

Barriers of dental care utilization for children living in military and civilian areas

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ABSTRACT

Aim: We planned our study to assess whether easy access to dental care facilities result in improved oral health and increased utilization of dental services by children. **Materials and Methods:** Four hundred child-parent pairs, 200 each from the military and civilian areas, were randomly selected (children aged 5 years). Prior to the clinical examination of their wards, parents were asked to complete a questionnaire regarding their sociodemographic details, family structure, dental care utilization, and attitudinal variables toward oral health. Dental caries prevalence and treatment needs were assessed using the World Health Organization (WHO) criteria (1997). **Statistical Analysis Used:** Students' *t*-test and chi-square test were used to assess the significance of difference between the two groups. Multivariate regression analysis was performed for all covariates associated with the child's dental attendance pattern. **Results:** The percentage prevalence of children affected by dental caries was observed to be statistically higher in the civilian area. The mean decayed, missing, and filled teeth (DMFT) score was 2.35 ± 2.92 and 3.26 ± 3.35 in the military and civilian areas, respectively (t stat = 2.78, $P = 0.002$). The percentage of teeth requiring treatment was observed to be 22.5% and 27.6% in the military and civilian areas, respectively ($\chi^2 = 16.77$, $P < 0.0001$). Covariates significantly associated with increased child's dental attendance were identified as: High level of the mother's education, regularity of dental visits by the parents, the child's increased brushing frequency, and past caries experience. **Conclusion:** Despite the adequate availability of dental facilities in military areas, untreated dental problems are prevalent. Our finding confirms that dental care utilization is not solely access-related, and other barriers need to be investigated.

KEYWORDS: Caries experience, dental attendance, decayed, missing, and filled teeth (DMFT)

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Introduction

In developing countries such as India, health disparities affecting disadvantaged children remain a nationwide problem. Amid other health concerns, the prevalence of early childhood caries remains high among these children. Poor accessibility to dental care facilities is one of the leading causes of deteriorating oral health in the lower strata of society.^[1,2] Although dental care is a part of the primary health care in India, dental care services in the civilian sector are mostly centralized and offered primarily by regional hospitals in urban centers. Additionally, the utilization of oral health services is promoted largely by the experience of pain resulting from tooth decay and not for want of regular check-ups.^[2]

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In contrast, the oral health services provided by the Indian Army Dental Corps (ADC) are based on time-tested protocols of education, motivation, and periodic inspection, thus providing exceptional patient service. The ADC has adopted methods of delivering oral health care to service personnel and their families through a network of treatment facilities. In 2008, the ADC, along with the Army Wives Welfare Association (AWWA), launched a nationwide campaign to propagate and foster oral health practices by targeting the most affected clientele, mothers and children.^[3] This program provides annual oral health check-ups, a series of lectures, and distribution of health education pamphlets to the wards. Children here have easy access to dental care facilities at subsidized rates. The armed forces are thus, a more organized sector when providing oral health care.

We, therefore, conducted the following study to assess whether easy access to dental care facilities improves oral health and increases utilization of dental care by children residing in military areas.

Materials and Methods

A cross-sectional study was planned in schools located in the military and civilian area of Pinjore block, Panchkula district (Haryana, India). A list of schools was obtained from the concerned authorities in the two sectors, and every third school was selected for inclusion.

Sample selection

After obtaining necessary approval from the school authorities, a total of 400 school-going children aged 5 (± 6 months) years were enrolled in the study. The designated sample size was determined *via* a power analysis. Children were selected using systematic random sampling, 200 each from the schools of the military and civilian areas. The parents of selected children were invited to the school premises for an interview and their permission was sought for their child to be examined.

Children were included in the study only if they had been residing in their respective areas for the last 2 years and not suffering from any chronic systemic illness. They were excluded if they suffered from severe tooth crowding, were undergoing orthodontic treatment, or had any special health care needs.

