (0.05). The formula provided that 398 samples would be sufficient for this study.

Sampling and data collection procedure

The samples were selected using multistage stratified systematic sampling. In the first stage, three wards were randomly selected out of the 30 wards of Rajshahi city. In the second stage, three muhallas were selected from each selected ward by random sampling. In the third stage, 50 households were selected from each selected muhalla using systematic random sampling. Then one married adult male was chosen from one selected household. In case of more than one married adult males in a selected household, one of them was selected by lottery.

A semi-structured questionnaire was used for collecting data. The questionnaire was at first written in English, then translated to Bangla so that the respondents and their family members could easily understand and answer the questions. The questionnaire was reviewed and edited by three experts. The final form of the questionnaire consisted of 56 questions regarding anthropometric, demographic, socioeconomic and familial information and physical and

mental conditions of the respondents. It included 20 questions of bipolar spectrum disorder scale (BSDS) (BSDS, 2013).

Three adult male interviewers were trained for collecting data in three wards. They went to the respective selected households and briefed the respondents about the research. A total of 26 respondents refused to give any kind of information or interview. Written consent was taken from the agreed subjects. Most of them gave instant interview on the spot (their respective households). However, some subjects took the questionnaire and asked the interviewers to collect it later. In such cases, the interviewers collected the answered questionnaires on other days. 8 such respondents failed to return their questionnaires. Finally, 364 subjects took part in the study. The rate of participation was 91.46%. However, 10 questionnaires were found incompletely filled-up. These were discarded. Thus, finally, data of 354 subjects were available for analysis. The survey was conducted during the period of May 15 to June 30, 2019.

Outcome (dependent) variable

The outcome variable for this study was BPD among married adult males. For screening BPD, 20 questions of BSDS were included in our questionnaire. BSDS is a very effective tool for assessment of BPD with a sensitivity of 0.76 and specificity of 0.93 (Ghaemi et al., 2005). Scores of the 20 questions ranged from 0 to 25. Classification of BSDS scores were modified a little and rearranged followingly: 'no bipolar disorder' (0-12 points), 'probable bipolar disorder' (13-19 points), and 'bipolar disorder' (20-25 points). This classification was used for determining prevalence of BPD. However, as the prevalence values of 'bipolar disorder' and 'probable bipolar disorder' were found very low, for convenience of doing further statistical analysis, BPD was re-classified as 'bipolar disorder' (13-25 points) and 'no bipolar disorder' (0-12).

Independent variables

Based on similar studies conducted in the past, and considering the objectives of this study, some anthropometric, demographic, socio-economic, familial, medical and psychosocial factors were considered as independent variables in this study. The variables were age (18-30 years, ≥ 31 years), nutritional status (under-nourished, healthy, over-nourished), respondent's education level (uneducated, primary, secondary, higher), father's education level (uneducated, primary, secondary, higher), mother's education level (uneducated, primary, secondary, higher), respondent's occupation (home workers, hard workers, service), type of family (nuclear, joint), number of family members (2-3 members, 4-6 members, ≥ 7 members), family's monthly income (poor, $\leq 20,000$ Taka; middle, 21,000-50,000 Taka and

rich, $\geq 51,000$ Taka), age at the first marriage (<18 years, ≥ 18 years), duration of present conjugal life (<5 years, 5-15 years, >15 years), death of children (no, yes), number of live children (0, 1, ≥ 2), number of marriage (once, twice or more), stress/anxiety (no, yes), relationship with partner (good, poor), substance abuse (no, yes), if sick treated immediately (no, yes), comorbid chronic disease (no, yes), family members' chronic disease (no, yes), comorbid mental disease (no, yes), blood relative's mental disease (no, yes), suicidal thought/attempt (no, yes), blood-relative's suicide/suicidal attempt (no, yes) and death of beloved one (no, yes).

Statistical Analysis

Frequency distribution was utilized to determine the prevalence of BPD. The Chi-square test and binary logistic regression model were used to investigate the associated factors and effect of these factors on BPD. SPSS (IBM, version 22) was used for analyzing the data. The significance level was set at 5% ($p < 0.05$).

