

Do Children of Working Mothers Experience More Dental Caries?

Abstract

Background: Pain and discomfort due to untreated dental caries lead to eating and sleep disruptions, behavioral changes, and poor quality of life. Among adolescents, severe dental caries may lead to activity restriction, school absenteeism, and poor academic performance. Dietary factors, parent's socioeconomic status, and family income have been associated with dental caries experience. The employment status of the mother is a measure of socioeconomic status of the family. **Aims:** This study aims to estimate the prevalence of dental caries and to find out its sociodemographic, oral health behavioral, and clinical determinants among older adolescent (15–18 years) students in Kerala. **Settings and Design:** This was a cross-sectional study conducted at higher secondary schools. **Methods:** Oral examination and sociodemographic and oral health behavioral data collection were done among 1065 older adolescent students in the age group 15–18 across five districts of Kerala by a multistage cluster sampling design. Decayed, missing, and filled teeth (DMFT) and Significant Caries (SiC) index were taken. **Statistical Analysis Used:** SPSS version 16 software was employed. Multiple regression analysis was done to estimate adjusted odds ratios (OR) of predictors of dental caries experience. **Results:** The overall dental caries experience for the group was 59.8% (95% confidence interval [CI]: 56.9–62.7). About 40% of students had no caries experience, 43% had DMFT score 1–3, and only 16.8% had DMFT score 4 and more. Mean DMFT was 1.67 (95% CI: 1.56–1.79). Diet preference, timing of sugar intake, and sugar form were not significantly associated with caries. Mean SiC index was 3.90 (95% CI, 3.75–4.05). In the unadjusted analysis, age, gender, place of residence, mother's employment status, school type, frequency of sugar intake, oral hygiene status, and timing of last dental visit were significant. In the adjusted analysis, however, age, male gender, government schools, timing of last dental visit, and employed mothers were significant predictors for higher dental caries experience. **Conclusions:** Mother's employment was the strongest predictor (OR 2.82, 95% CI: 2.15–3.69) for dental caries experience among adolescents when adjusted to other variables in the final multivariate model.

Keywords: Adolescent, decayed, missing, and filled teeth, dental caries, risk factor, Significant Caries Index

Introduction

Dental caries is one of the most common dental problems affecting children and adolescents in all age groups involving both primary and permanent teeth.^[1] Over the past few decades, a decline in dental caries prevalence has been reported from the developed world possibly due to improved awareness, the use of fluorides, changing lifestyles, improved oral hygiene practices, preventive dental services, and changes in diagnostic criteria.^[2] However, such a trend is not obvious in developing countries.^[3] Pain and discomfort due to untreated dental caries may lead to eating and sleep disruptions, behavioral changes, and poor quality of life.^[4] In school-going children,

severe dental caries may lead to activity restriction including school absenteeism and poor academic performance.^[5]

Along with dietary factors, sociodemographic factors including parent's socioeconomic status and family income have been associated with dental caries experience.^[6] Certain reports point to an inverse relationship between high mother's education and low caries experience of their children.^[7,8] The employment status of the mother is a measure of socioeconomic status of the family. Kerala, the Southern-most Indian state, is the most literate and rapidly urbanizing region in the country with high female employment. It would be interesting to know whether the working status of mothers influences the dental caries experience of their adolescent children. The objective of this study was

R. M. Baiju,
Elbe Peter¹,
Vivek Narayan²,
Jolly Mary
Varughese³,
N. O. Varghese⁴

Departments of Periodontics,
¹Orthodontics and ²Public
Health Dentistry, Government
Dental College, Kottayam,
³Director, Department of
Medical Education, Kerala,
⁴Principal, PMS Dental College,
Thiruvananthapuram,
Kerala, India

Address for correspondence:

Dr. R. M. Baiju,
Department of Periodontics,
Government Dental
College, Gandhi Nagar,
Kottayam - 686 008, Kerala,
India.
E-mail: baijurm@gmail.com

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to estimate the prevalence of dental caries and to find out its sociodemographic, oral health behavioral, and clinical determinants among older adolescent (15–18 years) students in Kerala.

Methods

This cross-sectional study was conducted among adolescent students (15–18 years) at selected higher secondary schools in accordance with the Declaration of Helsinki (as amended in Edinburgh, 2000). The ethical clearance of the study was obtained from Government Dental College, Kottayam (Order No. M/02/2011/DCK). Written permissions were obtained from the heads of the schools, informed consent from the parents, and verbal consent from the students.

