International Journal of Advanced Health Science and Technology
Homepage: ijahst.org
e-ISSN:2808-6422; p-ISSN:2829-3037
Vol. 5, No. 4, pp. 190-194, August 2025

RESEARCH ARTICLE
OPEN ACCESS

Manuscript received June 10, 2025; revised August 3, 2025; accepted August 21, 2025; date of publication August 30, 2025
Digital Object Identifier (**DOI**): https://doi.org/10.1109/ijahst.v5i4.514

How to cite: Zhorif Abrial Afif, Bambang Hadi Sugito, And Ida Chairanna Mahirawatie, "The Relationship Between Diet Patterns and Dental Caries in Preschool Children : Study At Muslimah Nu Islamiyah Kindergarte, Taman Sidoarjo", International Journal of Advanced Health Science and Technology, Vol. 5, No. 4, pp. 190-194, August 2025.

The Relationship Between Diet Patterns and Dental Caries in Preschool Children : Study at Muslimah Nu Islamiyah Kindergarte, Taman Sidoarjo

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This paragraph of the first footnote will contain support information, including sponsor and financial support acknowledgment. For example, "This work was supported in part by the U.S. Department of Commerce under Grant BS123456."

ABSTRACT Dental caries is still a common problem, especially in children under 6 years old. Diet is a way of regulating the type and amount of food to maintain nutrition, prevent disease and maintain a healthy body. In August 2024, researchers conducted dental examinations on 10 children at the Muslimah NU Islamiyah Taman Sidoarjo Kindergarten and all had dental caries with an average def-t of 4.6. The aim is to determine whether there is a relationship between diet and dental caries in preschool children at Muslimah NU Islamiyah Taman Sidoarjo Kindergarten. This study used a quantitative method with a *Cross Sectional* research design. A total of 36 respondents were selected according to the specified criteria. he results showed that the value (p-value 0.001 <0.05). Data were collected through dental caries examination forms and dietary pattern questionnaires. Data analysis using the *chi-square* test. The results showed that there was a relationship between diet and dental caries in preschool children at Muslimah NU Islamiyah Kindergarten Taman Sidoarjo in 2025.

INDEX TERMS diet, dental caries, preschool children

I. INTRODUCTION

Early childhood caries (ECC), although preventable, still remains one of the most prevalent diseases in children worldwide. Feeding and oral hygiene practices in infancy are plausible contributors to early childhood caries. The possible mechanisms involved with the etiology of ECC can be associated with differences concerning social factors and family and socioeconomic variables, which determine distinct forms of behavior [27]. Effects of high sugar consumption are best revealed from the classic vipeholm [31]. Sugar increased caries most if consumed between meals, and in a form that was retained for a long time in the mouth, such as toffee .

One of the most common problems is dental caries, which has a special type that mainly affects children under the age of six. The disease known as dental caries attacks the enamel, dentin and cement-the hard tissues of the teeth. Children's health can also be affected by dental caries as it can cause discomfort and difficulty chewing food, as well as digestive problems that can affect a child's growth, development and nutrition [19].

According to a 2007 Centers for Disease Control and Prevention study, the prevalence of dental caries has increased by 70%, especially among toddlers and preschoolers, from 24% to 28% in children aged 2-5 years. In Indonesia, the active dental caries rate rose from 53.2% in 2013 to 57.6% in 2018, according to data from the Basic Health Research (2018) [11] .

The condition known as tooth decay, or dental caries, attacks the hard tissues of the teeth, starting with the demineralization of tooth enamel due to an acidic environment. Because dental caries can be caused by a variety of factors, the condition is sometimes referred to as a multifactorial disease. Dental caries has three main causes: germs, environment, and tooth condition. Time is also a contributing factor. Brushing habits, diet (especially consumption of foods that cause caries), low pH of saliva, drinking habits (such as consuming bottled milk with high sugar content), and knowledge of oral hygiene are other factors that contribute to the development of dental caries [1].

