Bruxism and Oral Health-related Quality of Life among Male Inmates in a Penal Institution, Mysore: A Cross-sectional Study

Abstract

Background: One of the widespread problems of oral health is bruxism and is defined as a parafunctional habit with involuntary grinding and gnashing of the teeth occurring during sleep. However, bruxism is connected to anxiety and stress, but the published literature on bruxism among prison inmates is scanty. Objective: The objective of the study was to determine the prevalence of active sleep bruxism and its impact on oral health-related quality of life (OHRQoL) among inmates in Central Penal Institution, Mysore. Materials and Methods: The study was cross sectional and conducted among eligible male inmates at Central Penal Institution, Mysore. The information on active sleep bruxism and OHRQoL was collected using a predesigned structured questionnaire by means of personal interview by a trained investigator. The active sleep bruxism was assessed using the criteria of American Academy of Sleep Medicine and OHRQoL was through modified oral health impact profile (OHIP-14). The data analysis was done using descriptive statistics, Chi-square test, t-test, analysis of variance, and linear regression model. Results: A total of 212 male inmates aged between 18 and 80 years were considered for the study. The prevalence of active sleep bruxism among the study population was 31.6%. The mean OHIP-14 score was significantly higher ($P < 0.001$) among the inmates having active sleep bruxism (38.52 ± 12.8) suggesting a high oral health impact as compared to inmates without this disorder (31.67 ± 12). Conclusion: The prevalence of active sleep bruxism was higher among the inmates of penal institution as compared to the general population. The active sleep bruxism had a negative impact on OHRQoL.

Keywords: Bruxism, oral health-related quality of life, prisoners

Introduction

One of the widespread problems of oral health is bruxism and is defined as a parafunctional habit with involuntary grinding and gnashing of the teeth during sleep,[1] frequently seen in 9.3%–14% of adults among general population.[2,3] Occurrence of the similar situation during consciousness is known as bruxomania.[4] Bruxism belongs to psychosomatic disorders,[5,6] together with anxiety and negative emotions such as guilt or shame.[7] Although it is not a fatal disorder, it can influence the quality of life, especially through oral problems, such as attrition of teeth, frequent fractures of dental restorations, masticatory dysfunction, and orofacial pain.[8]

Oral health is defined as the health of oral and its related tissues that enable an individual to eat, speak, and socialize without active disease, discomfort, or embarrassment.[9] Over the last few decades, many instruments were developed by several investigators aiming at the measurement of oral health and its impact on quality of life of an individual. Among them, most extensively used with self-evident psychometric properties is the oral health impact profile (OHIP).[10] The OHIP-49 was developed with the aim of providing an aggregate of subjective information on difficulty in function, comfort, and ability of oral conditions. These impacts were intended to complement traditional oral epidemiological indicators of clinical disease that help in gathering information about “burden of oral illness.”[11] Slade simplified original version of the OHIP-49 which was too long to 14-item concise version called as OHIP-14 which indicated consistency and sufficient cross-cultural reliability.[10]

Despite great achievements and awareness in the oral health, problems still persists in

Address for correspondence:
Dr. Ravi Kumar Thetakala,
Department of Public Health Dentistry, Lenora Institute of Dental Sciences, Rajahmundry, Andhra Pradesh, India.
E-mail: ravikumar.dental@gmail.com

How to cite this article: Thetakala RK, Chandrashekar BR, Sunitha S, Maurya M, Sharma P, Shubhi G. Bruxism and oral health-related quality of life among male inmates in a penal institution, Mysore: A cross-sectional study. Indian J Dent Res 2018;29:275-9.
many communities around the world particularly among disadvantaged and socially marginalized. Prisoners are one such disadvantaged, socially marginalized, and underserved population needing special attention.[12]

The prison population is unique and challenging with many health problems, including poor oral health. Many challenges exist in delivering health services in the prison system including service provision with respect to safety, security procedures, recruitment, and retention of dental staff.[13] The challenges affecting the provision of dental care to prisoners are illustrated in the model by Harvey et al.[14]

With prisons being a restricted area with safety issues, only a few research studies about bruxism in prisoners[7,12] have been published, and none of them have investigated the relationship between bruxism and the oral health-related quality of life (OHRQoL). As the information is sparse, the objective of the present study was to determine the prevalence of active sleep bruxism and its relationship with OHRQoL among inmates in Central Penal Institution.

