

# Influence of Oral Hygiene Behaviors on the prevalence of Dental Caries among patients visiting Rural Health and Training Centre

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## ABSTRACT

Oral health remains an essential indicator of general health. According to World Health Organization (WHO), oral health is linked to the overall wellbeing and quality of life of people. There are numerous researches which had been conducted in the past which proved the interdependence between general and oral health. This is of particular importance in the case of diseases such as diabetes mellitus and cardiovascular conditions. Globally, oral diseases are a major public health problem, especially in middle and low - income countries. The study included a total of 200 outpatients visiting the rural health and training center in Vayalanallur, Tamilnadu. The study was carried out for a period of three months from April to June 2019 SPSS Statistics for Windows, version 16. 0 was used to analyze the data. The relationship between daily habits, oral hygiene behaviors and dental caries was analyzed by *Chi - square* tests. Overall, 200 research participants between the ages groups of 18 to 76 years were investigated, which included 70.5 % (141 / 200) females and 29.5 % (59 / 200) males. Fifty - six per cent (112 / 200) of the study participants who received more than 8 years of formal education had no caries. Surprisingly, it's the same group who received more education also had a greater per cent of people 56.4 % (63 / 112) presented with more than four decayed teeth.

**KEYWORDS:** Carbohydrate diet, Oral hygiene, Improper brushing, Lack of fluoride exposure, Socio - economic

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### How to Cite This Article:

Ganesh A, Rajan J, Sivanandam BP, et al. Influence of Oral Hygiene Behaviors on the prevalence of Dental Caries among patients visiting Rural Health and Training Centre. *J Evid Based Med Healthc* 2022; 9(10):41.

Received: 04-Apr-2022,

Manuscript No: JEBMH-22-55477;

Editor assigned: 06-Apr-2022,

PreQC No. JEBMH-22-55477 (PQ);

Reviewed: 20-Apr-2022,

QC No. JEBMH-22-55477;

Revised: 02-Jun-2022,

Manuscript No. JEBMH-22-55477 (R);

Published: 14-Jun-2022,

DOI: 10.18410/jebmh/2022/09.10.41.

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## INTRODUCTION

Oral health remains an essential indicator of general health. According to World Health Organization (WHO), oral health is linked to the overall wellbeing and quality of life of people. There are numerous researches which had been conducted in the past which proved the interdependence between general and oral health.<sup>1</sup> This is of particular importance in the case of diseases such as diabetes mellitus and cardiovascular conditions.<sup>2-5</sup> Globally, oral diseases is a major public health problem, especially in middle and low - income countries. Review of Literature: According to the Global Burden of Disease study (GBD), there were 3.5 billion people affected by oral conditions worldwide. Dental caries contributed to the majority of these cases affecting both children (532 million cases) and adults (2.3 billion cases).<sup>6</sup> According to WHO, dental caries remains the most common non - communicable disease worldwide.<sup>7</sup> Dental caries by definition is an irreversible disease of bacterial origin that affects the teeth by destructing the organic substance and causing demineralization of inorganic content which inevitably leads to decay of the tooth.<sup>8</sup> Dental caries is a multifactorial disease with the interaction of various complex primary factors such as - the host, the substrate, and the microbial flora, and time. Combined effects of the above - mentioned factors along with other modifying risk factors such as person's dietary behaviors which include high sugary and carbohydrate diet, frequent consumption of food in short intervals, inadequate oral hygiene practices such as improper brushing, lack of fluoride exposure, socio-economic status such as poverty could aid in developing tooth decay at a much faster rate.<sup>9</sup> Although effective methods are known for the prevention and management of dental caries, it remains a major public health problem in India. A systematic analysis conducted on the global burden of disease study in 2017 found that out of Asians, Indian people had a greater incidence of dental caries. The incidence of caries was higher among females when compared with males.<sup>10</sup> There could be a few reasons for the higher prevalence of caries in India. Lack of oral health knowledge, inadequate oral hygiene practices, changing lifestyle and dietary behaviors from traditional foods towards the consumption of frequent sugary and carbohydrate diets, lesser and later visits to the dentist's office where irreversible destruction of both teeth and tissues had taken place which requires expensive treatments, poverty, and disproportionate distribution of dental manpower across urban and rural areas. In the past, many attempts had been made to understand the higher prevalence of caries in India. Although many epidemiological studies were conducted, the focus was predominantly on urban areas where there is better oral health awareness among people and good access to dental care. Few studies focused on rural areas but remain constrained to younger children in certain age groups.<sup>11,12</sup> Very few researches focused on understanding the caries prevalence in rural adults, but they are limited geographically to northern, central, and eastern parts of India.<sup>13-17</sup> Based on the research that has been conducted in the past, little is known about oral hygiene behaviors

