

## Dental Caries and its Socio-Behavioral Predictors— An Exploratory Cross-Sectional Study

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**Objectives:** To assess dental caries status and oral health related behavior of 12 year old school children in relation to urbanization and gender; to analyze the effect of socio-demographic and behavioral variables on dental caries experience. **Study design:** Study sample comprised 831, 12 year old school children in, India. Caries status was assessed by Decayed, missing, filled teeth (DMFT) index and a 16 item closed ended questionnaire was administered to children for assessing their oral health related knowledge, beliefs and behavior. **Results:** Mean caries experience and prevalence was 1.94 and 64.9% respectively. Decay was the dominant component of DMFT. Greater proportion of female and urban children presented better oral health knowledge, beliefs and practices. Boys were more liable (OR=1.2, 95% CI=1.10-1.96) for having caries than girls. Children living in rural areas and whose parents were not professionals or semiprofessionals were more likely to experience caries. Children whose mothers were unskilled or house wives were more than twice likely to present caries (OR=2.14, 95% CI-2.03-2.45) than those children whose mothers were skilled or semi-skilled. Children of illiterate fathers and mothers were 1.09 (95% CI, 1.02-1.49) and 1.98 (95% CI, 1.13-1.99) times more likely to have dental caries than those children whose parents had greater than 10 years of education. Children, those who cleaned their teeth less than once a day presented an odds ratio of 1.36 (CI-1.17-1.86) also higher odds of dental caries was observed in children consuming sweets or soft drinks more than once a day. **Conclusions:** The prevalence and severity of dental caries was low among urban children and girls than their rural and boy counterparts. In general, oral health knowledge, beliefs and practices were low, predominantly in rural and male children. Caries experience was significantly associated with gender; location of residence, brushing frequency, frequency of consumption of soft drinks and sweets, parents' occupation and education.

**Key words:** Dental caries; School children; Socioeconomic factors; Tooth brushing.

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### INTRODUCTION

Dental caries is prevalent worldwide and is a public health problem in many countries<sup>1</sup>. The prevalence of dental caries varies between the countries with a declining trend being observed in developed countries. In contrast, increasing figures of caries prevalence are reported from those countries that are less developed and emerging economies<sup>2</sup>. In less developed nations, the increasing prevalence of dental caries has been ascribed to urbanization, poor socio-economic status (SES) and change in lifestyle<sup>3</sup>. Dental caries is multifactorial and is also influenced by biological and behavioral factors other than the aforementioned environmental factors.<sup>4</sup>

Literature suggests that inequalities in oral health are mainly influenced by SES with poorer oral health being observed in individuals belonging to lower SES than those with higher SES.<sup>5,6</sup> In addition behavioral practices like tooth cleaning; professional mechanical tooth cleaning<sup>7</sup> and dietary sugars<sup>8</sup> have been proven to be related to dental caries. These practices are in turn related to lifestyle and living circumstances.<sup>7</sup>

Evaluating the impact of different social environments on oral health is significant component of dental public health research.<sup>9</sup> In addition, it is also important to assess the influence of modifiable risk factors like oral health related behaviors on dental caries to plan health promotion activities. This can be achieved by using multivariate models with various risk factors as independent variables and dental caries as dependent variable. Based on the literature, we have hypothesized that children living in rural areas, males, those children practicing poor oral hygiene practices and having parents of lower education or occupation would experience greater caries than their comparative counterparts.

Most of the literature on the effect of socio-demographic and behavioral risk factors on dental caries status comes from developed countries and there are no studies from the state of Rajasthan that have evaluated the influence of various risk factors on dental caries in school children. The present study aimed to assess dental caries status and oral health related behavior of 12 year old school children of Udaipur district (Rajasthan State) in relation to urbanization and gender; to analyze the effect of socio-demographic and behavioral variables on dental caries experience.

## MATERIALS AND METHOD

The present study is part of a large survey conducted on 6 and 12 year old school children of Udaipur district during the period, November 2007 to July 2008. However, the results related to dental caries status and behavior of 12 year old school children are only presented in this paper.