The prevalence estimate of 53.2% for periodontal disease (gingival bleeding, calculus, and pockets) from a 2004 study among 15-year olds was considered for sample size estimation with a precision of 10%, obtaining 355 which was rounded to 400.^[9] A design effect of 2 was considered and then an extra 35% was added to compensate for any data loss since the study was part of a large project involving administration of several questionnaires. Thus, data of 1080 individuals were collected from five districts based on multistage sampling technique and finally 1065 were considered for analysis, rest discarded due to incomplete or missing information [Figure 1]. Forty schools, including government and private, were selected by random method from both urban and rural areas.

Following universal infection control protocol, a single senior dentist with more than 20 years experience (Intra examiner reliability, ICC 0.82-0.93) performed oral examination and data collection. The participants were seated in a semi-reclining chair with high backrest in an area with good ventilation and ample natural light. The examiner stood in front or back of the chair for the oral examination. The operational definition for dental caries experience was the total cumulative impact of decay till the day of examination including teeth treated (filled, root canal

treated with/without crowns), teeth filled with secondary caries, and teeth extracted or missing due to caries. Oral health behavioral, sociodemographic (place of residence, socioeconomic status, school type, parent's education, and employment) and dietary information were collected. The educational status of parents (mother and father separately) were assessed as school only (low), higher secondary or predegree (medium), and college (high). Mother's employment status was assessed as employed or unemployed.

Decayed, missing, and filled teeth (DMFT) index scores were categorized as dental caries experience (score 1 and above) and no caries experience (score 0). The Significant Caries (SiC) Index was computed from the highest one-third of DMFT scores. Independent samples *t*-test and ANOVA were employed for the comparison of continuous variables and Chi-square test for categorical variables. Based on the results of the bivariate analysis, multivariate logistic regression models were developed. Nagelkerke *R*² and Hosmer–Lemeshow test (*P* > 0.05) were considered for goodness of fit analysis of the multivariate model. For all other comparisons, *P* < 0.05 was considered as statistically significant.

Results

The descriptives are given in Table 1. Sweet consumption on the previous day was recorded as once (32%), twice (42.1%), and thrice or more (25.9%). For cleaning teeth, 93.4% preferred toothpaste and brush, 5.2% used tooth powder with toothbrush, and only 1.4% used other options such as finger, herbal leaves, charcoal, or stick. A small section of the students used additional oral hygiene aids such as mouthwash or dental floss (10.2%) apart from regular toothbrushing. Majority practiced a combined horizontal/vertical brushing technique (59.1%), whereas 28.4% brushed their teeth in a horizontal manner alone. Majority reported that they brush twice daily (55.8%), whereas 43.1% cleaned their teeth once. A small proportion (1.1%) brushed more than twice a day.

The educational status of mothers was higher when compared to fathers. No illiterate mother was found, 17.3% had college education while 58.6% had school only and 24.1% had higher secondary education. About 46.9% mothers were employed. Majority among the employed mothers had higher secondary or more education. Most of the unemployed mothers had school-only education (72.7%). Majority of the students (53.8%) never visited a dentist in their life, 24.5% visited within last 2 years, 10.1% within 1 year, and 11.5% visited within 6 months. The purpose of visit was for getting some treatment (98.9%) rather than preventive checkups. The overall dental caries experience for the group was 59.8% (95% CI: 56.9-62.7). About 40% of students had no caries experience, 43% had DMFT score 1–3, and only 16.8% had DMFT score 4 and more. Mean DMFT of the population was 1.67, (95% CI: 1.56–1.79).

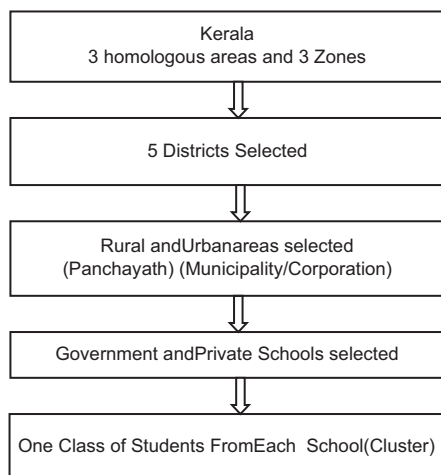


Figure 1: Multistage sampling strategy employed across Kerala

Mean D score was 1.34, (95% CI: 1.24-1.44). Range of D score was from 0 to 9. There were few missing teeth due to caries – mean M score was 0.10 (0.08–0.12). Among the adolescents, 993 had no missing teeth, 49 had one, 18 had two, 3 had three, and 2 had four. Similarly, 925 adolescents had no filled teeth. Mean F score was 0.25 (0.19–0.29). The maximum filled teeth in a person was 8. Hence, the bulk of the disease burden for dental caries experience was due to decayed teeth as 564 individuals had at least 1 decayed tooth.

