## Research Article

# PREVALENCE OF DENTAL CARIES AMONG RURAL ADULTS AND ELDERLY POPULATION IN AMBALA DISTRICT

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## ABSTRACT

The present cross-sectional study was conducted with the aim to assess the dental caries among rural population of Ambala district. The sample size comprised of total 1250 subjects of age 20 years and above. Chi-square and ANOVA were used for statistical analysis. The prevalence of dental caries was 69.5%. The mean DMFT was 5.2. These values were significantly higher in women compared to men. In all age groups the values of missing teeth were the highest. Dental caries was significantly associated with age, gender & education status.

## INTRODUCTION

Oral health is a standard of the oral & related tissues which enables an individual to eat, speak & socialize without active disease, discomfort or embarrassment & which contributes to general well being.[1] Despite great successes in improving the oral health of populations globally, problems still remain in many communities around the world, particularly among the underprivileged groups in developing countries. Dental caries is the major oral health condition in the developing countries, affecting 60-90% of the school children and the vast majority of adults. In India, the prevalence of dental caries is reported to be 50-60%.[2,3] Nearly 19% of the population aged between 65 ≥ years is edentulous. [4]

India is the second highest populated country with population of 1.3 billion.[5] out of which approximately 68% live in rural areas & remaining 32% in urban areas.[6] The dentist to population ratio is 1:10,000 in urban areas, whereas 1:2,50,000 in rural areas.[7] There are several challenges being faced in delivery of oral health care to the rural population, such as lack of man power & poor accessibility which is compounded by poverty & illiteracy. Most of the epidemiological studies on dental caries have been done among children and there have

been very few studies assessing dental caries status of adults and elderly rural population. Therefore, keeping in mind the paucity of literature on dental problems in adults and the public health importance of dental caries, this study was planned to provide some information on the oral health needs of the adult population in rural areas of Ambala.

## MATERIALS AND METHOD

This cross-sectional study was conducted from September 2007 to July 2008 to assess the dental caries status of rural population of Ambala district after obtaining prior clearance from ethical committee. A pilot study was conducted to assess the practical difficulties in rural setup and the format was updated. Sampling was done using systematic multistage cluster sampling. Sample size was calculated using the formula $n=4(pq/L2)$ where p = population proportion of positive character, q=1-p & L = Allowable Error. For this study L was presumed to be 5% of p giving a power of (1-L) i.e. 95% to study. p was 60%,as obtained from pilot study and sample size calculated was 1060.

One of the blocks of Ambala district was randomly selected and the villages under this block were divided into north, east, south & west zones, from each zone 3 villages were randomly

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selected and from each village one anganwadi was randomly selected. In the selected anganwadis houses were visited with the help of anganwadi workers & sarpanch of the village and approximately 100 subjects who were the permanent residents of that place were examined after taking the verbal consent. All individuals below 20 years were excluded from the study. The subjects were made to sit on available furniture & were examined with adequate illumination (Type III). [8] For the clinical examinations, Oral health surveys: Basic Methods World Health Organization (WHO) in 1997 was used.[9] Calibration procedures were performed prior to the study on 30 patients. Demographic details were recorded according to a structured format. Recording was done with the help of a recorder who was made to sit near the examiner. Socioeconomic status was calculated using B.G Prasad's classification which was modified using the Aggarwal criteria (Table 1).[10]

**Table 1** Socioeconomic classification using modified B.G Prasad's classification

| Social class | Income per capita (Rupees) | |
| | Prasad's Classification | Modified Classification for July 2008 |
| --- | --- | --- |
| Upper high | 100 above | 12700 above |
| High | 50-99 | 6350 – 12699 |
| Upper middle | 30-49 | 3810-6349 |
| Lower middle | 15-29 | 1905-3809 |
| Poor | Below 15 | 1904 |

The All India wholesale price index (AIWPI) for the month of July 2008 was 239.3[10].
Multiplication factor 239.3 * 0.53 = 127

After examination, subjects were educated regarding healthy oral hygiene practices & pamphlets regarding health education were distributed. The needy population in the village was treated by organizing a dental camp. Referral cards were issued for those needing further treatment.