Questionnaire

Data concerning sociodemographic details (parents' education level, family income, and occupation), family structure, frequencies of dental care utilization, (e.g., whether the parent goes for regular dental visits, timing of the child's first dental visit), and attitudinal variables concerning the inevitability of dental caries were collected using a structured questionnaire. The sociodemographic details recorded were used to assess

the socioeconomic status (SES) of the respondents and only families in the lower socioeconomic class (evaluated using Kuppuswamy's socioeconomic status scale) were included in the study.^[4] The part of the questionnaire related to dental care utilization and attitude toward oral health displayed good internal consistency using Cronbach's α , giving a value of 0.82.

Clinical examination

The dental examination was performed using a sterilized mouth mirror and blunt probe under natural light by a single examiner. The children were made to sit on ordinary chairs facing away from direct sunlight. The probe was used only to remove the plaque or food debris to evaluate the tooth surfaces. 10% of the sample size was reexamined which displayed good intraexaminer reliability (*kappa* score = 0.8). Dental caries and its treatment needs were assessed using the World Health Organization (WHO) recommendations for oral health surveys (WHO, 1997).

Statistical methods

All analysis was performed at a 5% significance interval ($P < 0.05$) using Statistical Package for the Social Sciences 12.0 (SPSS Inc., Chicago, IL). The mean values for dental caries experience and its treatment needs were assessed using descriptive statistics. The Student's *t*-test was used to assess the significance of difference between the two groups. Differences in values of treatment needs were evaluated using the chi-square test. Simple as well as multivariate regression analyses were performed for all covariates possibly associated with the child's dental attendance pattern. Odds ratio was summarized with 95% confidence interval (95% CI).

Results

Four hundred child-parent pairs were recruited for the study, 200 each from the schools of the military and civilian areas, respectively. All children were aged 5 years (± 6 months) and the SES was kept constant through the study cohort.

53.5% and 64.5% of the children were found to be affected by early childhood caries in the military and civilian areas, respectively. The percentage prevalence of dental caries was statistically different in the two areas [Table 1] with a higher value seen in the civilian area.

The mean decayed, missing, and filled teeth (DMFT) score was 2.35 ± 2.92 in the military area and 3.26 ± 3.35 in the civilian area, and the difference was statistically significant. On evaluating individual components, mean number of decayed teeth (DT) was 2.25 ± 2.93 and 3.19 ± 3.27 , the mean number of missing teeth (MT) was 0.01 ± 0.14 and 0.07 ± 0.99 , and the mean number of filled teeth (FT) was 0.14 ± 0.72 and 0 in the military and civilian areas, respectively. There was a

significant difference in the military and civilian areas when comparing the DT (t stat = 3.02, $P = 0.001$) and FT (t stat = 2.73, $P = 0.003$) components. The difference in the MT component was however, not significant (t stat = 0.85, $P = 0.19$) [Table 2].

When assessing treatment needs, 22.5% of the teeth examined in the military area and 27.6% in the civilian area needed treatment, the difference in the percentage being highly significant ($\chi^2 = 16.77$, $P < 0.0001$). The percentage of teeth needing one surface restoration, two or more surface restorations, crowns, and pulp therapy were all found to be significantly higher in the civilian area as compared to the military area. Other care involved space maintenance and space regaining due to the early loss of primary teeth. Sealant requirement in the two areas was not found to differ significantly ($\chi^2 = 0.66$, $P = 0.41$) [Table 3].

Results of the univariate logistic regression analysis (with reduced child's dental attendance as the outcome) showed significant associations with a lower level of maternal education, low regularity of dental visits by the parent, no history of previous dental treatment requirement of the parent, the child's previous caries experience and decreased brushing frequency, and parents' perception of the inevitability of dental caries. The final multivariate logistic regression model displaying the best predictors of dental attendance by children in the study population were: Mothers' level of education, regular dental visits by parent, child's brushing frequency, and past caries experience by the child [Table 4]. The model had good fit based on Hosmer-Lemeshow (H-L) statistic (P value >0.05).