In order to collect the representative sample, a combination of multi stage and cluster sampling procedure was executed. The sampling procedure has been discussed in our previous paper<sup>10</sup>. A total of 923 subjects were selected by sampling. Ethics approval was obtained from the institutional Ethics committee for research of Darshan dental college and hospital. Permissions were availed from the school and district education department, verbal assent from each participating child and written informed consent from their parent was also acquired.

Dental examination of the subjects was carried out under natural day light by a single investigator (SK); artificial illumination was used at times when required. Caries status was evaluated by means of Decayed, Missing and Filled Teeth (DMFT)<sup>11</sup> index and caries diagnosis was done according to WHO criteria<sup>12</sup>. In order to minimize the intra examiner variability, 10% subjects were randomly selected in each school for repeated examination. Kappa co-efficient for intra-examiner reliability for DMFT was found to be 93%.

Socio-demographic information was collected through personal interviews with children. In addition, a closed ended questionnaire was administered to collect data on children's oral health related knowledge, beliefs and behavior. Socio-demographic information comprised age, gender, place of residence, occupation and education status of parents. Occupation and education status of parents was classified according to occupation and education components of Kuppuswamy scale<sup>13</sup>. Kuppuswamy scale is a cumulative SES tool which has three components; education, occupation and family income to classify a family's SES into high, middle and low.<sup>13</sup> In this study, only education and occupation of the parents was classified according to Kuppuswamy scale. Therefore, SES of the families could not be categorized into high, middle or low.

Income component of the Kuppuswamy scale was not considered as the data was obtained from children who were not aware of their family's income status.

Data related to oral health knowledge, beliefs and behavior of children was collected using a structured 16 item closed ended questionnaire with most of the questions being adopted from a previous study by Varenne *et al*<sup>14</sup> which was developed by WHO collaborating Centre for Community Oral Health Programs and Research at University of Copenhagen. Seven items assessed participant's dental knowledge and beliefs which included questions on the effect of tooth decay on appearance and importance of natural teeth. Questions on behavioral practices included four items on oral hygiene practices (brushing frequency, use of oral hygiene aids, usage of tooth paste and dental visiting habits) and five items on dietary practices (consumption of various sugary foods and drinks). Only those children were examined who filled the questionnaire completely. The questions which were originally designed in English were translated into local language, Hindi.

## Statistical analysis

SPSS 15.0, Inc., (Chicago, IL) was used for statistical analysis of data. Means, frequencies were calculated and unpaired t – test was administered for evaluating the statistical differences in means whereas proportions were compared by the use of Chi-square or Fisher exact test. For multiple logistic regression analysis (enter method), the dependent variable dental caries indicated the presence or absence of caries, whereas the independent variables were gender (boys and girls), location (rural and urban), parent's occupation (professional or semiprofessional, unskilled or unemployed and other occupations), parent's education (>10 years of education, 1 – 10 years of education and illiterate), brushing frequency (sometimes or never and more than once a day), oral hygiene aids (tooth brush with tooth paste and others), dental visit (never been and had been to dentist at least once during lifetime) and consumption of various sugary foods and drinks (never and sometimes or more than once a day). The effect of each independent variable was assessed adjusting for all other variables in the model. Odds ratio was calculated for all the variables with 95% confidence intervals. Hosmer–Lemeshow goodness-of-fit test was used to assess the Goodness-of-fit of the final model. A p value of <0.05 was considered significant.

## RESULTS

A total of 932 children were invited, of which 92 subjects were unwilling to participate in the study. Thus, the final sample size of the present study was 831 with a response rate of 90.03%. It is evident from **table 1** that 64.9% of the study population had caries and the mean caries experience was 1.94. Decay was the dominant component of DMFT index. There was a significant difference between the genders for decayed ( $p<0.05$ ), filled ( $p<0.05$ ) components and total DMFT ( $p<0.05$ ) with boys experiencing greater caries than girls.