Materials and Methods

The present study has a descriptive cross-sectional design. The study population consisted of male prisoners in Central Penal Institution, located in Mysore, Karnataka. Before the study, ethical clearance was obtained from the Institutional Ethical Committee (No: DCH/IEC/2014-15/ [45]). Permission and informed consent were obtained from the concerned authorities and study participants, respectively, after explaining the purpose and procedure of the study. Before administration of the questionnaire, all the patients were informed that the data they provided were anonymous and would be reported only in an aggregate form. The study was conducted over a period of 2 months from March to April 2015.

The validation process of Kannada (local language) version of the questionnaire was carried out in three phases, i.e., translation and cultural adaptation, testing the comprehensiveness of the instrument in a pilot study, and finally, administering the questionnaire in the main study to evaluate the psychometric properties (reliability and validity) of the questionnaire.[10]

A pilot study was conducted among 27 participants to assess the feasibility and operational efficiency of the study protocol and to calculate the sample size required. The estimated sample size of 189 was obtained using “N” Master software at desired confidence interval of 95%. Adding upon 10% anticipated nonresponse rate, the minimum estimated sample size obtained was 209. The internal consistency of modified OHIP-14 was assessed in the pilot study, and the questionnaire was found to be reliable (Cronbach’s alpha coefficient = 0.86).

Male inmates of central prison who were pronounced as convicted were recruited into the study after obtaining informed consent. Inmates under trial and who were included in the pilot study were excluded from the main study.

A total of 1198 male inmates were present among which 650 were convicted and remaining 548 were under trials. A systematic random sampling technique was used for the selection of required sample size those fulfilling the inclusion criteria. List of all the convicted inmates was obtained by the central prison authorities. The list was immediately returned back to the authorities in the view of the confidentiality to be maintained. Each prisoner who fulfilled eligibility criteria was allotted a number. A starting number was chosen at random by lottery method and every third number was picked thereafter. If a potential participant was selected, but declined to take part, the next available number was substituted.

A predesigned and tested closed-ended questionnaire was used to collect the desirable information. The first part of the questionnaire contained general information such as age, marital status, level of education, employment status before imprisonment, smoking habit, and duration of imprisonment. The second part of the questionnaire (modified OHIP-14) assessed OHRQoL using a concise form of the OHIP-49, consisting of two items related to bruxism in each of the seven domains in the source instrument. Each item elicited information on the presence of functional or psychosocial impact associated with problems involving the teeth and mouth. Items are scored on a 5-point Likert scale, ranging from never, hardly ever, occasionally, fairly often, and very often (coded 1 through 5, respectively).[11] The sum of scores ranged from 14 to 70. The third part of the questionnaire assessed active sleep bruxism based on the diagnostic criteria of the American Academy of Sleep Medicine (2005) which includes three questions.[15] Respondents were scored as suffering from active sleep bruxism if their answer was positive to either question 1 or 2 or both, and in addition, any positive symptom listed among question 3. The questionnaire refers to events experienced during the past 6 months.[15] The questionnaire was filled out by means of personal interview carried out for all participants by a trained investigator. The personal interview ensured uniformity in data collection by limiting the scope for misinterpreting the questions.

Statistical analysis

The statistical analysis was done using the Statistical Package of the Social Sciences (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY, USA). The psychometric property of modified OHIP-14 was further tested through reliability and validity tests, and the data analyses include descriptive statistics, Chi-square test, t-test, and analysis of variance. A linear regression model was fitted to the data for analyzing the relationship between independent variables and total OHIP-14 score. The statistical significance level was fixed at 0.05.
Results

The present study was conducted among 212 convicted male inmates of Central Penal Institute, Mysore. The age distribution of the study participants in different groups (bruxism and nonbruxism) was mentioned in Table 1. The prevalence of active sleep bruxism was found to be 31.6% among jail inmates. There was a statistically significant association between the distribution of study participants according to the duration of stay in prison and prevalence of active sleep bruxism [Table 2]. Table 3 showed that mean OHIP-14 score was significantly higher \((P < 0.001)\) among inmates with active sleep bruxism disorder when compared with the inmates without active sleep bruxism. The linear regression model [Table 4] confirms that longer duration of stay in prison was associated with significantly higher OHIP scores \((P < 0.05)\) which indicates poor oral health status. In addition, occupation and bruxism were also significantly associated with higher OHIP scores \((P < 0.05)\). It also shows that independent variables taken into consideration attribute for 12% of variances on the dependent variable \((R^2 = 0.12)\).

Discussion

Prisoners belong to one among the most underserved groups which is neglected by the government and communal system in the country. They face challenges both in prison during their stay and when they are out of prison.[12] The results of this cross-sectional study on convicted inmates in the Central Penal Institution of Mysore, Karnataka, provide a unique opportunity to analyze the prevalence of bruxism and OHQoL among prisoners. It was not possible to study both genders due to the insufficient number of female prisoners.

