

Oral Health Status and Practices of 5 and 12 Year Old Indian Tribal Children

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Objectives: To assess oral health status and practices of 5- and 12-year-old Tribal school children.

Methods: A total of 418, 5-year-old children and 327, 12-year-old children were enrolled. Information on demographic characteristics of participants along with oral health behavior was collected. Clinical data were collected on dental fluorosis, periodontal status, dental caries and treatment needs. Dean's index criterion was used to assess dental fluorosis. Community Periodontal Index (CPI) for periodontal conditions and Dentition status and treatment needs for dental caries were recorded. **Results:** Between meal sugar consumption was high (100%). None of the children in both the age groups had visited trained health personnel for dental treatment. Dental fluorosis prevalence in 5- and 12-year olds was 11.9% and 22.9% respectively. Bleeding on probing and calculus was common between both the age groups. A low mean number of healthy sextants were found and this decreased with age. Mean dmft/DMFT values for 5- and 12-year olds were 4.13 ± 3.90 and 1.15 ± 1.62 . Significant caries index (SIC) scores for 5- and 12-year olds were 7.17 ± 4.30 and 3.78 ± 3.21 respectively. **Conclusion:** The present study reveals high sugar consumption, dental fluorosis, poor oral hygiene, and untreated dental disease of tribal children. Under these circumstances, the implementation of preventive programs including restriction of sweets in school premises for the tribal children is the key to good oral health.

Keywords: Tribal children, Koragas, Adivasi, Dental caries, Oral health status

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INTRODUCTION

Adivasi is an umbrella term for a heterogeneous set of ethnic and tribal groups believed to be the aboriginal population of India. They comprise a substantial indigenous minority of the population of India. Terms such as atavika (Sanskrit for forest dwellers), vanvasi or girijan (hill people) are also used for the tribes of India. Adivasi carries the specific meaning of being the original and

autochthonous inhabitants of a given region, and was specifically coined for that purpose in the 1930s.¹

About half of the world's autochthonous people, comprising 635 tribal communities (including 75 primitive tribal communities) live in India. Tribal peoples constitute 8.2% of India's total population, over 84 million people according to the 2001 census. In South India, about one percent of the populations of Kerala and Tamil Nadu are tribal, whereas about six percent in Karnataka are members of tribes.²⁻⁴

Koragas (hill-tribes) who belong to primitive tribes of Dakshina Kannada and Udupi districts are illiterate and superstitious. They are very quiet, inoffensive race, small and slight, men seldom exceed 5 feet six inches, black skinned like most Indian aborigines, thick lipped, noses broad and flat, and hair rough and bushy. Their principal occupation is basket making and they must labour for their masters. They live on outskirts of villages, and may not dwell in houses of clay or mud but in huts of leaves called koppus. Like many of the tribes of India, they are distinguished by unswerving truthfulness.⁵

The working conditions, lifestyle of this community have been oppressed by the majority communities for long. Ajalu practice includes differentiating between Koragas and person belonging to other communities, treating them as inferior human beings, mixing inedible or obnoxious substance in the food and asking them to eat that food and to make the

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children and adults run buffaloes before the beginning of Kambala (festival).⁶ Low socioeconomic status individuals have fatalistic or pessimistic views of health in general and oral health specifically.⁷

One of the main problems tribal people generally encounter is the introduction of sweets into their daily diets. Generally, huge multinational companies reach out of reach areas and sell sweets and sweets beverages and change their basic diet. Prevalence of periodontal disease and dental caries in 1986 was found to be low in rural areas of Delhi despite perfunctory oral health care system with no fluoridation of water supply and indifference to oral health care practices among the children aged 5–14. Mean reported dmft/DMFT values for tribal children were between 0.5 and 1.2, findings being prior to the presence of these cultured companies.⁸ Similar low dmft/DMFT scores were reported in 1993 for tribal school children of Wardha⁹ and Mandu districts.¹⁰

This study explores the association between social disadvantaged tribal children and oral health status and practices of 5- and 12- year old offspring's from Koraga in Udupi District, Southern India.

METHOD

Study design and subjects

The target population for the cross-sectional study involved 6 schools for Tribal children in Udupi district

Children in the age range 5 ± 1 and 12 ± 1 years studying in 1st class were considered for the study. A total of 418 children were present for 5-year age group and 327 children were present in 12 year age group; all the children were selected and invited to participate in the study.

