Prevalence of Oral Diseases and Risks to Oral Health in an Urban Community Aged above 14 Years

Abstract

Introduction: Oral health is a requisite to general health and quality of life. The public health problems associated with oral diseases are a serious burden in every nation around the globe. Aims: The aim of this study is to assess the prevalence of dental problems and the oral health seeking behavior of an urban south Indian population aged >14 years. Materials and Methods: In this population-based cross-sectional study, 101 households were selected through systematic random sampling. About 419 participants were interviewed and information on sociodemographic characteristics, personal, and dental history was obtained and a complete oral cavity examination was performed. Results: The prevalence of dental caries, periodontal problems, and tooth wear were 78.75%, 74.7%, and 72.3%, respectively. The mean number of overall affected teeth in the population by one dental problem is 16 ± 8.13. The mean Decayed, Missing and Filled Teeth (DMFT) score was 4.5. The risk factors that were significantly associated with the poor oral health status were age >31 years (Odds Ratio (OR), 2.88), education less than eighth grade (OR, 2.35), inadequate oral hygiene practices (OR, 1.61), use of any form of tobacco (OR, 2.08), and alcohol consumption (OR, 2.02). Only 185 (44.1%) participants perceived that they had a dental problem at the point of the survey and only 20 of them (10.81%) visited a dentist. Conclusion: This study showed a high prevalence of dental caries, periodontal problem, and tooth wear. This emphasizes the need for community-based awareness program on dental health and recommends periodic dental health screening program at the community level for early diagnosis and better treatment.

Keywords: Dental caries, oral hygiene, periodontal problems, tooth wear

Introduction

Oral health is recognized as an important aspect of an individual’s general health and quality of life. Impairment of oral health diminishes the quality of life. The World Health Organization (WHO) defines good oral health as “being free of chronic mouth and facial pain, oral and throat cancer, oral infection and sores, birth defects such as cleft lip and palate, periodontal (gum) disease, tooth decay, tooth loss and other diseases and disorders that affect the mouth and oral cavity and those that limit an individual’s ability in biting, chewing, smiling, speaking and psychosocial wellbeing.” The health problems associated with oral diseases are on rise and is a serious burden in many developing and underdeveloped countries around the globe. It is the most neglected aspect of public health across the globe, especially in a country like India.

The current global and regional patterns of oral diseases are explicitly associated with living conditions, lifestyles and the utilization of preventive oral health systems. Due to the continuous changing trends of lifestyle and diet patterns, there is an increased risk to poor oral health and hygiene in the community especially in an urban setup. In general, surveillance of oral health is neglected in modern public health. It is imperative to know the magnitude of the oral health problems and risk factors associated with it to develop an oral health promotion program at the regional and national level. Hence, a study was undertaken in an urban community of Vellore, South India, to estimate the prevalence of dental problems, oral health status, oral hygiene practices, and oral health seeking behavior of people in the age group >14 years. The risk factors associated with poor oral health was also studied.
Materials and Methods

Study setting and population

A community-based cross-sectional study was carried out at an urban community of old town region of Vellore in South India. The total population of old town is around 7,437 people with an average family size of four. The number of households in this area is 1,798 with around 4,982 people >14 years of age. Two regions, were randomly selected out of four regions in this area.[9] In the selected areas, there were 748 households comprising of 2,376 individuals >14 years of age. Subjects with permanent teeth and retained deciduous teeth were included in the study, whereas individuals who were terminally ill, bedridden, and mentally disabled as well as pregnant women were excluded from the study.

Ethical considerations

The study proposal was approved by the Institutional Review Board and Ethics Committee (IRB No. 9035 dated September 4, 2014). The permission of the counsellor of the old town of Vellore region was obtained prior to the start of the study. Informed consent was taken from participants of age ≥18, whereas consent and assent were taken for all those <18 years of age. Oral health education was given in small groups to the participants, and individuals with dental problems were referred to the dental clinic.

Sample size and design

With reference to an epidemiological study where the prevalence of noncarious lesions was reported as 35.4%, the sample size was calculated assuming a relative precision of 20%.[10] All family members fulfilling the eligibility criteria were included in the study. Using design effect of 2, the required sample was 365. Systematic random sampling method was followed in this study. Out of 748 households in the selected area, 101 households were selected. If a selected household was found to be locked, the next household was selected.

