

Signs of Bruxism and Temporomandibular Disorders among Patients with Bipolar Disorder

SUMMARY

Background/Aim: There is an abundance of data regarding temporomandibular disorders (TMD) and bruxism specific to patients with bipolar disorder (BD). This study aimed to investigate the prevalence of TMD signs in subjects with and without BD. **Material and Methods:** The case group included 242 adult patients (103 men and 139 women) with BD and the control group included 187 subjects without BD (89 men and 98 women). The case and control groups were compared for the presence of bruxism and the signs of TMD including muscle and temporomandibular joint (TMJ) tenderness to palpation, limitation of maximum mouth opening, and TMJ sounds. **Results:** The frequency of at least one sign of TMD was significantly higher in patients with BD (191/242, 78.9%) than the control group (95/187, 50.8%) ($p < 0.001$). Statistically significant differences were found between the case and control groups in terms of joint pain on palpation ($p < 0.05$), masseter muscle pain on palpation ($p < 0.01$), joint clicks ($p < 0.001$) and limited mouth opening ($p < 0.001$). Bruxism was significantly higher in patients with BD (49.6%) than the control group (19.8%) ($p < 0.001$). **Conclusions:** Patients with BD appear to be more prone to having TMD signs and bruxism compared to the control group, but this comorbidity should be better understood by further studies.

Key words: Bipolar Disorder, Temporomandibular Disorder Signs, Bruxism

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Introduction

Temporomandibular disorders (TMDs) are a wide group of clinical problems which involve the masticatory muscles, the temporomandibular joint (TMJ), and the accompanying structures of the stomatognathic system¹. The etiology of TMDs involves biomechanical, neuromuscular, biopsychosocial, and neurobiological factors². From an etiological viewpoint, there are some suggestions that psychosocial factors deserve special attention³, due to the fact that TMDs are quite common in patients with psychiatric disorders³⁻⁸. In addition, psychiatric disorders and TMDs seem to share some of the same comorbidities, such as reduced quality of life^{3,9}. In addition to the single or combined effects of the psychotropic drugs, the deterioration of the stomatognathic apparatus among psychiatric patients may be precipitated by the impaired social and cognitive

functioning resulting in a relative poor quality of life^{6,8,10}. It has also been suggested that bruxism may be associated with emotional tension, psychosomatic disorders, hostility, aggressiveness, apprehension and a tendency to worrying, as well as with psychiatric disorders¹¹⁻¹³.

Bipolar disorder (BD) is a severe intermittent psychiatric disorder which remains as one of the most challenging psychiatric disorder to manage with a prevalence rate of 4%¹⁴. BD disrupts the patients overall health status, quality of life and ability to function throughout the whole life¹⁵. Due to the significant economic, social, individual and familial burdens caused by the BD on patients, it is classified as the sixth leading cause of disability worldwide¹⁶. However, there is insufficient information in the literature which focuses on TMDs in patients with BD¹⁷ who need to be treated for long periods¹⁴. There are a number of studies present on the disruption of the dopaminergic system which is known

to have a role in BD¹⁸, that may also have a role in the etiopathogenesis of bruxism¹⁹. The present study is aimed at investigating the prevalence of the signs of TMD and bruxism in a group of patients with BD, being compared to a control group. The hypothesis was that signs of TMDs and bruxism would be more prevalent in patients with BD.

Material and Methods

The case group comprised of 242 patients with BD who were consecutively admitted to the Mood Clinic of Psychiatry during the period from January 2012 through October 2012. The mean age of the case group was 35.83 years (SD= 9.65). Mean duration of BD was 13.0 years (SD= 7.7), mean length of treatment was 11.32 years (SD= 7.46) and the mean number of hospitalizations was 6.52 (SD= 4.81). The patients were diagnosed with BD in accordance to DSM-IV (Diagnostic and Statistical Manual of Mental Disorders) criteria²⁰ on the basis of case records review which is a semi-structured interview based on checklist of items from DSM-IV (performed by K.A., psychiatrist) and information obtained from relatives in or the back the validity of diagnosis. In the course of the clinical examinations, all of the patients with BD were in remission; HDRS (Hamilton Depression Rating Scale)²¹ and YRMS (Young Mania Rating Scale)²² were <7. Inclusion criteria for patients were being adults (over the age of 18), had natural dentition or fixed dental rehabilitation. Patients were excluded from the study if they, had a history of drug or alcohol abuse, a history of facial or cervical injury, an identifiable neurological disorder, any signs of mental retardation or somatic disorder with neurological components, hormonal diseases, or neoplasms⁵.