Information on demographic characteristics of participants along with oral health behaviors such as frequency of brushing, material used for cleaning teeth, and visits to any health personnel for dental needs was collected by means of personal interviews administered by the examiner. The dental team comprised of the examiner assisted by a recording clerk, an interpreter and a local health worker.

Clinical examination

All the subjects were examined under adequate illumination (Type III) and clinical data were collected on dental fluorosis, periodontal status, dental caries and treatment needs.

Dean's index criterion was used to assess dental fluorosis. The recording was made on basis of two the two teeth that are most affected. If two teeth are not equally affected, the score for the less affected of the two teeth was recorded. Community Periodontal Index (CPI) was used to record the periodontal condition using a mouth mirror and CPI probe. The Community periodontal index (CPI) was introduced by WHO to provide country profiles of periodontal health status and to enable countries to plan intervention programs to reduce prevalence and severity of periodontal disease.

WHO's criterion was used for detection of dentition status and treatment needs.¹¹ The examination was conducted

with a plane mouth mirror. A systematic approach was adopted for assessment of dentition status and treatment needs. The examination proceeded in a orderly manner from one tooth or tooth space to the adjacent tooth or tooth space. A tooth was considered present in mouth when any part of it was visible. If permanent and primary tooth occupy the same tooth space, status of permanent tooth was recorded. Data on treatment needs are of great value at local and national levels because they provide a basis for estimating personnel requirement and costs of an oral health programs under prevailing or anticipated local conditions. Treatment requirements were assessed for the whole tooth, including both coronal and root caries. Significant Caries Index (SiC) scores were calculated in order to bring attention those children with the highest caries scores in study population. The SiC Index is the Mean dmft/DMFT of the one third of the study group with the highest caries score. The index is used as a complement to the mean DMFT value.

Ethical clearance was taken from Kasturba Hospital Ethics Committee, Kasturba Hospital, Manipal. Informed written consent was taken from parents and parents before carrying out the survey. All examinations were performed by a single examiner and duplicate examinations were conducted on one of every ten subjects throughout the survey. Intra-examiner reliability for various indices was assessed using kappa statistic which was in range of 0.82–0.86.

Statistical analysis

All the data collected were entered into spreadsheets. SPSS software version 13 was used for statistical analysis. Mean and standard deviations were calculated for DMFT/dmft and their components along with CPI scores in each age group. Logistic regression analysis was performed to determine the importance of the factors associated with periodontal status whereas for caries status linear regression analysis was executed. A set of independent variables including age, gender, frequency of cleaning teeth, and frequency of between meal sugar consumption were considered. Dental visits, type of diet, and material used for cleaning teeth were not considered because the dependent variable did not assume two values on the cases being processed. Odds ratio was calculated for all variables with 95% confidence intervals. All the dependent variables to be included in the regression analysis were dichotomized. $p \leq 0.05$ was considered as statistically significant.

RESULTS

Table 1 shows the general characteristic of the study population. The total sample size comprised of 418 children from 5-year age group and 327 children in 12 year age group. Of the 418 children 5-year olds examined 226 (54%) were males and 192 (46%) were females. In 12- year age group, of the 327 children examined 157 (48%) were males and 170 (52%) females. In both the age groups, all the children (100%) used toothbrush and toothpaste for cleaning teeth. In 5-year age group, three fifty eight (85.6%) children brushed teeth once a day and 60 (14.4%) brushed two or more times

Table 1. Demographic and oral health behavioral characteristics of Tribal children

| Oral health related behavior variables | | 5- years N (%) | 12 years N (%) |
|--|-------------------------|-------------------|-------------------|
| Gender | Male | 226 (54) | 157 (48) |
| | Female | 192 (46) | 170 (52) |
| Mode of cleaning teeth | Finger | - | - |
| | Toothbrush | 418(100) | 327 (100) |
| Frequency of cleaning teeth | Once daily | 358 (85.6) | 198 (60.6) |
| | Two or more times a day | 60 (14.4) | 129 (39.4) |
| Material used for cleaning teeth | Toothpaste | 418 (100) | 327 (100) |
| | Toothpowder | - | - |
| Type of Diet | Vegetarian | - | - |
| | Mixed | 418 (100) | 327 (100) |
| Frequency of in between meal sugar consumption | Once a day | - | - |
| | Two times a day | 135 (32.2) | 196 (59.9) |
| | Three times a day | 283 (67.8) | 131 |
| | (40.1) ≥ 3 times a day | - | - |
| Dental visit | Never visited | 418 (100) | 327 (100) |
| | Previous visit | - | - |

