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NOTE: Articles will be added in this issue till 26.12.2023

CONTENTS

S.No.	Articles	Pages
1.	Home Management of Fever in Under-Five Children: Knowledge, Attitude and Practice among Mothers Attending a Paediatric Outpatient Clinic in Port Harcourt, Nigeria. ShareThis *Boma Awoala West, Woroma Wonodi, Gloria Nwosu* [ABSTRACT] [PDF Full Text] [DOI: https://doi.org/10.52403/gijhsr.20230401]	1-16
2.	The Prevalence of Gingivitis in School Student Age 9-12 Years at Biting 01 Elementary School, Arjasa Agroindustrial Region, Jember District. *Dyah Setyorini, Roedy Budirahardjo, Farah Nur Handayani, Melok Aris Wahyukundari, Ristya Widi Endah Yani* [ABSTRACT] [PDF Full Text] [DOI: https://doi.org/10.52403/gijhsr.20230402]	17-22
3.	Validity & Reliability of Vonfidans (Het's Device to Instantly Test Vaginal Tightness) to Test the Vaginal Tightness. *Dhara Santosh Agnihotri, Dr. Anjali R Bhise, Krutarth Purnendu Shah, Shila Bhagwanji Amersheda, Dr. Vandana K Saini, Dr. Arati Mahishale, Dr. Hemant Tiwari, Yojana Navneet Mange, Samiksha Gupta, Ushma Bhojani, Garima Biswas, Chelsi Brahmbhatt* [ABSTRACT] [PDF Full Text] [DOI: https://doi.org/10.52403/gijhsr.20230403]	23-30
4.	Acute Respiratory Distress Syndrome: A Case Report and Review on Diagnosis and Novel Interventions in Management. *Dr. Bilal Harris, Dr. Fatema Aliasger Rampurawala, Rhea Joshi, Bibin Thoppil Siby, Sona Subash* [ABSTRACT] [PDF Full Text] [DOI: https://doi.org/10.52403/gijhsr.20230404]	31-38
5.	The Relationship between Knowledge of the Effects of Electronic Cigarettes on Oral Health and the Use of Electronic Cigarettes among Students at the University of Jember. *Leni Rokhma, Dyah Setyorini, Tri Askhabul Khaffi, Surartono, Hestieyonini* [ABSTRACT] [PDF Full Text] [DOI: https://doi.org/10.52403/gijhsr.20230405]	39-44

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Original Research Article *P-ISSN: 2456-9321*

The Prevalence of Gingivitis in School Student Age 9-12 Years at Biting 01 Elementary School, Arjasa Agroindustrial Region, Jember District

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ABSTRACT

Elementary school-age children experience gingivitis due to minimal knowledge and awareness about dental and oral hygiene, which can cause plaque formation. Gingivitis in children can also be influenced by bad habits that usually occur in children, such as chewing on one side and breathing through the mouth. Based on basic health research in Indonesia in 2013, gingivitis in children under 12 years old was found to be 80%. This research was an observational study with descriptive research using a cross-sectional design (cross-sectional study). Data is calculated using the prevalence formula, and gingivitis examination uses the gingival index. The plaque index is used to determine the appearance of plaque as one of the etiologies of gingivitis and the questionnaire is used to determine other causes of gingivitis in children. The results showed that the prevalence of gingivitis based on severity was the highest, which were mild gingivitis at 36.3%, and moderate gingivitis at 40.9%. The prevalence of gingivitis based on age is highest among 12-year-olds with 30.3%. The prevalence of gingivitis based on gender is mostly experienced by men at 43.9%. The etiology of gingivitis in this study was most influenced by plaque which was measured by the plaque index.

Keywords: Gingivitis, agroindustry, elementary school children

INTRODUCTION

Gingivitis is an inflammation of the gingiva which is characterized by redness, swelling, and bleeding of the gingiva.[1] Gingivitis is not just a problem endured by adults, but can also occur in children. Research conducted by Sharva et al in 2014 found that 53.09% of children suffered from mild gingivitis and 5.5% from moderate gingivitis.[2] Based on basic health research in Indonesia in 2013, 80% of gingivitis in children under 12 years old was found to be characterized by malocclusion, crowded teeth, and/or hormonal factors.[3] Gingivitis in children can also be influenced by bad habits that usually occur in children such as chewing on one side and mouth breathing. [4]

The prevalence of gingivitis in children increases with a peak at puberty. [1] The main cause of gingivitis is the accumulation of microorganisms that form a colony and then form dental plaque that sticks to the gingival margin. The main bacteria that can cause gingivitis is Porphyromonas gingivalis. Other causes of gingivitis are caries, malocclusion, space maintainer, hematological disorders, and use of drugs[5], Gingivitis in children can be caused by children's minimal knowledge and

awareness about dental and oral hygiene so it can cause plaque formation.[6]

