A STUDY TO ASSESS THE EFFECT OF RISK FACTORS SUCH AS CHOCOLATE, ICE-CREAM, TEA & COFFEE WITH SUGAR FOR OCCURRENCE OF DENTAL CARIES DURING THE MIXED DENTITION PERIOD (6 TO 12 YEARS) RESIDING IN URBAN AND RURAL AREA OF WARDHA DISTRICT.

Community Medicine

Deepti Chandrakar	Master of Public Health, State Consultant NPPCD, Indravati Bhavan, Naya Raipur 492101, Chhattisgarh
Meenakshi Khapre	Assistant Professor, Department of Community & Family Medicine, AIIMS Rishikesh
Abhay Mudey	Professor, Department of Community Medicine, Jawaharlal Nehru Medical College, Sawangi, Wardha, Maharashtra
Vasant Wagh	Professor, Department of Community Medicine, Jawaharlal Nehru Medical College, Sawangi, Wardha, Maharashtra
Manish Prasad*	Associate Professor, Department of Community Medicine, Government Medical College, Ambikapur, Chhattisgarh *Corresponding Author

ABSTRACT

Oral health is an essential and integral component of health throughout life. Good oral hygiene results in a mouth that looks and smells healthy, this means: teeth are clean and free of debris. Therefore this study was conducted to assess the effect of risk factors such as chocolate, ice-cream, tea & coffee with sugar for occurrence of dental caries during the mixed dentition period (6 to 12 years) residing in urban and rural area of Wardha district. It was a cross sectional comparative study conducted from July 2015 to March 2016 and carried out among 100 school children age 6-12 yrs in two schools at Wardha district. It can be concluded from the study that coffee, milk, coffee, tea with sugar was found to have inconsistent relationship with its frequency of consumption and occurrence of dental caries.

INTRODUCTION:

Oral health is an essential and integral component of health throughout life [1]. Good oral hygiene results in a mouth that looks and smells healthy, this means: teeth are clean and free of debris. Gums are pink and do not hurt or bleed when one brushes or floss. Bad breath is not a constant problem [2]. Despite great achievements in the oral health of populations globally, problems still remain in many communities around the world particularly among the underprivileged groups in developed and developing countries. The prevalence of oral diseases is higher among poor and low and middle income countries [3]. Dental diseases are very prevalent in India, and this high prevalence has led to a substantial burden on individuals, communities and the healthcare system [4].

"The period during which both the primary and permanent teeth are present in mouth together is known as mixed dentition". Mixed Dentition phase begins at around 6yrs of age with the eruption of 1st permanent molar and lasts till about 12yrs of age. Dental caries is defined as "irreversible disease of calcified tissues of teeth, characterized by demineralization of the inorganic portion and destruction of the organic substances of the tooth, which often leads to cavitations" [5]. It has found that prevalence of dental caries to be as high as 72% in the rural adolescents in India, in Maharashtra prevalence of dental caries among 3-14 years old children to be 80.92% [6]. Though many dental problems related studies were conducted in school, we found very few on rural children. Finding of risk factors and how much they contribute to caries are more important in prevention and control. Therefore this study was conducted with the following objective;

Aim

To assess the effect of risk factors such as chocolate, ice-cream, tea & coffee with sugar for occurrence of dental caries during the mixed dentition period (6 to 12 years) residing in urban and rural area of Wardha district.

Objective

To assess the effect of risk factors such as chocolate, ice-cream, tea & coffee with sugar for occurrence of dental caries during the mixed dentition period (6 to 12 years) residing in urban and rural area of Wardha district.

MATERIALS & METHODS

Study population: The study was conducted in the two selected schools of Wardha district. School was chosen where child comes from an urban area and other where they come from rural area. Thus one school forms pool of urban children and other rural.

Study Design and settings: The study was conducted from July 2015 to March 2016. Permission was obtained from the concerned authorities of respective schools and also from the Institutional Ethic Committee (I. E.C) of DMIMS (DU) Sawangi (M). A written consent was taken from the principal of respective school prior to conducting an oral health check-up (verbal consent was taken from the parents on day of examination)

Inclusion Criteria: Those children whose guardian gave verbal consent for participation in the study, children of age group 6-12 years, children who were present in schools on the day of data collection

Exclusion Criteria: Physically or mentally challenged children, medically compromised or with gross dental/ Oro-facial defects like cleft lip or cleft palate, not co-operative, those that do not belong to specific pool. Example: schools with urban children pool, the children from rural area were excluded.