a day whereas for 12-year olds 129 (39.4%) and 198 (60.6%) did tooth brushing once daily and more than one time respectively. In both the age groups all the children (100%) had mixed diet being provided in the school premises. In 5-year age group, 135 (32.2%) and 283 (67.8) children consumed between meal sugar two times and three times a day respectively. Similarly, for 12-year olds, between meal sugar consumption was 196 (59.9%) and 131 (40.1%) for two and three times a day respectively. None of the children in both the age groups had visited trained health personnel or a dentist for dental treatment; one of the striking features of the study

In 5-year age group, out of 50 (11.9%) children with dental fluorosis 11 (21.6%), 29 (57.2%), and 10 (21.4%) children had very mild, mild, and moderate fluorosis. For 12-year olds, of the 75 (22.9%) children 10 (13.3%), 31 (41.3%), 29 (38.7%) and 5 (6.7%) had questionable, mild, moderate and severe dental fluorosis respectively. Calculus was more ubiquitous irrespective of age and there was a definite trend for calculus scores to increase with age. A low mean number of healthy sextants were found and this decreased with age. Bleeding on probing and calculus was common among both the age groups. (Table 2)

The d/D component contributed most to the caries index. Three hundred and nineteen (76.3%) 5- year olds and 165 (50.4%) 12 year children had dental caries. Not one of the subjects had a filled tooth. Mean dmft/DMFT values for 5- and 12- year olds were 4.13 ± 3.90 and 1.15 ± 1.62 respectively. Significant caries index (SIC) scores for 5- and 12-year olds were 7.17 ± 4.30 and 3.78 ± 3.21 respectively. (Table 2)

Table 2. Oral health status of Tribal children

| Oral health related behavior variables | | 5-Years N (%) | 12-Years N (%) |
|--|-----------------|------------------|-------------------|
| Dental Fluorosis | Absent | 368 (88.1) | 252 (77.1) |
| | Present | 50 (11.9) | 75 (22.9) |
| Periodontal Status | Healthy | 108 (25.8) | 18 (5.5) |
| | Bleeding | 184 (44) | 49 (15) |
| | Calculus | 126 (30.2) | 260 (79.5) |
| Mean No. of Sextants | CPI = 0 | 2.48 ± 1.21 | 1.07 ± 1.15 |
| | CPI = 1 | 1.91 ± 1.43 | 2.92 ± 1.59 |
| | CPI = 2 | 1.52 ± 1.47 | 2.00 ± 1.53 |
| Decayed teeth (dt/DT) | Absent | 99 (23.7) | 162 (49.6) |
| | Present | 319 (76.3) | 165 (50.4) |
| Missing teeth (mt/MT) | Absent | 411 (98.3) | 327 (100) |
| | Present | 7 (1.7) | - |
| Filled teeth (ft/FT) | Absent | 418 (100) | 327 (100) |
| | Present | - | - |
| Mean dmft /DMFT | | 4.13 ± 3.90 | 1.15 ± 1.62 |
| Range dmft / DMFT | 0-1 | 145 (34.7) | 162 (49.5) |
| | 1-3 | 175 (41.9) | 129 (39.5) |
| | ≥ 3 98 | (23.4) | 36 (11) |
| SIC (Significant caries Index) | 7.12 ± 4.30 | 3.78 ± 3.21 | |

Table 3 shows the results of stepwise multiple linear regression analysis of the caries status (dmft) in relation to several independent variables, which included gender, frequency of cleaning teeth and frequency of between meal sugar consumption. All the variables in the model explained only 20% of the variance in caries status for the 5-year group. The contribution of frequency of in between meal sugar consumption was small (16%) but significant. ($P < 0.001$)

Stepwise multiple regression analysis was also performed to analyze the caries status (DMFT) for 12 year olds. Similar to previous model, variables explained only 24 % of variance in caries status. The contribution of frequency of cleaning teeth ($P < 0.05$) and frequency of in between meal sugar consumption was small (18%) but significant. ($P < 0.001$) (Table 4)

