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Mood disorders in subjects with bruxing behavior

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Summary *Objective*. An investigation was conducted on 105 subjects to assess the existence of an association between mood psychopathology and bruxism.

Methods. Validated clinical criteria were used to diagnose bruxism and a self-report validated questionnaire (MOODS-SR) was filled out by each patient for an evaluation of depression and mania symptoms of mood spectrum.

Results. Prevalence of mood psychopathology, as identified by MOODS-SR score $\geq$60, was significantly higher in bruxers (11/38, 28.9% vs. 6/67, 8.9%; $P=0.007$). Significant differences between bruxers and non-bruxers also emerged in total MOODS-SR ($P=0.001$) scores and in total scores of domains evaluating manic ($P=0.001$) and depressive symptoms ($P=0.007$).

Conclusions. Support to the existence of an association between bruxism and mood disorders has been provided. Further studies are strongly needed to clarify mechanisms underlying the described association.

Introduction

Bruxism is considered the most detrimental among all the parafunctional activities of the stomatognathic system.[1] Some works demonstrated an association with signs and symptoms of temporomandibular disorders,[2–4] and in particular with myofascial pain.[5]

Nevertheless, despite the increasing number of works dealing with the various unsolved issues concerning bruxism, there are many interesting aspects which need to be further investigated. A major concern is the definition of bruxism itself, which is a term grouping different entities.[6] For example, sleep and awake-bruxism seem to recognize a different pathogenesis but they are hard to be clinically distinguished;[7] similarly, a clearer distinction between detected bruxism and perceived bruxism should be made.[8] Unfortunately, bruxism as a pathophysiological entity can only be detected by means of polysomnographic recordings, whose employ is limited by the high costs and the low number of adequately equipped sleep laboratory.[9] For these reasons, a set of clinical criteria was developed and validated to screen patients for sleep studies[10] and, even though a clinical approach to bruxism diagnosis still remains incomplete, not allowing a distinction between the different types of such disorder, it is the easiest and most adopted

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method to gather data in large-sample preliminary studies. In particular, one of the aspects for which pilot data have to be provided is represented by the description of temperamental traits which characterize bruxers. Infact, according to some authors,[6,11] psychiatric factors could be involved in the etiopathogenesis of bruxism, and parafunctional activities in general. Such a hypothesis seems to be supported by works suggesting a shift from peripheral (i.e. occlusal) to central (i.e. stress, emotion, personality) regulation theories.[10,12-15]

Some authors, using the same clinical screening oriented criteria, reported that bruxers showed significantly higher scores in a newly adopted validated psychometric instrument evaluating anxiety disorders.[16] Other clinically oriented works tested the existence of an association between parafunctions and psychopathology;[17] others investigated the personality of subjects with long-standing bruxing behavior;[18] others more claimed that stress is a major risk factor and could play a triggering role on the basis of subjective coping and tolerance skills, hypothesizing that stress could act as a disruptor of sleep structure.[19-21]

In such a confuse contest, some papers suggested a role for dopaminergic system disorders,[9,22] which are also related to bipolar disorders.[23] Based on the hypothesis that dopaminergic system disorders might represent a shared pathogenetic pathway for both bruxism and bipolar psychopathology, a pilot study investigated the prevalence of manic-depressive disorders in bruxers, showing an association between mood disorders and anamnestically diagnosed bruxism and also pointing out some interesting aspects concerning a possible relation with manic symptoms.[14]

Therefore, to test the null hypothesis that patients' perception of their bruxing activity could have altered the results of the previous study, so that mood disorders should actually have a similar prevalence in both bruxers and non-bruxers, in the present investigation the same validated psychometric instrument (MOODS-SR) has been used to assess the whole spectrum of mood disturbances in a sample of bruxers identified by means of a validated set of clinical diagnostic criteria.[10]

Materials and methods

Power analysis

To ascertain the size of the study group was statistically significant, a priori calculation of the sample size necessary for this investigation was made.

The values of type I and type II errors were set at 0.05 and 0.10, respectively. Data about the estimated variance were drawn from other works in the literature.[24-26] The difference to detect has been identified in a 40% difference between groups in mean MOODS-SR scores, which can be considered clinically relevant.[27] In consideration of that, to have a 90% statistical power to detect a 40% difference between groups, the needed sample size was about 35 subjects per group.

Study design

Participants were consecutively selected among 20–30 years old patients attending the Section of Prosthetic Dentistry, Department of Neuroscience, University of Pisa, Italy, for conservative care during the year 2003. Subjects were included on the basis of the presence of all permanent teeth, except third molars. Criteria for the exclusion from the study were: presence of Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD)[28] Axis I Group I diagnosis of myofascial pain and/or Group III diagnosis of arthralgia or osteoarthritis; presence of gross malocclusion; presence of neurological disorders; use of medications influencing sleep or motor functions; presence of chronic pain in other areas of the body; presence of rheumatic disorders. One hundred-five subjects (59 males, 46 females; mean age 24.6 ± 3.3 years; range 19–34) satisfied inclusion/exclusion criteria. Participants were clinically investigated for the presence of bruxism and were assessed for the presence of mood psychopathology by means of a self-report questionnaire. Research was approved by the Ethic Committee, and all subjects signed a consensus module prior to the start of the study.