Sample size: Literature review indicated that urban dental caries observed was found to be 47.4% and the rural dental caries was found to be 27%.

Based on the above observations, with a-α level of 0.05 and β of 0.05 (Power = 95%), it was estimated that at least 75 individuals need to be examined in each group [7].

$$n = (Za/2 + Zb) 2 \times [P1(1-p1) + p2(1-p2)] / (p1-p2)^2$$
$$= (1.642+0.84)2 \times [0.27(0.73) + 0.47(0.53)] / (0.27 - 0.47)^2$$
$$\approx 75 \text{ in each group i.e. urban and rural school}$$

Data collection procedure: A cross sectional comparative study was carried out among 100 school children age 6-12 yrs in two schools at Wardha district. Considering the drop-out rates of 10% and additional 10% were added to 75. Thus sample size became 82.5. Initially school children were selected from rural area. On the day of dental examination, 100 children with guardians were present therefore; all of them were taken as sample for study. Hence in other school also, from where urban children had to be selected, 100 sample sizes were chosen for the study purpose.

Statistical Analysis: Data was entered in MS excel and analyzed by Epi info version 6 and SPSS 17. Descriptive statistics was used. Inferential statistics like chi square and odds ratio was used evaluate the association with different factors. Cut off point for significance was considered at 5% level. The data thus analyzed was presented in the form of tables, graphs etc.

RESULTS

Table 1 Prevalence of Dental caries with respect to Frequency of intake of Chocolates in Rural and Urban area

Frequency of Intake of Chocolates	Rural (n=100)		x^2=3.289 Df=2 P=0.193 NS	Urban (n=100)		x^2=3.271 Df=2 P=0.195 NS	Total caries in rural and urban
	Total Children Examined	Children with caries		Total Children Examined	Children with caries		
Never	25	13(52.00%)		12	2(16.66%)		15(40.54%)
Several times month	02	01(50.00%)		41	10(24.39%)		11(25.58%)
Once a week	07	02(28.57%)		02	00(00.00%)		02(22.22%)
Several times week	08	07(87.50%)		24	09(37.50%)		16(50.00%)
Everyday	55	31(56.36%)		16	05(31.25%)		36(50.70%)
Several times a day	03	03(100.0%)		05	02(40.00%)		05(62.50%)
Total	100	57(57.00%)		100	28(28.00%)		85(42.50%)

*Chi square applied between rural caries and non caries children and urban caries and non caries non children *S= Significant, NS= Non significant, Several times a month and once a week were added together, several times a week, everyday and several times a day were added together for calculation purpose of chi square test

Table 2 Prevalence of Dental caries with respect to Frequency of intake of milk with sugar in Rural and Urban area

Frequency of Intake of milk with sugar	Rural (n=100)		x^2=0.163 df=1 P=0.686 NS	Urban (n=100)		x^2=0.170 df=1 P=0.680 NS	Total caries in rural and urban
	Total Children Examined	Children with caries (%)		Total Children Examined	Children with caries (%)		
Never	43	26(60.46)		11	2(18.18)		28(51.85)
Several times month	00	00(00.00)		03	0(00.00)		00(00.00)
Once a week	03	03(100.00)		00	0(00.00)		03(100)
Several times week	01	01(100.00)		04	1(25.00)		02(40.00)
Everyday	49	24(48.97)		73	20(27.39)		44(36.06)
Several times a day	04	03(75.00)		09	5(55.55)		08(61.53)
Total	100	57(57.00)		100	28(28.00)		85(42.50)

* Chi square applied between rural caries and non caries children and urban caries and non caries non children *S= Significant, NS= Non significant, Several times a month and once a week, several times a week , and several times a day, every day were added together for calculation purpose of chi square test

Table 3 Prevalence of Dental caries with respect to frequency of intake of tea with sugar in Rural and Urban area