**Table 2** presents the response of study population to statements on knowledge and beliefs towards oral health. There was a significant difference in relation to location of residence and gender for most of the statements on oral health knowledge and beliefs. Majority of the children in urban areas reported that tooth decay can make them look bad ( $p<0.001$ ). More girls reported significantly better knowledge and beliefs than boys except for the statement on sugar consumption.

**Table 1: Percentage prevalence of dental caries and mean caries experience of 12 year old surveyed population in relation to urbanization and gender**

	Location		Gender		Total
	Urban	Rural	Boys	Girls	
<i>Prevalence†</i> % (n)	63.0% (264)	66.7% (275)	66.9% (279)	62.8% (260)	64.9% (539)
<i>DT‡</i> Mean (SD)	1.93 (2.11)	1.88 (2.00)	2.03 (2.13)*	1.78 (1.98)	1.90 (2.06)
<i>MT‡</i> Mean (SD)	0.02 (0.16)	0.01 (0.12)	0.01 (0.12)	0.02 (0.16)	0.02 (0.14)
<i>FT‡</i> Mean (SD)	0.02 (0.21)	0.03 (0.21)	0.04 (0.28)*	0.01 (0.12)	0.02 (0.21)
<i>DMFT‡</i> Mean(SD)	1.96 (2.13)	1.93 (2.07)	2.08 (2.14)*	1.81 (1.98)	1.94 (2.07)

† - Fisher exact test, ‡- unpaired't test. \*p<0.05. DT – Decayed teeth, MT- missing teeth, FT – Filled teeth, DMFT – Decayed, missing and filled teeth index

It was observed that a significantly lower proportion of rural children (p<0.01) and boys (p<0.05) claimed that they cleaned their teeth twice or more daily (**table 3**). Many children have reported of using more than one oral hygiene aid. The practice of using neem stick and soap was greater among rural children while tooth paste with tooth brush and tooth powder were more popularly used among urban children. A quarter of the total subjects reported of using fluoridated tooth pastes against 17.2% non-fluoridated tooth paste users. It was observed that 88% had never been to a dentist and only 11.9% subjects visited a dentist in the preceding year. There were significant differences between the urban and rural children for dental visiting habit with 12.4% urban participants visiting a dentist in contrast to 11.4% rural residents (p<0.001), chi square analysis also disclosed significant differences (p<0.01) between the genders with 12.6% girls visiting a dentist in the previous year in comparison to 11.3% boys.

**Table 4** indicates that significant differences were observed in the frequency of sugary foods consumption by location and gender. Consumption of sugary foods was more frequent in urban subjects than their rural counterparts. Fresh fruits and milk with sugar were often consumed by respondents from urban areas and female children. Consumption of sweets was relatively more frequent among urban than rural children whereas no differences were observed between the genders.

The influence of various socio behavioral variables on caries status was analyzed by binomial logistic regression analysis as presented in **table 5**. Only those independent variables that significantly influenced the caries status in multivariate analysis are presented in the table. Boys were more liable (OR=1.2, 95% CI=1.10-1.96) for having caries than girls. Rural residents and those whose parents were not professionals or semiprofessionals were more likely to present caries than their comparative counterparts. Children of unskilled mothers or house wives were more than twice likely to present caries (OR=2.14, 95% CI=2.03-2.45) than those children whose mothers were skilled or semi-skilled. When parent's level of education was taken into consideration, it was clear that children of illiterate fathers and mothers were 1.09 (95% CI, 1.02-1.49) and 1.98 (95% CI, 1.13-1.99) times more likely to have dental

**Table 2: The distribution of 12 year old children according to their answers to statements on dental diseases and prevention in relation to location and gender**

