

Oral Health Status and the Impact of Socio-behavioral Factors in Institutionalized Children - Sri Lanka

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Abstract There is an under-researched area in scientific literature, regarding the oral health status and dental epidemiological investigations of the socially marginalized groups such as institutionalized children. The aim of this survey was to determine “the oral health status and impact of socio-behavioral factors of children under probationary care in Sri Lanka. A cross sectional population based study was conducted at 36 homes of institutionalized children in Central Province, Sri Lanka. All the children (1104) were screened and those who were above 6 years old has included to the study. An interview administered questionnaire was filled out for each child. Comprehensive oral examination was conducted by three calibrated examiners. The prevalence of dental caries in deciduous teeth was 26.86% while 56.79% in permanent teeth. The mean dmft was 0.75 ± 1.61 while the mean DMFT was 1.19 ± 1.43 . Gingival bleeding presented in 44.67% of study subjects. Despite reporting higher usage of tooth brush and tooth paste, high percentage of bleeding gums were found in these children and this could be attributable to improper tooth brushing techniques and lack of individual supervision.

Keywords: oral health, institutionalized children

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1. Introduction

Oral health is a fundamental component of general health. Although enjoying good oral health encompasses more than just healthy teeth, most of the children have inadequate oral and general health because of active and uncontrolled dental caries [1]. Dental caries is considered the most prevalent disease among children in the global scenario second to common cold according to World Health Organization (WHO) [2]. Since oral and general health are inextricably linked to each other, children with unfavorable oral health development makes them as a risk group demanding special attention for planning of Dental Health Program [3].

Poor oral health can be attributed to a number of factors, including unequal and limited access to oral health care, lack of appropriate quality measures in oral health care, inadequate health literacy and lack of attention to oral health among primary care providers. While access has improved, the vulnerable groups still lack the oral health services they need. Accessing oral health care is particularly difficult for certain socially marginalized communities like institutionalized children [4].

Evidence suggests that the socially marginalized communities bear the highest disease burden. Children from disadvantaged backgrounds show a high prevalence of dental caries with a minimal dental care utilization. Meanwhile the provision of oral health care in developing

countries like Sri Lanka is limited due to inadequate dental manpower, financial resources, and lack of perceived need for dental care among the people [5]. Literature suggests that children from orphanages of different countries have a high prevalence of dental caries, gingivitis, and dental trauma. This has been attributed to overcrowding, lack of adequate staff, psychological stress, poor oral health practices and improper dietary habits [6,7,8,9].

Most oral health surveys conducted globally so far have primarily covered children, adolescents, and adults from the general population with the socially marginalized groups heavily under-researched both nationally and globally. However such studies are important to expand the level of oral health care delivery system. In Sri Lanka, systematic information about the oral health status is scarce. Ministry of Health in collaboration with the World Health Organization has conducted three National Oral Health Surveys including the present survey in 1983/84, 1994/95 and 2002/ 2003. These surveys indicate overall declining trend in prevalence and severity of dental caries yet marking a substantial problem among all age groups. (4th National Oral Health Survey in process). Therefore the main objective of this survey was to determine the oral health status, treatment need and the impact of socio-behavioral factors of institutionalized children in Central Province, Sri Lanka. The specific objectives are to determine the prevalence of dental caries, periodontal status and other oral conditions among the institutionalized

children and to correlate the findings with national figures of most recent National Oral Health Survey report (NOHS).

2. Materials and Methods

A cross sectional population based survey was carried out in April - June 2015 at 36 homes of institutionalized children under care of Department of probation and child care, Central Province, Sri Lanka. Ethical approval was obtained from Ethical Review Committee, Faculty of Dental Sciences, University of Peradeniya. Altogether 1104 resident children were screened and those who are above 6 years included in the study. Children below 5 years and those who having psychological problems excluded from the study. Informed written consent was obtained from the heads of respective institutions and an informed assent the children above 12 years. Every child found with treatment needs treated on site or referred to special care.

