

Research Article

Dental Caries and Dietary Habits: A Community-Based Cross-Sectional Study among Young Adolescents

Aakanksha Bharti¹, JG Prasuna², Pravesh Mehra³, SK Rasanias⁴

¹Department of Community Medicine, Lady Hardinge Medical College.

²Director Professor, ⁴Director Professor and Head, Department of Community Medicine, Lady Hardinge Medical College.

³Professor and Head, Department of Dental and Oral surgery, Lady Hardinge Medical College.

DOI: <https://doi.org/10.24321/2455.7048.202021>

I N F O

Corresponding Author:

Aakanksha Bharti, Department of Community Medicine, Lady Hardinge Medical College.

E-mail Id:

aakanksha.bharti@gmail.com

Orcid Id:

<https://orcid.org/0000-0002-8851-8925>

How to cite this article:

Bharti A, Prasuna JG, Mehra P, Rasanias SK. Dental Caries and Dietary Habits: A Community-Based Cross-Sectional Study among Young Adolescents. *Epidem Int* 2020; 5(3): 10-14.

Date of Submission: 2020-02-11

Date of Acceptance: 2020-08-20

A B S T R A C T

Introduction: Dental caries is among the most common dental problems affecting humans. The prevalence and severity of dental caries is increasing in developing countries which may be attributed to changing lifestyle and dietary patterns that include binge eating habits and high sugar containing diet, popularity and easy availability of soft, sticky, high carbohydrate content food items among young adolescents.

Objectives: (1). To study the magnitude of caries among 5 to 15 year olds residing in Kalyan Puri. (2). To assess the associated dietary practices among study subjects.

Methods: This was a community-based cross-sectional study in urban resettlement colony, Kalyan Puri, East Delhi. An interview schedule was designed and pretested for dietary history and clinical examination was done using an oral probe, dental mirror and torch to assess the magnitude of caries. DMFT index was calculated for each child. Data analysis was performed using Statistical Package for the Social Sciences version 11.2. The qualitative variables were expressed in proportion and quantitative variables were summarized by mean and standard deviation.

Result: Caries was present in 22.4% of subjects. The mean DMFT index was 0.48 ± 0.991 with range 0 to 6. Study subjects who were consuming protective food items more than once a week were found to have comparatively less problems of teeth. Conclusion: This study gives the need for raising awareness regarding good oral hygiene, appropriate dietary practices and promotion of homemade, natural and indigenous products with good nutritional values over the use of processed food.

Keywords: Dental Caries, Dietary Habits, Young Adolescents

Introduction

Dental diseases are the most common non-communicable

diseases globally.¹ They are responsible for a silent epidemic, which cuts across age and socioeconomic status, but as

Epidemiology International (ISSN: 2455-7048)

Copyright (c) 2020: Author(s). Published by Advanced Research Publications



most of these are neither life threatening nor severely debilitating, there is a general negligence towards oral health care. Dental caries is among the most common dental problems affecting humans. Prevalence of caries is about 60% to 80% in children.²

Caries impact people in various ways, oral pain, difficulty in eating and chewing, embarrassment while smiling and communication are some of the problems. Children having poor oral health are prone to restricted activity days 12 times more than the children with good oral health. Globally an average of 224 years/ 1 lakh population of health loss is estimated due to oral health conditions.²

The prevalence and severity of caries is increasing in developing countries which may be attributed to changing lifestyle and dietary patterns that include binge eating habits and high sugar containing diet, popularity and easy availability of soft, sticky, high carbohydrate content food items among adolescents. Prevalence of dental caries in 1940 in India was 55.5% which increased to 68% in 1960³⁻⁵ and has now increased to 60% to 80% in children. DALYs due to oral conditions increased 20.8% between 1990 and 2010.² Overall the general impression is that dental caries has increased in prevalence and severity in urban and cosmopolitan population since last two decades. Dental caries can be effectively prevented by modification of dietary and oral hygiene practices.

Short of literature among adolescents especially in the community setting, high prevalence of dental caries in this age group globally and the immense power of caries to make a person morbid and reduce the quality of life is the drive for conducting this study.