**Table 2** Demographic Characteristics of study population

| Age (Years) | Female N(%) | Male N(%) | Total N(%) |
| --- | --- | --- | --- |
| **Age distribution of study population.** | | | |
| 20-24 | 105(16.1%) | 123 (20.6%) | 228(18.2%) |
| 25-34 | 176(27%) | 137 (22.9%) | 313(25%) |
| 35-44 | 166(25.4%) | 114(19.1%) | 280(22.4%) |
| 45-54 | 104(15.9%) | 89 (14.9%) | 193(15.4%) |
| 55-64 | 65(10%) | 76 (12.7%) | 141(11.3%) |
| 65 ≥ | 37(5.7%) | 58(9.7%) | 95 (7.6%) |
| Total | 653(52.2%) | 597(47.8%) | 1250(100%) |
| **Distribution of study subjects according to education** | | | |
| Uneducated | 269(41.2%) | 125(20.9%) | 394(31.5%) |
| I – V | 117(17.9%) | 66(11.1%) | 183(14.6%) |
| VI – VIII | 126(19.3%) | 133(22.3%) | 259(20.7%) |
| IX – X | 78(11.9%) | 134(22.4%) | 212(17.0%) |
| XI – XII | 36(5.5%) | 77(12.9%) | 113(9.0%) |
| Diploma | 1(.2%) | 7(1.2%) | 8(.6%) |
| Graduate | 20(3.1%) | 47(7.9%) | 67(5.4%) |
| Post-graduate | 6(.9%) | 8(1.3%) | 14(1.1%) |
| Total | 653(100.0%) | 597(100.0%) | 1250(100.0%) |
| **Distribution of study subjects according to socioeconomic status (SES)** | | | |
| Upper High | 6(0.9%) | 5(0.8%) | 11(.9%) |
| High | 16(2.5%) | 19(3.2%) | 35(2.8%) |
| Upper Middle | 30(4.7%) | 42(7%) | 72(5.8%) |
| Lower Middle | 109(17.1%) | 112(18.8%) | 221(17.9%) |
| Poor | 478(74.8%) | 418(70.1%) | 896(72.6%) |
| Total | 639(100%) | 596(100%) | 1235(100.0%) |

Pearson Chi-Square test was used to determine any association between caries prevalence and gender. Analysis of variance (ANOVA) was utilized to determine any difference in mean DMFT scores in terms of age, gender, education status and socioeconomic status.

## RESULTS

Among the 1250 subjects examined, 47.8% (597) were males & 52.2% (653) were females. Majority of the subjects were labourers, uneducated and belonged to lower socioeconomic status (Table 2). The mean per capita income of 1235 subjects who revealed their income was Rs 1689. 73.1% of subjects brush their teeth once a day or more, 23.1% less than once a day and 3.8% never or rarely brush their teeth.

### Dental caries status

The prevalence of dental caries was 69.5% (870) & found to be highest in 45-54 years of age group (Table 3). Females had higher caries experience as compared to males (77.3% compared to 61%). A total of 32,828 teeth were examined among which 89.3% (29,389) were sound, 10% (3263) decayed, 0.3 % (125) were filled with no decay, 0.1% (39) filled with decay & 0.03% (12) were bridge abutment. Missing teeth because of dental caries increased from 0.8% in 20-24 year age group to 55% in 65 ≥ years age group. 75 subjects had root caries, maximum being in 55-64 years age group.

**Table 3** Dental caries prevalence among study subjects according to age

| Age (Years) | N | Dental caries prevalence N(%) |
| --- | --- | --- |
| 20-24 | 228 | 131(57.5% ) |
| 25-34 | 313 | 216(69.0%) |
| 35-44 | 280 | 214(76.4%) |
| 45-54 | 193 | 152(78.8%) |
| 55-64 | 141 | 97(68.8%) |
| 65 ≥ | 95 | 59(62.1%) |
| Total | 1250 | 869(69.5%) |

The mean DMFT was 5.2 & it was higher in females (6.11 in females and 4.20 in males). Mean number of teeth decayed & missing due to caries were significantly related to age, gender & education. However, comparison of dentition status with socioeconomic status was not found to be statically significant (Table 4).

### Treatment needs

Mean number of teeth requiring one surface filling, two or more surface filling, pulp therapy & extraction was 1.28, 0.43, 0.28 & 2.14 respectively. Mean number of teeth requiring filling of one or more surface was significantly associated with age & gender (Table 5). Subjects in higher socioeconomic status had a greater need for one surface filling as whereas subjects belonging to lower socioeconomic status had a greater need for extraction.