Knowledge and beliefs		Agree	Disagree	Don't know
<i>Tooth decay can make me look bad</i>	Urban**	95.4% (400)	3.9% (16)	0.7% (3)
	Rural	89.7% (369)	6.2% (26)	4.1% (17)
	Males*** Females Total	88.7% (370) 96.4% (399) 92.5% (769)	7.4% (31) 2.7% (11) 5.1% (42)	3.8% (16) 1.0% (4) 2.4% (20)
<i>Keeping natural teeth is not that important</i>	Urban***	41.5% (175)	46.1% (193)	12.4% (51)
	Rural	57.0% (235)	35.1% (144)	7.9% (33)
	Males* Females Total	52.9% (220) 45.8% (190) 49.3% (410)	38.6% (161) 42.4% (176) 40.6% (337)	8.5% (36) 11.8% (48) 10.1% (84)
<i>Regular visits to the dentist keep away dental problems</i>	Urban	76.8% (322)	16.0% (67)	7.2% (30)
	Rural	77.9% (321)	13.3% (55)	8.7% (36)
	Males ** Females Total	72.9% (304) 81.9% (339) 77.4% (643)	18.7% (78) 10.6% (44) 14.7% (122)	8.4% (35) 7.5% (31) 7.9% (66)
<i>Brushing my teeth can prevent tooth decay</i>	Urban	83.8% (351)	13.8% (58)	2.4% (10)
	Rural	78.9% (325)	18.7% (77)	2.4% (10)
	Males** Females Total	77.2% (322) 85.5% (354) 81.3% (676)	19.4% (81) 13.0% (54) 16.2% (135)	3.4% (14) 1.4% (6) 2.4% (20)
<i>Brushing my teeth will keep me away from having gum troubles</i>	Urban***	80.7% (338)	17.4% (73)	1.9% (8)
	Rural	64.6% (266)	28.2% (116)	7.3% (30)
	Males** Females Total	67.6% (282) 77.8% (322) 72.7% (604)	26.6% (111) 18.8% (78) 22.7% (189)	5.8% (24) 3.4% (14) 4.6% (38)
<i>Eating and drinking sweet things does not cause tooth decay</i>	Urban***	42.0% (176)	51.5% (216)	6.6% (27)
	Rural	60.4% (250)	35.6% (145)	4.1% (17)
	Males Females Total	52.3% (218) 50.2% (208) 51.3% (426)	41.5% (173) 45.4% (188) 43.4% (361)	6.2% (26) 4.3% (18) 5.3% (44)
<i>Using fluoride is a good way of preventing tooth decay</i>	Urban***	59.2% (248)	23.9% (100)	16.9% (71)
	Rural	46.6% (192)	29.6% (122)	23.8% (98)
	Males*** Females Total	49.2% (205) 56.8% (235) 52.9% (440)	34.1% (142) 19.3% (80) 26.7% (222)	16.8% (70) 23.9% (99) 20.3% (169)

Chi square test. \*\*p<0.01, \*\*\*p<0.001

**Table 3: Percentage distribution of 12 year old school children according to various oral health practices in relation to location and gender**

Oral health practices		Location		Gender		Total
		Urban	Rural	Boys	Girls	
Tooth cleaning frequency	At least once a day	68.3%(286)**	75.7%(312)	71.9%(300)*	72.0%(298)	72.0%(598)
	Twice or more than twice a day	26.0%(109)	22.6% (93)	22.5%(94)	26.1%(108)	24.3%(202)
	Several times a week	4.1% (17)	1.7% (7)	3.8%(16)	1.9% (8)	2.9% (24)
	Never	1.7 % (7)	0.0%(0)	1.7%(7)	0% (0)	0.8% (7)
Use of various oral hygiene aids	Brush and paste	88.8% (372)*	84.2%(347)	85.4%(356)	87.7%(363)	86.5%(719)
	Neem stick	35.1%(147)**	44.2%(182)	36.5%(152)	42.8%(177)	39.6%(329)
	Soap	2.9% (12)***	9.7% (40)	5.5% (23)	7.0% (29)	6.3% (52)
	Coal	12.4% (52)	15.3% (63)	17.0%(71)**	10.6% (44)	13.8%(115)
	Salt	24.6% (103)	28.4%(117)	26.9%(112)	26.1%(108)	26.5%(220)
	Tooth powder	47.0%(197)**	38.1%(157)	46.5%(194)*	38.6%(160)	42.6%(354)
	Others	5.5% (23)	8.7% (36)	8.6% (36)	5.6% (23)	7.1% (59)
Use of tooth paste	No use of tooth paste	11.2%(47)***	15.7% (65)	14.6%(61)**	12.4% (51)	13.5%(112)
	With fluoride	23.9% (100)	28.4%(117)	25.9%(108)	26.3%(109)	26.1%(217)
	Without fluoride	14.8% (62)	19.7% (81)	21.1% (88)	13.3% (55)	17.2%(143)
	Don't know	50.1% (210)	36.2%(149)	38.4%(160)	48.0%(199)	43.2%(359)
Dental visits	Never been	87.6%(366)***	88.6%(365)	88.7%(369)**	87.4%(362)	88.0%(731)
	Had been to dentist 1-2 times in last 12 months	11.7% (50)	10.9% (45)	11.1% (47)	11.6% (48)	11.3% (94)
	Had been to dentist >2 times in last 12 months	0.7% (3)	0.5% (2)	0.2% (1)	1.0% (4)	0.6% (5)