Discussion

The first objective of our study was to assess the prevalence of dental caries in the two areas, i.e., military area and civilian area. The percentage of children affected by dental caries in the civilian area was found to be significantly higher than in the military area [Table 1]. The difference in dental caries prevalence between the two areas may be attributed to the fact that parents of children in the military area were exposed to dental health awareness programs and encouraged to take up regular monitoring of oral health, which in turn helped them to reinforce good oral habits in their children. The prevalence of dental caries in 5-year-old children was reported to be 71.11% in South Kanara, Karnataka by Shetty and Tandon,^[5] 57.9% in the city of Cuttak, Orissa by Dash *et al.*,^[6] and 94.3% in Mangalore, Karnataka by Sudha *et al.*^[7] Chawla *et al.* in their study reported a prevalence of 60.3%, which was approximately similar to our study with regard to the prevalence of dental caries in the civilian area.^[8]

When assessing dental caries, a statistically significant difference was seen in the DMFT values between the military and civilian areas [Table 2]. This difference

Table 1: Percentage of school children affected by dental caries

Area	Number of children examined (n)	Number of caries-free children	Percentage of children affected by dental caries (%)	χ^2	P value
Military area	200	93	53.5	5	0.02
Civilian area	200	71	64.5		

* $P < 0.05$ considered statistically significant

Table 2: Distribution of variables regarding dental caries status according to age and area

Area	Variable			
	DMFT (mean \pm SD)	DT	MT	FT
Military area	2.35 (± 2.92)	2.25 (± 2.93)	0.01 (± 0.14)	0.14 (± 0.72)
Civilian area	3.26 (± 3.35)	3.19 (± 3.27)	0.07 (± 0.99)	0
t-test (P value)	2.78 (0.002)*	3.02 (0.001)*	0.85 (0.19)	2.73 (0.003)*

* $P < 0.05$ considered to be statistically significant, DMFT = Decayed, missing, and filled teeth, DT = Decayed teeth, FT = Filled teeth, MT = Missing teeth, SD = Standard deviation

Table 3: Treatment needs for dental caries

Treatment needs	Military area	Civilian area	χ^2	P value
Total number of teeth examined	4,000	4,000		
Total teeth requiring treatment	900 (22.5%)	1105 (27.6%)	16.77	<0.001
Sealants	420 (46.66%)	447 (40.45%)	0.66	0.41
One-surface restorations	269 (29.88%)	370 (33.50%)	24.28	<0.001
Two- or more surface restorations	70 (7.78%)	81 (7.33%)	0.81	0.37
Crowns	76 (8.45%)	102 (9.23%)	3.798	0.05
Pulp therapy	63 (7%)	91 (8.23%)	7.37	0.007
Extraction	2 (0.22%)	14 (1.27%)	9.02	0.003
Other care	0	0	0	0

* $P < 0.05$ considered to be statistically significant

Table 4: Multiple logistic regression to assess variables influencing the dental attendance pattern in children

Variables	OR (95% CI)*	P value
Mother's education level	6.42 (2.37-16.22)	0.002
Parents' regularity of dental visits	6.75 (2.85-16.00)	<0.001
Daily brushing frequency	2.88 (1.24-6.65)	0.009
Caries experience by the child	4.12 (1.78-10.43)	0.001
Area of residence	EXCL**	
Dental caries experience by parent	EXCL	
Father's education level	EXCL	
Parents' perception of the inevitability of dental caries	EXCL	
Nuclear or joint family	EXCL	
Number of siblings	EXCL	

*95% CI, 95% confidence interval, **EXCL = Excluded variable as P value >0.05 , CI = Confidence interval, OR= Odds ratio

may be attributed to the fact that the status of oral health awareness among the parents in the military area is enhanced by the regular information provided to them through educational programs. Additionally, resource availability is not a constraint in the cantonment area. The accessibility to oral health facilities in the military area is established by the contribution of the “FT” component.