**Table 4** Association of DMFT with Age, Gender and Education (Mean ± Standard deviation)

| Comparison of DMFT with Age | | | | |
|---|---|---|---|---|
| Age | N | D | F | M |
| 20-24 | 228 | 1.50± 2.16 | .03 ± 0.19 | .19 ± 1.04 |
| 25-34 | 313 | 2.37 ± 2.67 | .23 ± .27 | .79 ± 1.92 |
| 35-44 | 280 | 3.05 ± 3.41 | .21 ± 0.23 | 2.41 ± 3.95 |
| 45-54 | 193 | 3.50 ± 3.2 | .08 ± 0.17 | 4.17 ± 5.64 |
| 55-64 | 141 | 2.79 ± 3.22 | .07 ± 0.12 | 5.16 ± 7.13 |
| 65 ≥ | 95 | 2.66 ± 3.4 | .03 ± 0.21 | 6.03 ± 9.98 |
| Total | 1250 | 2.61 ± 3.09 | .1 ± 0.52 | 2.46 ± 5.15 |
| P value | | .000* | .78 | .000* |
| Comparison of DMFT with socioeconomic status | | | | |
| Upper High | 11 | 2.27 ±2.61 | .00 | .27 ± 0.91 |
| High | 35 | 2.89 ± 3.32 | .14 ± 0.43 | 1.8 ± 3.79 |
| Upper Middle | 72 | 2.31 ± 2.6 | .35 ± 1.25 | 2.03 ± 4.69 |
| Lower Middle | 221 | 2.13 ± 2.91 | .07 ± 0.31 | 2.59 ± 5.51 |
| Poor | 896 | 2.73 ± 3.15 | .08 ± 0.46 | 2.53 ± 5.21 |
| Total | 1235 | 2.63 ± 3.09 | .10 ± 0.52 | 2.47 ± 5.18 |
| p value | | .093 | .051 | .513 |
| Comparison of DMFT with education status | | | | |
| Uneducated | 394 | 3.56±3.74 | 0.06± 0.32 | 4.26± 6.97 |
| I – V | 183 | 2.68± 2.84 | 0.04 ± 0.22 | 2.66 ± 4.92 |
| VI – VIII | 259 | 2.31 ± 2.64 | .1 ± 0.43 | 1.85 ± 4.25 |
| IX – X | 212 | 2.13 ± 2.79 | .13 ± 0.66 | 1.54 ± 3.32 |
| XI – XII | 113 | 1.67 ± 2.19 | .23 ± 0.77 | .41 ± 1.19 |
| Diploma | 8 | 1.75 ± 3.06 | .13 ± 0.35 | .50 ± 0.93 |
| Graduate | 67 | 1.30 ± 1.72 | 0.9 ± 0.38 | .57 ± 1.5 |
| Post-graduate | 14 | 2.14 ± 2.21 | 0.71 ± 2.12 | 1.07 ± 2.17 |
| Total | 1250 | 2.64 ± 3.09 | 0.1 ± 0.52 | 2.46 ± 5.15 |
| p value | | .000* | .510 | .000* |

| Comparison of DMFT with Gender | | | | |
|---|---|---|---|---|
| | Gender | N | Mean | p value |
| Decay | Male | 597 | 1.97 ± 2.57 | .000* |
| | Female | 653 | 3.19 ± 2.57 | |
| Filled no decay | Male | 48 | .14 ± .60 | .726 |
| | Female | 27 | .07 ± .42 | |
| Missing due to Caries | Male | 597 | 2.05 ± 4.98 | .008* |
| | Female | 653 | 2.83 ± 5.29 | |

**Table 5** Comparison of treatment needs with Age & Gender (Mean ± Standard deviation)

| Comparison of treatment needs with Age | | | | | |
|---|---|---|---|---|---|
| Age (Years) | N | Filling for one surface | Filling for two surfaces | Pulp therapy | Extraction |
| 20-24 | 228 | 1.07 ± 1.31 | .26 ± 0.61 | .17 ± 0.41 | .57 ± 1.48 |
| 25-34 | 313 | 1.46 ± 1.69 | .37 ± 0.86 | .35 ± 0.72 | 1.17 ± 2.03 |
| 35-44 | 280 | 1.46 ± 1.6 | .52 ± 1.04 | .33 ± 0.69 | 2.32 ± 3.54 |
| 45-54 | 193 | 1.54 ± 1.83 | .70 ± 1.1 | .34 ± 0.81 | 3.60 ± 4.25 |
| 55-64 | 141 | .95 ± 1.39 | .42 ± 0.89 | .21 ± 0.5 | 3.37 ± 4.26 |
| 65 ≥ | 95 | .56 ± 1.03 | .24 ± 0.63 | .15 ± 0.46 | 3.83 ± 4.23 |
| p value | | .000* | .000* | .002* | .000* |

