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Periodontal health status and oral hygiene practices of Iruliga tribal community residing at Ramanagar district, Karnataka, India

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Abstract:

Objective: To assess the periodontal health status and oral hygiene practices of 'Iruliga' tribal community residing at Ramanagar district, Karnataka. *Methods:* Data was collected using Community Periodontal Index (CPI). Interviewing also collected the data regarding oral hygiene practices prevalent in the tribal population. *Results:* Usage of oral hygiene aids showed that 2079 (79.8%) Iruligas used chew sticks. According to Community Periodontal Index, gingival bleeding was found in 4.22% (n=110); followed by calculus in 57.9%; shallow pockets (4-5 mm) in 22.0%; and deep pockets (≥ 6 mm) in 3.67% of Iruligas. Percentage of Iruligas with loss of attachment of 4-5mm was 22.03; followed by 6-8mm loss of attachment seen in 3.88% of Iruligas; and 9-11mm loss of attachment seen in 0.04%. *Conclusions:* This study revealed a relatively low prevalence of periodontal disease among Iruliga tribal population and chew sticks represent an alternative instrument to the toothbrush for prevention and control of oral diseases in developing countries.

Key-words: Periodontal health, oral hygiene practices, chewsticks, tribal

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Introduction:

Adivasis, literally means "Original people of the forest" comprise a substantial indigenous minority of the population of India. Tribal people constitute 8.3% of the nation's total population, over 84 million people according to the 2001 census (1).

The 'Iruli'ga' tribe is a typical example for a tribal culture. According to the anthropologist, Dr. D.S. Manjumdar "tribe is a collection of families bearing a common name, members of which occupy the same territory, speak the same language and observe certain taboos regarding marriage, profession or occupation and have developed a well assessed system of reciprocity and mutuality of obligation"(2). The Iruligas residing at Ramanagar are distinct from others, being far less civilized. They are the jungle tribes of the plains (2). Till date no studies on their periodontal health status is available. Therefore, this study aims to assess the periodontal health status and oral hygiene practices of 'Iruliga' tribal community residing at Ramanagar district, Karnataka.

Methods:

The information regarding the population of Iruligas residing at each village was obtained from the village panchayats of the concerned villages and a total population of 2605 Iruligas residing at Ramanagar was included for the study.

Inclusion criteria

The natives belonging to Iruliga tribe residing at the villages of Ramanagar district

who were willing to participate were included.

Exclusion criteria

People who did not belong to Iruliga tribe were excluded.

Data was collected using Community Periodontal Index (CPI) (3). Examination was done under good natural light using a mouth mirror and CPI Probe. The details of oral hygiene practices of the tribal population were obtained by personal interview prior to clinical examination. Repeated attempts were made to examine those people who were not available at the first attempt of examination. Sterilization of the instruments was done using chemical method of sterilization.

Statistical Methods

The Statistical software namely SPSS 15.0, Stata 8.0, MedCalc 9.0.1 and Systat 11.0 were used for the analysis of the data. Microsoft word and Excel have been used to generate graphs, tables etc. Chi square test/Fisher Exact test has been used. Statistically significant figure set for the study was when $p < 0.05$. 95% Confidence Interval was used with $P \pm 1.96 * SE (P)$, where $SE (P)$ is the Standard error of proportion = $P * Q / \sqrt{n}$.

Results:

The total study population was 2605, comprising of 1545 males and 1060 females in the age group of 1-80 years (Figure 1 and 2) with the mean age of 30.56 ± 19.51 . The information gathered regarding their usage of oral hygiene aids showed that 2079 (79.8%) Iruligas used chew sticks, whereas

390 (14.9%) of them used finger with either rangoli powder/salt/charcoal. Only 5 (0.19%) Iruligas used finger with either toothpaste or toothpowder. Toothbrush was used by only one (0.03%) Iruliga with either toothpaste or toothpowder (Figure 3).

Periodontal status as indicated by Community Periodontal Index is shown in figure 4. Subjects with healthy periodontal tissues were found to be 2.41% (n=63). Subjects with bleeding only were 4.22% (n=110); subjects with calculus were 57.9%; subjects with shallow pockets (4-5 mm) were 22.0%; and subjects with deep pockets (≥ 6 mm) were 3.67%.