The survey involved a structured interviewer-administered questionnaire followed by an oral examination. The completion of the questionnaire and the clinical examination were conducted the same day. The clinical examination assessed the dentition status, gingival health and dental trauma and was based on the methods and criteria described by the World Health Organization (WHO) [10]. Dental caries was recorded at the cavity level in order to measure the caries experience indices (dmft/DMFT). Dental trauma was recorded if signs of treated or untreated fractures, discoloration, fistula or a missing tooth were present. Gingival bleeding used as the indicators for gingival inflammation which was recorded as the presence or absence of bleeding on probing. As per the recommendation of WHO, periodontal pockets were not recorded in the survey population since they were under the age of 17 years. [10] Visual inspection was used for registration of dental caries and the clinical examinations were carried out in lighted operatory using a plane mouth mirror. The Community Periodontal Index probe was used for assessment of gingival conditions. Data were recorded using the WHO oral health assessment form for children - 2013. Field dental health programmes were organized at

the site in order to provide dental treatment for the needy children after the clinical examination. Necessary referrals were made for the children with special needs.

Before commencement of the survey, three clinical examiners were standardized and calibrated to ensure reliability and consistency of measurements. All children taking part in the study were invited to structured interviewer administered questionnaire on socio-behavioral risk factors. The following principal variables were covered: knowledge, attitudes and practices related to oral health, dietary habits, self-assessment of oral status and experience of pain and discomfort. The questionnaire was formulated based on the World health organization- Oral Health Questionnaire for children-2013 [10].

3. Statistical Analysis

Data processing, analysis and statistical evaluation were performed by means of Minitab 16 statistical software and Microsoft Excel. The data were described by uni and bivariate frequency distributions of dental caries and gingival bleeding. Moreover, the mean dmft-DMFT indices were computed. Kruskal-Wallis Test was used to compare the associations of dental caries indices with factor variables such as children's perception of oral health and oral health related problems. An ordinal logistic regression model was developed to analysis the factors associated with dental caries indices.

4. Results

Out of 685 participants who have the inclusion criteria, 54.01% were females and 45.99% were males. Mean age of study subjects was 11.88 ± 4.02 . Majority of children were Tamil (50.87%) followed by Sinhalese (47.39%) and Muslims (1.16%). The age of 66 children could not be accurately confirmed as they did not have birth certificates. Their age was estimated using the dental records. Mean number of teeth present was 23.87 for 6-12 age group and 27.39 for 13-17 age group.

Table 1. Profile of dental caries & gingival bleeding by gender, ethnicity and age groups ($\alpha = 0.05$)

	No	% treated caries (ff)	% of dental caries (dd)	% of BOP	Mean dmft	Mean DMFT
Total	685	20.44	70.37	44.67	0.75	1.19
Gender						
Male	315 (45.9%)	10.51	30.51	18.54	0.88	1.11
Female	370 (54.1%)	9.93	39.85	26.13	0.63	1.25
Ethnicity						
Sinhala	325 (47.5%)	9.49	31.53	20.00	0.91	1.10
Muslim	8 (1.2%)	0.29	0.73	0.44	0	1.12
Tamil	348 (50.8%)	10.37	37.52	23.65	0.62	1.25
Age Groups						
6-12	303 (44.3%)	8.91	32.70	18.10	1.44	0.78
13-17	382 (55.7%)	11.53	37.66	26.57	0.19	1.51

The dental caries profile and gingival inflammation among the study subjects is shown in Table 1. The prevalence of dental caries in deciduous teeth was 26.86% while 56.79% in permanent teeth. The mean dmft was

0.75 ± 1.61 while the mean DMFT was 1.19 ± 1.43 . Untreated caries was dominant in both dentitions. In males mean dmft was 0.88 ± 1.79 and mean DMFT was 1.11 ± 1.36 , where as in females mean dmft was 0.63 ± 1.44

and mean DMFT was 1.25 ± 1.49 . Neither dmft nor DMFT showed statistically significant association with gender. Gingival bleeding has been presented in 44.67% in study subjects. Sinhala and Tamil subjects has shown higher value of dD components which is not statistically significant. Age group 6-12 years study subjects have shown higher value of dmft while 12-13 shown vice versa for DMFT. Both relationships were statistically significant ($P=0.01$).

