Assessment of Periodontal Status among Eunuchs Residing in Bhopal City, Madhya Pradesh, India: A Cross Sectional Study

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Abstract

Aim: To assess the periodontal status among eunuchs residing in Bhopal city, Madhya Pradesh, India.

Materials and Methods: Based on convenient non-probability snow ball sampling technique, all the self-identified eunuchs residing in the city of Bhopal along with a matched control consisting of cross section of the general population residing in the same locality where these eunuchs live was examined to assess the periodontal status of the population by using WHO oral health assessment proforma 1997. All the obtained data was entered into a personal computer on Microsoft excel sheet and analyzed by using a software; SPSS version 20. Data comparison was done by applying chi square test, ANOVA and multiple logistic regression analysis.

Results: A total of 639 subjects comprised of 207 eunuchs, 218 males and 214 females. The overall gingival and periodontal disease prevalence was 87.3% with calculus and shallow pocket contributing a major part i.e., 67%. Among study participants, 56.9% males were having highest prevalence for calculus. Whereas, eunuchs were having highest prevalence for bleeding (17.4%), shallow pocket (22.7%) and deep pocket (9.7%). However, highest of 19.7% males and 10.1% eunuchs were having attachment loss of 4-5 mm and 6-8 mm respectively. However, 6.3% eunuchs were having attachment loss of 12 mm or more.

Conclusion: The results of the current study showed poor periodontal status among eunuch population with most of the population requiring simple therapy. This indicates that comprehensive oral hygiene instruction and dental prophylaxis need to be initiated.

Key words: Eunuchs, Trans-genders, Periodontal diseases, Periodontal status, Loss of attachment

Introduction

Periodontal disease is one of the most prevalent dental diseases affecting the whole adult population throughout the world varying only in degree from mild to severe depending on multiple factors [1-3]. It has been implicated as an emerging risk factor for a number of major systemic diseases or conditions, including cardiovascular disease, stroke, and diabetes, as well as for pre-term, low–birth weight infants [4-6].

Periodontal diseases are inflammatory disorders caused by the specific microorganisms in the dental plaque that may lead to loss of periodontal attachment, including destruction of the periodontal ligament and adjacent supporting bone. Periodontal probing depth provides useful information about the present inflammatory status of periodontal tissue, and may also be indicative of the chronicity of the local inflammation [7]. Significant data on periodontal disease prevalence and distribution among different populations were collected using Probing Pocket Depth (PPD) as the primary variable [8].

In the numerous studies worldwide, dental plaque growth and inflammation of gingival tissue are ubiquitous and strongly linked, irrespective of age, gender or racial/ethnic identification [8].

The prevalence of periodontitis is considerably higher in the developing countries [9-11]. India is one of the major emerging market economies with a population of over 1 billion and – is very diverse in geography, culture, tradition, habits and even race. This diversity also extends to literacy rates, health indicator rates Infant Mortality Rate (IMR) and hygiene practices [12].

There has been a general perception that oral health in India is considered to be the least import [12]. On the other hand, even the most basic oral health education and simple interventions like pain relief and emergency care for acute infection and trauma are not available to the vast majority of population [13]. One of the reasons is lack of epidemiological data to identify areas needing oral health care.

In India, there are multiple socio-economic disadvantages that members of particular group experience which limits their access to health and healthcare [14]. Eunuchs are one of these neglected special vulnerable groups in India where special attention is required to improve the overall oral health scenario of the country.

The word EUNUCH is derived from a Greek word meaning "keeper of the bed" [15]. These transgender communities historically exist in many cultural contexts, known as *Bakla* in the Philippines, *Xaniths* in Oman, *Serrers* among the Pokot people of Kenya, and *Kinnars, Jogappas*, *Jogtas*, or *Shiv-shaktis* in South Asia [16].