Agro-industry is an industry that utilizes agricultural products as raw materials, designs, and provides services for these activities.[7] There are various kinds of agro-industrial companies in Jember Regency, one of which is PT. Perkebunan Nusantara X (PTPN X) located in Arjasa district. The majority of people's jobs in the agro-industrial area of Arjasa sub-district are farmers, farm workers, and casual daily workers. The agricultural and rural sectors are areas with the lowest 30% social welfare status and influence the economic level as well as education and knowledge of the community. [8] Community welfare can not only be seen from the level of education but also from the level of health. When the expenditure spent on health is greater, a person's health status will get better, which then has an impact on welfare.[9]

Research showed that gingivitis is more common in people with low socioeconomic status because they show more positive attitudes towards oral care and have better access to health services.[10]

Dental and oral health problems in Indonesia are still a very important concern in health development and need to be paid attention to by health workers. Various efforts to improve welfare need to be made, starting with improving the health of children, including the health of their teeth and mouth.[11]

MATERIALS & METHODS

This research was an observational study with descriptive research using a cross-sectional design (cross-sectional study). This research was conducted at Biting 01 Elementary School, Arjasa Agroindustrial Region, Jember Regency in May 2023. The sampling technique in this research used total sampling. Data obtained on the population of students aged 9-12 years at Biting 01 Elementary Student, Arjasa District, Jember Regency was 66 students, but at the time the research was carried out only 58 students were present.

Data are grouped based on the severity of gingivitis which is calculated using the gingival index. The data was then grouped by age and gender and then calculated using the prevalence formula. Data on the etiology of the causes of gingivitis obtained based on plaque index examination and interview results are presented in the table.

$$\text{Prevalence} = \frac{\text{Number of old cases + new cases}}{\text{Number of population at risk}} \times K$$

The condition of the gingiva is measured using the Gingival index. The examination is carried out using a periodontal probe by inserting the tip of the blade at the gingival margin 1-2 mm, then moving it from distal to mesial.[12] The examination was carried out on the buccal aspect of teeth 16 and 26, the facial aspect of tooth 11, the lingual aspect of teeth 36 and 46, and the labial aspect of tooth 31. [13]

Scoring and criteria for the gingival index system:[13]

Score	Criteria
0	Normal Gingiva
1	Slight change in color and slight edema but no bleeding on probing
2	Redness, edema, and glazing, bleeding on probing
3	Marked redness and edema, ulceration with a tendency to spontaneous bleeding.

The scores of the four areas of the tooth can be summed and divided by four to give the GI for the tooth. The GI of the individual can be obtained by adding the values of each tooth and dividing by the number of teeth examined. The Gingival Index may be scored for all surfaces of all or selected teeth or for selected areas of all or selected teeth.[13]

Score	Criteria
0,1 – 1,0	Mild Gingivitis
1,1 – 2,0	Moderate Gingivitis
2,1 – 3,0	Severe Gingivitis

In this study, the etiology of gingivitis will be divided into 3, which are plaque, the habit of chewing on one side, and mouth breathing. The Loe and Silness plaque index is used to determine the appearance of plaque in students and a questionnaire containing several questions is used to determine the causes of gingivitis in children.

RESULT

The total number of children aged 9-12 years was 66 people, however, 8 people were not present at the time of the examination so the number of research subjects was 58 students.

Table 1. Frequency distribution by gender

Gender	Total (n)	Percentage (%)
Boy	31	53.4 %
Girl	27	46.6 %
Total	**58**	**100**

Based on the gender of the 58 research subjects, it was found that there were more boys than girls, which was 31 people (53.4%) compared to the number of women, which was 27 people (46.6%).

Table 2. Frequency distribution by age

Age (years)	Total (n)	Percentage (%)
9	8	13.7 %
10	14	24.1 %
11	16	27.5 %
12	20	34.4 %
Total	**58**	**100**

Based on the age of the students, it showed that there are 8 people aged 9 years (13.7%), 10 years old as many as 14 people (24.1%), 11 years old as many as 16 people (27.5%), and 12 years old as many as 20 people (34.4%).

Table 3. Prevalence of gingivitis based on severity

Gingival index score	Total (n)	Prevalence (%)
0 (No Gingivitis)	3	4.5 %
0.1 – 1.0 (Mild Gingivitis)	24	36.3 %
1.1 – 2.0 (Moderate Gingivitis)	27	40.9 %
2.1 – 3.0 (Severe Gingivitis)	4	6.06 %
Total	**58**	

In this study, the prevalence of students who had healthy gingiva was 3 people (4.5%), mild gingivitis was 24 people (36.3%), moderate gingivitis was 27 (40.9%) and severe gingivitis was 4 people (6.06 %).

Table 4. Prevalence of gingivitis based on age

Age (years)	Gingivitis			
	Yes	%	No	%
9	8	12.1 %	-	-
10	14	21.2 %	-	-
11	13	19.6 %	3	4.54 %
12	20	30.3 %	-	-
Total	**55**		**3**	

In this study, it can be seen that the prevalence of gingivitis in students aged 9 years was 8 people (12.1%). In students aged 10 years, the prevalence of gingivitis was 14 people (21.2%). In students aged 11 years, the prevalence of gingivitis was 13 people (19.6%) and in subjects aged 12 years the prevalence of gingivitis was 20 people (30.3%). There were 3 students (4.54%) who did not experience gingivitis.

