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# Determining the influence of oral hygiene practices and diet on dental caries among 15-year-old adolescents of Loni block, Ghaziabad- A cross-sectional study

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ABSTRACT

**Background:** Dental caries is a prevalent chronic disease globally, affecting millions and posing significant public health challenges. Adolescents are particularly vulnerable due to various factors including oral hygiene practices and dietary habits. This cross-sectional study aimed to determine the influence of oral hygiene practices and diet on dental caries among 15-year-old adolescents in Loni Block, Ghaziabad.
**Materials and Methods:** A total of 140 adolescents from private and public schools were included in the study. Data on oral hygiene practices, dietary habits, and dental caries were collected using structured questionnaires and clinical examinations. Statistical analysis was performed using SPSS version 23.
**Results:** The majority of participants were female (56.4%) and had never received dental care (73%). Most participants brushed their teeth once a day (48.6%) and used fluoridated toothpaste (84.0%). Fresh fruit consumption was reported several times a week by 45.0% of participants, while sweet consumption varied. Dental caries prevalence was high, with 59.3% of participants affected.
**Conclusion:** The present study underscores the importance of addressing oral hygiene practices and dietary habits to combat dental caries among adolescents. Targeted interventions focusing on education and promoting healthy behaviors are crucial for improving oral health outcomes in this population.



## 1. Introduction

Health is a multifaceted construct influenced by many different factors such as biological, environmental, social, cultural and economic. Maintaining a balanced lifestyle, including adequate nutrition, regular physical activity, and adequate relaxation, is essential for overall health. Oral health, including the condition of your teeth, gums and oral cavity, plays an important role in overall health. Oral disease poses significant public health problems due to its widespread prevalence and socioeconomic divide.[1] Tooth decay is a chronic disease defined as a permanent dentition with an unmistakable cavity, weak enamel, a noticeably soft floor or wall, a tooth with a temporary filling, or a tooth that has been filling but also decayed. Tooth decay and periodontal disease affect millions of people worldwide, causing discomfort, difficulty eating, speaking, and financial burden when left untreated.[2] By 2023, it is estimated that nearly 3.5 billion people worldwide will be affected by dental diseases, of which approximately 2 billion will have cavities in their permanent teeth and 514 million children will have cavities in their baby teeth. The risk of tooth decay is influenced by biological and environmental factors, including family predisposition, socioeconomic status, and dietary habits.[3]

Scientific evidence emphasizes the continuous interaction between diet, nutrition and oral health, in both health and disease. Good oral health is essential

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for overall health, with factors such as poor dietary choices, smoking, alcohol consumption and inadequate oral hygiene contributing significantly to dental diseases different mouths. Good oral hygiene, including regular plaque removal, is essential to prevent tooth decay and gum disease.[4]

Establishing good oral health habits early in life is important, as habits formed in childhood tend to persist into adulthood. Practicing oral hygiene such as brushing, flossing and having dental check-ups is essential to reduce plaque buildup and protect tooth enamel. However, adherence to these practices among adolescents may vary due to socioeconomic disparities, cultural influences, and access to dental care services.[5]

The aim of the study was to determine the effect of oral hygiene practices and diet on dental caries in 15-year-old adolescents in Loni Block, Ghaziabad.

## 2. Materials and Methods

A cross-sectional study was conducted to determine the effect of oral hygiene practices and diet on dental caries among 15-year-old adolescents in Loni Block, Ghaziabad. The study was conducted in private and public schools. A written protocol was prepared for the investigation which included information such as the aim and objectives of the investigation; description and type of information collected; Sampling methods to draw the study population and statistical methods to analyze the data. The study was approved by the institutional ethics committee and review board. Informed consent was obtained from all study participants to avoid any inconvenience and ensure full cooperation. Study participants were 15 years old (those who had reached the corresponding age on or before the test day), students present on the survey day and students whose parents provided written informed consent were included in the study. Subjects unwilling to participate in the study and participants with special needs were excluded. A pilot study was conducted with 40 students and their mothers to test the feasibility of conducting the main survey through clinical examination and questionnaires. Necessary modifications were made to the data collection process and the final form was designed. Using data from the pilot study, sample size estimates, appropriate data collection procedures, and estimates of the time required to test each participant in the current study were designed. Data from the pilot study were not included in the main study. Participants were recruited using convenience sampling techniques. A total of 140 participants were included in the study. This close-ended questionnaire-based study comprised basic demographic variables like age, gender, and location. Behavioral factors, oral hygiene practices, and dietary factors were assessed and clinical examination for dentition status using WHO criteria 2013 was done.