In India, eunuchs are also called as '*Hijra*', which actually refers to third gender or 'male-to-female' transgender people, most see themselves as neither men nor women [17]. According to *Telegraph* report, India has an estimated 1.5 million eunuchs [18]. But the census data on them does not exist, so to make an accurate enumeration is impossible as they continue to persist as a marginalized and secretive community [17]. They generally live together by forming a group called as '*Gharana*' (familial house to which they owe allegiance) which is headed by a Guru (most senior member) and other members are as

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'*Chelas'* (followers) [17]. Their sources of livelihood mainly include performing at marriage and birth celebrations, *badhai* (ritual performing) *basti*/*mangti* (begging) for alms and prostitution [15].

Unlike in other parts of the world, the attitude towards a *hijra* in Indian society is discriminatory and biased in general. They are considered as the most vulnerable, frustrated, and insecure community of the country [16]. They are also denied general, oral health and psychological assistance [12]. In India, the accessibility to medical and dental facilities for the eunuchs is nearly non-existent. There is every possible chance that this neglected special group of population may have heavy stress and indulge in alcoholism, gutkha-pan chewing and other pernicious habits. These factors may cause many periodontal problems which can make their lives worse.

Epidemiologic data can form the basis for selection and implementation of strategies to prevent and treat periodontal diseases. There is scarcity of published literature regarding the periodontal status of this special group.

Thus the aim of the present pathfinder study was to assess the periodontal disease status among eunuchs population residing in Bhopal city, Madhya Pradesh, India following the guidelines of the World Health Organization for population based surveys.

Materials and Methods

A cross sectional study following the STROBE [19] guidelines was conducted among the eunuchs of Bhopal city, Madhya Pradesh India.

Ethical clearance

The detailed proposed study protocol was submitted and approved by the ethical committee of Peoples University, Bhopal.

Informed consent

A brief study protocol was explained and written informed consent was obtained from each study subject before the oral examination.

Source of data

The study subjects consisted of self-identified eunuchs residing in the Bhopal city. A matched control consisting of cross section of the general population residing in the same locality where these eunuchs live was also examined. The eligible controls (males and females) were matched with eunuchs for pertinent variables like age, sex and geographical distribution.

Sampling design and sample selection

Based on convenient non-probability snow ball sampling technique, all the self-identified eunuchs residing in the city of Bhopal who were present at the time of examination and who full filled the selection criteria were examined. Based on interviews with local informants, four prominent localities of the city where most of the eunuchs reside were identified. These areas were *Mangalwara*, *Budhwara*, *Patra*, *and Ahamadpur kala*. All the identified areas were visited and eunuchs residing in these areas were contacted. The eunuchs who consented to become part of the study guided us to the similar samples they knew about. The subjects were explored till saturation occurs and no new cases were identified.

A cross section of the general population (males and females) residing in the same locality where these eunuchs live was also examined.

Selection criteria

The selection criteria followed in this study were as given below.

Inclusion criteria:

1. Eunuchs: All the self-identified eunuchs available during the study period were considered for the study.

2. The matched controls with the eunuchs for certain pertinent variables like age, sex and geographical distribution.

3. Participants who gave informed consent to participate at the time of study.

Exclusion criteria:

1. Participants with history of medication for any systemic illness (medically compromised patients).
2. Participants not willing to participate in the study
3. Participants affected with mental retardation, physically and mentally handicapped, orthopedic defects, etc.

Sample size

A total of 639 subjects comprised of 207 eunuchs, 218 males and 214 females residing in the city of Bhopal, Madhya Pradesh India were examined.

Schedule of the survey

A survey was systematically scheduled to cover all the identified areas of the Bhopal city. The survey period extended for a period of three months from April to June 2013.

Method of collection of data

Information on demographic characteristics like age, sex, oral health related habits, occupation and socioeconomic statuses (modified Kuppuswamy's scale 2012) were collected which was based on the primary objective of the study.