The control group consisted of 187 subjects with a mean age of 37.3 years (SD= 8.9). The control group was defined as the absence of a major axis I (clinical syndromes) and axis II (personality disorders and developmental disorders) psychiatric disorder according to DSM-IV criteria²⁰. The controls satisfied inclusion and exclusion criteria similar to those applied to the patients. Additionally, potential controls were excluded if they had a first degree relative with a history of psychotic disorder, mood disorders, or suicide.

This study was conducted in according with the Helsinki Declaration and was approved by the institution's ethics committee (B10.4.ISM04.34.26.08-24053). All subjects gave written informed consent to participate. TMD signs and bruxism were assessed through clinical examination performed by a single examiner (O.G. prosthodontist) who was blinded to group allocation, throughout the study. Reliability studies were conducted using a second assessor (G.M. prosthodontist) who was blind to diagnosis under the same conditions. The second assessor separately examined and measured the 30

randomly selected subjects from the current study groups using the same protocols. All nominal variables in the inter-observer examination indicated substantial to almost perfect agreement between them, as assessed by Kappa coefficient (0.76 to 0.82)²³.

Four cardinal TMD signs including limited mouth opening (measurements of interincisal distance in active maximal mouth opening plus vertical overlap), the presence of joint sounds (clicking/crepitation), joint and muscle (masseter and temporalis) tenderness to palpation were assessed. Clinical examination was performed by utilizing the procedures described in Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) Axis I principles²⁴. A scale of 0 to 3 was used for joint and muscle tenderness to palpation (0= no pain, 1= mild pain, 2= moderate pain, 3= severe pain). Joint and muscle tenderness to palpation was defined as at least 2 in a scale of 0 to 3. All these data were collected as categorical ones (present / absent of signs).

The diagnosis of bruxism was based on history and clinical assessment according to the criteria of the American Academy of Sleep Medicine²⁵. For diagnosis, the subjects reported or were aware of tooth-grinding sounds or tooth clenching during sleep or awake and one or more of the following should be present: (1) abnormal wear of the teeth (the presence of wear facets on teeth is a clinical indicator of bruxism); (2) jaw muscle discomfort, fatigue, or pain and jaw locking upon awaking; (3) masseter muscle hypertrophy during voluntary forceful clenching. The presence of tooth wear on one mandibular canine was evaluated according to Johansson et al.²⁶ (grade 0-no visible facets, grade 1-enamel only, grade 2-enamel and dentin, and grade 3-extensive cusp abrasion). Abnormal tooth wear was defined as present when grade 2 and 3. Patients were considered positive for the presence of bruxism when the clinical and at least one of the anamnestic indicators were positive, so that the two indicators, clinical and anamnestic, serve as a control for each other.

The data were subjected to descriptive and statistical analysis using SPSS for Windows statistical software package version 18.0. T-test for continuous variables and Chi-Square-tests for qualitative variables were used to evaluate differences between groups. A p value, $p \leq 0.05$, was defined as statistically significant.

Results

A comparison of sociodemographic data between the case and control group is presented in Table 1. There were no statistically significant differences between the two groups in terms of the age, gender and educational level ($p > 0.05$). The psychiatric data of the patients with BD are presented in Table 2. Psychiatric diagnosis of the case group consisted of 201 patients with Bipolar I, 8 patients with Bipolar II, 33 patients with BD, not otherwise specified (NOS)²⁰. As

shown in Table 3, significant differences were found between the case and control group for limited mouth opening ($p<0.001$), temporomandibular joint clicks ($p<0.001$), and masseter muscle pain to palpation ($p<0.001$) and joint pain to palpation. No significant difference was found between the groups regarding the prevalence of crepitation and temporal muscle tenderness to palpation ($p>0.05$). Bruxism was more prevalent among patients with BD (49.6%) compared with the control group (19.2%) ($p<0.001$). The total frequency of any TMD signs was higher in the patients with BD (191/242, 78.9%) than the control group (95/187, 50.8%) ($p<0.001$).