Frequency of intake of tea with sugar	Rural (n=100)		x^2=2.798 df=1 P=0.094 S*	Urban (n=100)		x^2=0.066 df=1 P=0.797 NS	Total caries in rural and urban
	Total Children Examined	Children with caries		Total Children Examined	Children with caries		
Never	31	22(70.96)		75	21(28.00)		43(40.56%)
Several times month	00	00(00.00)		12	5(41.66)		05(41.66%)
Once a week	05	01(20.00)		00	00(00.00)		01(20.00%)
Several times week	01	01(100.0)		00	00(00.00)		01(100%)
Everyday	60	30(50.00)		13	02(15.38)		32(43.83%)
Several times a day	03	3(100.00)		00	00(00.00)		03(100%)
Total	100	57(57.00)		100	28(28.00)		85(42.50%)

* Chi square applied between rural caries and non caries children and urban caries and non caries non children*S= Significant, NS= Non significant, (Several times a month, once a week, several times a week ,everyday and several times a day were added together for calculation purpose of chi square test)

Table 4 Prevalence of Dental caries with respect to Frequency of intake of coffee with sugar in Rural and Urban area

Frequency of Intake of Coffee with sugar	Rural (n=100)		x^2=0.150 df=1 p=0.698 NS	Urban (n=100)		x^2=0.066 df=1 p=0.797 NS	Total caries in rural and urban
	Total Children Examined	Children with caries		Total Children Examined	Children with caries		
Never	93	53(56.00)		75	20(26.66)		73(43.45%)
Several times month	00	00(00.00)		19	05(26.31)		05(26.31%)
Once a week	02	02(100.0)		01	01(100.0)		03(100.0%)
Several times week	00	00(00.00)		02	00(00.00)		00(00.00%)
Everyday	05	02(40.00)		02	01(50.00)		03(42.85%)
Several times a day	00	00(00.00)		01	01(100.0)		01(100%)
Total	100	57(57.00)		100	28(28.00)		85(42.50%)

* Chi square applied between rural caries and non caries children and urban caries and non caries non children *S= Significant, NS= Non significant, (Several times a month, once a week, several times a week, everyday and several times a day were added together for calculation purpose of chi square test)

Preventive	46 (46.00)	26 (26.00)	72 (36.00)
Prompt	11(11.00)	20 (20.00)	31 (15.50)
Immediate	00 (0.0)	00 (0.0)	00 (00.00)
Refer	00 (0.0)	00 (0.0)	00 (00.00)
Total	100	100	200

Table 5 Distribution of data according to the need of intervention

Intervention needed	Area		Total n=200 (%)
	Rural n=100 (%)	Urban n=100 (%)	
No treatment	43 (43.00)	72 (72.00)	115 (57.50)

Table 6 Logistic Regression

Variables	Unadjusted	Adjusted (for all)	Adjusted (except area, grade of teeth and gums)

chocolates (ref :everyday)	1.249 (0.013)	1.254 (0.07)	1.32(0.007)
milk with sugar (ref everyday)	0.9 (0.18)	1.06 (0.35)	1.113 (0.34)
tea with sugar (ref :everyday)	1.069 (0.374)	0.987(0.92)	0.98 (0.85)
coffee with sugar (ref :everyday)	1.02 (0.90)	1.2 (0.35)	1.2 (0.29)

DISCUSSION

In table 1 overall in the rural area in those who ate chocolates had caries 58.66% and those who never ate had 52.00%. In urban area 29.54% chocolate eaters and 16.66% non-eaters had caries. This variation shows that rural area had higher prevalence of caries in chocolate eaters than the urban. The result was found to be non significant.

Table 2 shows frequency of intake of milk with sugar, most of the children who did not consume it, followed by some took it every day, a few who responded as several times a day, followed by once a week and several times a day. The result was found to be non significant.

Table 3 shows frequency of intake of tea with sugar, most of the children did not consume tea with sugar, followed by those who took it every-day, followed by several times a day followed by once a week and several times in month. The result came out to be significant as p value is less than 0.05.

Table 4 shows the frequency of intake of coffee with sugar. Most of the children did not consume coffee with sugar, followed by several times in month, once a week, everyday and several times a day. Urban children consumed more coffee than rural. The result came was non-significant.

Chocolate (table 1), milk with sugar (table 2), tea with sugar (table 3), coffee with sugar (table 4), shows inconsistent relationship with frequency of consumption and prevalence of dental caries, this may be due to confounders or multi-factorial causation of caries.