Chi square test. \*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Table 4: Distribution (%) of 12 year olds according to how often they consume sugary foods in relation to location and gender**

Sugary foods and drinks		Once a day or more often	Once or several times a week	Seldom/never
Fresh fruits	Urban ***	68.3% (286)	23.6% (99)	8.1% (34)
	Rural	48.5% (200)	24.5% (101)	26.9% (111)
	Male *	54.0% (225)	27.3% (114)	18.7% (78)
	Female	63.0% (261)	20.8% (86)	16.2% (67)
	Total	58.5% (486)	24.1% (200)	17.4% (145)
Soft drinks	Urban	26.5% (111)	17.9% (75)	55.6% (233)
	Rural	23.3% (96)	18.2% (75)	58.5% (241)
	Male*	24.7% (103)	21.8% (91)	53.5% (223)
	Female	25.1% (104)	14.3% (59)	60.6% (251)
	Total	24.9% (207)	18.1% (150)	57.0% (474)
Sweets	Urban***	28.9% (121)	35.6% (149)	35.6% (149)
	Rural	26.2% (108)	20.4% (84)	53.4% (220)
	Male	27.3% (114)	31.2% (130)	41.5% (173)
	Female	27.8% (115)	24.9% (103)	47.3% (196)
	Total	27.6% (229)	28.0% (233)	44.4% (369)
Tea or coffee with sugar	Urban ***	67.3% (282)	13.8% (58)	18.9% (79)
	Rural	76.7% (316)	13.6% (56)	9.7% (40)
	Male	71.5% (298)	16.1% (67)	12.5% (52)
	Female	72.5% (300)	11.4% (47)	16.2% (67)
	Total	72.0% (598)	13.7% (114)	14.3% (119)
Milk with sugar	Urban*	68.0% (285)	16.0% (67)	16.0% (67)
	Rural	60.9% (251)	16.3% (67)	22.8% (94)
	Male**	62.4% (260)	20.1% (84)	17.5% (73)
	Female	66.7% (276)	12.1% (50)	21.3% (88)
	Total	64.5% (536)	16.1% (134)	19.4% (161)

Chi square test. \*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Table 5: Logistic regression analysis with dental caries as dependent variable (DMFT=0 vs. DMFT≥1) and various socio-behavioral predictors as independent variables among 12 year old school children of Udaipur district**