Table 1. Clinical and demographic characteristics of subjects with and without BD

	Bipolar Disorder	Control	p value
Age (m \pm SD)	35.83 \pm 9.65	37.30 \pm 8.99	0.070
Gender			0.300
Male	103 (42.6)	89 (47.6)	
Female	139 (57.4)	98 (52.4)	
Educational Level N (%)			
8 years or less	96 (39.7)	88 (47.1)	0.100
More than 8 years	146 (60.3)	99 (52.9)	
Marital Status N (%)			
Single	118 (48.8)	43 (23.0)	
Married	102 (42.1)	136 (72.7)	<0.001*
Divorced/Widowed	22 (9.10)	8 (4.30)	

(m \pm SD) mean \pm standard deviation, p values were calculated by using t test; N (%) number of cases (%); p values were calculated by using chi-square test. *Statistically significant difference between the two groups

Table 2. Psychiatric data of subjects with BD

Psychiatric Data	N	%
Psychiatric Diagnosis		
Bipolar I	201	83.1
Bipolar II	8	3.3
Bipolar Disorder NOS	33	13.6
First episode		
Depression	108	44.6
Mania-hypomania	112	46.3
Mixed	4	1.7
Undifferentiated	11	7.4
ECT	67	27.7
History of illness in relatives		
Type of illness in relatives	133	54.9
Type of illness in relatives		
Bipolar disorder	99	40.9
Schizophrenia	16	6.6
Other	15	6.2
Undifferentiated	19	7.9
Psychiatric treatment*		
No drug during the assessment	7	2.9
Mood stabilizer monotherapy	46	19
Mood stabilizers +Antipsychotics	153	63.2
Antipsychotic monotherapy	8	3.3
Polypharmacy	28	11.6

N: number of cases; (%): percentage of group; NOS: Not Otherwise Specified, ECT: Electroconvulsive Therapy *46 patients were taking one or more than one mood stabilizer such as lithium, valproate sodium, carbamazepine, lamotrigine (19%); 153 were taking a combination of mood stabilizer and atypical antipsychotic and/or typical antipsychotic such as risperidone, olanzapine, quetiapine, aripiprazole, clozapine, chlorpromazine (63%); 8 were taking atypical antipsychotic and/or typical antipsychotic monotherapy (3.3%); 28 were taking at least 3 or more agents such as mood stabilizer, atypical antipsychotic and/or typical antipsychotic, antidepressant medications such as tricyclic antidepressants and selective serotonin reuptake inhibitors (11.6%).

Table 3. Prevalence of temporomandibular disorder signs and bruxism in patients with and without BD

	Bipolar Disorder		Control		Significance p value
	N	%	N	%	
Limited mandibular opening	55	22.6	18	9.6	0.000*
Clicking	120	49.6	59	31.6	0.000*
Creptitation	26	10.7	11	5.9	0.070
TMJ tenderness	51	21.1	23	12.3	0.010*
Masseter tenderness	67	27.7	31	16.6	0.007*
Temporalis tenderness	37	21.1	20	10.7	0.100
At least one of the 6 TMD signs	191	78.9	95	50.8	0.000*
Bruxism	120	49.6	37	19.8	0.000*

TMD: Temporomandibular disorder, TMJ: Temporomandibular joint. The p value was calculated by using chi-square test. * $p<0.05$, statistically significant difference between groups.

Discussion

This study provided an opportunity to support our knowledge on the prevalence of TMD signs and its distribution among patients with BD. The main finding of the present study was a higher prevalence of bruxism and TMD signs, expressed as joint clicking, joint tenderness to palpation and masseter muscle tenderness to palpation and limited mouth opening in patients with BD compared to a control group. The results are consistent with previous clinical studies of psychiatric patients³⁻⁸. On the other hand, the present study only analyses the signs of the TMD which is not synonymous with the TMD. It must be noted that while a TMD sign can indicate a clinical condition alone, it may also be a subclinical event or a normal variation. In healthy populations, the prevalence of TMD signs are found to be higher. Epidemiological studies show that between 33% and 86% of the general population shows at least on symptom for TMD, and between 12% and 51% of the population are aware of the symptoms²⁷. A multiplicity of factors may be considered in efforts to explain this relationship. Like other psychiatric problems, these may include not only inherent conditions such as the burden of recurrent mood episodes, impaired cognitive and social functioning and relatively poor quality of life associated with the illness itself but also the side effects of the psychotropic medications³⁻⁸. Future research is encouraged to validate these preliminary results and evaluate further the relationship between BD and TMD.

