ORIGINAL RESEARCH

Assessment of Dentition Status and Treatment Needs among Eunuchs Residing in Bhopal city, Madhya Pradesh, India: A Cross-sectional Survey

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ABSTRACT

Aim: The current cross-sectional study following the STROBE guidelines was conducted to assess the dentition status and treatment needs among eunuchs residing in Bhopal city, Madhya Pradesh, India.

Materials and Methods: Based on convenient non-probability snowball 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. A cross-section of the general population (males and females) residing in the same locality where these eunuchs live, was also examined. The WHO oral health assessment pro forma (1997) was used to collect the information on dentition status. All the obtained data were analyzed using software; Statistical Package for the Social Sciences version 20.

Results: The dental caries experience was higher among males (69.7%) compared to females (67.3%) and eunuchs (67.1%). There was no statistically significant difference among the study subjects. However, the overall need for one surface filling was highest (55.4%) among the study subjects. Eunuchs needed a higher number of two surface fillings (21.2%).

Conclusion: The findings of the current study spotlight the higher prevalence of dental caries among 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 this socially deprived community pertaining to oral health.

Keywords: Dental caries, Dentition status, Eunuchs, Transgenders.

How to cite this article: Arjun Torwane N, Dayma A, Joshi KR, Mishra M, Singh VR, Khanal LR. Assessment of Dentition Status and Treatment Needs among Eunuchs Residing in Bhopal city, Madhya Pradesh, India: A Cross-sectional Survey. Int J Prev Clin Dent Res 2018;5(1):S28-34.

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Source of support: Nil

Conflicts of interest: None

INTRODUCTION

The world is going through an epidemiological transition. This is true more so for a developing country like India in which the infectious and the nutritional diseases are of public health concern.[1] Dental caries is one of the major infectious and multi-factorial diseases. Its existence can be traced back to the pre-historic era as verified from the skeletal remnants of human bodies. It is a gradual, irreversible decay caused by interplay of web of factors, namely microorganisms, host, substrate, tooth, and time.[2]

Studying the epidemiology of dental caries enables the assessment of its prevalence, helps to determine peoples' need for dental care, and informs the development of prevention and treatment programs.[3]

Available studies of adults have shown that population groups with lower education, poor income, or low occupational status tend to have more dental caries[4,5] and less remaining teeth.[6] Furthermore, variations in dental health status have been associated with unfavorable oral health behavior[7,8] and unhealthy lifestyle,[9] as well as with demographic factors such as age, gender, or place of residence.[10,11]

The overall prevalence of dental caries in India is reported to be 50–60%. This clearly indicates that approximately one out of two Indians suffers from cavities.[1,2] Furthermore, this prevalence exceeds considerably high among populations of low socioeconomic status.

In India, there are multiple socioeconomic disadvantages that member of a particular group experience which limits their access to health and health care.[1] 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."[12] 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.[13]

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.[12] According to the Telegraph report, India has an estimated 1.5 million eunuchs.[14] However, the census data on them do not exist, so to make an accurate enumeration is impossible as they continue to persist as a marginalized and secretive community.[13] Many *hijra* come from other sexually ambiguous backgrounds: They may be born inter-sexed, be born male or female and fail to develop fully at puberty or be males who choose to live as *hijra* without ever undergoing the castration procedure.[13,15] They generally live together by forming a group called as "*Gharana*" (familial house to which they owe allegiance) which is headed by a Guru and other members are as "*Chelas*" (followers).[12] Each member of the *gharana* follows the *guru-chela* relationship. Their sources of livelihood mainly include performing at marriage and birth celebrations, *badhai* (ritual performing) *basti/mangti* (begging) for alms and prostitution.[13]

Unlike in other parts of the world, the attitude toward a *hijra* in Indian society is discriminatory and biased in general. The *hijra* claim that mainstream society does not understand their culture, gender, and sexuality.[15] They are considered as the most vulnerable, frustrated, and insecure community of the country.[13] They are also denied general, oral health, and psychological assistance.[12] Furthermore, 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 the population may have heavy stress and indulge in alcoholism, gutkha-pan chewing, and other pernicious habits. These factors may cause many oral health-related problems which can make their lives worse.