especially in people who reside in rural areas of Southern India. Lacunae in research. There is a need for an in - depth investigation in these regions to understand their oral hygiene behaviors. Therefore, a cross - sectional study that will exclusively assess and investigate these problems among the rural population will help us to create awareness among these populations which will be beneficial for them in maintaining good oral health by obtaining the necessary treatment needs, improving their oral hygiene behaviors, and daily dietary habits.

## MATERIALS AND METHODS

The study included a total of 200 outpatients visiting the Rural Health and Training Centre in Vayalanallur, Tamilnadu. The study was carried out for a period of three months from April to June 2019. Ethical clearance was obtained from the Institutional Ethics Committee. The inclusion criteria for the study were outpatients visiting dental outpatient department of a rural health and training center. The age groups selected for this study were participants over 18 years. Participants who suffered from any form of mental and physical disabilities and participants who were not willing to give consent were excluded from the study. Participants had been briefed about the study and the data collection procedure. Once they had full understanding about the study, informed consent was obtained from them. Participants then had undergone intraoral examinations performed by the dentist, and they answered questions about their oral hygiene behaviors and daily dietary habits. A survey form about the study was gathered from the World Health Organization (WHO) oral questionnaire for adults.<sup>18</sup> Terms that were complex and unfamiliar have been modified prior. Questionnaires have also been made available in their regional language, Tamil by linguistic experts. Information was gathered on the demographic, socio - economic factors, oral hygiene behaviors and dietary habits of the patients. The study also recorded whether the patient had any decayed, missing, or filled teeth using DMFT Index obtained from the WHO adult oral health evaluation form. The instruments used for intraoral examination were mouth mirrors and no: 23 Shepherd's Hook Explorer. Simple random sampling methodology has been used to select subjects from those attending the dental outpatient departments of Rural Health and Training Centre. The sample size was calculated based on a study done and was estimated to be 189. (Expected proportion - 67 relative precision % - 10, desired confidence level % - 95). The sample size was increased by 5 % and was rounded off as 200.

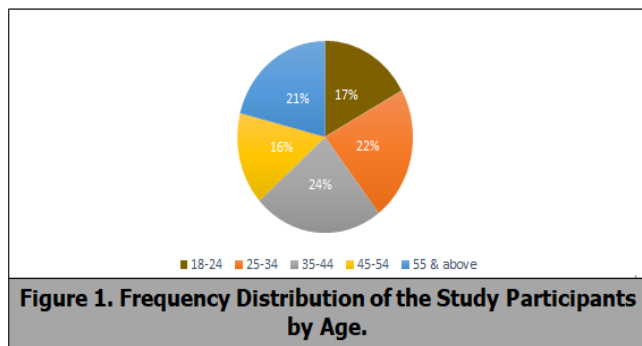
## Statistical Analysis

SPSS Statistics for Windows, version 16.0 was used to analyze the data. The relationship between daily habits, oral hygiene behaviors and dental caries was analyzed by *Chi - square* tests.