Diet is a method or attempt to control the type and amount of food consumed for specific purposes, such as maintaining health and nutritional status or avoiding or assisting in the treatment of disease. Controlling food consumption through the selection of nutritious foods is known as diet. According to Roeslan and Sadono (1997), dental caries is less common in populations that consume a high-fiber diet compared to populations that consume sweet and soft foods. Therefore, the incidence of dental caries may be related to diet or diet [21]. Dental caries is more common in children with a poor diet. If consumed regularly and become a habit, tooth-cleaning foods, such as fruits and

e-ISSN:2808-6422; p-ISSN:2829-3037
Vol. 5, No. 4, pp. 190-194, August 2025

vegetables, can help prevent tooth decay. Dental caries is more common in those who consume more sugar [10].

According to World Health Organization (WHO), oral health was defined as the state of absence of tooth decay (dental caries), oral, facial, throat, periodontal, tooth loss, and other diseases and restrictions individuals in chewing, smiling, talking, and psychosocial well-being[29]. In 2019, the World Health Organization (WHO) stated that oral health is essential to human well-being.

Having a healthy mouth means not suffering from periodontal disease, tooth decay, tooth loss, infection, or discomfort in the mouth, as well as other disorders that can interfere with daily activities [9]. Based on the study, 51.1% of preschool-aged children did not brush their teeth regularly, and most of them consistently consumed sugary foods (66%). Therefore, maintaining a healthy diet and regular teeth cleaning are important ways to prevent tooth decay [12].

Index values, a numerical representation of the condition of a group in relation to a particular dental disease, are used to evaluate the status of dental caries. Def-t is the index value used for the primary teeth. Furthermore, the number of teeth that fall into the D, M, F, or d, e, f category is recorded. DMF-T, often called def-t, uses a range of values to determine its assessment criteria: very low, low, medium, high, and very high.

The main cause of cavities (caries) is an unhealthy lifestyle, particularly regarding brushing after meals. Food debris left between teeth, if not promptly cleaned, will be broken down by bacteria. The presence of bacteria in the mouth is normal [13].

If this problem is left untreated, it can lead to a decreased appetite in children, which can lead to nutritional deficiencies and impaired physical growth. Furthermore, caries in preschool children can interfere with concentration in learning and lower their self-confidence in socializing with their peers [14].

Nutrition affects the teeth during development and malnutrition may exacerbate periodontal and oral infectious diseases. However, the most significant effect of nutrition on teeth is the local action of diet in the mouth on the development of dental caries and enamel erosion. Foods rich in starch, without the addition of sugars, play a small role in coronal dental caries. Sugars, particularly sucrose, are the most important dietary etiological cause of caries [26]. Sugar is considered a cariogenic dietary component, and a robust literature has linked sugar consumption with dental caries [32].

Based on preliminary data collection that has been carried out by researchers directly in August 2024 at the Muslimah NU Islamiyah Kindergarten, Sidoarjo Regency, from 10 children who have undergone dental examinations, it was found that 10 children had dental caries with an average def-t of 4.6 which is included in the high category according to WHO. then the problem found is the high rate of caries in Muslimah NU Islamiyah Kindergarten students in Sidoarjo Regency with this possible cause is the lack of maintaining a diet and getting a program from health services, especially on how to maintain diet and dental health at Muslimah NU Islamiyah Kindergarten, Sidoarjo Regency.

II. METHODS

This research is analytic in nature using *Cross Sectional* research. The sample of this study used Simple *Random Sampling* with 36 respondents who fit the specified criteria. The data used in this study were primary data, in the form of observation sheets and examination sheets containing dental caries examination formulars, dietary pattern questionnaire sheets then tested using the non-parametric *Chi-Square* correlation test. The questionnaire used was pre-tested for clarity and reliability, and dental assessments followed WHO criteria for def-t index classification. In this data analysis using (*alpha*) $\alpha = 0.05$, which is used to set relevant limits. This research has passed ethical review at the Poltekkes Kemenkes Surabaya with number EA/3450./KEPK-Poltekkes_Sby/V/2025.

III. RESULT

A total of 36 samples were studied with respondents who met all predetermined inclusion criteria, namely children who were willing to become respondents and participate in the study.

TABLE 1
Respondent Characteristics

Characteristics	Frequency (N)	%
Child Age		
5-6 years old	36	100
Gender of Child		
Male	20	55.6
Female	16	44.4
Total	36	100

According to the data in table 1, most of the respondents are male with a percentage of 55.6%, female gender 44.4% with an average age of 5-6 years, which is 100%.