In one of the previous studies[12] related to prisoners, about 25% inmates had parafunctional habits, and among all, bruxism (22.6%) was found to be significantly prevalent parafunctional habit. Hence, in the present study, bruxism is taken as main variable to correlate with the OHRQoL of prisoners.

Sleep bruxism may be clinically diagnosed when there are typical signs such as abnormal dental wear, tooth grinding sounds during sleep, and mandibular muscle discomfort.[16] The gold standard for the diagnosis of sleep bruxism is polysomnographic evaluations, but as they are relatively expensive, prevalence studies on bruxism can mostly be performed by implementing clinical diagnosis methods or self-administered questionnaire.[17]

Age groups are categorized as 18–28, 29–38, 39–48, and >49 years to avoid the digit preference bias.[18] Frequently, measurements are recorded with rounding up/down to nearby simpler value, i.e., ending with the digits 0 and 5. A person of age 29 or 31 is very likely to report his age 30 years. Thus, intervals such as 29–38, 39–48 are better to ameliorate the effect of digit preference instead of conventional 30–40, 40–50, etc.[18]

Sleep bruxism is present in almost one-third of our study population that is significantly higher than the general population (9.3%–14%).[1–3] This might be most probably due to the inmate punishing himself unconsciously by hitting his teeth and mouth, devoted to nutrition and communication.[17] The prevalence of bruxism obtained in the present study was almost in line with the earlier studies (29.2%).[17] The prevalence of bruxism was found to be highest during 29–38 years (approximately 4th decade) of life and was found to be decreasing with age, but there was no statistically significant difference between them. This finding was in accordance with results of earlier studies conducted by Ciancaglini et al.[19] Ohayon et al.[20] and systematic review by Manfredini et al.[17] A study conducted by Sendhilkumar et al.[21] found to have maximum stress during the 4th decade of life, and the probable reason could be that period being very essential for work, money, and job stability. The prisoner’s perception that their crucial period getting wasted in jail could be the most probable reason for their stress that leads to maximum bruxism during this period.

There was a significant association between bruxism and duration of stay among prisoners with the prevalence of bruxism being highest in the first 5 years (0–60 months) of stay. This can be explained on the basis that in the beginning days of the prison (0–5 years), psychological stress being more, and as time elapsed, they compromised with the situation and get habituated to prison life and

| Table 1: Age distribution of study participants based on prevalence of active sleep bruxism |
| Age group (years) | With bruxism (%) | Without bruxism (%) | Total |
|------------------|-----------------|-------------------|-------|
| 18–28            | 12 (17.9)       | 44 (30.3)         | 56 (26.4) |
| 29–38            | 29 (43.3)       | 50 (34.5)         | 79 (37.3) |
| 39–48            | 16 (23.9)       | 29 (20)           | 45 (21.2) |
| >49              | 10 (14.9)       | 22 (15.2)         | 32 (15.1) |
| Total            | 67 (100)        | 145 (100)         | 212    |
| Statistical inference \( (\chi^2, df, P) \) | 3.962, 3, 0.266 |

| Table 2: Distribution of study participants according to duration of stay and prevalence of active sleep bruxism |
| Duration of stay (months) | With bruxism (%) | Without bruxism (%) | Total |
|---------------------------|-----------------|-------------------|-------|
| <60                       | 48 (71.6)       | 105 (72.4)        | 153 (72.2) |
| 61–100                    | 11 (16.4)       | 27 (18.6)         | 38 (17.9) |
| >101                      | 8 (11.9)        | 13 (9.0)          | 21 (9.9) |
| Total                     | 67 (31.6)       | 145 (68.4)        | 212 (100) |
| Statistical inference \( (\chi^2, df, P) \) | 6.37, 2, *0.04 |

*Statistically significant
Similar findings were observed with the previous study conducted among prisoners by Singh et al. in Lucknow.\(^{[12]}\) The mean OHIP-14 score was significantly higher among the inmates with active sleep bruxism disorder when compared with the inmates without active sleep bruxism, thus indicating high oral health impact in former group compared to latter. This suggests a poor OHRQoL among the inmates having active sleep bruxism compared to inmates without this disorder. In the present study, among participants with active sleep bruxism, mean OHIP score tends to increase as the age increases indicating a poor OHRQoL, but there was no statistically significant association between them.