The presence of bruxism was diagnosed according to a validated set of screening oriented clinical diagnostic criteria, so that in the present work bruxism is only approached in terms of its clinical impact on the masticatory apparatus and not as a more complex pathophysiological disorder affecting central nervous system.[10] Diagnosis of bruxism was made when the patient exhibited, at least five nights a week, grinding bruxism sounds during sleep during the last 6 months, as reported by his/her bed partner, and at least one of the following adjunctive criteria: observation of tooth wear or shiny spots on restorations; report of morning masticatory muscle fatigue or pain; masseteric hypertrophy upon digital palpation. All participants were instructed by a trained psychiatrist to fill out

a self-report validated questionnaire (MOODS-SR) to evaluate the mood spectrum.[25]

MOODS-SR is the self-report version of the Structured Clinical Interview for Mood Spectrum (SCI-MOODS), that is an assessment instrument based on the recently proposed spectrum model of psychopathology.[27,29] The SCI-MOODS was validated against the SCID (Structural Clinical Interview for DSM), which represents the standard assessment instrument for psychoatric disorders. The SCI-MOODS was found to discriminate between patients with mood disorders and subjects belonging to control groups as well as between bipolar and unipolar disorders.[30] A good agreement was also shown between interview (SCI-MOODS) and self-report (MOODS-SR) formats.[25]

Self-report version was used in this investigation for practical reasons, since it requires only about 15–30 min to be completed. For such reason, it is also more easily accepted by non-psychiatric patients than an extended psychiatric interview. Infact, all approached patients accepted to fill out the MOODS-SR questionnaire after being appropriately informed of the aim of the study.

The MOODS-SR questionnaire is composed of 161 items providing a separate rating for each of the major DSM-IV depressive and manic symptoms, and also identifying and rating sub-threshold and atypical manifestations. MOODS-SR is capable to detect lifetime, sub-threshold and atypical manifestations of mood spectrum, including symptoms not listed within DSM criteria.[25,29–31]

It is divided into four domains:

- *Mood*. It explores mood phenomenology from subclinical unipolar and bipolar depressive symptoms to severe mixed and manic symptoms.
- *Energy*. It is devoted to energy levels and changes in everyday activities, with particular attention to work, hobbies and social life.
- *Cognition*. It explores the cognitive changes that often occur with energy and mood dysregulation.
- *Rhythmicity and vegetative functions*. It considers disturbances and rhythmic changes in feelings and behavior associated with physical experiences such as eating, sexual activity, and sleep, including variations in affective and subaffective symptoms.

Every item is assigned 1 point if the response is positive or 0 if the response is negative. The seven impairment items at the end of each section are not scored, so that scores of MOODS-SR can range from 0 to 154. Patients with a score of 60 or more are considered to have clinically meaningful spectrum symptoms.[25]

Participants were divided into two groups (bruxers and non-bruxers). Chi-square test was performed to compare prevalence of mood psychopathology between the two groups. Mean ranks of the two groups in MOODS-SR were compared by means of Mann–Whitney test. All statistical procedures were performed with the Statistical Package for the Social Sciences (SPSS 9.0, SPSS Inc., Chicago, IL, USA).

Results

Bruxism was diagnosed in 38/105 (36.2%) subjects, while the remaining 67/105 (63.6%) participants did not meet criteria for bruxism. Despite prevalence of bruxism was higher in females (20/46, 43.5%) than in males (18/59, 30.5%), chi-square test showed that gender difference between groups was not significant (chi-square = 1.883, $P = 0.170$). Similarly, *T*-test showed that bruxers and non-bruxers did not differ as regards mean age (23.9 ± 2.6 vs. 25.0 ± 3.6; $T = 1.625$, $P = 0.107$) (Table 1).

Prevalence of mood psychopathology, as identified by MOODS-SR score ≥ 60, was significantly higher in bruxers (11/38, 28.9% vs. 6/67, 8.9%; $P = 0.007$) (Table 2).

Significant differences between bruxers and non-bruxers also emerged in total MOODS-SR ($U = 786.5$; $P = 0.001$) scores and in total scores of domains evaluating manic symptoms ($U = 783.5$; $P = 0.001$) and depressive symptoms ($U = 872$; $P = 0.007$) (Table 3).

Table 1 Sex distribution and mean age (±standard deviation) of bruxers and non-bruxers.