Data collection

During December 2014 to January 2015, three to five families were visited each day to collect the data, preferably when all the family members were present. All the members in each of the selected households fulfilling the inclusion criteria were invited to participate in the study. After obtaining the written consent, the principal investigator interviewed the participants using a pretested questionnaire. The questionnaire included 22 set of questions categorized under five broad domains, namely sociodemographic details (3 set); personal, medical, and dental history (4 set); oral examination findings (4 set); oral health seeking behavior (5 set); and oral hygiene practices (6 set). The questionnaire was pretested on 10 subjects before the collection of data and then applied to the target population. Examination of the oral cavity was done by a registered dentist. Periodontal problems were examined using the periodontal probe and malocclusion was assessed clinically using ADA Type III examination. The appearances of the tooth wear, such as attrition, abrasion, and erosion, were identified clinically. The oral health status was graded based on the DMFT score.[8,11] The score for each individual was calculated by summing up the total number of decayed teeth (D), missing teeth (M), and filled teeth (F).

Data analysis

The data entry was done in Epi Info v7 software and the analysis of the obtained data was performed using SPSS V21. Prevalence of dental problems, oral health seeking behavior, and oral hygiene practices was calculated. Continuous variables, such as age, socioeconomic status, education, were dichotomized. Modified Kuppuswamy scale was used to evaluate socioeconomic status.[12,13] Mean DMFT score was calculated. Individuals with score less than five based on DMFT grading were categorized as good oral health status and the rest as poor oral health status.[14] Oral hygiene practice was evaluated with the score obtained for the six questions based on the basic requirements, such as tools used to clean the teeth, number of times of cleaning the teeth, and types of toothbrush used. The options under each question were given a score, with the maximum score to the most favorable practice and the minimum score to the least favorable practice. Individuals with cutoff score 13 were classified as adequate oral hygiene practices. Chi-square test and odds ratio were used to analyze the risk factors associated with poor oral health status and inadequate oral hygiene practices.

Results

Sociodemographic details

The sociodemographic details of the participants are given in Table 1. In total, 101 households were included in this study. The investigator found 433 individuals eligible to be enrolled in the study out of which only 419 (96.7%) individuals consented to be part of the study. The mean age of the study population was 33 ± 15.81 years with a range of 15–95 years. The mean number of years of education was 7.2 ± 4.82 with a range of 0–17 years of education. The women were mostly housewives and the men were mainly manual laborers.

Tobacco products and alcohol use

Among the study participants, 48 (11.09%) consumed alcohol, out of which 21 (43.75%) used to consume it daily and 18 (37.5%) of them used it for >10 years. About a quarter of the participants consumed some form of tobacco. Among the 46 (10.62%) participants who smoke, 38 (82.6%) smoked daily and 28 (61%) have been smoking for >10 years. Among the 44 (10.16%) participants who...
chewed tobacco, 25 (56.8%) used it daily and 20 (45.4%) of them had chewed tobacco for >10 years. Among the 28 participants (6.5%) who use snuff, 26 (92.8%) participants use snuff daily, and 9 (32.1%) of them has this tendency of taking snuff for >10 years.

**Dental problems**

About 75% of the participants reported a history of having a dental problem and more than half of them reported having decayed tooth in the past. A quarter of them also reported of having sensitivity and missing tooth in the past. It was observed that as the age progressed, the proportion with history of decayed teeth, mobile tooth, and missing tooth increased. Only two of the participants did not have any oral health problems on examination. The five most prevalent dental problems observed among the subjects were dental caries, periodontal problems, tooth wear, malocclusion, and edentulism. The details are tabulated in Table 2. The mean number of teeth affected with dental caries is 3.36, tooth wear is 6.83, periodontal problems are 7.5, malocclusion is 2.7, and edentulism is 1.4. The age group of 35–54 is seen to have very high proportion of the three prevalent dental findings identified in the study population.

**Oral health status**

About two-third of the study participants had a good oral health status based on the DMFT score. The mean DMFT (SD) score was 4.5. Only 185 (44.1%) participants perceived that they had a dental problem at the point of the survey and only 20 of them (10.81%) visited a dentist.