Independent variable		B	S.E	P	Odds ratio	C.I
<i>Gender*</i>	<i>Females</i>	-	-	-	-	-
	<i>Males</i>	0.18	0.14	0.019	1.20	1.10-1.96
<i>Location*</i>	<i>Urban</i>	-	-	-	-	-
	<i>Rural</i>	0.15	0.20	0.046	1.16	1.07-1.76
<i>Father's occupation*</i>	<i>Professional, Semi-professional Clerical, Shop owner, Farmer, skilled, semi-skilled</i>	0.29	0.53	0.048	1.74	1.26-1.91
	<i>Unskilled, unemployed</i>	0.23	0.22	0.031	1.79	1.15-1.95
<i>Mother's occupation*</i>	<i>Professional, Semi-professional Clerical, Shop owner, Farmer, skilled, semi-skilled</i>	0.58	0.68	0.039	1.55	1.14-1.84
	<i>Unskilled, house wives</i>	0.76	0.24	0.002	2.14	2.03-2.45
<i>Father's level of education*</i>	<i>1- 10</i>	0.18	0.38	0.036	1.19	1.04-1.75
	<i>Illiterate &gt; 10</i>	0.03	0.22	0.029	1.09	1.02-1.49
<i>Mother's level of education*</i>	<i>1- 10</i>	0.63	0.44	0.015	1.53	1.22-1.96
	<i>Illiterate &gt; 10</i>	0.01	0.22	0.029	1.98	1.13-1.99
<i>Tooth cleaning frequency*</i>	<i>Less than once a day</i>	0.31	0.44	0.048	1.36	1.17
	<i>More than once a day</i>	-	-	-	-	-1.86
<i>Soft drinks**</i>	<i>More than once a day, Sometimes a week</i>	0.20	0.16	0.002	1.22	1.09
	<i>Never</i>	-	-	-	-	-1.68
<i>Sweets*</i>	<i>More than once a day, Sometimes a week</i>	0.07	0.15	0.024	1.07	1.01
	<i>Never</i>	-	-	-	-	-1.47

\*  $p < 0.05$ , \*\*  $p < 0.001$

Goodness-of-fit Hosmer-Lemeshow test chi square = 4.357, d.f = 8,  $p = 0.824$

caries. The influence of oral hygiene practices on caries status was also observed; it was found that those who cleaned their teeth less than once a day presented an odds ratio of 1.36 (CI-1.17-1.86). Additionally, logistic regression model indicated higher odds of dental caries if the respondent consumed sweets or soft drinks more than once a day or sometimes in a week. The goodness of fit of the model was assessed using the Hosmer–Lemeshow goodness-of-fit statistic and it showed an adequate fit for the model ( $p = 0.824$ ).

## DISCUSSION

In India, many epidemiological studies on children's oral health have been carried out. Nevertheless, there are no studies that provide information on risk factors for dental caries in 12 year old school children pertaining to Rajasthan and particularly Udaipur district. School going children were targeted in the present study because of the ease of access to children at schools. In order to collect representative data from the heterogeneous district population various focal points were selected.

The proportion of children with caries was 64.9% in the present study which is in accordance with 52.2% of the 12 year old children nationwide<sup>15</sup>. The mean DMFT was 1.94 which is greater than 0.7, 0.9 and 1.7 reported in Udaipur region, Rajasthan state<sup>16</sup> and the whole nation respectively<sup>15</sup>. The sample in the present study consisted of children attending school and thus the high caries prevalence seen in this study population might be due to non-inclusion of children not attending schools who may have less caries experience. Caries prevalence observed in our study is similar to that of the neighboring countries such as Bangladesh<sup>17</sup> and Pakistan<sup>18</sup> but in Srilanka<sup>19</sup>, caries prevalence of 39.2% has been reported. These differences in caries prevalence observed between the countries can be due to many reasons, such as, provision of public dental services, lifestyle of the study populations, representativeness of the study population to the whole nation, time frame of the data collected, methodology of caries examination and many more. Therefore, comparison of dental caries prevalence between the countries might not be rational in all circumstances.

Decayed component was the dominant expression which indicates the need for dental care and inadequate availability of dental services in the study region, it is reported that most of the dental decay remains untreated in low and middle-income populations<sup>20,21</sup>. Caries experience among boys was greater than girls; similar trend was observed by past studies<sup>16,22</sup>. We have observed better oral hygiene practices among girls than boys which could be a plausible explanation for more girls being caries free than boys.