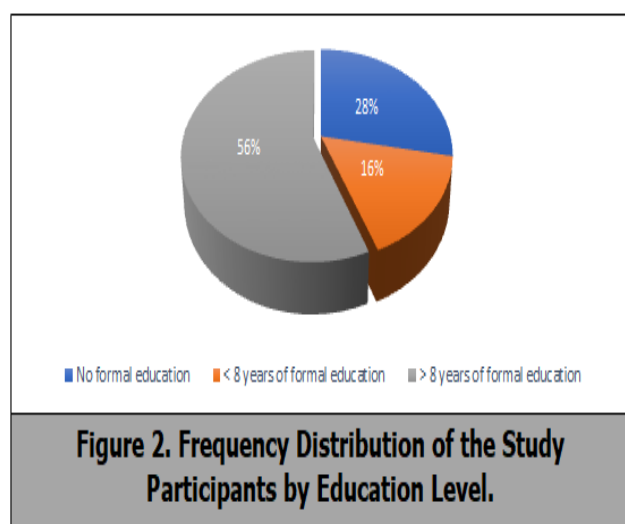
## RESULTS

Overall, 200 research participants between the age groups

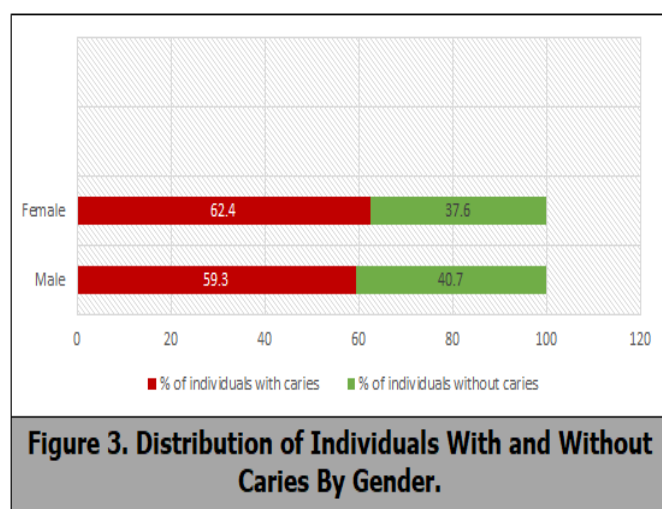
of 18 to 76 years were investigated, which included 70.5 % (141 / 200) females and 29.5 % (59 / 200) males. The majority of the participants were from two age groups 25 - 34 and 35 - 44 years (Figure 1).



Among the 200 study participants, almost 28 % (56 / 200) had no formal education. 16 % (32 / 200) had received less than eight years of formal education (Figure 2).

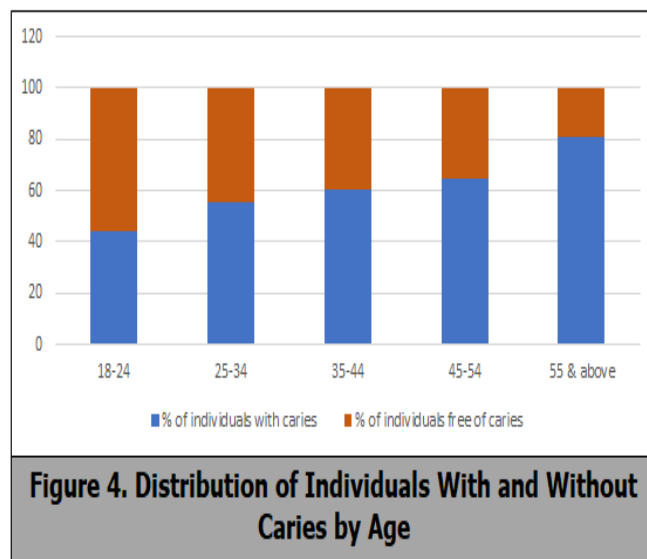


The overall caries prevalence of the study population is 61.5 % (123 / 200). Females reported higher caries prevalence when compared to males (Figure 3).



### Dental Caries and Age Group

The caries prevalence was lower among younger age groups between 18 - 24 years (44.1 %) (15 / 34) and it increased as the age group was higher. The highest prevalence of caries was observed in people over 55 years with almost about 81 % (34 / 42) of the study participants in that age group having caries (Figure 4).



Distribution of individuals with and without caries by age. The mean number of decayed teeth was 1.22 with a range from 0 to 10. The mean number of missing teeth and filled teeth were 1.85 and 0.16 respectively with a range from 0 to 6. The overall mean DMFT is 3.14.

### Dental Caries and Education

Fifty - six per cent (112 / 200) of the study participants who received more than 8 years of formal education had no caries. Surprisingly, it's the same group who received more education also had a greater per cent of people 56.4 % (63 / 112) presented with more than four decayed teeth. Likewise, the second higher per cent who presented with more than four decayed teeth was observed in those who had not received any formal education.