The deficiency of published literature at both national and international level on the oral health-related status of this special group has encouraged us to take up the present study with the aim of assessing the dentition status and treatment needs among eunuchs residing in the Bhopal city, Madhya Pradesh, India.

MATERIALS AND METHODS

A cross-sectional study following the STROBE[16] 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 a cross-section of the general population residing in the same locality where these eunuchs live was also examined to compare the prevalence of oral lesions.

Sampling Design and Sample Selection

Based on convenient non-probability snowball 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. 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 until 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. All the eligible males and females were matched with eunuchs for pertinent variables such as age, socioeconomic status, and geographical distribution.

Selection Criteria

Inclusion criteria

The following criteria were included in the study:

1. Eunuchs: All the self-identified eunuchs available during the study period for the study.
2. The matched controls with the eunuchs for certain pertinent variables such as age, socioeconomic status, and geographical distribution.
3. Participants who gave informed consent to participate at the time of the study.

Exclusion criteria

The following criteria were excluded from the study:

1. Participants with a 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 207 eunuchs, 218 males, and 214 females residing in the city of Bhopal, Madhya Pradesh, India.

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 3 months from April to June.

Method of Collection of Data

Information on the demographic characteristics such as age, sex, occupation, educational level, socioeconomic status, and oral health-related habits of the surveyed subjects were collected using an interviewer based, predesigned, structured, and close-ended questionnaire which had been designed based on the primary objective of the study. The questionnaire was prepared in English, translated into local (Hindi) language and then re-translated back to English to check for consistency. The subjects were asked to respond to each item according to the response format provided in the questionnaire. Response format included multiple choice questions in which the subjects were asked to choose an appropriate response from a provided list of options. The completed response format was carefully checked by the investigator.

Clinical Examination

The WHO oral health assessment pro forma (1997)[17] was used to collect the information on dental caries. 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) and private and rented out rooms (for controls) where subjects reside.

Clinical examination was performed using a plane mouth mirror and CPI probe under the adequate natural light. An examination of the dentition status in the mouth was made on every subject.

Statistical Analysis

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

RESULTS

A total of 639 subjects were distributed into 3 groups, i.e., 218 (34.1%) males, 214 (33.5%) females, and 207 (34.4%) eunuchs. The difference among gender was not statistically significant ($P = 0.40$) [Figure 1].

Majority of the study participants belonged to an upper lower socioeconomic group which comprised 97.6% eunuchs, 77.1% females, and 67% males. The difference in the distribution of socioeconomic status among genders was statistically significant ($P = 0.000$) [Figure 2].

Most of the females, i.e., 78 (36.4%) had a history of visit to a dentist, whereas 140 (67.6%) eunuchs and 144 (66.1%) males had never visited any dentist. The difference in visit to a dentist among gender was not statistically significant ($P = 0.67$). However, in response to a question related to dental facilities available in the area, majority of eunuchs, i.e., 173 (84%) eunuchs, 105 (49.5%) females, and 94 (43.1%) males were aware of the availability of private dental clinic in their area while 92 (42.2%) males, 85 (39.7%) females, and 14 (6.8%) eunuchs were not aware of any dental facilities available in their area. The difference among gender was statistically significant ($P = 0.000$). Furthermore, an assessment of the frequency of sugar intake; it was found that majority of eunuchs, i.e., 88 (42.5%) eunuchs