The dietary factors diet preference, timing of sugar intake, and sugar form were not significant between those with

caries and without caries. Frequency of sugar intake showed a statistically significant difference among those with caries and without caries. In the *post hoc* comparison, those who consumed sugar thrice a day experienced more dental caries compared to those who consumed once a day [Table 2].

There was a significant difference in caries experience between the two locations of residence, with 62.9% from rural having dental caries experience as opposed to 57% among the urban. Students from government schools had more caries experience (62.8%) when compared to students from private schools (55.4%). There was a gender differential in caries experience with boys (66.2%) having more caries experience compared to girls (55%). The caries experience among the socioeconomic classes was not significant [Table 3].

Mean SiC index of the population was 3.90 (95% CI, 3.75–4.05). Boys compared to girls, those from high-income families compared to low-income families, and those adolescents with employed mothers compared to those with unemployed mothers had reported higher mean SiC index [Figure 2]. Poor oral hygiene and recent dental visiting were associated with more dental caries experience.

In the unadjusted logistic regression analysis, age, gender, place of residence, mother's employment status, school type, frequency of sugar intake, oral hygiene status, and timing of last dental visit were significant [Table 3]. However, in the adjusted analysis, age, male gender, government schools, last dental visit within 1 year and employed mother's emerged as statistically significant predictors for higher dental caries experience among adolescent students [Table 4]. Mother's employment was the strongest predictor with children of working mothers having the highest odds for dental caries experience (odds ratio [OR] 2.82, 95% CI: 2.15–3.69) when adjusted to other variables in the

Table 1: Descriptives of the older adolescent population

Variable	n (%)
Gender	
Male	458 (43.1)
Female	607 (56.9)
Age	
≤16	670 (62.9)
≥17	395 (37.1)
Location	
Urban	553 (51.9)
Rural	512 (48.1)
Socioeconomic status	
High income	573 (53.8)
Low income	492 (46.2)
School type	
Government/aided	630 (59.2)
Private	435 (40.8)
Last dental visit	
Within 1 year	231 (21.7)
>1 year	834 (78.3)
Dental caries experience	
No caries (DMFT score 0)	428 (40.2)
Caries (DMFT score 1 and above)	637 (59.8)

DMFT: Decayed missing filled teeth index

Table 2: Comparison of dental caries experience with frequency of sugar intake and mother's education

Frequency of sugar intake	Mean DMFT	SE	95% CI of mean	P	Post hoc comparison				
					Groups compared	Mean difference	SE	95% CI	P
Once a day	1.45	0.097	1.26-1.64	0.02	Once and twice	0.2	0.13	-0.52--0.12	0.299
Twice a day	1.65	0.088	1.48-1.83		Once and thrice	0.53	0.12	-0.88--0.17	0.002*
Thrice or more	1.98	0.120	1.74-2.21		Twice and thrice	0.326	0.14	-0.66-0.01	0.06
Mother's educational status	Mean SiC	SE	95% CI of mean	P	Post hoc comparison				
					Groups compared	Mean difference	SE	95% CI	P
School only	3.77	0.08	3.61-3.93	0.001*	School and Higher secondary	0.393	0.18	0.05-0.83	0.09
Higher secondary	4.16	0.18	3.80-4.53		Higher secondary and college	0.836	0.40	0.11-1.7	0.09
College	5.00	0.50	3.91-6.09		School and college	1.23	0.38	0.34-2.11	0.003*

*Significance, ANOVA *post hoc* Tukey. DMFT: Decayed, missing, and filled teeth; CI: Confidence interval; SiC: Significant caries index; SE: Standard error

Table 3: Predictors of dental caries experience among adolescents-unadjusted analysis