	Bruxers ($N = 38$)	Non-bruxers ($N = 67$)
Females	20 (43.5%)	26 (56.5%)
Males	18 (30.5%)	41 (69.5%)
Mean age	23.9 ± 2.6	25.0 ± 3.6

Table 2 Prevalence of mood psychopathology (MOODS-SR score ≥ 60).

	Bruxers ($N = 38$)	Non-bruxers ($N = 67$)
MOODS ≥ 60	11 (28.9%)	6 (8.9%)
MOODS-SR < 60	27 (71.1%)	61 (91.1%)

Table 3 Mean ratings (±standard deviation) of bruxers and non-bruxers in MOODS-SR and *P*-values for Mann–Whitney *U*-test.

MOODS-SR	Bruxers ($N=38$)	Non-bruxers ($N=67$)	*P*
Total score	48±20.5	33.4±19.2	0.001
Mood (depression)	6.5±4.0	5±4.8	0.027
Mood (mania)	10.7±4.7	7.6±5.0	0.002
Energy (depression)	3.2±2.4	2±2.2	0.006
Energy (mania)	5.2±2.8	3.4±2.3	0.002
Cognition (depression)	6.2±4.3	3.9±3.7	0.003
Cognition (mania)	6.3±4.0	4.1±3.2	0.006
Vegetative functions	9.7±4.3	7.3±5.2	0.013
Depression (total)	16±9.2	11.1±9.1	0.007
Mania (total)	22.3±10.6	15.1±9.2	0.001

Discussion and conclusions

A consistent amount of literature suggests that peripheral sensory influences play a minor role in the etiopathogenesis of bruxism,[13-15] while central nervous system-related factors seem to have much more importance.[6,9,11] Among these, an interesting issue is represented by the study of the psychic component, whose abnormalities can contribute to determine poor sleep quality[32] and high emotional tension,[29] which are key risk factors for sleep[21] and awake bruxism, respectively.[7]

According to these suggestions, some works addressed the study of the supposed association between bruxism and anxiety,[16,17,20] showing that some symptoms related to anxiety disorders have a significantly higher prevalence in bruxers than in non-bruxers.

Nevertheless, despite some possible common neurological alterations were described in bruxers and bipolar patients,[9,22,23] only one pilot work, to our knowledge, investigated for possible clinical associations between such disorders.[14]

Findings from that paper suggested that a number of both depressive and manic symptoms of the mood spectrum seems to characterize bruxers[14] but, unfortunately, generalization of results was prevented by the anamnestical approach to bruxism diagnosis which did not allow to exclude a possible infuence of patients' self-perception of bruxism on the described associations, and further studies were needed.

In the present investigation, which adopted a validated set of screening oriented clinical diagnostic criteria for the diagnosis of bruxism,[10] the existence of an association between bruxism and mood psychopathology has been confirmed.

Infact, symptoms of both depression and mania have a higher prevalence in bruxers than in non-bruxers, in agreement with results from the pilot work conducted with the same psychometric instrument.[14]

The use of MOODS-SR instrument, which is based on a newly validated concept of spectrum of psychopathology, allowed to identify the presence of a wide range of symptoms belonging to the mood spectrum.

Bruxers seem to be characterized by disturbances in mood phenomenology, levels of activity, cognitive functions and rhythmicity of their vegetative functions; furthermore, such disturbances manifest themselves with an alternation of periods of reduced (i.e. depressed) and increased (i.e. manic) functions.

Mood spectrum abnormalities in the study sample are mostly sub-threshold, even though differences between bruxers and non-bruxers are significant as for the prevalence of over-threshold psychopatholgy as well.

The clinical significance of this study findings is difficult to be established since, despite MOODS-SR has proved to be accurate to detect depression in non-psyhciatric patients,[33] the importance of sub-clinical symptoms in a non-psychiatric population has yet to be defined.

Furthermore, the presence of psychopathological symptoms in bruxers is hard to explain. In particular, while an association with anxiety symptoms and a reduced ability to cope with stress was predictable on the basis of empirical data and clinical observations, and was then supported by a previous work with a similar design,[16] a bruxism-mood disorders relation was quite less predictable.

Based on findings from the present investigation, some suggestions for future researches could be provided. For example, psychiatric literature[23] seems to suggest that bipolar patients are characterized by disturbances in the central neurotransmitter system which may also be involved in the etiology of bruxism.[22,34]

In particular, future works should try to describe common neurological deficits or pathogenetic pathways between manic and depressive disorders and bruxism, if existing. In this sense, there is a strong need to clarify the role of some neurotransmitters, and dopamine in particular, which are called into cause as key factors in the etiopathogenesis of both bipolar disorders and bruxism.[23,35-37]

In conclusion, findings from the present work support the existence of an association between clinically diagnosed bruxism and both depressive and manic symptoms. These observations lend support to studies claiming a role for central and systemic factors in the pathogenesis of bruxism, even though only speculative hypotheses can be proposed about mechanisms underlying the described associations.

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