The prevalence of bruxism found in the BD group, approximately 50%, was not very surprising. Due to motor dysfunctions associated with psychiatric disorders, it is likely that many patients with mental illness develop parafunctional habits such as bruxism. Several explanations may account for this phenomenon. Increased levels of emotional stress cause an increase in the muscle tone in the head and neck as well as the level of non-functional muscle activity, such as bruxism and teeth clenching²⁸. It is also reported that bruxism is related with disturbances in mood phenomenology, levels of activity, and cognitive functions which manifest themselves as alternating periods of reduced (depressed) and increased (manic) functions²⁹. In addition, several hypothesis from the studies on neurotransmitter systems under the influence of medications may explain regarding association between bruxism and BD. Complications such as oral dyskinesia caused by the longer term of use of antipsychotic drugs may be a contributing factor to muscle stiffness, temporomandibular joint degenerative changes, damage to teeth and dental prostheses and oromandibular dystonia which causes involuntary and excessive contractions of the tongue, lip and jaw muscles³⁰. Given the nature of our study, we cannot claim that surely medications and not the pathologies themselves

cause bruxism, but international literature supports the correlation between medications and bruxism³¹.

Another important finding in this study is the significant difference with respect to the limited mandibular opening between groups. Maximum mouth opening distance is used for the estimation of the temporomandibular joint mobility and function³². In the present study sample, 23% of patients with BD vs. 9.6% in controls, showed limited mouth opening; however the patients haven't felt impaired by the symptom and did not seek medical treatment. Therefore, the clinical relevance regarding the difference of pain-free mouth opening between groups remains unclear. It can be argued that the higher prevalence of bruxism in patients with BD may contribute to the significant difference of limited mouth opening between the patient groups. Hyperactivity of the muscles of mastication can slowly progress to reduced jaw opening and usually associated with tiredness and/or pain in the muscle groups³³.

In the present study, joint clicking was the most common single sign reported as occasional to frequent however, crepitus, was also evaluated and no significant difference was found between groups. TMJ sound is reported to be a common clinical finding and a subjective report in TMD patients according to the epidemiological investigations and clinical series³³. Therefore it may be disregarded as regular finding due to the fact that it is a common finding in asymptomatic individuals as well^{33,34}. In view of this, the significant differences in pain or tenderness of joint and masseter muscle to palpation between patients with BD and controls are important, because pain during function and/or at rest is the primary reason for patients to seek treatment¹. The finding of significant difference of joint and masseter muscle tenderness to palpation in patients with BD and controls is in line with the previous findings regarding psychiatric patients^{3,5}. Also, the literature reports that there is a positive relationship between psychological distress and muscle pain³⁵. Motor dysfunctions associated with psychosocial disorders may give rise to a sustained activity of the masticatory muscles increasing their anaerobic metabolism³⁶. Fatigue, muscle spasms and pain are associated with prolonged tension and simultaneous production of lactic acid⁶. On the other hand, pain or tenderness during palpation of the masseter muscle and joint is not an entirely objective finding, as it is also an expression of a subjective feeling which can lead to the overestimation of the clinical signs. Although pain is the major reason for seeking medical care, difficulties in getting an accurate patient history regarding the BD and differences in pain threshold among all psychiatric disorders must also be considered³⁷.

There are several limitations of this study: (1) The absence of clinical diagnosis of TMD. A single symptom or sign from the masticatory system is not synonymous with TMD; nor does it automatically lead to a TMD

diagnosis. (2) Keeping this in mind, diagnosis of bruxism in this investigation, which did not aim to distinguish sleep from wakeful bruxism, was based upon the presence of a clinical and at least one anamnestic indicator. It can be definitively diagnosed with electrophysiological tools, such as polysomnography or an ambulatory recording system, but it is not easily applicable to this study group³⁸. (3) The possible effects of medication on TMD signs and bruxism were not evaluated (due to heterogeneity of type of medication, that has not allowed any analysis comparing the different effects of each treatment).

Conclusions

Within the limitations of this study, it can be concluded that BD patients are more prone to having TMD signs and bruxism compared to the normal population. This study may contribute to better understanding of TMD in this specific population and, therefore, may help health care professionals to identify these problems and direct patients for appropriate treatment.

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