RESULTS

The frequency distribution revealed that the prevalence of BPD, probable BPD and no BPD among married adult males in Rajshahi city, Bangladesh was 4 (1.1%), 18 (5.1%) and 322 (93.8%) respectively (Fig.1).

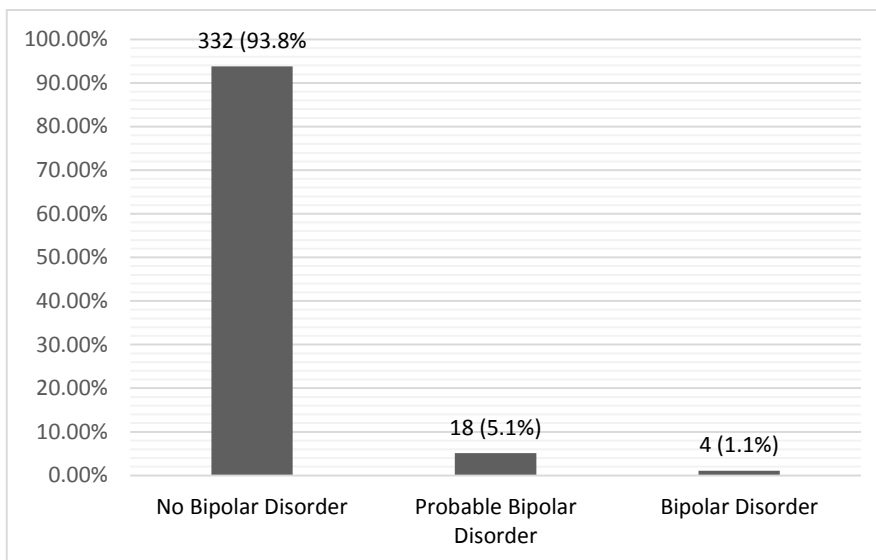


Figure 1: Prevalence of BPD (three categories) among married adult males in Rajshahi city, Bangladesh

To do further statistical analysis, the prevalence of BPD was determined in two categories- BPD and no BPD and that was 22 (6.2%) and 332 (93.8%) respectively (Figure 2).

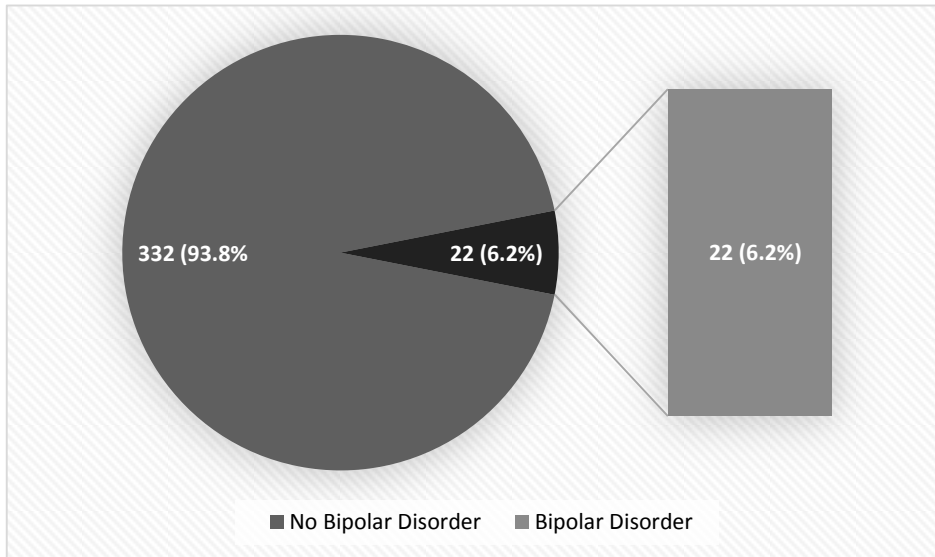


Figure 2: Prevalence of BPD (two categories) among married adult males in Rajshahi city, Bangladesh

To investigate the associations of BPD, the chi-square (χ^2) test was done and it demonstrated that respondent's education level, father's education level, respondent's occupation, family's monthly income, nutritional status, stress/anxiety, substance abuse, suicidal thought/attempt, blood-relative's suicide/suicidal attempt, comorbid mental disease, blood relative's mental disease, relationship with partner and comorbid chronic disease were statistically significant ($p < 0.05$) factors associated with BPD among the married adult males (Table 1). Only the significant factors were shown in the table which was considered as independent variables in the logistic regression model.