| Comparison of treatment needs with Gender | | | | |
|---|---|---|---|---|
| | Gender | N | Mean | p value |
| Filling for one surface | Male | 597 | 1.01 ± 1.30 | .000* |
| | Female | 653 | 1.52 ±1.76 | |
| Filling for two surfaces | Male | 597 | .30±.67 | .000* |
| | Female | 653 | .55 ±1.06 | |
| Pulp therapy | Male | 597 | .27 ±.60 | .449 |
| | Female | 653 | .29 ±.69 | |
| Extraction | Male | 597 | 1.76 ±3.05 | .000* |
| | Female | 653 | 2.49 ±3.72 | |

## DISCUSSION

The present study was a cross-sectional study conducted according to the WHO recommendations to assess dental caries status of rural population of Ambala district. Male to female ratio in our study was lower whereas literacy rate &

employment status was better as compared to that of rural population of Haryana state.[11] Majority of the people were either farmers or laborers which is the major occupation of Haryana.[11] The number of males & females was not equal in our study as the study was conducted during the day time & some of the male members could not be contacted. Moreover, it was seen that females cooperated better than males for the study.

Prevalence of dental caries was 69.5% in this study which is higher than reported by Damle *et al*[2], Goyal *et al* [2] ,Uetani M *et al*[12] but similar to Tiwari *et al*.[2] Similarly prevalence of dental caries in 35-44 years age group was 76.4% which was higher as compared to Benoit V *et al*[2], NCMH report[2] but lower than Patro BK *et al* [3] & DCI survey [13] which reported it to be in range of 80 – 95%. Dental caries among 65 ≥ years age group was 62.1% which is lower than that reported by Patro BK *et al* [3] & DCI survey [13] which reported it to be 70%. The prevalence of dental caries was higher in females as compared to males which is supported by the literature and also the trend of dental caries was in accordance with the ICMR surveys[2] which showed an increase in caries prevalence with age. Studies however, have shown inverse relationship between socioeconomic status and dental caries which are contrary to our finding but similar to Jagadeesan R *et al* [14] who found no relation between caries & socioeconomic status.

The average DMFT in the present study was 5.2 which is lower than that reported by Kieser JA[15], Leif AH [16] and Jolanta S.[17] Similarly, DMFT in females was 6.11 which was higher than reported by Jagadeesan *et al*.[14] The mean DMFT was higher i.e. 3.35( 25-34 year age group) in present study to that compared to Shah N[2] & 5.6 in 35-44 year age group which is lower than reported by Benoit *et al*.[18]

Prevalence of root caries was lower than that reported by Shah N.[2] The overall prevalence of teeth missing due to caries was 50.4% for females which was higher than that reported by Jagadeesan *et al*. [14]. However, the mean number of missing teeth was lower than that reported by Ekanayaka A[19] for all age groups. It was found that the number of remaining teeth decreased with increasing age which is similar to that reported by Jagsdeesan *et al*. [14]

3.7% of carious teeth were restored which were lower than that reported by Kevin TA.[20] The need for pulp therapy was higher than that reported by Shah N.[2] Mean number of subjects in need of restoration and extraction was higher than that reported by Shah N.[2]

The results in the present study should, however, be interpreted with caution, since the method used did not include radiographic examination. Thus, higher DMFT values are likely since proximal dental caries was only registered when manifested clinically. Furthermore, variation in sunlight might also have affected the conditions to perform an adequate examination. Nevertheless, with the basic and easy to follow recommendations from the WHO we believe reliable and reproducible results were achieved and therefore making it possible to compare to other studies.

In the present study, 69.5% of subjects were in need of dental care for dental caries & there were hardly any fillings among the subjects and extraction was the most needed treatment. This

is probably due to the negligence of oral health and low dentist/patient ratio. Understandably, priority is given to manage the many life threatening diseases and socio-economic problems than oral health in this developing country. Traditionally, most diseases in the oral cavity including dental caries receive a low priority for treatment especially in developing countries. Therefore, this situation needs a serious consideration.

## CONCLUSION

The results of the present study showed the epidemiological picture regarding dental caries status of adult and elderly rural population of Ambala. The caries prevalence is 69.5% in the population. Dental caries experience was significantly related to age, gender & education status. Treatment needs were also significantly related to age and gender. Need for dental care was evidenced for all age groups examined. There is urgent need for preventive measures and restoratives programmes. This data can act as baseline information for planning oral health care program for the rural population.

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