TABLE 2
Frequency Distribution of Dietary Pattern Values in Pre School Children at Muslimah NU Islamiyah Kindergarten Taman Sidoarjo Year 2025.

Dietary Pattern	Frequency (n)	Percentage (%)
Good	15	41,7
Fair	12	33,3
Less	9	25,0
Total	36	100

According to the data in table 2, most of the eating habits of 36 respondents at the Muslimah NU Islamiyah Kindergarten in Taman Sidoarjo were in the "good" category, with 15 respondents (41.7%) having good eating habits, 12 respondents (33.3%) had moderate eating habits, while 9 respondents (25.0%) had poor eating patterns.

TABLE 3
Distribution of Dental Caries Values in Pre-School Children at Muslimah NU Islamiyah Kindergarten Taman Sidoarjo Year 2025.

Dental Caries	Frequency (n)	Percentage (%)
Very Low	8	22,2
Low	4	11,1
Medium	5	13,9
High	9	25,0
Very High	10	27,8
Total	36	100

According to the data in table 3 10 respondents (27.8%) had dental caries, most of which were very high among the 36 respondents. On the other hand, there were 8 respondents (22.2%) with very low dental caries, 4 (11.1%) with low dental caries, 5 (13.9%) with moderate dental caries, and 9 (25.0%) with severe dental caries.

TABLE 4
Relationship between diet and dental caries in preschool children at kindergarten Muslimah Islamiyah Taman Sidoarjo in 2025.

Diet	Dental Caries												*P Value*
	Very Low		Low		Medium		High		Very High		Total		
	N	%	N	%	N	%	N	%	N	%	N	%	
Good	8	53,3	2	13,3	2	13,3	3	20	0	0,0	15	100	0,000
Enough	0	0	2	16,7	3	25	5	41,7	2	16,7	12	100	
Less	0	0	0	0	0	0	1	11,1	8	88,9	9	100	
Total	8	22,2	4	11,1	5	13,9	9	25	10	27,8	36	100	

The results showed that 8 respondents (53.3%) had a very low incidence of dental caries mainly due to a good diet, 2 respondents (16.7%) had a low incidence of dental caries mainly due to an adequate diet, 5 respondents (41.7%) had a high incidence of dental caries mainly due to an adequate diet, and 8 respondents (82.9%) had a very high incidence of dental caries mainly due to an inadequate diet. *The chi-square* test analysis resulted in a p value of 0.000 <0.05, indicating that H0 is rejected and H1 is accepted. Therefore, it can be concluded that dental caries and diet have a significant relationship in preschool children at Taman Sidoarjo Muslimah NU Islamiyah Kindergarten. Table 4 demonstrates a significant correlation between poor dietary habits and higher levels of dental caries.

IV. DISCUSSION

The results of the research that has been carried out that the respondents have a diet in the "Good" category, because most consume fruit and vegetable foods. Several food categories, including those that contain good nutrients for the body such as carbohydrates, proteins, fats, vitamins, and minerals, are consumed in a diverse and nutrient-rich manner in a balanced diet. The General Guidelines for Balanced Nutrition (PUGS) classify food components into three main nutritional functions: regulating nutrients, energy-providing nutrients, and protein-providing nutrients [24].

Although children with a good diet, consuming nutritious foods such as vegetables, fruits, and dairy products, have the potential to maintain dental health, the frequency of consumption of cariogenic foods, especially those containing sugar, remains a major risk factor in the development of dental caries. Three meals a day, including snacks in the morning or afternoon, is a reasonable eating frequency. Overeating can lead to obesity, which is harmful to your health.

In this regard, children's food consumption methods based on their goals during a large meal or snack are also related to parenting styles [5]. Children's diet should be of sufficient quality and quantity to support optimal health. Children who are malnourished will have a weak immune system, making them more susceptible to disease [3].

This is in line with research conducted by Marlina *et al.*, (2024) which shows a relationship between the occurrence of caries in children in elementary school and the frequency of consumption of foods that cause caries. Excessive consumption of foods that cause caries can make the saliva in the mouth acidic, which will make teeth more susceptible to cavities.