Indian diet varies considerably from the western diet, as is expected due to the cultural differences. There is a dearth of studies addressing the Indian diet in relation to oral health, hence this study was planned to explore these determinants.

Materials and Methods

This was a community-based cross-sectional study carried out from January 2016 to December 2016, in urban resettlement colony, Kalyan puri, East Delhi. The ages and age groups recommended by WHO for population survey are 5 years, 12 years, 15 years, 35 to 44 years and 65 to 74 years for estimating the magnitude of the problem and to plan intervention activities for oral health.⁶ This study was planned to include the age groups (5 to 15 years), which is likely to encompass late phase of temporary teeth and early phase of permanent teeth. The inclusion criteria were all subjects from the age group 5 years to 14 completed years residing in Kalyan puri. Intellectually disabled subjects as per care giver's history were excluded from the study. The purpose and method of the study was explained

to the parents/guardians and only those subjects were included who gave their verbal assent and their parents gave a written consent. Those parents/guardians who were illiterate thumb impression was taken in front of a witness.

An interview schedule was designed and pretested for dietary history and clinical examination was done using an oral probe, dental mirror and torch to assess the magnitude of caries. DMFT index was calculated for each child by DMFT index given by Henry T Klein, Carrole E Palmer, Knutson JW (1938).⁷ The investigator had received training in orodental examination methods in the Department of Dental and Oral surgery, LHMC and associated hospitals for 1 week. Those requiring further investigation and treatment when required were referred to the Department of Dental and Oral surgery, Lal Bahadur Shastri hospital or LHMC and Associated hospitals. Health education was provided to all subjects.

Ethical clearance was taken from Institutional Ethical Committee.

Statistical Analysis

Data analysis was performed using Statistical Package for the Social Sciences version 11.2. The qualitative variables were expressed in proportion and quantitative variables were summarized by mean and standard deviation. The difference in proportion was analyzed by applying Chi-square test and p-value less than 0.05 was taken as cut off for commenting statistical significant association. The difference in means was analyzed statistically by applying unpaired student's t test and ANOVA and p-value less than 0.05 was taken as cut off for commenting statistical significant association. Odd's was calculated to study the association of dietary habits with caries.

Result

Among 460 subjects of 5 to 15 years studied, the proportion of males was 51.5% while females was 48.5%. The highest proportion of children was from the age group 13 to 15 years(23.5%) and 5 to 6 years of age (23.3%). Caries was present in 22.4% of subjects.

Table 1. Mean DMFT among children

| DMFT | Frequency (%) | Cumulative frequency (%) |
|------|---------------|--------------------------|
| 0 | 357 (77.6) | 357 (77.6) |
| 1 | 29 (6.3) | 29 (6.3) |
| 2 | 45 (9.8) | 74 (16.1) |
| 3 | 24 (5.2) | 98 (21.3) |
| 4 | 1 (0.2) | 99 (21.5) |
| 5 | 3 (0.7) | 102 (22.2) |
| 6 | 1 (0.2) | 103 (22.4) |

Table 2. Mean DMFT Index among subjects by Age and Gender (N=460)

| Age (in completed years) | Mean DMFT (Std. Deviation) | | p-value |
|--------------------------|----------------------------|--------------|---------|
| | Male | Female | |
| 5-6 (n=107) | 0.65 (1.126) | 0.42 (0.893) | 0.09 |
| 7-8 (n=83) | 0.42 (0.785) | 0.36 (1.025) | 0.67 |
| 9-10 (n=75) | 0.68 (1.334) | 0.39 (0.855) | 0.13 |
| 11-12 (n=87) | 0.43 (1.058) | 0.23 (0.733) | 0.14 |
| 13-15 (n=108) | 0.48 (0.875) | 0.62 (1.091) | 0.29 |
| Total (N=460) | 0.53 (1.036) | 0.43 (0.941) | 0.27 |