We further assessed the differences in treatment needs and observed that the number of teeth requiring treatment was significantly higher in the civilian area in contrast to the military area [Table 3]. Poor access to dental care facilities, along with financial barriers, may have contributed to the increased number of untreated teeth observed in the civilian area. Notwithstanding that a lesser number of untreated teeth was seen in the military area, a proportion of children still had dental problems. This finding displayed that even with the available means of achieving perfect dental health in the cantonment, individuals accord a low priority to dental health and hygiene, often waiting for the pain threshold to be crossed prior to visiting a dentist.

Another aspect to be considered was the lack of difference in sealant placement of the two areas. The aforementioned fact brings forth the lack of inclination toward preventive therapies. A study conducted by Nagarajappa *et al.* to assess the perceived barriers of preventive oral care provision identified that these were largely patient-related.^[9] Thus, the finding in our study could stem from poor knowledge of preventive remedies as well as negative attitude toward dental health. Mouradian *et al.*, in their study have shown that a lower income is strongly related to poor oral health, fewer dental visits, and fewer protective sealants.^[10] It is important that we highlight that preventive treatments are a prerequisite for successful oral health programs and also reduce future cost of nonpreventive dental procedures.^[11]

Our study also aimed to evaluate the potential factors influencing the dental attendance pattern of children. Factors identified to positively influence the dental attendance pattern of children were found to be a high level of the mother’s education, the child’s previous caries experience, regular dental check-ups by the parent, and higher frequency of tooth-brushing by the child.

A mother with higher level of basic education would be more aware of and receptive toward providing both preventive and symptomatic treatment to her children. Various studies have shown that higher level of maternal education results in lesser caries experience in their children.^[12,13] Another parental factor increasing the odds of a child visiting a dentist was the parents’ dental attendance pattern. A parent inclined toward preventive dental visits would encourage his/her wards to do the same.^[14,15] Additionally, an aware parent would encourage his/her child to inculcate good

oral hygiene habits and in turn, explain the association between brushing frequency and dental care utilization as observed in our study.

A fact that needs consideration is that the primary reason for dental care utilization in both areas was symptomatic dental attendance. Most children who visited the dentist did so for treatment and not as a preventive measure, and thus past caries experience by the child increased the odds of him/her visiting a dentist.

Contrary to expectations, the area of residence did not significantly influence the child’s dental attendance, displaying that dental care utilization could not be boosted in spite of the easy accessibility to treatment facilities. This finding brings into focus the fact that problems related to dental care utilization are not solely access-related.^[16] A three-point system, termed the triad of access triangle, has been identified to counter dental access problems. It focuses on three separate elements, namely, demand for care, dental workforce, and the economic environment.^[17] Thus, it must be stressed that inadequate access to dental care is a convoluted problem and requires a multifaceted solution.

A fact brought forth in our study is the divergent need versus demand for dental care. It is of paramount importance that we understand the barriers that prevent people from seeking appropriate and timely dental care. Psychosocial factors such as oral health beliefs play an important role when accessing dental care.^[18] In our study, almost all respondents believed in the inevitability of dental caries. Thus, access enhancement programs will fail unless this type of perception remains unchecked.

The economic environment would include both patient-related and dentist-related factors. Accessing dental care by patrons from lower SES would result in financial implications (cost of treatment, transportation cost, etc.) and loss of time (at work). With regard to the practitioner, there remains a market-based distribution of dentists.^[19] An economic milieu needs to be created, which provides incentives and reimbursements to dentists when providing pro bono work. Furthermore, in order to overcome health disparities in our country it is important we turn to novel methods such as geographic information system (GIS) and teledentistry, both of which will help plan resource allocation as well as improve patient access to dental care.^[20] Again, it is important we assess the challenges for implementing such measures in our country.

Conclusion

1. It is axiomatic that children in the military area suffer from untreated dental disease and do not utilize the treatment facilities to their advantage.

2. The findings of our study brought to the forefront that individuals from a lower strata of society consider oral health to be insignificant and inconsequential.
3. It is imperative that we identify the barriers to dental care utilization and mitigate existing prejudices toward preventive treatments. Prevention is critical to reducing disease burden and eventual treatment costs, and is required to be the cynosure of dental health programs.

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Conflicts of interest

There are no conflicts of interest.

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