**Oral hygienic practices**

The oral hygienic practices of the participants are described in Table 3. Only 279 (66.6%) participants had adequate oral hygiene practices based on the cutoff score of 13. In this population, 64 (15.2%) participants used tooth paste with brush alternatively with aids like tooth powder, neem twig, and charcoal depending on their convenience and perception. It was observed that majority (82.3%) of the population cleaned their teeth only once. Only 29% of the participants used soft brush, 15% used the vertical technique, but 73% rinsed the mouth after meals in the current study.

**Risk factors associated with oral health practices and oral health status**

The factors found to be significantly associated with poor oral health status [Table 4] were age >31 years (Odds Ratio (OR), 2.88), lower education (OR, 2.35), inadequate oral hygiene practices (OR, 1.61), and any use of tobacco and alcohol consumption (OR, 2.08 and 2.02), respectively, where P value is <0.05. The risk factors associated with oral health status which were not found to be significant are gender and socioeconomic status. The risk factors found to have significant association with inadequate oral hygiene practices [Table 5] were age >31 years (OR, 3.58), lower education (OR, 2.86), and any tobacco use (OR, 3.49), where P value is <0.01. The risk factors associated with inadequate oral hygiene practices which were not found to be significant are gender, socioeconomic status, and alcohol consumption.

**Discussion**

The state of experiencing pain and problems with eating, chewing, smiling, and communicating due to missing,
discolored, or damaged teeth have a profound effect on the daily lives of people and their overall well-being.\cite{4} Though the burden of oral diseases is really high, it is one of the most neglected areas of public health across the world. The high prevalence of history of dental problems (75.8%) in this study is comparable to a study done in North India among adults and elderly people.\cite{15} The worldwide prevalence of dental caries is 100% according to WHO and it was found to be 78.75%.\cite{4} The prevalence of periodontal problems in this study was found to be 74.7%, whereas it has been reported that >90% of the worldwide population is affected with periodontal problems of varying severity.\cite{3,16} The proportion of tooth wear detected (72.3%) was much higher than the prevalence of 43%, reported in the literature.\cite{17} Tooth wear leads to discomfort and sensitivity particularly during eating, drinking, or tooth brushing. The proportion of edentulism found in this study population was 31.7% with minimum one missing tooth. The reports of WHO say that almost 30% of the elderly population worldwide are completely edentulous.\cite{4} The mean DMFT score (4.5) of the study population found was similar to a study done in North India that showed a mean DMFT score of 5.02.\cite{18} In this study, 80% opined that oral health is associated with general health, which is much higher than the reported value of 43.2%.\cite{18} It was observed only few subjects (10.8%) with oral health problem sought medical help, which reflects the poor oral health seeking behavior of this population. The major reason for not visiting a dentist was that they never felt oral health problems to be a priority and an equal number was not aware of the need to seek care for oral health. The other reasons were lack of pain, embarrassment, and

### Table 3: Oral hygiene practices of study participants

| Oral hygiene practices | n (%) |
|------------------------|-------|
| Aids used to clean the teeth (n=419) |       |
| Tooth paste and toothbrush | 315 (75.1) |
| Tooth powder and toothbrush | 73 (17.4) |
| Charcoal | 53 (12.6) |
| Others | 33 (7.9) |
| Neem twig | 26 (6.2) |
| Brick powder | 11 (2.62) |
| Number of times of cleaning teeth in a day (n=419) |       |
| Once | 345 (82.33) |
| Twice | 71 (16.95) |
| Thrice | 3 (0.72) |
| Types of toothbrush used (n=419) |       |
| Soft | 122 (29.12) |
| Medium | 212 (50.60) |
| Hard | 22 (5.25) |
| No toothbrush | 63 (15.04) |
| Methods of cleansing teeth (n=419) |       |
| Horizontal | 362 (83.60) |
| Vertical | 65 (15.01) |
| Circular | 27 (6.24) |
| Frequency of changing toothbrush (n=356) |       |
| Once in 3 months | 308 (86.5) |
| Till it gets worn | 38 (10.6) |
| Once in 6 months | 9 (2.52) |
| Never | 1 (0.28) |