The mean number of sextants with healthy periodontal tissues was found to be 0.14 ± 0.68 , that of bleeding, calculus, shallow pockets (4-5 mm) and deep pockets (6mm or more) were found to be 0.38 ± 1.11 , 3.87 ± 2.44 , 0.79 ± 1.50 , and 0.06 ± 0.35

respectively. Mean number of sextants excluded from examination was 0.48 ± 0.79 (Table 1).

Percentage of subjects with loss of attachment by gender is given in table 2. Percentage of Iruligas with loss of attachment of 4-5mm was 22.03; followed by 6-8mm loss of attachment seen in 3.88% of Iruligas; and 9-11mm loss of attachment seen in 0.04%.

The correlation of age with prevalence of periodontal disease conditions shows a consistent increasing trend of presence of shallow (4-5 mm) and deep pockets (≥ 6 mm) after the age of 34 years as shown in figure 5. The correlation of age with prevalence of loss of attachment shows an increasing trend of loss of attachment of 4-5 mm after the age of 34 years as shown in figure 6.

Table 1: Mean number of sextants affected with periodontal disease conditions.

| CPI | Mean number of sextants |
|---|-------------------------|
| Healthy | 0.14 ± 0.68 |
| Bleeding | 0.38 ± 1.11 |
| Calculus | 3.87 ± 2.44 |
| Pocket (4-5 mm) | 0.79 ± 1.50 |
| Pocket (6mm or more) | 0.06 ± 0.35 |
| Mean number of sextants excluded from examination | 0.48 ± 0.79 |

Table 2: Prevalence of loss of attachment by gender.

| Loss of Attachment | Male | | Female | | Combined | |
|--------------------|------|--------|--------|--------|----------|--------|
| | No | % | No | % | No | % |
| 0-3 mm | 909 | 58.83 | 585 | 55.19 | 1494 | 57.35 |
| 4-5 mm | 263 | 17.02 | 311 | 29.34 | 574 | 22.03 |
| 6-8 mm | 89 | 5.79 | 12 | 1.13 | 101 | 3.88 |
| 9-11 mm | 1 | 0.04 | - | - | 1 | 0.04 |
| 12 mm or more | - | - | - | - | - | - |
| Not recorded | 283 | 18.32 | 152 | 14.34 | 435 | 16.70 |
| Total | 1545 | 100.00 | 1060 | 100.00 | 2605 | 100.00 |