Training and calibration of examiner

To ensure uniform interpretation, understanding and application by the examiner, of the codes and criteria for the periodontal diseases to be observed and recorded in the proforma used, the examiner was priorly calibrated and trained in the Department of Public Health Dentistry, People's Dental Academy before the commencement of the study. The recorder participated in the study was also priorly trained in the department. The calibration procedure was performed on a group of 10 subjects which were not included in the study. Duplicate examination was performed after two days on the same group of subjects to ensure the reliability of the examiner. The intra examiner reliability was assessed by using the Weighted Kappa statistics, which was 0.85 for CPI.

Clinical examination

WHO oral health assessment proforma (1997) was used to collect the information on periodontal status and loss of attachment [20]. The clinical examination through the survey was carried out by the principal investigator. The investigator read, understood and standardized his method of operation so as to minimize error and have reproducible data. A recording clerk was trained to assist in the recording

procedure throughout the survey. Clinical examinations were carried out in the living environments; these included *Deras* (for eunuchs), private and rented out rooms (for controls) where subjects reside.

Clinical examination was performed by using a plane mouth mirror and CPI probe under adequate natural light. An examination of oral cavity to record the periodontal status and loss of attachment was made on every subject.

Statistical Analysis

All the obtained data was entered into a personal computer on Microsoft excel sheet and analyzed by using a software; Statistical Package for Social Science (SPSS; IBM, USA) version 20. Data comparison was done by applying chi square test and analysis of variance. The statistically significant level was fixed at $P \leq 0.05$.

Results

Table 1 shows the distribution of demographic characteristics according to gender. A total of 639 subjects were distributed into 3 groups i.e., 34.1% (n=218) males, 33.5% (n=214) females, and 32.4% (n=207) eunuchs. Out of that, majority of the study participants i.e. 48.3% eunuchs, 45.4% males and 43.5% females were in the age group of less than 34 years. Highest of 68.2% females were unemployed while; most of the eunuchs i.e. 99% were unskilled workers. Similarly, majority of the eunuchs i.e. 202 (97.6%) were belonged to upper lower socioeconomic group which was followed by 165 (77.1%) females and 146 (67%) males. The difference in distribution of socioeconomic status among genders was statistically significant (P=0.001) *(Table 1)*.

Table 2 shows the oral health related habits among gender. Tooth brush was a common oral hygiene aid used by 191 (89.3%) females, 191 (87.6%) males and 176 (85%) eunuchs. Similarly, most of the study participants i.e. 211 (98.6%) females, 210 (96.3%) males and 205 (99%) eunuchs use either tooth paste or tooth powder to clean their teeth. However, a total of 181 (87.4%) eunuchs followed by 174 (81.3%) females and 175 (80.3%) males brush their teeth daily once. The difference among genders was not statistically significant *(Table 2)*.

Table 1. *Distribution of demographic characteristics according to gender.*

Variable	Gender			Statistical Inference
	Males N (%)	Females N (%)	Eunuchs N (%)	
Age Group				
<34 years	99(45.4%)	93(43.5%)	100(48.3%)	X^2 value= 8.30 df= 8 P value= 0.40
35-44 years	57(26.1%)	52(24.3%)	59(28.5%)	
45-54 years	35(16.1%)	43(20.1%)	24(11.6%)	
55-64 years	21(9.6%)	18(8.4%)	14(6.8%)	
> 65 years	6(2.8%)	8(3.7%)	10(4.8%)	
Total	218(34.1%)	214(33.5%)	207(32.4%)	
Occupation				
Profession/ Semi profession#	29 (13.3%)	11 (5.1%)	0	X^2 Value= 22.45 df= 6 P value= 0.001
Skilled worker/ Semi-skilled worker#	88 (40.4%)	45 (21%)	0	
Unskilled worker	49 (22.5%)	12 (5.6%)	205 (99%)	
Unemployed	52 (23.9%)	146 (68.2%)	2 (1%)	
Socioeconomic Status				
Upper	4 (1.8%)	1 (0.5%)	0	X^2 Value= 18.46 df= 4 P value = 0.001
Middle#	62 (28.4%)	36 (16.8%)	2 (1%)	
Lower#	152 (69.7%)	177 (82.7%)	205 (99%)	
# Categories have been collapsed for the statistical analysis				