Table 3. Frequency consumption of protective food items and Caries (N=460)

| Food item | Frequency consumption | Caries | No Caries | p-value | Odd's Ratio |
|-------------|-----------------------|-----------|------------|---------|-------------------------|
| Milk | ≤once a week | 16 (38.1) | 26 (61.9) | 0.01 | 2.34 CI: (1.20-4.55) |
| | >once a week | 87 (20.8) | 331 (79.2) | | |
| Vege-tables | ≤once a week | 5 (27.8) | 13 (72.2) | 0.57 | 1.3 CI: (0.47-3.87) |
| | >once a week | 98 (22.2) | 344 (77.8) | | |
| Fruits | ≤once a week | 57 (46.7) | 65 (53.3) | 0.00 | 5.56 CI: (3.47-8.92) |
| | >once a week | 46 (13.6) | 292 (86.4) | | |
| Juice | ≤once a week | 90 (23.7) | 289 (76.3) | 0.13 | 1.62 CI: (0.86-3.08) |
| | >once a week | 13 (16.0) | 68 (84) | | |

Table 4. Frequency consumption of cariogenic food items and Caries (N=460)

| Food item | Frequency consumption | Caries | No Caries | p-value | Odd's Ratio |
|-------------------|-----------------------|----------|-----------|---------|-------------------------|
| Confectionary | ≤once a week | 15(14.7) | 87(85.3) | 0.03 | 1.89 CI:(1.03-3.43) |
| | >once a week | 88(24.6) | 270(75.4) | | |
| Junk food | ≤once a week | 18(12.9) | 121(87.1) | 0.00 | 2.42 CI: (1.39-4.21) |
| | >once a week | 85(26.5) | 236(73.5) | | |
| Bakery items | ≤once a week | 17(13.5) | 109(86.5) | 0.00 | 2.20 CI: (1.24-3.88) |
| | >once a week | 86(25.7) | 248(74.3) | | |
| Carbonated drinks | ≤once a week | 63(16.9) | 310(83.1) | 0.00 | 4.18 CI: (2.53-6.91) |
| | >once a week | 40(46) | 47(54) | | |

DMFT Index is the total number of Decayed, Missed and Filled teeth. The DMFT index is an irreversible index and measures the total lifetime caries experience.

Table 1, Out of 460 subjects studied, 103 subjects (22.4%) had DMFT index of 1 or more, the mean DMFT index was 0.48±0.991 with range 0-6.

Mean DMFT Index (Table 2) among males was found to be higher (0.53) as compared to females (0.43). On applying unpaired student's t-test, the difference between means was found insignificant (p=0.273). When males were studied across age groups, the mean DMFT was highest in subjects

of age group 9 to 10 years (0.68) followed by 5 to 6 years age group (0.65) while in females the mean DMFT was highest in subjects of age group 13 to 15 years (0.62) followed by 5 to 6 years age group (0.42).

Mean DMFT index was highest among subjects belonging to middle and upper lower socioeconomic status (0.49) followed by upper socioeconomic status (0.38). The mean DMFT index was lowest among the subjects belonging to lower socio-economic status (0.29) (not shown in table).

The proportion of Caries was found to be low when the frequency consumption was more than once a week for milk

(20.8%), vegetables (22.2%), fruits (13.6%) and fresh fruit juice (16.0%) when compared to frequency consumption of less than/equal to once a week for milk (38.1%), vegetables (27.8%), fruits (46.7%), fresh fruit juice (23.7%). For all the above food groups (protective foods for oral health) the odds of developing caries when the consumption was less than/equal to once a week was definitely more than 1 (Table 3).

Children who were consuming protective food items more than once a week were found to have comparatively less problems of teeth.

When the frequency consumption of cariogenic food items was compared, proportion of subjects affected by caries who were consuming these items more than once a week was more (Table 4). This difference was statistically significant for all food items: confectionary ($p = 0.03$), junk food ($p = 0.00$), bakery items ($p = 0.00$) and carbonated drinks ($p = 0.00$).