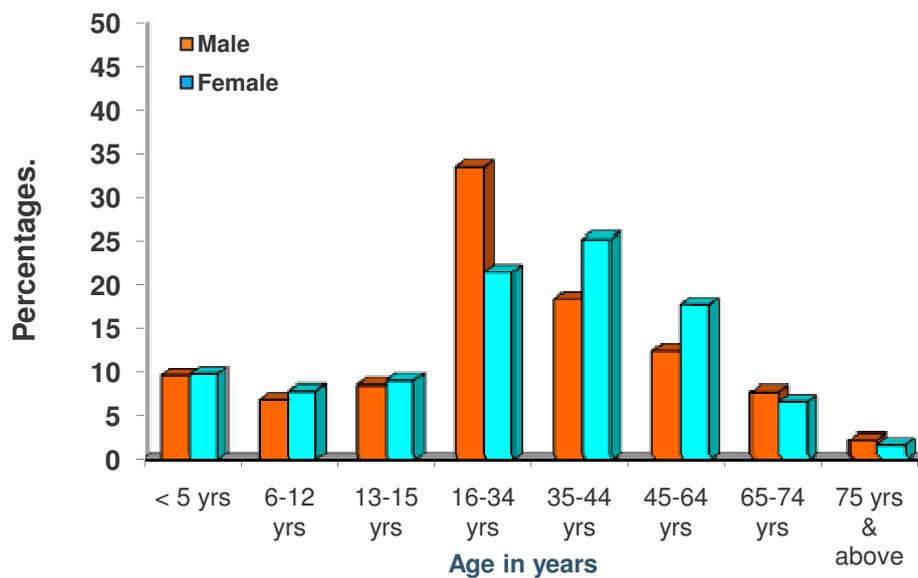


Figure 1: Age and sex distribution of study population

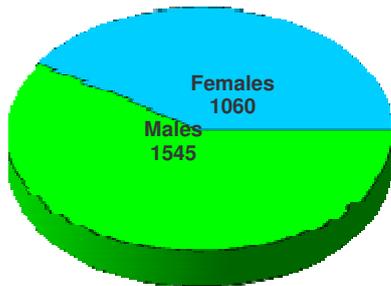


Figure 2. Gender distribution among Iruliga population

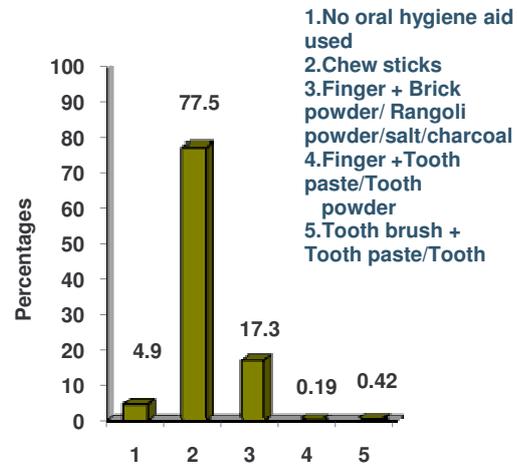


Figure 3. The distribution of oral hygiene practices among Iruligas

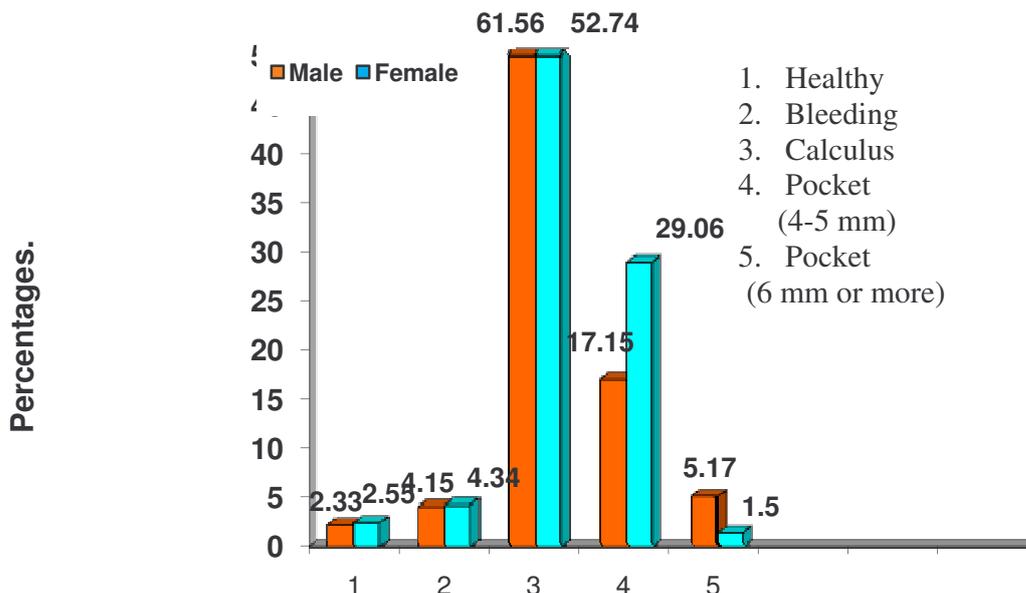


Figure 4. Prevalence of periodontal disease conditions using Community Periodontal Index (CPI).