### 2.1. Data collection

The study participants were approached personally. Prior scheduling was done before surveying during the 2023 academic year. The schedule was made to prevent unexpected time delays and major upsets in the survey timetable. All the questions were explained to avoid any ambiguity. They were assured of the confidentiality of their responses and were requested to give appropriate answers. The completed forms were subjected to statistical analysis using SPSS version 23.

## 3. Results

**Table 1:** Distribution of study participants according to demographic details

| Variables | Frequency | Percentage |
|---|---|---|
| **Age (in years)** | | |
| 15 | 140 | 100.0 |
| **Gender** | | |
| Female | 79 | 56.4 |
| Male | 61 | 43.6 |
| Total | 140 | 100.0 |
| **Class/Standard** | | |
| 9th | 93 | 66.4 |
| 10th | 47 | 33.6 |
| Total | 140 | 100.0 |
| **Last visit to the dentist** | | |
| Less than 6 months | 21 | 15.0 |
| 6–12 months | 4 | 2.8 |
| More than 1 year but less than 2 years | 4 | 2.8 |
| 2 years or more but less than 5 years | 5 | 3.6 |
| 5 years or more | 4 | 2.8 |
| Never received dental care | 102 | 73.0 |
| Total | 140 | 100.0 |
| **Reason for your last visit to the dentist** | | |
| Consultation/advice | 1 | 14.0 |
| Pain/trouble with teeth, gums, or mouth | 2 | 16.0 |
| Treatment/follow-up | 3 | 4.0 |
| Routine checkup/treatment | 4 | 4.0 |
| Don't know/don't remember | 102 | 72.9 |
| Total | 140 | 100.0 |

**Table 2:** Distribution of study subjects according to oral hygiene practices and dietary habits

| **Frequency of cleaning teeth** | **Frequency** | **Percentage** |
|---|---|---|
| Once a day | 68 | 48.6 |
| Twice or more day | 72 | 51.4 |
| Total | 140 | 100.0 |
| **Items used to clean teeth** | | |
| Toothbrush | 140 | 100.0 |
| Others (wooden and plastic toothpicks, dental floss, chew stick Meswak, tongue cleaner) | 0 | 0 |
| Total | 140 | 100.0 |
| **Type of cleaning agent** | | |
| Non-Fluoridated Toothpaste | 22 | 16.0 |
| Fluoridated Toothpaste | 118 | 84.0 |
| Total | 140 | 100.0 |
| **Changing toothbrush** | | |
| Up to 3 Months | 91 | 65 |
| 3-6 Months | 25 | 17.9 |
| >6 Months | 24 | 17.1 |
| Total | 140 | 100.0 |
| **Fresh fruit** | | |
| Several times a day | 4 | 2.9 |
| Everyday | 17 | 12.1 |
| Several times a week | 63 | 45.0 |
| Once a week | 19 | 13.6 |
| Several times a month | 37 | 26.4 |
| Seldom / Never | 0 | 0 |
| Total | 140 | 100.0 |
| **Biscuit, cake, cream cake** | | |
| Several times a day | 0 | 0 |
| **Everyday** | 46 | 32.9 |
| Several times a week | 25 | 17.9 |
| Once a week | 19 | 13.6 |
| Several times a month | 38 | 27.1 |
| Seldom / Never | 12 | 8.6 |
| Total | 140 | 100.0 |
| **Sweet, Pies, Bun** | | |
| Several times a day | 4 | 2.9 |
| Everyday | 24 | 17.1 |
| Several times a week | 36 | 25.7 |