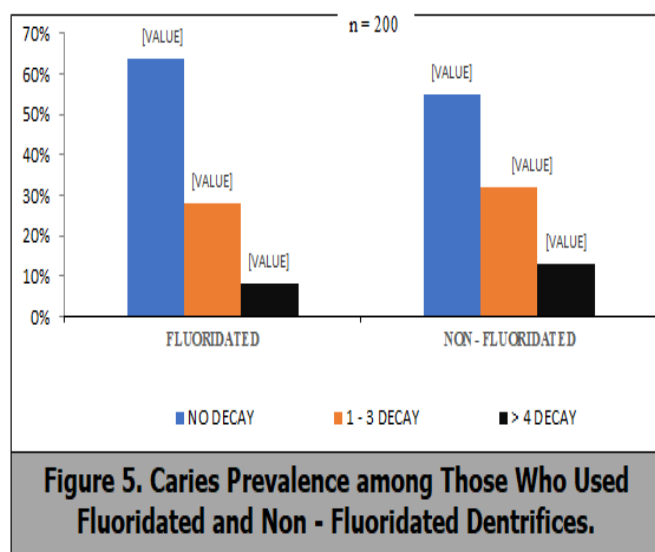
### Dental Caries and Oral Hygiene Habits

As for oral hygiene practices, a majority of the study participants reported brushing their teeth at least once a day. Only 3.5 % (7 / 200) of the participants brushed twice daily. The majority of the study participants used toothpaste to cleanse their teeth (82.5 %) (165 / 200), yet still, 17.5 % (35 / 200) of the population used other modes such as wooden stick / neem chew sticks, charcoal, and tooth powder to clean their teeth.

### Dental Caries and Fluoridated Dentifrices

37.5 % (75 / 200) of the participants used dentifrices that contain fluoride and 45.5 % (91 / 200) used dentifrices that didn't contain fluoride. Participants who used fluoride - containing dentifrices had no caries (64 %) (48 / 75) in general when compared with those who used non - fluoridated dentifrices (54.9 %) (50 / 91). Similarly, participants had a lesser number of tooth decay when they used fluoridated dentifrices when compared with non-

fluoridated dentifrices as depicted in figure 5.



### Dental Caries and Dietary Habits

A variety of sweetened beverages were consumed by the participants, the most common one being tea, sweetened with sugar. Nearly 56 % (112 / 200) of respondents reported consuming this beverage at least once a day. A gender difference was observed in the sweetened tea consumption a higher proportion of females (57.4 %) drank sweet tea compared to males (52.5 %). Sixty - eight per cent (136 / 200) of the participants consumed snacks in - between meals. Furthermore, 69.6 % (139 / 200) of the participants who had consumed snacks and beverages in - between the meals had more than four decayed teeth.

## DISCUSSION

The present study is one of the few studies that have sought to have an outlook of the dental caries experience of the rural population among adults. Caries prevalence was quite high, at 61.5 % (123 / 200). These high levels of caries in the rural population are found to be concurrent with the results from a previous study conducted (64.2 %).<sup>19</sup> Females reported having more caries than males. This is also found to be coinciding with another study conducted.<sup>15</sup> there could be a few reasons for higher caries prevalence, especially in females. Fear and anxiety related to dental treatment and costs, lack of awareness about treatment options, responsibilities in taking care of families often neglecting their oral and general health. All these results in a lack of timely care and presentation at later stages often leading to higher caries prevalence. Furthermore, frequent snacking at home in shorter intervals due to the accessibility of food can also lead to higher prevalence. Thus, the need for oral health promotion is of prime importance among women. Caries prevalence was also seen higher among older adults when compared with younger age groups. A few possible reasons could be that younger age groups have more oral health awareness than the elderly. Additionally, their immunity could also possibly play an important role in arresting this caries. However, this is not the case with the older population. Furthermore, with older people being