### Table 4: Risk factors associated with poor oral health status

| Variables | Oral hygiene practices (n=419) | Poor oral health status (n=171), n (%) | Good oral health status (n=248), n (%) | P | OR (95% CI) |
|-----------|-------------------------------|----------------------------------------|----------------------------------------|---|-------------|
| Age (years) |                               |                                        |                                        |   |             |
| >31 (n=208) |                               | 111 (53.4) | 97 (46.6) | <0.001 | 2.880       |
| ≤31 (n=211) |                               | 60 (28.4) | 151 (71.6) |         |             |
| Gender |                               |                                        |                                        |   |             |
| Females (n=286) |                               | 116 (40.6) | 170 (59.4) | 0.878 | 0.968       |
| Males (n=133) |                               | 55 (41.4) | 78 (59.6) |         |             |
| Education |                               |                                        |                                        |   |             |
| Eighth standard or less (n=220) |                               | 111 (50.5) | 109 (49.5) | <0.001 | 2.359       |
| More than eighth standard (n=199) |                               | 60 (30.2) | 139 (69.8) |         |             |
| Socioeconomic status |                               |                                        |                                        |   |             |
| Lower SES (n=406) |                               | 163 (40.1) | 243 (59.9) | 0.122 | 0.419       |
| Middle SES (n=13) |                               | 8 (61.5) | 5 (38.5) |         |             |
| Oral hygiene practices |                               |                                        |                                        |   |             |
| Inadequate oral hygiene practices (n=140) |                               | 68 (48.6) | 72 (51.4) | 0.022 | 1.614       |
| Adequate oral hygiene practices (n=279) |                               | 103 (36.9) | 176 (63.1) |         |             |
| Tobacco use |                               |                                        |                                        |   |             |
| Yes (n=105) |                               | 57 (54.3) | 48 (45.7) | <0.001 | 2.083       |
| No (n=314) |                               | 114 (36.3) | 200 (63.7) |         |             |
| Alcohol consumption |                               |                                        |                                        |   |             |
| Yes (n=48) |                               | 27 (56.3) | 21 (43.8) | 0.021 | 2.027       |
| No (n=371) |                               | 144 (38.8%) | 227 (61.2%) |    |             |

SES=Socioeconomic status, OR=Odds ratio, CI=Confidence interval
Table 5: Risk factors associated with inadequate oral hygiene practices

| Variables                  | Inadequate oral hygiene practices (n=140), n (%) | Adequate oral hygiene practices (n=279), n (%) | P     | OR (95% CI)   |
|----------------------------|-------------------------------------------------|------------------------------------------------|-------|---------------|
| Age (years)                |                                                  |                                                |       |               |
| >31 (n=208)                | 98 (41.7)                                       | 110 (52.9)                                    | <0.001| 3.585         |
| ≤31 (n=211)                | 42 (19.9)                                       | 169 (80.1)                                    |       | (2.323-5.533) |
| Gender                     |                                                 |                                                |       |               |
| Females (n=286)            | 93 (32.5)                                       | 193 (67.5)                                    | 0.569 | 0.882         |
| Males (n=133)              | 47 (35.3)                                       | 86 (64.7)                                     |       | (0.572-1.360) |
| Education                  |                                                 |                                                |       |               |
| Eighth standard or less    | 97 (44.1)                                       | 123 (55.9)                                    | <0.001| 2.861         |
| More than eighth standard   | 43 (21.6)                                       | 156 (78.4)                                    |       | (1.861-4.398) |
| Socioeconomic status       |                                                 |                                                |       |               |
| Lower SES (n=406)          | 137 (33.7)                                      | 269 (66.3)                                    | 0.422 | 1.698         |
| Middle SES (n=13)          | 3 (23.1)                                        | 10 (76.9)                                     |       | (0.460-6.270) |
| Tobacco use                |                                                 |                                                |       |               |
| Yes (n=105)                | 58 (55.2)                                       | 47 (44.8)                                     | <0.001| 3.491         |
| No (n=314)                 | 82 (26.1)                                       | 232 (73.9)                                    |       | (2.205-5.529) |
| Alcohol consumption        |                                                 |                                                |       |               |
| Yes (n=48)                 | 21 (43.8)                                       | 27 (56.3)                                     | 0.107 | 1.647         |
| No (n=371)                 | 119 (32.1)                                      | 252 (67.9)                                    |       | (0.894-3.033) |

SES=Socioeconomic status, OR=Odds ratio, CI=Confidence interval

lack of interest. It has been reported in the literature that the presence of the dental problem was not felt severe to visit a dentist.[9] Hence, it is necessary to create oral health awareness in the community, by conducting the oral health awareness programs including dietary and lifestyle modification on a regular basis, which helps in avoiding preventable dental and oral diseases, such as dental caries, periodontal diseases, precancerous lesions, and oral cancer. It also helps in avoiding the negligence toward the oral health and will improve the oral health seeking behavior.