Table 5. Prevalence of gingivitis by gender

Gender	Gingivitis			
	Yes	%	No	%
Girl	26	39.3 %	1	1.51 %
Boy	29	43.9 %	2	3.03 %
Total	**55**		**3**	

In this study, the prevalence of gingivitis in girls was 39.3% and in boys was 43.9%. Of the total 58 students, there were 55 students who experienced gingivitis, while 3 students who did not experience gingivitis consisted of 1 girl and 2 boys.

Table 6. Frequency distribution table of gingivitis etiologies

etiology	Total (n)
Plaque	41
Chew on one side	27
Mouth breathing	10

Based on table 6, it showed the etiological results of the occurrence of gingivitis in research subjects. The etiology of gingivitis was obtained based on plaque index measurements and the results of interviews using questionnaires with students. A total of 41 students experienced gingivitis caused by plaque with other etiologies, which were caused by the habit of chewing on one side for 27 students, and mouth breathing for 10 students. Based on the research results, 1 student can have more than 1 etiology, including plaque and chewing on one side,

plaque and mouth breathing, chewing on one side, and mouth breathing.

DISCUSSION

Data collection in this study used direct clinical examination and questionnaire sheets that were distributed.

Based on Table 3, the prevalence of students who have healthy gingiva is 3 people, and students who experience mild, moderate, and severe gingivitis is 55 people. These results showed that gingivitis in children is dominated by mild and moderate gingivitis. This is in line with research previously conducted by Pontoluli et al, that the gingivitis that often occurs in children is mild gingivitis and moderate gingivitis.[6]

The prevalence of gingivitis based on age is in Table 4, the age group with the highest percentage is 12 years old. In Eldarita's 2019 research, it was stated that the 10-12-year age group was included in the age group with frequent gingivitis. This is closely related to hormonal changes when entering puberty which causes increased blood flow to the gingiva and changes the reaction of the gingival tissue. When gingivitis occurs, the gingiva will become red, edematous, and bleeding. Gingival inflammation is also influenced by a person's habits in maintaining healthy teeth and mouth.[14] When dental and oral hygiene is maintained properly, the risk of gingivitis will decrease because there is no plaque formation on the gingival margin.

The prevalence of gingivitis based on the gender in Table 5 showed that there were 55 students who experienced gingivitis, while 3 students who did not experience gingivitis consisted of 1 girl and 2 boys. In Pontoluli et al's research, gingivitis in boys was higher than in girls because girls tended to care more about dental and oral hygiene compared to boys who tended to be more indifferent and consumed more sweet foods.[6] Gingivitis in children can occur due to many factors such as chewing on one side, mouth breathing, and the use of orthodontic devices can contribute to plaque formation due to difficulties in cleaning the oral cavity.[10] Caries, malocclusion, space maintainer, hematologic disorders, use of drugs, and hormonal factors influence the occurrence of gingivitis. [5]

In Table 6, it can be seen that 41 students experienced gingivitis caused by plaque. Another etiology was the habit of chewing on one side (27 students) and mouth breathing (10 students). Based on the research results, 1 student can have more than 1 etiology, including plaque and chewing on one side, plaque and mouth breathing, chewing on one side, and mouth breathing. Chewing on one side is a habit that can occur due to caries or edentulous on the side that is not used. This can cause gingivitis due to plaque formation because chewing has a self-cleansing effect. The habit of chewing on one side is one of the factors that can cause gingivitis. [15] Apart from chewing on one side, mouth breathing is one of the etiologic causes of gingivitis. This is because mouth breathing can cause the oral cavity to become dry and reduce the self-cleansing effect, thereby causing plaque accumulation.[16]

In this study, the plaque index was measured using the Loe and Sillnes plaque index and food coloring as a substitute for disclosing agents because chemical-based disclosing agents have a taste that children do not like and have the potential to cause allergic reactions.[17] Based on the results above, it showed that children tend to brush their teeth twice a day but it can be seen from the plaque index measurement results that students have moderate and poor clinical criteria. This is because students still don't know the right time to brush their teeth and lack knowledge about good and correct tooth-brushing techniques.[1] Excessive plaque accumulation at the gingival margin can cause inflammation due to the immune response to bacterial activity in the plaque. This can occur due to the behavior of children who still lack knowledge and awareness in maintaining the health of their teeth and mouth.[18] High plaque scores can be found in the mixed dentition phase because there is discomfort

in brushing teeth during tooth eruption.[1] The students sampled in this study were aged 9 to 12 years and were in the mixed dentition phase.

CONCLUSION

1. The prevalence of gingivitis based on severity was the highest, which were mild gingivitis at 36.3%, and moderate gingivitis at 40.9%.
2. The prevalence of gingivitis based on age is highest among 12-year-olds with 30.3%.
3. The prevalence of gingivitis based on gender is mostly experienced by men at 43.9%.
4. The etiology of gingivitis in this study was most influenced by plaque which was measured by the plaque index.

Declaration by Authors

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