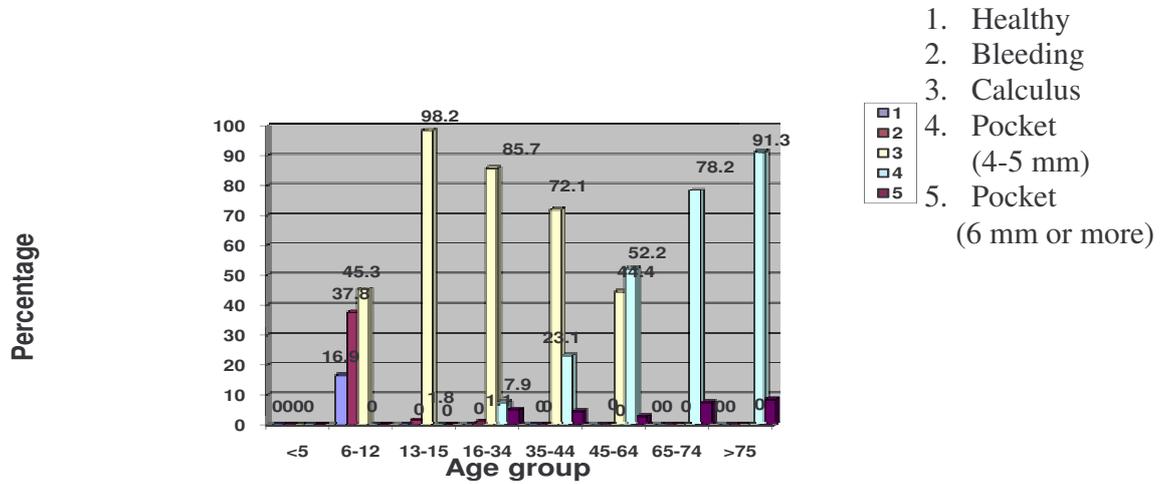


Figure 5. Correlation of age with the prevalence of periodontal disease conditions.

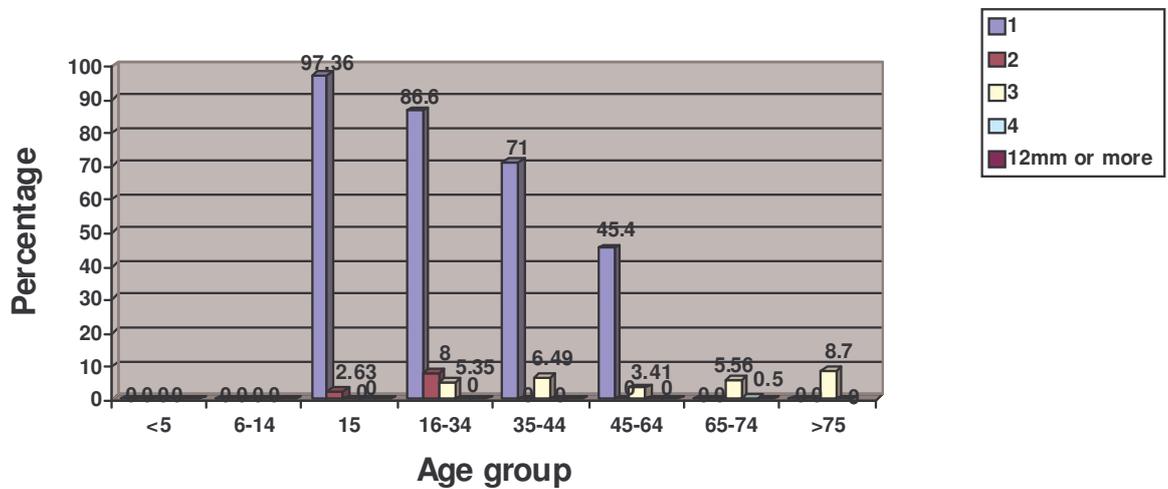


Figure 6. Correlation of age with prevalence of loss of attachment

Discussion:

The present study was conducted to assess the periodontal health status and oral hygiene practices of Iruliga tribal population residing at Ramanagar. Iruligas represent a typical example for an aboriginal lifestyle and culture, which has recently seen the effect of civilization (2). They are isolated in their culture and religion, in fact; they are not integrated into the surrounding Hindu or Muslim communities.

The information regarding their usage of oral hygiene aids showed that 2079 (79.8%) Iruligas used chew sticks, whereas 390 (14.9%) of them used finger with either rangoli powder/salt/charcoal. Only 5 (0.19%) Iruligas used finger with either toothpaste or toothpowder. Toothbrush was used by only one (0.03%) Iruliga with either toothpaste or toothpowder.