Table 1: Association of socio-economic, household, familial, medical and psychological factors with bipolar disorder among married adult males in Rajshahi city, Bangladesh

Variables N (%)	No BPD N (%)	BPD N (%)	X ² -value	p-value
Respondent's education level			13.107	0.005
Uneducated, 35 (9.89)	28 (80.0)	7 (20.0)		
Primary, 101 (28.53)	95 (94.1)	6 (5.9)		
Secondary, 87 (24.58)	83 (95.4)	4 (4.6)		
Higher, 131 (37.00)	126 (96.2)	5 (3.8)		
Father's education level			16.025	0.001
Uneducated, 143 (40.40)	126 (88.1)	17 (11.9)		
Primary, 110 (31.07)	109 (99.1)	1 (0.90)		
Secondary, 59 (16.67)	55 (93.2)	4 (6.8)		

Higher, 42 (11.86)	42 (100.0)	0 (0.0)		
Respondent's Occupation			7.670	0.041
Home workers, 5 (1.41)	5 (100.0)	0 (0.0)		
Hard workers, 189 (53.39)	171 (90.5)	18 (9.5)		
Service, 160 (45.20)	156 (97.5)	4 (2.5)		
Family's monthly income			5.592	0.049
Poor, 113 (31.92)	101 (89.4)	12 (10.6)		
Middle, 209 (59.04)	200 (95.7)	9 (4.3)		
Rich, 32 (9.04)	31 (96.9)	1 (3.1)		
Nutritional status			11.903	0.004
Under-nourished, 26 (7.34)	23 (88.5)	3 (11.5)		
Healthy, 219 (61.86)	213 (97.3)	6 (2.7)		
Over-nourished, 109 (30.80)	96 (88.1)	13 (11.9)		
Stress/Anxiety			10.249	0.001
No, 165 (46.61)	162 (98.2)	3 (1.8)		
Yes, 189 (53.39)	170 (89.9)	19 (10.1)		
Substance abuse			39.52	0.001
No, 311 (87.85)	301 (96.8)	10 (3.2)		
Yes, 43 (12.15)	31 (72.1)	12 (27.9)		
Suicidal thought/attempt			18.02	0.002
No, 338 (95.48)	321 (95.0)	17 (5.0)		
Yes, 16 (4.52)	11 (68.8)	5 (31.3)		
Blood relative's suicide/ attempt			32.31	0.001
No, 335 (94.63)	320 (95.5)	15 (4.5)		
Yes, 19 (5.37)	12 (63.2)	7 (36.8)		
Comorbid mental disease			4.518	0.045
No, 338 (95.48)	319 (94.4)	19 (5.6)		
Yes, 16 (4.52)	13 (81.3)	3 (18.8)		
Blood relative's mental disease			23.17	0.001
No, 345 (97.46)	327 (94.8)	18 (5.2)		
Yes, 9 (2.54)	5 (55.6)	4 (44.4)		
Relationship with partner			13.75	0.010
Poor 8 (2.26)	5 (62.5)	3 (37.5)		

Good, 346 (97.74)	327 (94.5)	19 (5.5)		
Comorbid chronic disease			15.56	0.001
No, 307 (86.72)	294 (95.8)	13 (4.2)		
Yes, 47 (13.28)	38 (80.9)	9 (19.1)		