It appears that there is no reliable way to actually stop a patient from long-term bruxism. Soft splints have been shown to reduce bruxism activity to an extent initially. However, in most of the cases, recurrence to pretreatment levels after 4–6 weeks of splint use is noticed. Bruxism activity is known to vary over time, but that variance cannot be predicted at present. Experimental studies have been done on the use of various medications (clonidine, clonazepam, and L-dopa) to minimize bruxism activity, but no suitable and safe candidate has been identified for long-term use.\(^{[22]}\) The best option is to remove etiology, and psychological treatments such as cognitive behavioral therapy can be used to treat any underlying problems.\(^{[23]}\)

### Limitations

As in any research, the present study is also not without limitations. The most evident was the self-reported nature of the information. Thus, further exploration of these results is warranted to fully uncover the causal mechanism and relationship between OHRQoL and bruxism. The present study is only a cross-sectional study, and there is a danger that bias was introduced by the sample, which was small and included only a male population. Moreover, active sleep bruxism was evaluated through diagnostic criteria of 3-item questionnaire and not by a standardized method. More precise and informational results could be obtained if the present study inference would be compared with nonprisoner population, questioned, and examined by the same codes and criteria.

### Recommendations

The findings from the present study suggest that planning of oral health care in prisons should take into consideration not only physical factors but also psychological factors which are important in the development of parafunctional habits. The authorities of prisons should consider creating the best conditions for good and effective health care. They should try to incorporate stress-relieving atmosphere through yoga sessions, personality development, sports, and more recreational activities so that inmates can develop some extra skills during their stay in prisons and relieve their stress, which in turn will have a therapeutic effect.

---

**Table 3: Mean oral health impact profile in relation to active sleep bruxism**

| Age group (years) | Mean±SD Among participants with active sleep bruxism | Mean±SD Among participants without active sleep bruxism | Total Mean±SD | Statistical inference (between groups) (t, df, P) |
|------------------|----------------------------------------------------|------------------------------------------------------|--------------|--------------------------------------------------|
| 18-28            | 40.08±15.12                                       | 28.11±9.40                                          | 30.68±11.80  | −3.399, 54, *0.001                                |
| 29-38            | 36.55±12.82                                       | 34.34±13.03                                         | 35.15±12.92  | −0.731, 77, 0.467                                |
| 39-48            | 39.81±10.94                                       | 30.75±14.05                                         | 33.97±13.63  | −2.227, 43, *0.03                                |
| >49              | 40.30±13.69                                       | 33.95±9.90                                          | 35.94±11.39  | −1.489, 30, 0.147                                |
| Total            | 38.52±12.8                                        | 31.67±12                                            | 33.83±12.64  | −3.8, 210, *0.001                                |

*Statistically significant. SD=Standard deviation

**Table 4: Various factors associated with oral health impact profile by linear regression model**

| Model          | Unstandardized Coefficients | Standardized Coefficients | t | Significance |
|----------------|-----------------------------|----------------------------|---|--------------|
| B              | SE                          | β                          |    |             |
| Constant       | 23.510                      | 3.567                      |    |              |
| Age            | 0.079                       | 0.090                      | 0.073 | 0.874 | 0.383 |
| Duration       | 0.031                       | 0.025                      | 0.092 | 1.226 | *0.022 |
| Marital status | −1.008                      | 1.994                      | −0.039 | −0.506 | 0.614 |
| Education      | 1.768                       | 1.905                      | 0.064 | 0.928 | 0.354 |
| Occupation     | 5.645                       | 2.298                      | 0.168 | 2.456 | *0.015 |
| Smoking        | −1.228                      | 1.808                      | 0.046 | −0.679 | 0.498 |
| Bruxism        | 6.895                       | 1.817                      | 0.254 | 3.795 | *0.001 |

*Statistically significant, age and duration of imprisonment are continuous variables marital status: Married=1, others (single and divorced)=0, education level=illiterate, primary, and secondary school=1, PUC, UG, PG=0, occupation: Worker=1, nonworker (students)=0, smoking: Smokers=1, nonsmokers=0, bruxism: Bruxism=1, nonbruxism=0, variance \(R^2=0.12\). SE: Standard error
on oral health, thus imparting the moral and psychological support.

**Conclusion**

The prevalence of active sleep bruxism was higher among the inmates of penal institution as compared to the general population. The OHRQoL of inmates with bruxism appears to be worse than population without disorder. Thus, the active sleep bruxism had a negative impact on OHRQoL. It creates an alarming need to focus on these risk groups with special emphasis on the factors contributing to the poor oral health status.