The level of oral health knowledge and beliefs was significantly better in urban children and girls than the rural and boy participants. Differences in oral health knowledge, beliefs and practices between urban and rural populations have been demonstrated by studies worldwide<sup>23</sup>. Positive oral health beliefs and knowledge about prevention of oral disease were reported by more urban participants than rural subjects. Easier access to information through the media and dentists or other medical professionals in urban areas may explain these differences. A higher proportion of girls had positive dental beliefs about prevention than boys. A major proportion of the respondents were not aware of the benefit of fluorides in preventing dental caries while the positive beliefs towards the importance of tooth brushing were wide spread in agreement with previous studies among school children of India<sup>24</sup> and Africa<sup>14</sup>. The practice of using

neem stick was more prevalent in rural children, which can be due to the traditional practices that are followed in rural areas. Moreover, the proportion of individuals who did not use tooth paste was more among rural subjects and boys in agreement with a previous study<sup>25</sup>. Significantly lower percentage of rural children and boys claimed that they brush their teeth twice or more daily. The variation in oral hygiene practices with urbanization has been observed in many of the previous studies which can be due to the cultural differences between the urban and rural areas. The reason for greater proportion of female subjects brushing more frequently might be due to higher level of awareness of personal appearance in girls. It was noteworthy that greater proportion of children from rural areas than urban residents had never been to dentist. The effect of urbanization on dental visiting habits is evident from the literature<sup>14,26</sup>. This might be due to the accessibility issues in rural areas as most of the dentists in India practice in urban regions.

Consumption of sugary foods was more frequent in urban subjects compared to their rural counterparts; this finding is consistent with previous surveys from India<sup>16,25</sup> and China<sup>27</sup>. The difference between the locations of residence for sugar consumption might be due to the difference in socio cultural characteristics and wide spread availability of sugary foods in urban localities. It was even noticed that girls had positive dietary practices with many girls reporting consumption of fresh fruits and milk. Similar pattern of sugar intake was noticed in a previous survey in Rajasthan where 16.2% of boys consumed sugar more than two times a day in contrast to 14.6% girls<sup>16</sup>.

In accordance with the previous findings<sup>27</sup> the multifactorial nature of dental caries was confirmed by the results. The effect of gender and urbanization on dental caries existed in multivariate analysis also. As hypothesized, children whose fathers belonged to lower occupation status and whose mothers' were housewives were more likely to have dental caries in accordance to studies from Belgium<sup>28</sup> and France<sup>29</sup> while no influence of maternal occupation was found on children's dental caries in Japan<sup>30</sup>. However, studies conducted worldwide<sup>10,30-32</sup> observed children of less educated parents being more prone for dental caries than those children whose parents are well educated. Although the literature review by Attin and Hornecker<sup>33</sup> concluded that the quality of tooth cleaning is important than frequency for preventing dental caries, we have found children brushing less than once a day of being at greater risk for dental caries than those who brush more than once a day. Frequent consumption of sweets and soft drinks was associated with greater risk of caries but consumption of milk or tea with sugar was not a risk factor for dental caries. Studies, both longitudinal<sup>34</sup> and cross-sectional<sup>35</sup> have found that children frequently consuming milk have a tendency to experience less caries than those who are frequent consumers of soft drinks or juices. Comparison of findings between developing and developed countries should be done cautiously as dental caries is multifactorial and is influenced by a wide range of factors. The effect of socio-demographic and oral hygiene related variables on dental caries might be subsided by the accessibility and availability of free or subsidized public health services which exists in most of the developed countries.

**CONCLUSIONS**

The prevalence and severity of dental caries was low among urban children, boys had greater caries experience than girls and untreated caries was the dominant expression. In general, positive oral health knowledge, beliefs and practices were low, predominantly in rural and male children. Substantial proportions of children had no tradition of performing regular oral hygiene practices and dental visits were infrequent. Caries experience was significantly associated with gender, location of residence, brushing frequency, frequency of consumption of soft drinks and sweets, parents' occupation and education.

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