Then binary logistic regression analysis was done to assess effect of the associated factors on BPD (Table 2). It demonstrated that uneducated subjects were more likely to have BPD than the subjects of primary education (AOR=6.300, 95 % CI: 1.863-21.307; $p<0.01$). Over-nourished males were more prone to develop BPD than the healthy males (AOR=-1.570, 95 % CI: 0.077-0.564; $p<0.01$). The married males who had poor relationship with their partners were more likely to develop BPD (AOR=0.097 95 % CI: 0.022-0.436; $p<0.01$). The males with substance abuse (AOR=-2.455, 95 % CI: 0.034-0.215; $p<0.01$), comorbid mental disease (AOR=0.258, 95 % CI: 0.068-0.984; $p<0.05$), blood-relative's mental disease (AOR=0.069, 95 % CI: 0.017-0.278; $p<0.01$), stress/anxiety (AOR=0.166, 95 % CI: 0.048-0.571; $p<0.01$), suicidal thought/attempt (AOR=8.583, 95 % CI: 2.679-27.495; $p<0.01$), blood-relative's suicide/suicidal attempt (AOR=0.093, 95 % CI: 0.030-0.285; $p<0.01$) and comorbid chronic disease (AOR=0.187, 95 % CI: 0.075-0.466; $p<0.01$) were more vulnerable to developing BPD than their counterparts.

Table 2: Effect of the associated socio-economic, household, familial and psychological factors on bipolar disorder among married adult males in Rajshahi city, Bangladesh

Variables	B	P value	AOR	95% CI of AOR	
				Lower	Upper
Respondent's education level					
Uneducated vs High educated ^R	1.841	0.003	6.300	1.863	21.307
Primary vs High educated ^R	0.465	0.454	1.592	0.472	5.371
Secondary vs High educated ^R	0.194	0.777	1.214	0.317	4.655
Nutritional status					
Undernourished vs Overnourished ^R	-0.037	0.957	0.963	0.253	3.661
Healthy vs Overnourished ^R	-1.570	0.002	0.208	0.077	0.564
Relationship with Partner					
Good vs Poor ^R	-2.335	0.002	0.097	0.022	0.436
Substance abuse					

No vs Yes ^R	-2.455	0.001	0.086	0.034	0.215
Comorbid mental disease					
No vs Yes ^R	-1.354	0.047	0.258	0.068	0.984
Blood relative's mental disease					
No vs Yes ^R	-2.676	0.001	0.069	0.017	0.278
Stress/anxiety					
No vs Yes ^R	-1.798	0.004	0.166	0.048	0.571
Respondent's suicidal attempt					
No vs Yes ^R	-2.150	0.001	8.583	2.679	27.495
Blood relative's suicide/attempt					
No vs Yes ^R	-2.375	0.001	0.093	0.030	0.285
Comorbid chronic disease					
No vs Yes ^R	-1.678	0.001	0.187	0.075	0.466

B- Coefficient; AOR- Adjusted Odds Ratio; CI- Confidence Interval; R- Reference factor

DISCUSSION

In this study, the prevalence of BPD (1.1%) and probable BPD (5.1%) falls within the global prevalence range– 14.3% in Pakistan (Rahman Raza et al., 2014), 8.6% in India (Shenoy and Praharaj, 2019), 2.4% in 11 countries of the Americas, Europe and Asia (Merikangas et al., 2011), 2.2% in Canada (Schaffer et al., 2006), 2.0% in England (Tobias and Steven, 2018) and 1.2% in Singapore (Chong et al., 2012). While considering in two categories, the prevalence of BPD was determined as 6.2%. Hence, the prevalence of BPD in spectrum form ranged from 1.1% to 6.2% which was consistent with the global bipolar spectrum disorder (BSD) prevalence that ranges from 2.6% to 7.8% ((Tohen and Angst. 2002). BPD prevalence is usually higher in urban environments than in the rural areas (Tsuchiya et al., 2003). This might be a cause of comparatively higher prevalence of BPD (in spectrum form), as all of our subjects came from urban areas.