**Acknowledgment**

We would like to convey our heartfelt gratitude for the kind support provided by the central prison staff and all the prisoners who contributed and cooperated to participate in this project.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Shetty S, Pitti V, Satish Babu CL, Surendra Kumar GP, Deepthi BC. Bruxism: A literature review. J Indian Prosthodont Soc 2010;10:141-8.
2. Santos-Silva R, Bittencourt LR, Pires ML, de Mello MT, Taddei JA, Benedito-Silva AA, et al. Increasing trends of sleep complaints in the city of Sao Paulo, Brazil. Sleep Med 2010;11:520-4.
3. Winocur E, Uziel N, Lisha T, Goldsmith C, Eli I. Self-reported bruxism – Associations with perceived stress, motivation for control, dental anxiety and gagging. J Oral Rehabil 2011;38:3-11.
4. Reddy SV, Kumar MP, Sravanthi D, Mohsin AH, Anuha V. Bruxism: A literature review. J Int Oral Health 2014;6:105-9.
5. Aggarwal VR, McBeth J, Zakrzewska JM, Lunt M, Macfarlane GJ. Are reports of mechanical dysfunction in chronic oro-facial pain related to somatisation? A population based study. Eur J Pain 2008;12:501-7.
6. Bader G, Lavigne G. Sleep bruxism; an overview of an oromandibular sleep movement disorder. Review article. Sleep Med Rev 2000;4:27-43.
7. Cavallo P, Savarese G, Carpinelli L. Bruxism and health related quality of life in southern Italy’s prison inmates. Community Dent Health 2014;31:117-22.
8. Koyano K, Tsukiyama Y, Ichiki R, Kuwata T. Assessment of bruxism in the clinic. J Oral Rehabil 2008;35:495-508.
9. Prasad AK, Shankar S, Sowmya J, Priya CV. Oral health knowledge attitude practice of school students of KSR Matriculation School, Tiruchengode. J Indian Acad Dent Spec 2010;1:5-10.
10. Roumani T, Oulis CJ, Papagiannopoulou V, Yfantopoulos J. Validation of a Greek version of the oral health impact profile (OHIP-14) in adolescents. Eur Arch Paediatr Dent 2010;11:247-52.
11. Slade GD. The oral health impact profile. Measuring Oral Health and Quality of Life. Chapel Hill: University of North Carolina, Dental Ecology; 1997. p. 1-12.
12. Singh SK, Saha S, Jagannath GV, Singh P. Nature of crime, duration of stay, parafunctional habits and periodontal status in prisoners. J Oral Health Comm Dent 2012;6:131-4.
13. Reddy V, Kondareddy CV, Siddanna S, Manjunath M. A survey on oral health status and treatment needs of life-imprisoned inmates in central jails of Karnataka, India. Int Dent J 2012;62:27-32.
14. Harvey S, Anderson B, Cantore S, King E, Malik F, Bedi R. Reforming prison dental services in England - A guide to good practice. Health Educ J 2005;64(Suppl4): ii-iii,1-39.
15. Winocur E, Uziel N, Lisha T, Goldsmith C. Self-reported bruxism – Associations with perceived stress, motivation for control, dental anxiety and gagging. J Oral Rehabil 2010;37:1-9.
16. Cunali RS, Bonotto DM, Machado E, Hilgenberg PB, Bonotto D, Farias AC, et al. Sleep bruxism and temporomandibular disorders: Systematic review. Rev Dor São Paul 2012;13:360-4.
17. Manfredini D, Landi N, Fantoni F, Segù M, Bosco M. Anxiety symptoms in clinically diagnosed bruxers. J Oral Rehabil 2005;32:584-8.
18. Indrayan A. Basic Methods of Medical Research. 3rd ed. 2012: AIRBS Publishers; New Delhi.
19. Ciancaglini R, Gherlone EF, Radaelli G. The relationship of bruxism with craniofacial pain and symptoms from the masticatory system in the adult population. J Oral Rehabil 2001;28:842-8.
20. Ohayon MM, Li KK, Guilleminault C. Risk factors for sleep bruxism in the general population. Chest 2001;119:53-61.
21. Sendhilkumar M, Tripathy JP, Harries AD, Dongre AR, Deepa M, Vidyulatha A, et al. Factors associated with high stress levels in adults with diabetes mellitus attending a tertiary diabetes care center, Chennai, Tamil Nadu, India. Indian J Endocrinol Metab 2017;21:56-63.
22. McAuliffe P. Types of bruxism. J Ir Dent Assoc 2012;58:138-41.
23. Orthlieb JD, Tran TN, Camoin A, Mantout B. Propositions for a cognitive behavioral approach to bruxism management. J Stomatol Occlusion Med 2013;6:6-15.