Risk factor	Dental caries experience, n (%)		Crude OR	95% CI	P
	Absent	Present			
Age	428 (40.2)	637 (59.8)	1.32	1.12-1.54	<0.001*
Frequency of sugar consumption					
Daily once	341 (32)	148 (43.4)	1.11	0.83-1.39	0.472
Twice	448 (42.1)	183 (40.8)	1.41	1.10-1.72	0.037*
Thrice or more	276 (25.9)	97 (35)			
Place of residence					
Urban	238 (43)	315 (57)	1.28	1.001-1.64	0.049*
Rural	190 (37.1)	322 (62.9)			
School type					
Private	190 (44.6)	236 (55.4)	1.36	1.06-1.74	0.016*
Government/aided	238 (37.2)	401 (62.8)			
Gender					
Male	155 (33.8)	303 (66.2)	1.60	1.24-2.05	<0.001*
Female	273 (45)	334 (55)			
Socioeconomic status					
Low income	190 (38.6)	302 (61.4)	1.13	0.88-1.44	0.333
High income	238 (41.5)	335 (58.5)			
Oral hygiene					
Good	205 (43.7)	264 (56.3)	1.30	1.02-1.66	0.038*
Poor	223 (37.4)	373 (62.6)			
Last dental visit					
Within 1 year	71 (30.7)	160 (69.3)	1.69	1.24-2.30	<0.001*
>1 year	357 (42.8)	477 (57.2)			
Mother's employment status					
Unemployed	287 (50.8)	278 (49.2)	2.62	2.04-3.39	<0.001*
Employed	141 (28.2)	359 (71.8)			

*Significant. OR: Odds Ratio; CI: Confidence interval

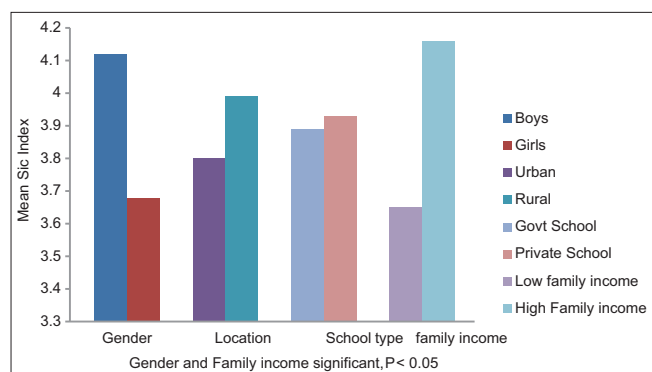


Figure 2: Comparison of mean Significant Caries index among sociodemographic variables

final model. Timing of last dental visit emerged as the next strongest predictor as Visiting dentist within the last one year had an odds of 1.99 (95% CI: 1.34–2.54) for more dental caries experience compared to those who visited dentist before 1 year.

Discussion

About 20 years ago, an increasing prevalence of dental caries was reported in rapidly developing countries like India due to changes in lifestyles and dietary patterns.^[9]

The general impression is that the prevalence and severity of dental caries had increased among the urban and cosmopolitan populations around the world in the past two decades. Little was known about the recent prevalence of dental caries and the sociodemographic, dietary, and oral health behavioral risk factors associated with dental caries among older adolescents in Kerala.

The current prevalence of dental caries experience observed in this study (59.8%, 95% CI: 56.9–62.7) was less than the reported 63.1% among 15-year olds in 2003.^[10] The mean DMFT was low (1.67) as compared to the 2003 data (2.3) for the age group and considerably low when compared with a recent study among Japanese University students.^[11] The prevalence and the mean DMFT of the present study are slightly more when compared to a recent report from Kozhikode city which included students from only Government schools.^[12] Since the mean DMFT was low in this study, DMFT index score of 1 and above was taken as having dental caries experience. This criterion has been reported previously.^[13] SiC Index estimated the participants with a significantly higher caries experience among the adolescent population since the mean DMFT value was very low and the sample size was good. It was two or three times higher than the mean DMFT values.

Table 4: Multivariate regression model showing predictors of dental caries experience among adolescents

	<i>P</i>	OR	95% CI
Age	0.006	1.27	1.07-1.52
Mother's employment status			
Unemployed*			
Employed	<0.001	2.82	2.15-3.69
School type			
Private*			
Government	0.029	1.36	1.03-1.79
Gender			
Female*			
Male	0.003	1.51	1.15-1.98
Oral hygiene			
Good*			
Poor	0.570	1.08	0.82-1.41
Frequency of sugar intake			
Once*			
Twice	0.840	1.03	0.76-1.39
Thrice or more	0.095	1.34	0.9-1.90
Timing of last dental visit			
>1 year*			
Within 1 year	<0.001	1.99	1.42-2.80
Socioeconomic status			
High*			
Low	0.006	1.50	1.12-2.00
Place of residence			
Rural*			
Urban	0.334	1.14	0.87-1.50

*Reference category, significance $P < 0.05$. OR: Odds ratio; CI: Confidence interval

Only 6.8% of adolescents reported missing teeth due to caries, of which 4.6% had lost only one tooth. Proportion of filled teeth was 13.1%. Therefore, the decayed component (untreated dental caries) contributed significantly to the dental caries experience. Armfield *et al.*^[14] reported similar results. This situation is common to many third world countries due to high cost of treatment.^[15] Moreover, absence of dental insurance and less than adequate facilities for restorative dentistry in the public sector add up to the untreated caries burden.