Table 5 shows most of them did not need any intervention followed by 72 children who needed preventive or routine treatment measures and 13 students needed prompt measures. The result was found to be significant.

As per a theory [8], resulting hydroxyapatite chemical gets deposited on the tooth surfaces causing demineralization of teeth and eventually leading to cavity formation. Sreebny LM [9] in a study found dental caries to be positively correlated with dietary sugar. Petersen PE [10] observed that high frequency of consumption of sweets and sugary drinks implied significantly higher dental caries. This was found after the control of confounders related to oral hygiene practices and socio-economic status. The study also found that Danish chocolate factory workers had significantly higher dental caries experience and higher tooth loss than ship-yard workers, after controlling for confounding factors. This was then confirmed in another study of sweet biscuit factory workers in Finland. Singh G [11] (2014) in a study in Jammu observed that prevalence of dental caries was high (18.9%) in children consuming sweets daily as compared to children taking sweets weekly. Children eating chocolate every-day were 1.25 times at risk of caries than who doesn't eat it often. However on adjusting for all factors this association was not significant except area and grade of teeth which seems to be strong predictor of caries.

Tadesvosyan A [12] (2005) in Armenia observed in dental caries affected children that those who ate sweets more than 3 times a day composed 63 percent of the survey population. The children mentioned cakes, candies, chocolate, ice-cream and other types of sweets as the usually consumed sweets, thus many evidences can be found to relate sugar with dental caries. In addition, oral hygiene standard, socio-economic status and fluoride exposure all influence the sugars-caries relationship.

CONCLUSION

Coffee, milk with sugar and tea with sugar was found to have inconsistent relationship with its frequency of consumption and occurrence of dental caries. Chances of Dental caries were found 1.32 times more in Chocolate eaters than those who never ate it.

Recommendations

Training should be given to primary school teachers regarding proper brushing technique and good oral hygiene status. Availability of dentist should be made in the inapproachable areas. Oral health education especially for the school student's programme regarding avoiding chocolate and sugar products by various mass media should be addressed.

REFERENCES
1) U.S. Department of Health and Human Services (2000). Oral Health in America: A Report of the Surgeon General. Rockville, MD: HHS, National Institutes of Health, National Institute of Dental and Craniofacial Research.
2. Oral health (2016, January 14) Retrieved from http://www.mouthhealthy.org/en/az-topics/o/oral-health
3. The World Oral Health Report (2003, January 14) Retrieved from http://www.checkdent. com/en/content/what-is-oral-health
4. Lin, S. and Malik, A. Oral Health: Addressing Dental Diseases in Rural India: Implementing Public Health Interventions in Developing Countries (2012, 6 Feb 2016) Retrieved from http://www.ictph.org.in/tps-2011/images/ictph-chapter-4.pdf
5. William, G. et al. (2Eds.). (1974). A Textbook of Oral Pathology; 853
6. Kalaskar, R.R., Kalaskar, A.R., Chandrolikar, H., Hazarey, S. (2015) Prevalence of Dental Caries and Treatment Needs in School Going Children of Vidarbha Region, Central India. Universal Research Journal of Dentistry 5 (2): 69-72
7. Gupta, R., Gaur, K.L., Sharma, A.K., Zafer, S., Kewalramani, S. (2013) Comparison of Associating factors of Dental Caries in urban and rural children in Jaipur, (Raj) India. Journal of dental and medical sciences; 9(3):55-60
8. Balakrishnan, M., Simmonds, R.S., Tagg, J.R. (2000) Dental caries is a preventable infectious disease. Australian Dental Journal; 45: (4):235-245
9. Sreebny, L.M., (1982) Sugar availability, sugar consumption and dental caries. Community Dent Oral Epidemiol. ; 10 (1):1-7
10. Petersen PE. (1983) Dental health among workers at a Danish chocolate factory, Community Dentistry and Oral Epidemiology; 11: 337– 341
11. Singh G, Kaur G, Mengi V, Singh B. (2014) A study of dental caries among school children in rural area of Jammu, Annals of Dental specialty; 2(1): 1-5
12. Tadevosyan, A., Petrosyan, V., Thompson, M. (2005) Dental caries, oral hygiene and nutritional skills of Sisian schoolchildren aged 12 years. Technical Report, American University of Armenia, College of Health Sciences