Table 2. *Oral health related habits among gender.*

Habit	Gender			Statistical Inference		
	Males N (%)	Females N (%)	Eunuchs N (%)	X^2 Value	df	P value
Cleaning of teeth with						
Tooth brush	191 (87.6%)	191 (89.3%)	176 (85%)	1.78	2	0.41
Finger/chew stick	27 (12.4%)	23 (10.7%)	31 (15%)			
Material use for cleaning of teeth						
Tooth paste/ powder	210 (96.3%)	211 (98.6%)	205 (99%)	1.78	2	0.41
Others	8 (3.7%)	3 (1.4%)	2 (1%)			
Frequency of brushing						
Once	175 (80.3%)	174 (81.3%)	181 (87.4%)	3.54	2	0.17
Twice	43 (19.7%)	40 (18.7%)	26 (12.6%)			
Use of tobacco						
Smokeless tobacco	66 (30.3%)	58 (27.1%)	113 (54.6%)	22.35	2	0.001
Smoking tobacco	17 (7.8%)	3 (1.4%)	0	24.7	2	0.001
Both smokeless and smoking tobacco	41 (18.8%)	6 (2.8%)	74 (35.7%)	57.33	2	0.001
Total tobacco usage	124 (56.9%)	67 (31.1%)	187 (90.3%)	57.19	2	0.001
Frequency of tobacco usage						
Once in a day	13 (6%)	12 (5.6%)	6 (2.9%)	13.81	2	0.001
Many times a day	111 (50.1%)	55 (25.5%)	181 (87.4%)			

Adverse habits like chewing and smoking tobacco in various forms were assessed. Majority of eunuchs (90.3%) were having habit of tobacco consumption. This was followed by 56.9% males and 31.1% females. The difference in use of tobacco products was statistically significant (P=0.000). Whereas, in a response to frequency of tobacco usage; 181 (87.4%) eunuchs, 109 (50%) males and 55 (25.5%) females said that they were taking tobacco many times a day. The difference was statistically significant (P=0.000) *(Table 2)*.

The overall gingival and periodontal disease prevalence was 87.3% with calculus and shallow pocket contributing a major part i.e., 67%. Among study participants, 56.9% males were having highest prevalence for calculus. Whereas, eunuchs were having highest prevalence for bleeding (17.4%), shallow pocket (22.7%) and deep pocket (9.7%). The difference among gender was statistically significant (P=0.000). However, majority of the females i.e., 144 (67.3%) were having attachment loss of 0-3 mm. Highest of 43 (19.7%) males and 21 (10.1%) eunuchs were having attachment loss of 4-5 mm and 6-8 mm respectively. However, 13 (6.3%) eunuchs were having attachment loss of 12 mm or more. The distribution of attachment loss among genders was not statistically significant (P=0.64) *(Table 3)*.

The mean number of healthy sextants was high among females i.e., 2.93 when compared with males (2.26) and eunuchs (2.13). While males were having high mean number of sextants with calculus i.e., 2.17, eunuchs had highest mean number of sextants with bleeding (1.24), shallow pocket (0.49) and deep pocket (0.12). This difference among genders was statistically significant except for deep pocket. Similarly, the mean number of sextants with loss of attachment 4-5 mm were higher among males (0.61) followed by females (0.47) and eunuchs (0.46%). There was no statistically significant difference in the mean of sextants with loss of attachment of 6-8 mm, 9-11 mm and more than 12 mm among males, females and eunuchs *(Table 4)*.

Discussion

The current cross-sectional, epidemiological survey was conducted with the aim of assessing the periodontal status of Eunuchs (Hijra) residing in Bhopal city, Madhya Pradesh, India. This was the unique study which revealed the oral health related information of eunuch/ Hijra (third gender) community. The oral examination was conducted by using WHO oral health assessment proforma 1997. A total of 639 subjects comprising of 207 eunuchs, 218 males and 214 females were recruited in the study.