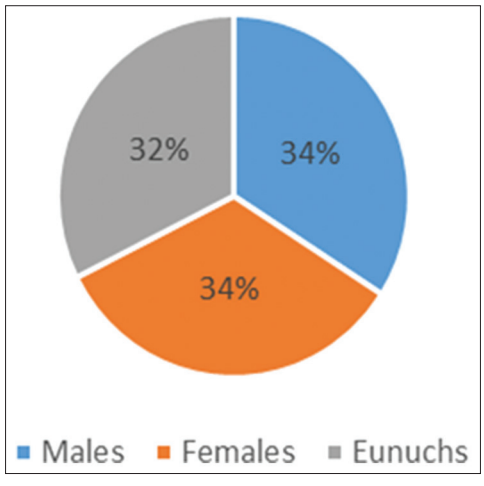

Figure 1: Distribution of subjects according to the gender

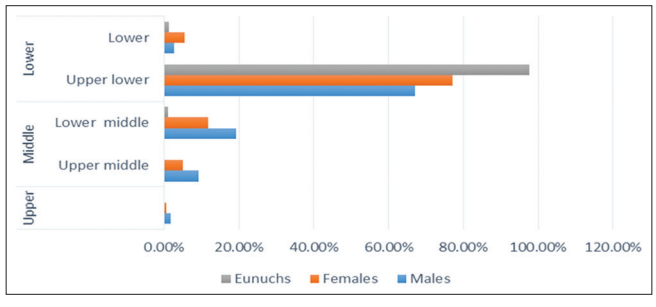

Figure 2: Distribution of socioeconomic status according to the gender

followed by 69 (32.2%) females and 68 (31.2%) males were taking sugary foods rarely while 57 (26.1%) males, 38 (17.8%) females, and 8 (3.9%) eunuchs were consuming sugar-containing food every day. The difference in the frequency of sugar intake was statistically significant (P = 0.000) [Table 1].

The dental caries experience was higher among males (69.7%) compared to females (67.3%) and eunuchs (67.1%). There was no statistically significant difference among the study subjects (P = 813) [Figure 3].

Among 639 subjects, 410 (64.2%) were having decayed teeth. This prevalence of decayed teeth was greater among males, i.e., 148 (67.9%) followed by 135 (63.1%) females and 127 (61.4%) eunuchs while 54 (25.2%) females, 53 (25.6%) eunuchs, and 41 (18.9%) males were having missing teeth due to caries. The prevalence of filled teeth was very less among all the three genders. However, dental caries experience expressed in terms of the total decay-missing-filled teeth (DMFT) index among males, i.e., 152 (69.7%) was higher compared to 144 (67.3%) females and 139 (67.1%) eunuchs. The difference in the distribution of DMFT was not significant among the study population [Table 2].

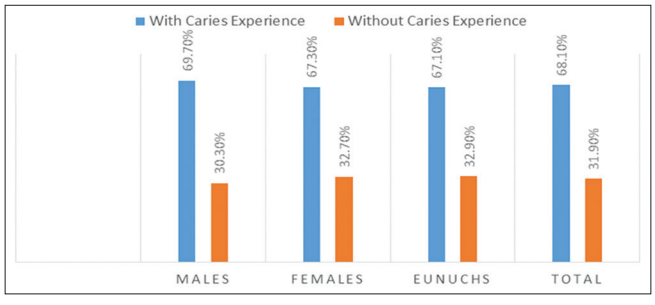

Figure 3: Prevalence of dental caries according to the gender

Among males highest mean number of decayed teeth, i.e., 1.89 were recorded. Mean number of teeth missing due to caries was higher among females, i.e., 0.62. Similarly, 0.06 mean number of filled teeth was observed among females. However, total DMFT with a mean of 2.47 was found higher among males in comparison with females (2.42) and eunuchs (2.0). The difference in the distribution of mean DT, MT, FT, and DMFT among gender was not statistically significant [Table 3].

The overall need for one surface filling was highest (55.4%) among study subjects. The need for pit and fissure sealants was highest among females (36.4%). One surface filling was the most frequent treatment need among males (57.3%). Eunuchs needed higher number of two surface fillings (21.2%). Pulp care and restoration were required more among males (27.1%), while extractions were required more among females (36.7%) and males (37.4%). Need for any other care like prosthesis was higher among males (36.2%) than females (36.4%) and eunuchs (36.7%). The difference in the distribution of treatment needs among genders was significant for fissure sealants, pulp care, and restorations [Table 4].