Discussion

The prevalence of caries in this study was found to be 22.4% and the mean DMFT index was 0.48 ± 0.991 with range 0 to 6. Mean DMFT Index among males was found to be higher (0.53) as compared to females (0.43). The results are in conformity with the study conducted by Kulkarni,⁸ reporting higher mean DMFT in boys (1.48) than girls (1.11). While in the study done by Seth et al.,⁹ DMFT was higher among females than males. DMFT found in 5 to 6 year age group was: females- 0.81 and males- 0.31 and 10 to 12 year age group: females-1.41 and males-0.64 The finding was explained on the basis of the fact that eruption of permanent teeth at an earlier age in girls cause exposure to the oral environment. Goel et al.¹⁰ reported the DMFT of girls is slightly higher than that of boys. Although Dhar et al.¹¹ reported there was no significant difference in DMFT with gender. Goel et al.¹² in their study among 96 elderly (> 65 years) reported a very high prevalence of caries (100%) and periodontal diseases (77.4%) in Delhi indicating that the severity and prevalence of dental diseases increases with increasing age if not intervened at appropriate time. Similar results were found in this study, wherein highest DMFT was found in 9 to 10 year old males and 13 to 15 year old females. Mean DMFT Index was highest among subjects belonging to middle and upper lower socio-economic status (0.49), while it was comparatively less in subjects of upper (0.38) and lower (0.29) socio-economic status, the difference in mean was not statistically significant ($p = 0.945$). Similar results were found by Kulkarni et al.⁸ where no significant difference in DMFT Index was found across different socio-economic status of family.

Caries is a multifactorial disease resulting in localized dissolution and destruction of calcified tissues. Unhealthy

lifestyles among adolescents like skipping meals, preference for sweetened food, carbonated drinks, junk food, snacking in between meals leads to poor nutrient intake as well as vulnerability to caries.

Harikiran et al.¹⁴ in their study among 11 to 12 year old children reported that 79% consumed sweets regularly, that is several times a day to once in a week while 21% never consumed sweets. High proportion of study participants reported having hidden sugar every day: soft drinks (32.1%), milk with sugar (65.9%), and tea with sugar (56.1%). Goel et al.¹² reported in a study in Delhi among elderly that most subjects had a habit of snacking on sweets, of which 36 (37.5%) subjects had sweets during meals, 27 (28.1%) in-between meals, 29 (30.2%) during and in-between meals. Petersen et al.¹⁶ reported that hidden sugar in the form of soft drinks, milk with sugar, tea with sugar was consumed often by children.

The odds of developing caries was found to be five times more when the frequency consumption of fruits was less than once a week while it was more than twice when the consumption of milk was less than once a week. Hence frequency consumption of milk, vegetables, fruits, fresh fruit juice were found to be protective against oral health problems. Almost similar results were found by Almushayt et al.¹⁷ that frequency of eating vegetables decreased the risk of caries

The odds of developing caries was found to be four times when the frequency consumption of carbonated drinks was more than once a week. While it was almost twice for the rest of the cariogenic items when the consumption was more than once a week.

Similar findings were reported by Malvania et al.¹⁸ that caries was significantly higher in children who consumed solid and sticky cariogenic food several times a day than those with once a day, once a week or occasionally. Watanabe et al.¹⁹ reported in Japanese children that almost half the children consumed sweet snacks once per day, and the other half of the children consumed sweet snacks twice or more per day, the incidence of caries was significantly higher in children who consumed sugar-sweetened beverages daily (20.4%) than those who did not (13.2%).

Conclusion

This study gives an overview of existing caries in a resettlement colony and the dietary practices affecting it. Consumption of cariogenic food items is high in the community. Understanding the importance of oral health as part of general health is the first and foremost.

Limitation

Ascertainment of dietary practices could not be done as the information was based on questionnaire method. The

generalizability of results could be compromised owing to the setting.

Recommendation

The study recommends: 1) Raising awareness regarding good oral hygiene since childhood and appropriate dietary practices which helps the tooth formation and oral cavity maintenance. 2) Promoting homemade, natural and indigenous products with good nutritional values over the use of processed food.