The results of the research that have been carried out show that the respondents have dental caries in the "Very High" category according to the dmf-t index criteria according to WHO. Because most of the respondents are still not right in maintaining dental health, such as brushing their teeth 2x a day properly and correctly [9]. Early dental care is very important to prevent tooth decay. Brushing your teeth with fluoride toothpaste is an easy way to maintain health and prevent tooth decay [7].

These results align with Keumala et al. (2020), affirming that high sugar intake and irregular brushing practices elevate caries risk. Implementing nutrition education for parents could serve as a preventive measure. Children are more prone to dental caries because they tend to choose sweet and sticky foods that can cause dental caries. Children usually consume chocolate, candy, and other sweet foods, but they rarely brush their teeth.

The main factors controlling the risk of dental caries in school-age children are dietary habits, oral hygiene and fluoride exposure [6]. The frequency and amount of consumption of simple sugars are associated with dental caries. The frequency of added sugar consumption is a more dominant factor in the etiology of dental caries, but there is evidence that the amount of sugar consumption affects the development of dental caries regardless of frequency.

Oral hygiene and its good practices should begin even before the eruption of the first element with the help of lap pads soaked in physiological solution, and then there should be the switch to the use of a toothbrush and fluorinated toothpastes with the help of parents. In this sense, ethnicity, social status, and degree of family education affect the development of injury to the hard tissue of the tooth. In fact, the prevalence of carious lesions is lower in children who brush their teeth more than once a day and especially those who brush before going to sleep with the help of parents [34].

There are two possible dietary ways to restrict sugar intake for caries pre vention: reducing the amount of added sugar to foods or drinks or reducing the frequency of sugar consumption. Determining the importance of reducing the total amount versus frequency of sugar consumption is challenging because these two factors are difficult to differentiate between: if either one increase, the other may uncontrollably increase [35].

In research that has been done, diet in pre-school children has a significant relationship with dental caries. Children at this age often consume sugary and cariogenic foods, which can increase the risk of caries. Research shows that a high sucrose diet is associated with a higher caries index in pre-school children. In addition, parents' knowledge about diet also affects children's dental caries status, parents with good knowledge tend to implement a healthy diet that can prevent caries [7].

A healthy diet could be provided by encouraging a diet rich in fruits, vegetables, and whole grains while avoiding sugary snacks and drinks. The FDI World Dental Federation guidelines insist on a low cariogenic diet by promoting a tooth-friendly diet that minimizes the consumption of sugary foods and drinks. These guidelines aim to reduce the risk factors associated with ECC and promote overall oral health in children [30].

According to the American Academy of Pediatric Dentistry,some of the preventive strategies for ECC

include using flu oride, avoiding frequent ingestion of sugar and nocturnal bottle-feeding, and establishing a dental home. Collaboration with non-dental primary health care providers may also contribute to increased access to dental services [33].

Based on H.L.Blum's theory, there are four important factors, namely Genetic Factors, Health service factors, and environmental factors. Although genetic factors cannot be changed, understanding of genetic predisposition can help in prevention and early treatment through access and quality of health services, including dental health services, plays an important role in the prevention and treatment of dental caries. Children's diet, especially the consumption of sugary foods and meal frequency, is influenced by the environment. Poor eating habits, such as frequent consumption of sweet snacks without being balanced with good dental hygiene, can increase the risk of dental caries [14].

The results showed that dental caries in preschool children at Muslimah NU Islamiyah Taman Sidoarjo Kindergarten in 2025 was related to dietary habits. Based on this idea, the study showed a strong correlation between the prevalence of dental caries in preschool children and poor diet, such as regular consumption of sugary foods and snacks that cause caries. Although the eating habits of preschool children are generally considered healthy, dental caries cases are high.

This shows that in addition to diet, other factors also play a role in the occurrence of caries, such as meal frequency, improper brushing habits, and lack of awareness of maintaining oral health. Research also shows that children's diets tend to be less balanced due to high appetite and the habit of choosing their own food. Children prefer sweet foods because they taste good and the shapes and colors are attractive [20]. Therefore, it is important to intervene to increase knowledge, change attitudes and expand access to healthy foods and dental health services to prevent caries in preschool children [18].

V. CONCLUSION

There is a significant association between dietary habits and dental caries among preschool children, emphasizing the urgent need for school-based oral health and nutrition programs.

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