*Continued on next page*

*Table 2 continued*

| | | |
|---|---|---|
| Once a week | 8 | 5.7 |
| Several times a month | 40 | 28.6 |
| Seldom / Never | 28 | 20.0 |
| Total | 140 | 100.0 |
| **Jam/Honey** | | |
| Several times a day | 4 | 2.9 |
| Everyday | 4 | 2.9 |
| Several times a week | 22 | 15.7 |
| Once a week | 12 | 8.6 |
| Several times a month | 25 | 17.9 |
| Seldom / Never | 68 | 48.6 |
| Total | 140 | 100.0 |
| **Chewing gum with sugar** | | |
| Several times a day | 4 | 2.9 |
| Everyday | 33 | 23.6 |
| Several times a week | 4 | 2.9 |
| Once a week | 13 | 9.3 |
| Several times a month | 24 | 17.1 |
| Seldom / Never | 57 | 40.7 |
| Total | 140 | 100.0 |
| **Sweets/ Candy** | | |
| Several times a day | 4 | 2.9 |
| Everyday | 29 | 20.7 |
| Several times a week | 12 | 8.6 |
| Once a week | 48 | 34.3 |
| Several times a month | 42 | 30.0 |
| Seldom / Never | 5 | 3.6 |
| Total | 140 | 100.0 |
| **Tea / Coffee/ Milk Without Sugar** | | |
| Several times a day | 8 | 5.7 |
| Everyday | 89 | 63.6 |
| Several times a week | 5 | 3.6 |
| Once a week | 8 | 5.7 |
| Several times a month | 17 | 12.1 |
| Seldom / Never | 13 | 9.3 |
| Total | 140 | 100.0 |

**Table 3:** Distribution of study subjects according to caries present

| Caries | Frequency | Percentage |
|---|---|---|
| Absent | 57 | 40.7 |
| Present | 83 | 59.3 |
| Total | 140 | 100.0 |

In our study, it was found that all study subjects were aged 15 years, making the sample homogeneous in terms of age whereas the distribution of study subjects by gender, with a slightly higher percentage of females (56.4%) when compared to males (43.6%). It was found that the majority of participants had never received dental care (73%), followed by the last dental visit less than 6 months (15.0%), 6-12 months (2.8%), more than 1 year but less than 2 years (2.8%), 2 years or more but less than 5 years (3.6%), and 5 years or more (2.8%). It was found the majority of subjects (72.9%) reported not knowing or not remembering the reason for their last dental visit followed by visiting the dentist due to pain or trouble with their teeth, gums, or mouth (13.0%), for consultation or advice (7.1%), for routine checkups or treatment (4.2%) and visited for treatment or follow-up (2.8%). (Table 1)

It was observed that the majority (45.0%) reported consuming fresh fruits several times a week, followed by those who consumed fresh fruits several times a month (26.4%), consuming fresh fruits every day (12.1%), or once a week (13.6%), whereas the majority of participants reported consuming these items every day (32.9%), followed by several times a month (27.1%) only 8.6% reported seldom or never consuming these items. In our study, it was observed that the majority reported seldom or never consuming these items (48.6%), while consuming them several times a week (15.7%) or once a week (8.6%). In our study, it was observed that the majority of participants reported consuming it every day (23.6%), followed by several times a month (17.1%) and 40.7 % reported never consuming chewing gum with sugar whereas, the majority of participants reported consuming them once a week (34.3%), followed by several times a month (30.0%) and 3.6% never consumed sweets or candy.(Table 2)

It was found that the majority of participants had caries (59.3%), followed by 40.7% who had no caries. (Table 3)

## 4. Discussion

Understanding the multifaceted interplay between oral hygiene routines and food behaviors is critical in determining their combined influence on dental caries in adolescents. While dental caries remains a major public health concern, particularly among this demographic, studying the synergistic effects of oral hygiene behaviors and dietary choices can provide valuable insights into preventive strategies and intervention programs aimed at promoting optimal oral health outcomes.

This study aimed to determine the effect of oral hygiene practices and diet on dental caries among 15-year-old adolescents in Loni Block, Ghaziabad.

The prevalence of dental caries was found to be 59.3% in Loni Block, Ghaziabad, India.