The participants used tooth paste with brush for cleaning the teeth were only 15.2% and some of the participants expressed that cleaning with toothbrush and paste does not give them the satisfaction as tooth powder or charcoal. It has been reported in the literature that 58% of the participants used only toothbrush and tooth paste to clean their teeth.[20] Majority (82.3%) of the population cleaned their teeth only once, whereas Jain et al. has reported that 44% brushed occasionally, 33% brushed once daily, 23% brushed twice daily, and none of them brushed more than twice.[20] Although using soft bristles toothbrush, vertical technique of cleaning and rinsing of mouth after meals are the recommended oral hygiene practices,[21‑23] only 29% used soft brush, 15% used the vertical technique, but 73% rinsed the mouth after meals in this study. This was higher than the results reported by Jain et al., where only 10% used soft bristles brush and the vertical technique for cleaning and 29% rinsed mouth after meals.[20] Heasman et al. in their randomized control trial study concluded that tooth brushing factors associated with tooth wear and periodontal problems were frequency of brushing, the method of brushing and the hardness of the bristles.[24] Also, they concluded that poor oral health is associated with poor oral hygiene practices. This study indicates that regular dental health education program emphasizing the correct hands on experience, such as brushing technique and flossing methods, can improve the oral hygiene practices. Though there are availability and accessibility of dental hospitals and healthcare providers in this urban community, the members do not approach the care providers unless they are symptomatic. The awareness toward the preventive aspect of dentistry, such as caries prevention, periodontal disease occurrence, prevalence of precancerous lesions, etc., is required to maintain good oral health status among this population. Similar findings has been reported by Kumar et al. in his study on assessment of oral health status among the factory workers in the rural area of the Vellore district.[25]

The risk factors that showed significant association with poor oral health status were age, education, oral hygiene practices, any form of tobacco use, and alcohol consumption. The risk factors that were found to be having an association with inadequate oral hygiene practices were also age, education, and any form of tobacco use. Our study showed no association of socioeconomic status and gender with poor oral health status and inadequate oral hygiene practices. The reasons could be that 97% of the study population belonged to lower socioeconomic status and the number of the female participants in this study was more compared with male participants. Srivastava et al. in a community-based study done in North India showed an association of age, socioeconomic status, frequency of
cleaning teeth, materials used for cleaning, and method of tooth cleaning with oral health status. Paulander et al. concluded that level of education was associated with oral health conditions and suggested that it should be used in assessing risk and planning of the correct preventive measures for oral health. Peterson in WHO oral health report 2003 stated that poor dietary habits, inadequate oral hygiene due to poor oral hygiene practices, alcohol consumption, and tobacco use are important harmful risk factors of oral health. It is felt that oral health awareness and dental education programs shall be conducted regularly to a smaller group based on age, education, and socioeconomic status.

To create awareness of proper oral health and hygiene practices, a brief health education was given to all members with the help of flip charts. Correct brushing and flossing techniques were demonstrated with the help of dental model, toothbrush, and floss. The participants were referred to the urban health center for further management of their dental problems. The limitations could be an underestimation in the recorded personal habits due to the participants feeling hesitant to reveal the habits openly because of embarrassment, guilt, or fear of being judged and also the dietary factors were not extensively explored.

Conclusion

This study showed a high prevalence of dental caries, periodontal problem, and tooth wear, and only 20 of them had ever visited a dentist. This emphasizes the need for community-based awareness program on oral health and recommends periodic dental health screening programs at the community level for early diagnosis and better treatment. Oral health campaigns create awareness among people that oral health is associated with general health in unimaginable ways.

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Conflicts of interest

There are no conflicts of interest.

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