retired and present at home, there is the easy accessibility of food, frequent snacking and beverage drinking can also be the reason for the higher prevalence in these age groups. Dental caries is a complex and dynamic process where a multitude of factors initiate and influence the progression of the disease but one of the main causes is the accessibility of fermentable carbohydrates in the developing nation even including rural areas of India. This study showed nearly 56 % (112 / 200) had consumed sweetened tea at least once a day, females consuming more than males. This study almost correlated with the findings of where a high proportion of the study sample drank sweetened tea, the most popular sweetened beverage, at least once a day.<sup>16</sup> The presence of readily available fermentable carbohydrates such as cookies, cakes, candies, soft drinks, sugary foods, etc., even in rural areas makes it easy for them to consume these foods. The longer these sticky foods stay in the oral cavity, the more acids are produced, and these acids can do more damage to the tooth structure. However, the carcinogenicity of a dietary carbohydrate depends on the frequency of intake, its composition, and its nature. So, it's of utmost importance to educate the population especially in rural areas where the awareness is less about these foods. Awareness should be made to replace these fermentable and sugary foods with healthy alternatives such as whole grains, vegetables, fruits, nuts, milk, etc., Although 96.5 % (193 / 200) of our study population brushed their teeth at least once a day, still caries prevalence was found to be 61.5 % (123 / 200). This proves that there is a need to educate people about the correct method of brushing techniques and the duration of brushing. Further, only 3.5 % (7 / 200) brushed twice daily and 17 % (34 / 200) still used various materials, other than dentifrices to brush their teeth / hence, educating them about oral hygiene is crucial. This could be done in the form of educational posters, educational videos explaining the right techniques etc., Participants who used fluoridated toothpaste reported to have lesser tooth decay. This highlights the importance of using fluoride - containing toothpaste. Fluoride has many benefits if used in the right concentration. It interferes with the metabolic activity of cariogenic bacteria it decreases the enamel solubility and demineralizes the tooth structure. Hence, it should be included in the toothpaste.

### Strengths and Limitations of the Study

This is one of the few studies which tried to understand the influence of oral hygiene and dietary behaviors on the prevalence of dental caries in adults in rural southern India. The study included a wide range of age groups which gave a broader perspective in understanding the caries prevalence in those age groups. In addition to recording the DMFT index, the study also aimed to understand the dietary and oral hygiene behaviors in these populations which could help in delivering targeted oral health awareness campaigns. There were a few limitations in the study. The study sample consisted of a majority of female participants. This is possible because the dental department in the rural health center operates on weekdays. Many men would go for work and would be available only on weekends. Hence, lesser men participated in the study. This might cause selection bias. Secondly, the participants consisted of those who reached the rural health Centre and not on a community basis.



Hence, most people who require some medical and dental care only would be present in the rural health Centre which could again cause selection bias. There could also be a possibility of recall bias amongst patients while answering the questionnaires. Despite the limitations, this study remains one of the few studies conducted on rural adults which tried to understand the influence of oral hygiene and dietary behaviors on the prevalence of dental caries in adults in rural southern India.

### CONCLUSION

The study found that the caries prevalence was higher in rural adults in southern India especially in older age groups when compared with younger age groups. Additionally, the study stresses the key undeniable fact that people consuming intense syrupy beverages, carbohydrates, and those who have snacking habits in - between meals experience a greater number of tooth decay. The study also found using fluoride - containing toothpaste reduces tooth decay. Early and timely dental screenings are crucial for identifying and treating dental diseases with minimal damage to the tooth structure and surrounding areas. However, instilling the importance of the early and timely visit to the dentists remains a challenge. With the advancements in technologies, many have mobile phones. A timely reminder about their next dental visit could help more people in receiving their oral care. Oral health education remains one of the prime ways in which we can forestall dental diseases and reduce the prevalence of oral diseases. People across all age groups from children to adults should be made sensitized about the basic concepts of oral hygiene, appropriate brushing techniques. Most often, oral health risk factors like consumption of sugary foods and tobacco also continue to be a risk factor for other non - communicable health conditions such as diabetes, heart conditions and cancers. Hence, combined oral health promotion to modify these risk factors and opting for healthy food habits could aid in both controlling the existing disease prevalence and reducing the incidence of new diseases which will lessen the burden of these diseases. Furthermore, India has many graduating dentists, but they are concentrated in urban areas which lead to disproportionate distribution of dental manpower in rural and urban areas. Health professionals are willing to work more in urban areas for better opportunities, high wages, better working conditions etc., this strikes a major imbalance of health care providers in rural areas. Government should develop several strategies to retain its workforce equally in urban and rural areas. They could provide higher wages to people who are willing to work in rural areas. In addition to it, they could compensate and provide incentives for any extra work that they do. Governments can offer permanent job positions and pensions to retain dentists in rural areas. For people agreeing to work in rural areas, Government could provide free housing and transportation facilities. Furthermore, they can encourage health graduates to work in rural areas for certain years and in turn, they can forgive their student loans which they would have taken for their health education. All these strategies could aid in people receiving more quality care in rural areas.

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