In our study, it was found that the majority of participants were females 79(56%) which was in accordance with the study done by Wang et al (2023) where 50.1% of the participants were female.[3]

In our study, it was found that the majority of participants (73%) never visited for dental care suggesting potential barriers to accessing dental services which were in accordance with the study done by Amit et al (2022) where 53% of study participants never visited for dental care Factors such as socioeconomic status, geographic location, or lack of awareness about the importance of dental care may contribute to this trend.[6]

In our study, it was found that the majority of participants (48.5%) of study participants brushed their teeth once a day which was in accordance with the study done by Amit et al (2022) showed that 47% of study participants brushed their teeth once a day. It could be influenced by cultural norms, personal habits, or recommendations from healthcare professionals regarding oral hygiene practices. It underscores the importance of regular tooth brushing in maintaining oral health.[6]

In our study, it was found that the majority of participants (100%) used toothbrush for cleaning their teeth which was in accordance with the study done by Karki et al (2023) where 99.6% of study participants used toothbrush for cleaning their teeth. The widespread adoption of this oral hygiene tool. This may be attributed to the effectiveness of toothbrushes in removing plaque and debris from teeth, as well as the promotion of toothbrush use in dental health education campaigns.[7]

In our present study, it was observed that 84.0% of study participants used toothpaste to clean their teeth which was similar to the study done by Karki et al (2023) and Skinner et al (2014) showed that 98.13% and 89.4% of study participants used toothpaste to clean their teeth.[7,8]

In our present study, it was observed that 65% of study participants changed their toothbrush every 3 months which was similar to the study done by Shenoy RP et al (2020) and Younus and Qureshi (2016) showed that the majority of participants changing toothbrushes at every 3 months, i.e. 88.1% and 65%. This may be influenced by cultural norms and practices within the population studied.[9,10]

In our present study, it was found that 45% of study participants consumed fresh fruits several times a week these findings are similar to the study done by Khokhar A. et al (2021) showed that the majority of participants (44%) consumed fresh fruits several times week, which may be due to the variations in dietary habits.[11]

In our study, it was found that 23.3% of the participants had consumed milk at least once a day which was in with our study whereas 63.6% of study participants consumed tea beverages which was in accordance with the study done by Hasheminejad et al (2020) stated that 42% of the participants had consumed tea beverages in daily living, sweetened soft beverages had been also consumed by 25.6% of the participants, maybe due peer influences and social norms, also can be influenced by their social circles.[12]

The prevalence of dental caries in our study was 59.3% among 15-year-old adolescents of Loni block, Ghaziabad. In particular, the results of Loni Block, Ghaziabad, offer important new perspectives on teenage oral health practices and habits. In addition to highlighting alarming patterns like the high percentage of people who never visited a dentist, our study also confirms earlier studies addressing the preponderance of female study participants. These findings may provide obstacles to people seeking dental care. In line with worldwide recommendations for oral hygiene, our results also highlight the need of brushing your teeth regularly.

Furthermore, the prevalence of dental caries among adolescents in the Loni block under the age of 15 years old emphasizes the importance of implementing preventative actions and providing access to full dental care facilities.[13] To reduce the incidence of dental illnesses in this population, it is imperative to address variables including socioeconomic status, geographic location, and promoting knowledge of the value of oral health. It was recommended to conduct comprehensive surveys to assess oral hygiene habits, including brushing frequency, flossing, and the use of fluoride products.[14] It was Implement changes in oral hygiene practices over time and their correlation with dental caries incidence, Identify key determinants of oral hygiene behaviors among adolescents. Development of targeted educational programs and interventions to promote optimal oral hygiene practices and prevent dental caries.[15]

## 5. Conclusion

In conclusion, our study contributes to the growing body of literature on oral health behaviors and outcomes among adolescents, highlighting areas for targeted interventions and future research to improve oral health outcomes in the community. The widespread use of toothbrushes and toothpaste among participants reflects the effectiveness of these oral hygiene tools and the influence of dental health education campaigns. However, disparities exist in certain dietary habits, with varying frequencies of consuming sweets, fruits, and processed foods compared to other studies. These differences may be attributed to cultural norms and dietary preferences within the population.

## 6. Recommendations

Develop targeted educational interventions aimed at improving oral hygiene practices and promoting healthy dietary habits.

Collaborate with local schools, community centers, and healthcare providers to disseminate information and resources to adolescents and their families

Provide valuable insights into the long-term impact of interventions and help inform future public health initiatives aimed at reducing the burden of dental caries in the community.

Create awareness regarding the promotion of oral health and prevention of dental caries.

## 7. Source of Funding

None.

## 8. Conflict of Interest

None.

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