This study clearly shows that majority of Iruligas use chew stick to clean their mouth (79.8%). Iruligas make chew sticks by chewing on one end of a twig of Neem tree (*Azadirachta indica*), which they call "bevun kaddi", until it becomes frayed into a brush. The saliva while chewing softens the natural fibers. After this brief period of chewing, the frayed end is used to clean their teeth and tongue, usually for about 5 minutes. After cleansing, the chew stick is left in the mouth for some additional time, which may stimulate salivation. After having been used, the chew stick is either replaced by a new one or the frayed end is cut off to expose a fresh end where new bristles are prepared by further chewing.

This practice is comparable to other populations and cultures around the world since antiquity. A variety of local trees and shrubs have been used for the preparation of chewing sticks in different parts of the world with various local names (4). Miswak is an

Arabic word-meaning tooth cleaning stick (4). In English, miswak has been mentioned as "the natural toothbrush" (4). In Ethiopia, a chew stick, generally called the "mefaka", is occasionally used by the majority of the population (4). *Diospyros lycioides* (*Ebenaceae*), known commonly as "muthala", is a popular chewing stick used in Namibia (5). *Rhus natalensis* and *Eucleadivinatorum* are plants used in Kenya as chewing sticks while in Asia; the nut tree (*Juglandaceae regia*) is commonly used (4). In United States, chew sticks have been used by people in isolated areas of the southern part of the country, particularly in Appalachia and the Ozarks (4). These include sticks made from *Betula lenta*, *Gaultheria procumbens*, *Liquidambar styraciflua*, *Sassafras albidum* and species from *Populus* (4). The roots, stems and twigs of the arak tree (*S.persica*) have been used for centuries as oral hygiene tools (5) and are today commonly used as tooth and tongue cleaning sticks by Muslims in the Middle East, as well as in Asian and various African countries (5,6).

The present study shows that 87.87% of Iruligas 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 (7)[91.61%] on Soligas in Biligiri Ranga Hills and to that of Peterson PE (8)[91%] on Malagasy tribes in Madagascar.

These findings do not agree with the findings of the study conducted by Bharathesh (9)[69.84%] on Todas, aboriginals of Nilgiri Hills in South India. The author related the lower prevalence of periodontal disease to the fact that Todas consumed large amounts of vegetables, tubers, and roots, which might have a self-cleansing effect on the teeth.

The highest prevalence of bleeding only (n=65, 37.8%) was found in 6-12 year old Iruliga children (mean number of sextant 0.38 ± 1.11), whereas calculus was the most commonly affected condition in all the age groups (57.97%, mean number of sextants = 3.87 ± 2.44), highest being in 13-15 years olds (n=223, 98.2%). This finding agrees with that of the study conducted by Mosha HJ *et al* (10) for Native Tanzanian population (mean number of sextants = 3.3) and high compared to the findings of the study conducted by Skrepcinski FB & Niendorff WJ (11) on American Indians and Alaska Natives (mean number of sextants = 1.8). Both studies indicated that calculus was the most commonly found condition in all age groups.

The prevalence of pockets was found in 34 yrs and above. The prevalence of periodontal pockets (CPI score 3 and 4) among Iruligas was found to be 26.67% which does not agree with the findings of 60.8% (CPI score 3 and 4) of Australian aborigines in Western Australia by Smith K *et al* (12).

In the age group of 35-44 years, prevalence of shallow pockets (4-5mm) in American Indians and Alaska Natives, reported by a study conducted by Phipps KR *et al* (13) was 53.5% and those reported by Skrepcinski FB and Niendorff WJ (11), was 38.1%, (mean number of sextants = 1.7) which was higher when compared to Iruligas, (23.1%; mean number of sextants = 0.79 ± 1.50) in the similar age groups.

For Iruligas 35-44 years of age, prevalence of loss of attachment 4-5mm was 22.03% and for 45-64 yr old Iruligas 51.2% (mean number of sextants = 0.79 ± 1.49). These findings are comparable to those of the study conducted by Bagramian RA *et al* (14) which indicated that Amish native people had a prevalence of 57.1% of 4-5mm attachment

loss in the same age group. Whereas attachment loss of 6-8mm was found in only 6.49 and 3.41 percent of Iruligas (mean number of sextants = 0.08 ± 0.47) in the age groups of 35-44 yrs and 45-64 yrs respectively, when compared to 16.7% of Amish in the similar age groups. Bagramian RA *et al* (14) suggested that low levels of periodontal disease was evident in Amish even though they did not seek dental care which may be due to their desire to maintain an isolated lifestyle.