Logistic regression analysis was employed to determine the contribution of age, gender, oral hygiene practices and frequency of between meal sugar consumption to periodontal status. The results of logistic regression showed that all

Table 3. Multiple Linear Regression model for dmft

| Model | R | R ² | Adjusted R ² | SE | R ² Change | P |
|-------|-------------------|----------------|-------------------------|------|-----------------------|-------|
| 1 | 0.1 ^a | 0.01 | 0.01 | 3.99 | .01 | .718 |
| 2 | 0.17 ^b | 0.03 | 0.03 | 3.97 | .02 | .828 |
| 3 | 0.45 ^c | 0.20 | 0.20 | 3.94 | .16 | 0.001 |

a. Predictors: Gender

b. Predictors: Gender, Frequency of Cleaning teeth

c. Predictors: Gender, Frequency of Cleaning teeth, Frequency of between meal sugar consumption

Table 4. Multiple Linear Regression model for DMFT

| Model | R | R ² | Adjusted R ² | SE | R ² Change | P |
|-------|-------------------|----------------|-------------------------|------|-----------------------|------|
| 1 | 0.2 ^a | 0.04 | 0.04 | 0.63 | .04 | .618 |
| 2 | 0.3 ^b | 0.09 | 0.09 | 0.61 | .05 | 0.04 |
| 3 | 0.48 ^c | 0.24 | 0.24 | 2.59 | .13 | 0.00 |

- a. Predictors: Gender
- b. Predictors: Gender, Frequency of Cleaning teeth
- c. Predictors: Gender, Frequency of Cleaning teeth, Frequency of between meal sugar consumption

independent variables were significantly related to periodontal status. The association between age of subjects and their periodontal status was evident with an odds ratio of 1.92 times in the older age group. Gender difference was noted for periodontal disease. Males were more likely to have periodontal disease, as compared to females with an odds ratio of 1.42. Subjects who cleaned their teeth two or more times a day were less likely to have periodontal disease than those who cleaned their teeth some times or never (OR = 1.68; P = 0.001). Frequency of between meal sugar consumption was also related to periodontal disease. (OR = 1.20; P = 0.001) (Table 5)

Table 6 shows the treatment needs for the two age groups. In 5-year age group one surface filling (1.40 ± 1.32) was the most required treatment followed by extraction (1.25 ± 0.3). For 12-year olds, more one surface filling (0.76 ± 1.22) was needed followed by two surface fillings (0.17 ± 0.12). A need for fissure fluoride and fissure sealants was observed for both the age groups studied.

Table 5. Logistic Regression analysis with CPI as dependent variable (Absence of periodontal disease, CPI score 0 Vs presence of Periodontal disease, CPI scores 1-2) and Age, Frequency of cleaning teeth, Frequency of between meal sugar consumption as independent variables

| Variables | B | SE B | P | OR (95%CI) |
|---|------|--------|------|-------------------|
| Age | 0.62 | 0.0032 | 0.00 | 1.92 (1.83, 1.99) |
| Gender | 0.59 | 0.0023 | 0.00 | 1.42 (1.36, 1.48) |
| Frequency of cleaning teeth | 0.60 | 0.0027 | 0.00 | 1.68 (1.60, 1.76) |
| Frequency of between meal sugar consumption | 0.58 | 0.0014 | 0.00 | 1.20 (1.15, 1.25) |

Variables: Age: 5 and 12, Gender: Male and Female, Frequency of cleaning teeth: once a day and more then once, Frequency of between meal sugar consumption: one time and more then one

Table 6. Mean number of teeth requiring treatment by age group

| Age group | One surface filling | Two surface filling | Crown | Pulp care | Extraction |
|-----------|---------------------|---------------------|-------------|-------------|------------|
| 5 | 1.40 ± 2.84 | 0.44 ± 0.31 | 0.3 ± 0.2 | 0.4 ± 0.2 | 1.25 ± 0.3 |
| 12 | 0.86 ± 1.22 | 0.14 ± 0.12 | 0.02 ± 0.13 | 0.06 ± 0.24 | 0.7 ± 0.41 |

DISCUSSION

The majority of the primitive tribal population groups in India is in perpetual poverty and stands much below the poverty line, suffering from an alarming malnutrition and high illiteracy. Previous studies have shown that people in developing countries usually have limited access to dental care, higher level of plaque and calculus than people in economically developed societies.¹²⁻¹³ This is certainly true for the present study group for whom dental services are non-existent, attributable to socioeconomic conditions, and fear of mixing with members of other communities. The government must take initiative more seriously, sincerely, and effectively to create sustainable development oral health programs among them.