Dental fluorosis was seen in 0.73% of children as 0.15% in age group 6-12 and 0.58% in age group 13-17. Dental trauma was seen in 5.84% of children and out of them only 0.88% had restorations of traumatized teeth. Males have shown higher prevalence of dental trauma

(3.65%) whereas females of 2.19%. Signs of dental erosions were observed in 0.58% of children and mucosal lesions (ulcers) were seen in 1.61%. Dento-facial anomalies were recorded as presenting of any form of malocclusion and 5.26% of subjects found with some form of malocclusion. Majority of them (4.09%) were belong to the age group of 13-17 while 1.17% belong to the age group of 6-12.

Caries experience (dmft and DMFT components) were significantly associated with own perception of oral health status of children (Table 2). No significant associations were found between gingival status and perception of oral health. (Kruskal-Wallis Test).

Table 2. Association of own perception of oral health & caries indices ($\alpha = 0.05$)

Statement	Yes*	No*	Don't Know *	P value (dmft)	P value (DMFT)
I am not satisfied with the appearance of my teeth	36.79	60.29	2.92	0.32	0.46
I often avoid smiling & laughing because of my teeth	14.60	85.26	0.15	0.78	0.28
Other children make fun of my teeth	10.80	87.88	1.31	0.01	0.03
Toothache or discomfort caused by my teeth forced me to miss classes at school or miss school for whole day	11.39	87.45	1.17	0.43	0.00
I have difficulty biting hard food	21.61	76.64	1.75	0.12	0.66
I have difficulty in chewing	14.89	84.09	1.02	0.86	0.16

Table 3 shows association of oral health related problems with dental caries indices for the study population. The DMFT indices of children have shown statistically significant association of several episodes of absenteeism from schools due to dental pain. The fact that "other children make fun of my teeth" has also shown a statistically significant association with both dmft and DMFT indices. (Kruskal-Wallis Test).

Table 3. Relationship between Dental Caries Indices and Oral health related problems ($\alpha = 0.05$)

Self-assessment of OH	N	Mean dmft	Mean DMFT
Very good	157	0.71	0.98
Good	413	0.61	1.20
Poor	97	1.39	1.50
Don't Know	18	2.63	1.11

* Proportion of children's responses in percentage.

All caries components were higher among the children who had never seen a dentist compared to those who had

seen a dentist. Although untreated caries was higher in children having seen a dentist, the difference compared to the children with no dental visits was not statistically significant ($P>0.5$).

Total of 98.1% of children brush their teeth with a tooth brush. However 15% stated the use of chew sticks. Usage of toothpaste was seen in 98% of children. In the total sample, 44% used fluoridated toothpastes while 3.2% used herbal toothpastes. However, a majority of them 52.4% was not aware of whether it contains fluoride or not. Frequency of brushing was statistically significant with either caries indices or gingival bleeding ($p < 0.05$).

As shown in Figure 1 consumptions of sugary foods were higher in this population. Considerable number of children reported using sugary foods very frequently such as 59% use of biscuits, 68.2% use of milk with sugar and 84% use of tea with sugar. However the use of sugary foods was not significantly associated with the dmft/DMFT indices.