No education was found to have important effect on BPD in our study. Supporting this finding, an earlier study observed that only 16% of BPD patients completed a college degree against 47% of the comparison group (David C. Glahn et al., 2006), i. e., BPD is more common among uneducated or less educated people. The probable cause behind it might be that uneducated people remain under continued stress and anxiety with earning livelihood. Besides, they are usually poor and more vulnerable to BPD ((Michael Bauer et al., 2011, Schoeyen et al., 2011). Influential effect of over-nutrition on BPD found in this study

simulates with the finding of some previous studies that showed obesity was contributory to BPD (Zhao Z, Okusaga OO, Quevedo J et al. 2016; Beyer JL and Payne ME, 2016).

This study revealed that the married males with comorbid mental disease, stress/anxiety and comorbid chronic disease were at high risk of developing BPD. These findings are supported by the findings of other previous studies such as in Europe (Pini et al., 2005), United States (Merikangas et al., 2007) and globally (Krishnan, 2005), (Bora et al., 2018). Marital life often becomes stressful and can trigger onset or relapse of mental illness (Grover et al., 2017) that justifies the poor husband-wife relationship being an important precipitating risk factor for BPD among married adult males as was found in this study. However, it was not possible to compare this finding, as to the best of our knowledge, no such study was conducted earlier. In this study, the respondents who had suicidal thought/attempt were more prone to develop BPD that is consistent with findings found in many other studies (Latalova K, 2014; Jamison KR, 2000). Significant comorbidities of mental disease and suicide/suicidal thought among blood-connected relatives of the respondents with BPD prove hereditary connection (Wu Y, Dang M, Li H et al., 2019; Latalova K, 2014.)

Strength and Limitations

This study determined, perhaps for the first time in Bangladesh, prevalence and associated factors of bipolar disorder among married adult males. Thus, it is suggested that the hypothesis of this study was demonstrated to be true. A new risk factor (relationship with partner) of BPD was discovered. Appropriate statistical models were used in this study. It is a household study which gave truer picture of the situation regarding BPD and its associated factors. However, this study had some limitations too. Types of BPD could not be determined in this study. The cross-sectional study could not establish actual cause-effect relationship. This study did not specify physical and mental comorbidities and biochemical factors. Some other important issues such as environmental factors, lifestyle, familial culture and customs, effects of drugs, treatment options and outcomes, etc. could not be studied. These limitations demand further in-depth and elaborate research strategies.

Conclusions and Recommendations

The current study determined the prevalence of bipolar disorder (1.1%) and bipolar spectrum disorder range (1.1%-6.2%) among married adult males in Rajshahi city, Bangladesh. It also detected the associated risk factors of BPD among them. The most influential factors were no education, under nutrition, hard work, poor relationship with partner, substance abuse, comorbid mental disease, blood-relative's mental disease, stress/anxiety, suicidal thought/attempt, blood-relative's suicide/suicidal attempt and comorbid chronic disease. As

no study has yet been conducted on BPD in Bangladesh, this current study laid down the ground-stone for further research regarding different aspects and issues of BPD in the country, such as, familial environment and culture, comorbidities, treatment options, treatment outcomes, biochemical picture, etc.

The findings of this study suggest that the government, non-government, social, religious and cultural organizations should intervene at the household (family) level to improve familial environment, reduce poverty, and enhance education and employment facilities for the people to reduce prevalence and severity of BPD. Health care facilities, especially mental health services should be easily available and accessible to all people. The health professionals should pay attention to the household and familial issues too while giving treatment and preventive and rehabilitating service to the BPD patients. The families and health professionals should take special care for finding out, treating and preventing the physical and mental comorbidities to which BPD patients are more vulnerable.

Ethical clearance

Ethical clearance for the study was taken from the Institutional Animal, Medical Ethics, Biosafety and Biosecurity Committee (IAMEBBC) for Experimentations on Animal, Human, Microbes and Living Natural Sources, Institute of Biological Sciences, University of Rajshahi, Bangladesh (Memo No: 120/ 320/ IAMEBBC/ IBSc, dated 11 April, 2019).

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Conflict of interest

All authors declare no conflicts of interest.

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