In National Oral Health Survey 2002-2003 regarding oral hygiene practices for 5- and 12-year olds, 57–60% children used toothbrush and toothpastes.¹⁴ In the present study all 5- and 12-year age group used toothbrush and toothpaste for cleaning teeth. In a study conducted in Orissa tribal school children used only datum. These are fresh neem or babul sticks, which are chewed and used as toothbrushes.¹⁵ Younger age, and low toothbrushing frequency were associated with poor oral hygiene in a multivariate model, in schoolchildren aged 6 to 12 years in Mexico.¹⁶

Periodontal status deteriorated with age in the present study. The overall prevalence of calculus among 5-year olds was 30.2% which increased to 79.5% for the 12- years old. The periodontal status of 12-year olds is worse than that of population of same age in National oral health survey. This may be explained by the very high prevalence of calculus observed on teeth associated with poor oral hygiene practices and lack of professional therapy

In the present study, 100% children from both the age groups reported having consumed between meal sugar two or more times the previous day. In National Oral Health Survey India, about 24-30 percent respondents reported taking sugar the previous day, of them about 14-15 percent had taken sugar two and more times for both 5-years and 12-year olds.

Mean dmft scores for 5-year old tribal children were 4.13 ± 3.90. Similar mean dmft scores were reported from Australia¹⁷⁻¹⁸ and Trinidad, West Indies.¹⁹ In contrast dmft value and caries prevalence was found to be lower as in studies conducted in India²⁰⁻²² and in other ethnic communities including 8 European countries²³ and UK.²⁴ Higher mean dmft values were reported in same age communities of Southern Thailand²⁵ and Kuwait.²⁶ The overall caries status reported in 5-year age group having one or more decayed teeth was 76.3%. This was higher as compared to the National oral health survey where 51.9% children had caries in one or more teeth. Higher prevalence and mean dmft scores were attributed to improper brushing techniques, high in-between meal sugar intake, and no dental utilization.

Mean DMFT scores for 12-year olds were 1.15 ± 1.62. Findings similar to Tribal school children for 12-year were reported in studies conducted in ethnic communities of Ashkelon²⁷ and China.²⁸ In contrast, higher mean DMFT

scores were reported in studies conducted in 8 European countries and Eastern Trinidad, West Indies. Higher levels of caries were observed among indigenous population of Guatemala with mean DMFT of 10.2.²⁶ For 12-year olds prevalence and mean of dental caries score having one or more decayed teeth was lower than the National survey. The finding could be attributed to higher level of dental fluorosis (22.9%) as compared to general population.

Low level of dental caries was reported despite perfunctory oral health care system with no fluoridation of water supply and indifference to oral health care practices among the tribal children in Orissa.¹⁵ Similarly tribal children in Mandu district, India exhibited a low prevalence of dental caries, both in primary and permanent dentitions, compared to rural as well as urban Indian children of the same age in remote villages¹⁰ These findings could be attributed to simple, coarse and traditional fibrous food consumed by the tribal children, prior to the presence of the cultured multinational companies.

Under these circumstances, the implementation of preventive programs for the population is high priority. The program should include free emergency and low cost basic dental treatment along with sweet and sweet beverages restriction within school premises. Appropriately trained tribal primary oral health care personnel could run the preventive programs. This would help to overcome the reluctance to accept dental services. Such programs should involve the help of local medicine and tribal heads.

It is recognized that because of the nature of the study sample, the findings from this study are not representative of other ethnic group in India or other countries. The findings are representative of tribal children (Koragas) of Udupi district, Southern India. The nature of the study was cross-sectional, thus precluding the ability to draw inferences about causal relationships. Given that no previous published studies have been conducted on tribal children, in particular the Koragas, the present study provides baseline information on the tribal children's oral health status which may be useful for planning future dental health services for the tribe.

CONCLUSIONS

The present study reveals high sugar consumption, dental fluorosis, poor oral hygiene, and untreated dental disease of tribal school, Koraga children. Under these circumstances, the implementation of preventive programs including restriction of sweets in school premises for the tribal children is the key to good oral health.

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