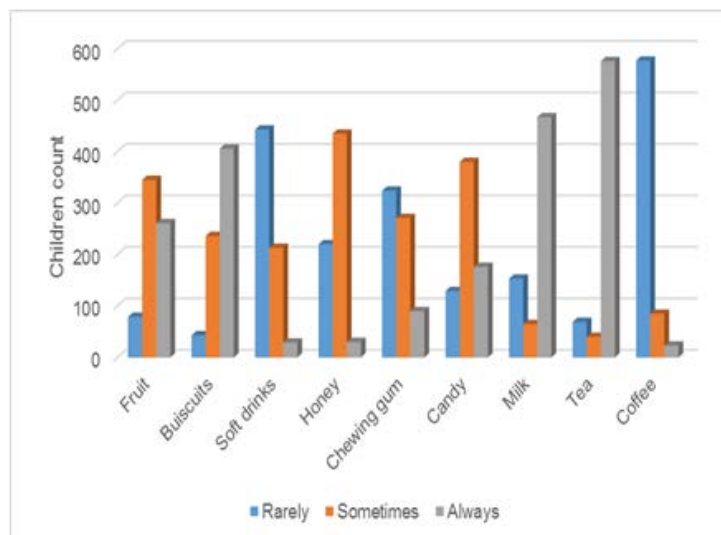


Figure 1. Pattern of sugary food consumption

An ordinal logistic regression model was developed to analysis the factors associated with dental caries indices. DMFT was considered as the response variable and frequency of dental visits, frequency of tooth brushing, use of tooth paste and frequency of sugar consumption were inserted as independent variables ($\alpha = 0.05$). The frequency of dental visits were significantly associated with DMFT ($P=0.00$). Frequency of brushing, usage of tooth brush and frequency of sugar consumption were not significantly associated with the DMFT ($P = 0.427, 0.789$ and 0.149).

5. Discussion

Institutionalization is, the placement of an individual in an institution, such as orphanage. This Orphaned, abandoned, and maltreated children pose problems for societies throughout the world. Although the actual number of children in residential institutions is impossible to gauge accurately, estimates have ranged from 2,000,000 to more than 8,000,000 globally. Most institutions are staffed with caregivers who work rotating shifts in rather bleak material conditions [11,12,13].

According to the report on voluntary residential institutions for children in Sri Lanka by UNICEF in 2007, there are 488 voluntary residential homes that provide care to children in Sri Lanka and 52 of them are for the children with disabilities. At the end of 2006, more than 19,000 children were living in these institutions, separated from their families; the approximate proportion of females is 54% and that of males is 46% [14]. The gender distribution of the current study sample was almost identical to this (Table 1).

Young children in institutional care have often been abandoned at birth or soon after because of poverty or parental instability. In some cases, the state may have intervened to remove young children from their parents' care. Most of the time children are found with no previous records. In this scenario, sometimes children are missing their birth records and other medical records. This could attribute to a problem of taking care of children and making them vulnerable to medical conditions such as congenital diseases or hypersensitivity reactions.[15] This has been observed in the study population as 66 children were unable to confirm their age due to loss of birth records. Dental age was estimated for them and necessary referrals were made to get through process of obtaining a birth certificate.

Systematic information about the oral health situation in Sri Lankan literature is not readily available. Regular data collection does not take place and the most recent national oral health survey was implemented back in 2002/2003. Presenting survey includes important target groups where it is expected that the oral disease pattern would reflect the socially marginalized life style. The study focuses on two of the most common chronic oral diseases in this age group; dental caries and gingival problems. As living conditions and lifestyles are markedly different throughout the country, this survey may not be seen as representative for the entire country. It has however most likely relevance to children living in institutions.

Though there are studies that suggested relationships between ethnicity and oral health status,[16] it was not

considered here since the most of the children had been living under same roof from their birth. National oral health survey- 2003 findings indicated that mean number of teeth present in age group 12 years old was 24.96 while that of 15 years old was 27.80. The study population represented consistent findings as 23.87 for age group of 6-12 years and 27.39 for 13-17 years. The national figures for mean tooth loss in permanent dentition were 0.07 and 0.17 respectively for 12 years and 15 years. Though it was not constant, findings observed in this study was 0.01 and 0.08 respectively. Neither dmft nor DMFT has shown significant correlation with gender but both were significantly associated with age. Those findings together suggest that the institutionalized children does not entirely reflect the figures of the third national oral health survey by making them a diverge group.