It is generally accepted that effective removal of dental plaque is essential to dental and periodontal health throughout life. Different populations and cultures around the world have practiced oral hygiene measures since antiquity (4). The relatively low prevalence of periodontal disease (especially periodontal pockets and loss of attachment) among Iruligas could be due to the traditional measure of oral hygiene like chew sticks, made of Neem trees (*Azadirachta indica*), used by majority of them (n=2079, 79.8%). Mechanical cleaning procedures are reliable means of controlling plaque, provided cleaning is sufficiently thorough and performed at regular intervals (15,16). In developed countries, this is achieved by tooth brushing with a manual or electric toothbrush in combination with dentifrice or toothpowder. In the developing countries, chew sticks are often used as the sole cleansing agent (4).

Various explanations for the cleansing efficacy of the chew sticks have been offered, including: (i) the mechanical effects of its fibres, (ii) the release of beneficial chemicals by the chew stick or (iii) a combination of both (i) and (ii) (4). The plant fibres remove plaque and simultaneously massage the gum. Unlike a modern toothbrush, the bristles of the chew stick are situated along the long axis of its handle. It has also been suggested that

naturally antimicrobial chewing stick substances may benefit the users by offering protection against and periodontopathic bacteria (4). It was found that oral anaerobic periodontal pathogen like black-pigmented *Bacteroides* species were most sensitive to extracts from selected African chew sticks while other *Bacteroides* species appeared to be unaffected. This may explain why these pathogens were not commonly found in the gingival crevices of adult Nigerians chewing stick users (4). Besides growth inhibition, chew sticks extracts have been shown to inhibit extracellular enzyme activities of periodontal pathogens (4).

Epidemiological studies on periodontal status of chew stick users provide us evidence of its beneficial effects. Darout *et al* (17) assessed and compared the periodontal status of adult Sudanese habitual chew stick and toothbrush users. The CPI was used to score gingival bleeding, calculus, probing depth, and loss of attachment of index teeth of each sextant. These investigators suggested that the periodontal status of the chew stick users in the studied Sudanese population was better than that of toothbrush users. The efficacy of chew sticks used for oral hygiene was comparable to or slightly better than that of the toothbrush. Since for majority of Iruligas, chew sticks form the sole measure of oral hygiene their role could be of major importance in decreased prevalence of periodontal disease. Hence, further research is needed to assess the usage and biological effects, antimicrobial activity, and chemical components of Neem (*Azadirachta indica*) chew sticks used by Iruligas. It has become evident that chewing sticks play a role in promoting oral hygiene and oral health, and therefore, the WHO and other institutions have recognized and encouraged their use (18).

A Consensus Statement on Oral Hygiene (19) concluded that bacterial plaque plays an important role in the etiology of gingivitis and periodontitis; that effective removal of dental plaque can result in the prevention or reduction of these diseases; that chew sticks may play a role in the promotion of oral hygiene; and that evaluation of the effectiveness of chew sticks requires further research. Compared with the modern toothbrush which developed from the chew stick, the latter has a very long tradition, is affordable, economical, more ecological, and readily available, can be used any time and anywhere without dentifrice, and may last longer (4). Elvin-Lewis pointed out that the use of chew sticks might have evolved in various cultures independent of each other (5). The World Health Organization has recommended and encouraged the use of these sticks as an effective and alternative tool for oral hygiene (4). This recommendation is also consistent with the principles of Primary Health Care Approach that focus on prevention, community participation, and the use of appropriate technology (20).

This study revealed a relatively low prevalence of periodontal disease among Iruliga tribal population and chew sticks represent an alternative instrument to the toothbrush for prevention and control of oral diseases in developing countries. Further research is required on chew sticks for better understanding of the properties, with emphasis on frequency and thoroughness of the cleaning.

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