A different sampling technique i.e. "snowball sampling" was adopted for this study. As eunuch (*Hijra*) community is highly secretive and hidden community, very little is known about them. Traditional methods, such as household surveys cannot produce reliable samples, and they are inefficient, because most hidden populations like eunuchs are rare. Accessing such populations is difficult because standard probability sampling methods produce low response rates and responses that lack candor [21]. Because of these reasons snowball sampling was the best method available for our study. In snowball sampling: ideally a randomly chosen sample serves as initial contact though in practice ease of access virtually always determines the initial sample; these subjects provide the names of a fixed number of other individuals who fulfill the research criteria. The researcher approaches these

Table 3. *Distribution of Periodontal Status and loss of attachment among gender.*

Periodontal Status						
Gender	**Healthy**	**Bleeding**	**Calculus**	**Shallow pocket**	**Deep pocket**	**Statistical Inference**
Males	23 (10.6%)	22 (10.1%)	124 (56.9%)	38 (17.4%)	10 (4.6%)	X^2 value 41.60 df 8 P value 0.01
Females	45 (21%)	29 (13.6%)	104 (48.6%)	26 (12.1%)	8 (3.7%)	
Eunuchs	13 (6.3%)	36 (17.4%)	89 (43%)	47 (22.7%)	20 (9.7%)	
Loss of Attachment						
Gender	**0-3mm**	**4-5 mm**	**6-8 mm**	**9-11 mm**	**>12 mm**	**Statistical Inference**
Males	138 (63.3%)	43 (19.7%)	15 (6.9%)	10 (4.6%)	11 (5%)	X^2 Value= 6.00 df= 8 P value= 0.64
Females	144 (67.3%)	39 (18.2%)	13 (6.1%)	9 (4.2%)	7 (3.3%)	
Eunuchs	128 (61.8%)	33 (15.9%)	21 (10.1%)	10 (4.8%)	13 (6.3%)	

Table 4. *Distribution of mean number of sextants affected by periodontal disease and loss of attachment among gender.*

Periodontal status					
Gender	**Healthy**	**Bleeding**	**Calculus**	**Shallow pocket**	**Deep pocket**
Males	2.26 ± 2.03	0.82 ± 1.17	2.17 ± 1.73	0.35 ± 0.79	0.05 ± 0.23
Females	2.90 ± 2.17	0.87 ± 1.22	1.71 ± 1.65	0.26 ± 0.69	0.06 ± 0.33
Eunuchs	2.13 ± 1.81	1.24 ± 1.41	1.69 ± 1.46	0.49 ± 0.91	0.12 ± 0.48
F value	8.79	6.75	5.93	4.43	2.43
P value	0.001	0.001	0.003	0.012	0.088
Loss of Attachment					
Gender	**0-3mm**	**4-5 mm**	**6-8 mm**	**9-11 mm**	**>12mm**
Males	4.69 ± 1.91	0.61 ± 1.07	0.13 ± 0.44	0.03 ± 0.26	0.18 ± 0.59
Females	5.09 ± 1.53	0.47 ± 0.85	0.11 ± 0.40	0.05 ± 0.24	0.12 ± 0.56
Eunuchs	5.03 ± 1.58	0.46 ± 0.85	0.12 ± 0.46	0.05 ± 0.37	0.03 ± 0.24
F value	3.44	1.60	0.18	0.33	5.17
P value	0.032	0.20	0.83	0.71	0.006

persons, and asks them to participate; and each subject who agrees is then asked to provide a fixed number of additional names. This process can be continued for as many stages as desired [21].

The lack of literature on oral health status of eunuchs, at both national and international level was the major problem we faced. Nevertheless a sincere attempt has been made to compare our results with other studies conducted among various populations worldwide.