Conflict of Interest: None

References

1. WHO | World Health Organization [Internet]. WHO. World Health Organization; 2017 [cited 2017 May 7]. Available from: http://www.who.int/oral_health/en/
2. Marcenes W, Kassebaum NJ, Bernabe E, Flaxman A, Naghavi M, Lopez A et al. Global Burden of Oral Conditions in 1990-2010: A Systematic Analysis. *J Dent Res* 2013; 92(7): 592-597.
3. Damle SC, Patel AR. Caries prevalence and treatment need amongst children of Dharavi Bombay, India. *Community Dent Oral Epidemiol.* 1994 Feb;22(1):62-3.
4. SHOURIE KL. Dental caries in Indian children. *Indian J Med Res* 1941; 29: 709-722.
5. Tewari A, Chawla H. Study of prevalence of dental caries in an urban area of India (Chandigarh). *J Indian Dent Assoc* 1977.
6. Petersen, Poul Erik, Baez Ramon J WHO. Oral health surveys: basic methods. 5th ed. World Health Organization. 1997. 13.
7. Soben P. Essentials of preventive and community dentistry. 3rd ed. Arya publishing house; 2007. 154-199.
8. Kulkarni SS, Deshpande SD. Caries prevalence and treatment needs in 11-15 year old children of Belgaum city. *J Indian Soc Pedod Prev Dent* 2002; 20(1): 12-15.
9. Seth Nikhil, Shivalingesh KK, Anand Richa, Sharma Abhinav, Singh Thakar Sahil KK. Caries prevalence and oral hygiene status among 7-12 years old school children from rural and urban areas of Gautam Budh Nagar, U.P. *J Adv Oral Res* 2016; 7(1): 35-40.
10. Goel P, Sequeira P, Peter S. Prevalence of dental disease amongst 5-6 and 12-13 year old school children of Puttur municipality, Karnataka State-India. <http://medind.nic.in/jao/jaoaj.shtml>. 2000.
11. Dhar V, Jain A, Van Dyke TE, Kohli A. Prevalence of gingival diseases, malocclusion and fluorosis in school-going children of rural areas in Udaipur district. *J Indian Soc Pedod Prev Dent* 2007; 25(2): 103-105.
12. Goel P, Singh K, Kaur A, Verma M. Oral healthcare for elderly: identifying the needs and feasible strategies for service provision. *Indian J Dent Res* 2006; 17(1): 11-21.
13. Rao A, Sequeira P, Peter S, Rajeev A. Oral health status of the institutionalized elderly in Mangalore, India. *Indian J Dent Res* 1999; 10(2): 55-61.
14. Harikiran AG, Pallavi SK, Hariprakash S, Ashutosh, Nagesh KS. Oral health-related KAP among 11- to 12-year-old school children in a government-aided missionary school of Bangalore city. *Indian J Dent Res* 2008; 19(3): 236-242.
15. Baskaradoss JK, Clement RB, Narayanan A. Prevalence of dental fluorosis and associated risk factors in 11-15 year old school children of Kanyakumari District, Tamilnadu, India: a cross-sectional survey. *Indian J Dent Res* 2008; 19(4): 297-303.
16. Petersen PE, Hoerup N, Poomviset N, Prommajan J, Watanapa A. Oral health status and oral health behaviour of urban and rural schoolchildren in Southern Thailand. *Int Dent J* 2001; 51(2): 95-102.
17. Almushayt AS, Cert P, Sharaf AA, El Meligy OS, Tallab HY, El Meligy O. Dietary and Feeding Habits in a Sample of Preschool Children in Severe Early Childhood Caries (S-ECC). *JKAU Med Sci* 2009; 16(4): 13-36.
18. Malvania E, Thanveer K, Ajithkrishnan C, Hongal S. Prevalence of dental caries and treatment needs among 12-year-old school going children in Vadodara City, Gujarat, India: A cross-sectional study. *Indian J Oral Sci* 2014; 5(1): 3.
19. Watanabe M, Wang D-H, Ijichi A, Shirai C, Zou Y, Kubo M et al. The Influence of Lifestyle on the Incidence of Dental Caries among 3-Year-Old Japanese Children. *Int J Environ Res Public Health* 2014; 11(12): 12611-12622.