Table 1: Response of study subjects in relation to dental visit, available dental facilities, and frequency of sugar intake

Response	Gender (%)			Statistical inference
	Males	Females	Eunuchs	
Ever visited a dentist for any problem				
Yes	74 (33.9)	78 (36.4)	67 (32.4)	χ^2 value=0.79
No	144 (66.1)	136 (63.6)	140 (67.6)	*P*=0.67
Dental facilities available in area				
Government hospital	21 (9.6)	14 (6.5)	11 (5.3)	χ^2 value=92.9
Private clinic	94 (43.1)	105 (49.5)	173 (84)	*P*=0.00*
None	92 (42.2)	85 (39.7)	14 (6.8)	
Do not know	11 (5)	10 (4.7)	8 (3.9)	
Frequency of sugar intake				
Everyday	57 (26.1)	38 (17.8)	8 (3.9)	χ^2 value=48.6
Several times a week	23 (10.6)	24 (11.2)	30 (14.5)	*P*=0.000*
Once in a week	36 (16.5)	41 (19.2)	26 (12.6)	
Rarely	68 (31.2)	69 (32.2)	88 (42.5)	
Never	34 (15.6)	42 (19.6)	55 (26.6)	

Table 2: Distribution of decayed, missing and filled teeth in permanent dentition according to the gender

Variables	Gender			Total	Statistical inference	
	Males	Females	Eunuchs		χ^2 value	*P* value
D	148 (67.9)	135 (63.1)	127 (61.4)	410 (64.2)	1.66	0.43
M	41 (18.9)	54 (25.2)	53 (25.6)	148 (23.2)	2.12	0.34
F	2 (1)	2 (1)	0	4 (1)	2	0.36
DMFT total	152 (69.7)	144 (67.3)	139 (67.1)	435 (68.1)	0.59	0.74

DMFT: Decay-missing-filled teeth

DISCUSSION

The current cross-sectional, epidemiological survey was conducted with the aim of assessing the dentition status and treatment needs of Eunuchs (Hijra) residing in Bhopal city, Madhya Pradesh, India. This was the unique, one of a kind study which revealed the oral health-related information of eunuch/Hijra (third gender) community. A total of 639 subjects comprising 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. Such kind of "Hidden populations" have two characteristics: First no sampling frame exists, so the size and boundaries of the population are unknown; and second, there exist strong privacy concerns, because membership involves stigmatized or illegal behavior, leading individuals to refuse to cooperate or give unreliable answers to protect their privacy.[18] 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.[18] Due to these reasons snowball sampling was the best method available for our study.

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.

Table 3: Distribution of mean DT, MT, FT, and DMFT according to the gender

Gender	DT	MT	FT	DMFT total
Males	1.89±2.30	0.56±1.61	0.02±0.21	2.47±3.17
Females	1.75±2.06	0.62±1.65	0.06±0.64	2.42±3.11
Eunuchs	1.44±1.67	0.56±1.22	0.00±0.00	2.0±2.22
Total	1.70±2.04	0.58±1.51	0.03±0.39	2.30±2.88
F value	2.73	0.136	1.10	1.73
P value	0.66	0.873	0.331	0.178

DMFT: Decay-missing-filled teeth

In our study, subject's socioeconomic status (SES) was assessed using modified Kuppuswamy's SES scale. This scale appears to be more comprehensive for SES classification of families in urban communities compared with other scales applicable in India. In our study, an updated version for 2012 was used. According to scale, the SES of eunuch community showed significantly low levels of educational, occupational, and family income compared to males and females which lead them into the lowest socioeconomic category.