The present study shows that 86.5% of total population has a prevalence of periodontal disease (including gingivitis). Out of which highest of 92.8% of eunuchs suffer from various forms of periodontal disease as assessed by Community Periodontal Index. This finding is comparable to the findings of the study conducted by Fareed [22] on Soligas in Biligiri Ranga Hills and to that of Peterson [23] on Malagasy tribes in Madagaskar. But the findings of our study are lower compared to study conducted by Ramfjord *et al.* [24] who observed 100% prevalence of periodontal disease (including gingivitis) in India. The majority of periodontitis was due to accumulation of calculus, plaque and debris.

The Percentage of healthy sextants was prominent in females (21%) than in males (10.6%) and eunuchs (6.3%). This finding is similar with that of Kundu *et al*. [25] in which females showed higher percentage of healthy sextants than males [25]. However, males (56.9%) had highest number of sextants with calculus while, highest sextants with bleeding (17.4%), shallow pockets (22.7%), and deep pockets (9.7%) were observed in eunuchs. This might be due to the fact that females are more aware about maintenance of their oral hygiene and regular professional dental care [22]. Similarly; in our study, eunuchs and males have found to be more exposed to deleterious oral habits like tobacco chewing and smoking, which are established as high risk factors for periodontal diseases [25]. Tobacco has been shown to affect gingival and periodontal diseases by several means like increased colonization of shallow periodontal pockets by periodontal pathogens and increased levels of periodontal pathogens in deep periodontal pockets. Smoking may alter neutrophil chemo taxis, phagocytosis and oxidative burst. It can also increase secretion of tumor necrosis factor alpha, prostaglandin E 2, neutrophil collagenase and elastase in gingival crevicular fluid [26].

The prevalence of attachment loss less than 3 mm was higher in females (67.3%) while attachment loss of 4-5 mm was greater in males (19.7%). Similarly, eunuchs had higher percentage of attachment loss of 6-8 mm (10.1%), 9-11 mm (4.8%), and more than 12 mm (6.3%). The difference in attachment loss was not statistically significant (P=0.64). Similar results showed by Bhat *et al.* [27] in which no significant difference in loss of attachment was observed among gender.

In our study, the number of mean sextants affected by periodontal pathologies were seen more in eunuchs as well as in male subjects than in females and this difference among genders was significant. These findings correlate with many other studies where gender difference was significant [28,29]. However, the results were contradictory to the results obtained by some studies [25,27] where they did not find any significant difference between genders.

The additional observations obtained in our study revealed that the prevalence and severity of periodontal disease increased with increasing age. The report of National Oral Health Survey 2002-2003 [12] along with results of study conducted by Sakthi *et al.* [30] support observations of our study where increased age was the major factor associated with increased severity of periodontal disease. Ageing is a natural process and changes are there in host immunity against disease process while increasing severity may be because of the untreated cumulative effect of disease process over the period of time [31].

The present study revealed a very high prevalence of periodontal diseases among eunuchs. The findings in this study spotlight the lack of dental accessibility for eunuchs. The poor oral health is due to deleterious habits, poor dental care facilities and the attitude and lack of awareness among eunuch population. An improved accessibility to dental services as well as dental health education is necessary to ensure the optimum dental health within the reach of eunuchs.

However the results of the present study hardly could be generalized due to the snowball sampling technique used. Nevertheless, this pathfinder study may provide the baseline data for future studies on eunuch population.

Furthermore, there is a distinct need for strengthening organized preventive and curative programs for eunuch population. There is an urgent need to plan properly to meet the unmet needs of eunuch subjects as it was observed that virtually no care has been provided for these socially deprived communities pertaining to oral health.

Conclusion

The results of the current study showed poor periodontal status among eunuch population with most of the population requiring simple therapy. This indicates that comprehensive oral hygiene instruction and dental prophylaxis need to be initiated. The data on periodontal conditions presented in this study are similar to data available from WHO on global oral health. The availability of estimates of periodontal disease prevalence would greatly improve the calculation of the needs estimates. These estimates are important for the future planning of dental services among eunuch community. Since this is the pioneer study, comprising the representative sample of eunuchs in Bhopal city, further studies with a larger sample size are required for a definite conclusion.

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