The relatively low mean DMFT found in this study and the prevalence of dental caries in permanent dentition in both age groups was in line with those figures found in national oral health survey. Considering the socially marginalized life style in this population, it might be expected to have a higher DMFT. The result indicates that the oral health status among institutionalized children is even better than that of the children of general population. This may be due to direct supervision from supervisors of institutions and guided schedules for oral hygiene practices such as brushing.

Dental fluorosis was seen in 0.73% of children which is not consistent with the national figure. The reduced number may be due to the presence of relatively low concentration of fluoride of water resources in the study area [17]. Children with fluorosis might have migrated from the fluoride rich areas. Traumatic injuries to the teeth were dominant in males than females as they actively participated in physical activities and sports. The low percentage of treated teeth may reflect the loss of parental care. Malocclusions were presented in 5.26% of children and none of them were receiving any form of treatment. This fact also can be attributed to the loss of parental care as the care takers tend to seek treatments only for the conditions causing dental pain. Majority of conditions which does not involve dental pain had been neglected.

The survey revealed a significant correlation between information on untreated dental caries and the subjective evaluation of own oral health. Due to the progressive nature of untreated caries, pulp-involvement and pain were relatively common in spite of the harmlessly looking DMFT levels. Untreated caries and caries indices were highly associated with toothache and absenteeism from schools due to dental pain. A significant relationship found with caries indices and the fact of "other children make fun of my teeth" stating that these children were subjected to psychological harassments by their friends due to poor oral health.

Experience of the dental pain was significantly associated with all components of the caries indices. All caries components were higher among the children who had never seen a dentist compared to those of had seen a dentist. Findings suggested that regular dental care has reduced the dental pain related problems that could have adversely affected the daily life functions and oral health related quality of life.

Sugar consumption is an important factor in the development of dental caries. The adverse effect is

directly proportional to both the frequency and the amount of intake of free sugars [18]. The frequent intake of soft drinks observed among children was possibly due to easy access from their care takers and well-wishers. The present study has shown that the risk of dental caries is relatively high among children consuming sugary drinks. Dental caries prevalence may vary according to dietary and life style factors. There was no statistically significant relationship of oral hygiene practices and dental caries in the present study. This might be due to faulty brushing techniques.

A significantly higher number of children stated tooth brushing at least twice daily in this sample. At the same time an extraordinary high prevalence of gingival bleeding was observed (44.67%). This inconsistency could be explained by either over reporting of tooth brushing or a lack of tooth brushing skills. Though the tooth brushing technique may be inadequate to the majority of the children, they may still gain some caries preventive effect using toothpaste with appropriate level of fluoride thus explaining the lower caries indices. Regression analysis also suggested the correlation between sugar consumption and caries indices were not significant which may again provide evidence of lack of tooth brushing skills and individual supervision. However, the frequency of dental visits was highly associated with the caries indices and it suggested that regular dental visits useful in improving oral health status of this kind of population.

6. Conclusion and Recommendations

The low level of dental caries provides a starting point for oral health promotion and preventive activities. The challenge for health authorities will be to keep the disease level continuously low. In Sri Lanka, the number of dentists are not sufficient to deal with the treatment need of the population so that they have only a little time for preventive measures. Furthermore, general dental health services have a strong curative focus and suffer from limited capacity to deliver essential health care. Therefore the health authorities should be focused on planning and implementation of oral health promotion programmes through schools, in collaboration with the education authorities. Care takers and administrators of these institutions should play an important role by providing a health promoting environment and healthy lifestyles. Access to food items and drinks rich in sugars should be discouraged and healthy choices have to be supported in order to prevent dental caries.

Acknowledgement

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Conflict of Interest

The authors declare that there is no conflict of interest by any means to this study.

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