Rural place of residence and studying in government schools were significantly associated with having dental caries experience. Piovesan *et al.*^[16] reported more dental caries experience in students from government schools. The gender differential in this study was marked with males having more caries experience (both mean DMFT and SiC Index). Bali *et al.* reported no gender difference in dental caries experience.^[11] Literature shows that dental caries has a female predilection.^[17] A recent study among the 3–15 age group in Guwahati city has reported a statistically higher caries prevalence among boys.^[18] This could be due to more access to sweets, the boys generally have when compared to girls.^[19] Girls are more health conscious and more likely to follow preventive home care instructions.

Care of teeth also is considered integral to good looks and beauty.

The low socioeconomic status had a statistically significant relationship with greater caries experience (SiC index) compared to high socioeconomic status. The present study assessed the socioeconomic status (family income) based on the Government of Kerala criteria as above poverty line or below poverty line as informed by the students. It is a dichotomous scale, which has its own limitations in defining the exact socioeconomic situation of families. Assessment of socioeconomic status of families is difficult among adolescents in an oral health survey. Students were not sure about their economic class as per the government data. The government data itself has its inherent limitations. Many students did not know their father's educational status or occupation. There is possibility of wrong information provided due to peer pressure or ego. Therefore, it is prudent to employ multiple indicators such as facilities at home, money spending, car ownership, and father's employment status for assessing socioeconomic status of adolescents in future studies.^[20] Literature suggests socioeconomic status of families as an important determinant of dental caries among adults.^[21]

Frequency of sweet intake on the previous day was assessed. Those who had consumed sweet thrice or more on the previous day had a statistically significant increased caries experience when compared to those who consumed sweet only once. Sweet consumption more than once in a week significantly increased the caries increment in permanent teeth.^[22] However, no such association between sugar intake and new cavitation has been reported by others.^[23] The evidence that links sugar consumption and dental caries is not consistent. Frequent fluoride exposure is suggested as one of the reasons for this inconsistency.^[24] The background exposure to fluoride could not be assessed in the present study as the study was a one-time assessment held at school. Apart from the frequency of sugar consumption, other dietary variables such as sugar form or timing of sugar intake did not demonstrate any significant relationship to dental caries experience.

Among the students, 53.8% had never visited a dentist, 11.5% paid the last visit within 6 months, and 10.1% within 1 year. Those who visited within 6 months had more dental problems such as pain, sensitivity, and difficulty in chewing. According to the findings of the National Oral Health Survey 2003 in India, among the 15 year olds, only 6% reported visiting dentist regularly.^[11] Adolescents are not usually taken for periodic preventive dental checkups in Kerala and the health insurance schemes do not cover dental treatment in the country. Those who sought dental treatment within 1 year had more dental caries experience when compared to those who last visited dentist more than a year ago. The relationship between higher dental caries experience and frequent dental visiting behavior can be explained in an Indian context where the discomfort

associated with dental caries could be the reason for the visit.

Mean SiC index was higher among the children of mothers with college education compared to those with school-only education, which was statistically significant. Children of employed mothers had a higher dental caries experience when compared to those of unemployed mothers which was statistically significant. Mother's role in the oral health behavior of children is well studied.^[25] It is reported that mother's employment status negatively affects children's health.^[26] Another report also suggest increased caries risk among children of employed mothers.^[27] Mothers play a pivotal role in developing good oral care practices in children. There will be limited attention on good dietary habits and oral health care of the children as working mother get less quality time for their children.

The socioeconomic status of the families and the sharing of household chores by spouse and other members of the family do influence the quantity and quality of time spent by working mothers for their children's needs. Such aspects were not assessed in the current study and this limitation should be considered in future studies.

Conclusions

Untreated dental caries burden is cumulative and can affect school attendance and performance and may even influence the overall development of adolescents. Mother's employment emerged as the strongest determinant of dental caries experience (adjusted OR 2.82, 95% CI: 2.15–3.69) among adolescents in Kerala when adjusted to age, gender, school type, socioeconomic status, and timing of last dental visit. Mothers take on the primary and major role in the care of children, according to the prevailing family culture in India. The high employment status among mothers and the stress associated with handling job and managing home severely depletes the quality time spent by them with the children for their oral care. Even though the employment status has given them financial independence, social participation and empowerment, the time dedicated for care of children gets reduced considerably. Therefore, more studies are needed to establish the link between working mothers and increased caries susceptibility of their children.

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Conflicts of interest

There are no conflicts of interest.

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