It was found that most of the study participants had unfavorable attitude toward regular visits to the dentist. These findings are similar with study conducted by Zhu *et al*.,[19] in which significant proportions of study participants had never seen a dentist. Similarly, eunuchs (96%) were more aware of the dental facilities available in their area. This could be correlated with the way of earning of eunuch community. As all of them earn through *"basti"* or *"mangti"* (kind of begging), for this they always explore and visit nearby places. Furthermore, the frequency of sugar exposure among study participants was very low especially, among eunuchs population. More than 69% of eunuchs either took sugar rarely or never, this was followed by 51% females and 47% males. The difference in sugar intake was statistically significant among gender. This result is in contrast with results obtained by Saravanan *et al*.[20] and Zhu *et al*.[19] where a higher frequency of sweet consumption was observed which was 83.2% and 55%, respectively.

The overall caries experience observed in the present study was 68.1%. This finding is lower compared to a study conducted by Saravanan *et al*.[20] (69.3%) and is slightly higher than the prevalence of India which is approximately 50–60%.[21,22] The overall DMFT among males, females, and eunuchs was 2.47 ± 3.17, 2.42 ± 3.11, and 2.0 ± 2.22, respectively. This clearly shows that eunuchs have recorded with less DMFT score which may be attributed to their low sugar intake than males and females. Although no previous DMFT data are available from eunuch population, the mean DMFT values in all age groups indicate that caries is almost ubiquitous in this population.

In our study, the decayed component contributed to

Table 4: Distribution of treatment needs according to the gender

Treatment needs	Males	Females	Eunuchs	Total	Statistical inference	
					χ^2 value	*P* value
Fissure sealant	73 (33.5)	78 (36.4)	45 (21.7)	196 (30.7)	9.68	0.01*
One surface filling	125 (57.3)	100 (46.7)	122 (58.9)	354 (55.4)	3.22	0.19
Two surface filling	33 (15.1)	29 (13.6)	40 (19.3)	102 (16)	1.82	0.40
Pulp care and restoration	59 (27.1)	53 (24.8)	38 (18.4)	150 (23.5)	4.68	0.09*
Extraction	80 (36.7)	80 (37.4)	70 (33.8)	230 (35.1)	0.87	0.64
Need for any other care	79 (36.2)	78 (36.4)	76 (36.7)	233 (36.5)	0.06	0.97

64.2% of the total caries experience, and thus untreated dental caries constituted for a major proportion of the total caries experience. Whereas, 23.2% of population had missing teeth and only 1% of the population had filled teeth. This clearly indicates poor utilization of dental health-care services among the study population. This may be correlated with lower socioeconomic status. Similarly, findings reported by Saravanan *et al*.[20] and Doifode *et al*.[23] and Corbet[24] showed an inverse relationship between socioeconomic status and mean DMFT. Along with low socioeconomic status, the main predictors for dental caries as were observed in the present study, were visit to dentist, reason to visit dentist, and frequency of sugar intake. These findings are in confirmation with the observations which were made in previous researches.[25,26]

While analyzing the treatment needs based on the dentition status, it was observed that one surface filling (55.4%), need for other care including complete or partial denture (36.5%), extraction (35.1%), fissure sealant (30.7%), and pulp care and restoration (23.5%) were the most frequent treatments which were needed among study population. A lack of knowledge on good oral hygiene practices, a lack of motivation, the low priority which was given to the dental care in the society, a lack of facilities for an early and a regular oral health check-up and a prompt treatment, and finally, the cost of the treatment may be the reasons for the accumulated treatment needs. These reasons are in accordance with a study conducted by Sanadhya *et al*.[27]

The data on dentition status presented in this study are similar to data available from the WHO on global oral health. The availability of estimates of caries prevalence would greatly improve the calculation of the needs estimates.

In conclusion, the findings of the current study spotlight the higher prevalence of dental caries among eunuch population which may be contributed due to poor dental care facilities and lack of awareness. An improved accessibility to dental services as well as dental health education is necessary to ensure the optimum dental health within reach of eunuchs. 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 this socially deprived community pertaining to oral health. 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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