The Correlation Between Caries Severity and Dental Pain Stress Level in the Community of Sucopangepok Village, Jelbuk Subdistrict, Jember Regency

Ristya Widi Endah Yani, Ari Tri Wanadyo Handayani*, Kiswaluyo**

** Dental Public Health Department, Faculty of Dentistry, University of Jember, Indonesia*

Correspondence: ***ristya_widi@unej.ac.id***

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ABSTRACT

Background: *The results of the Basic Health Research in 2018 show that the prevalence of caries in Indonesia is high (88.8%), and the prevalence of active caries in East Java is also high (42.4%). One of the consequences of untreated caries is dental pain stress due to toothache which has an impact on the quality of life.*

Method: *Observational analytical research with a cross-sectional approach on people aged 17 years and above was conducted on February 2023 – March 2023. A total of 318 respondents uses simple random sampling. The variable of the research are dental caries severity (using the PUFA index) and dental pain stress (using a modification of the Kessler Psychological Distress Scale questionnaire with Perceived Stress Scale).*

Result: *The data obtained were tabulated and analyzed with descriptive statistics and continued with the Spearman correlation test. 36% of respondents age 26-35 years, 57.23% were female. 41.82% have primary school education and work as housewives and farmers. The average caries severity is 2.6 categorized as high with dental pain stress categorized as medium. Spearman correlation test show significance (p) <0.05 which means there is a correlation between caries severity level and dental pain stress.*

Conclusion: *There is a relationship between caries severity and stress dental pain*

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INTRODUCTION

According to Basic Health Research in 2018 the population of Indonesian who have oral problems increased from 25.9% in 2013 to 57.6% in 2018. The prevalence of caries in Indonesia is high at 88.8%, while the prevalence of active caries in East Java itself is also still high with a percentage of 42.4%.[1,2] Based on the research conducted by Centres for Disease Control and Prevention in 2019 explained the prevalence of caries around the world reach 90%, which shows the caries level is very high.[3] Furthermore, the World Health Organization (WHO) reported in 2022 that Indonesia has 28.8% cases of caries on permanent teeth which are never treated. The highest prevalence of dental caries was at the age of 55-64 years (96.8%).[4,5]

In untreated caries, bacterial byproducts move into the pulp via dentinal tubules, causing coronal pulp inflammation. There is thus an increase in vascularity, as well as activation and sensitization of A-fibre nociceptors, resulting in intense pain when stimulated. Changes in NaCh expression and thermo-TRP sensitisation, as previously described, may contribute to thermal hyperalgesia at this period. Dental pain is one of the stresses that stimulate the interaction of the hormonal and neurological systems, producing behavior in the form of anxiety disorders and physiological responses.[6]

The pain caused by dental caries can cause a person to experience sleep disorders, discomfort, and even stress. Untreated dental caries can cause infection, causing severe pain or soreness when the pulp is exposed. This pain causes various changes ranging from emotions to changes in activity and disrupts a person's diet. The pain of a toothache can changes a person's emotional state which can impact the stress felt by the sufferer.[7] Dental caries has an impact in the form of pain that can affect a person's psychology, especially in increasing emotions of anger and stress that occur in person.[8] Research conducted by Hariyani et al (2023), suggests that people who suffer from toothache are more likely to experience stress and depression compared to people who do not suffer from toothache.[9]

Sucopangepok village is one of the villages located in Jelbuk Subdistrict, Jember Regency. This village has 15.04 km2 wide area with a 6.351 total population. Geographically Sucopangepok village is located ± 15 km from the health center with a quite difficult road access. The location of Sucopangepok Village, which is quite far from health facilities, has resulted in a decrease in the community's interest in taking care of their body and dental health.

Several other studies that have been conducted only discuss the relationship between stress levels and dental care. Therefore, based on this background, the authors are interested in conducting research related to the relationship between caries severity and dental pain stress. This study aims to analyze the relationship between caries severity and dental pain stress in the Community of Sucopangepok Village, Jelbuk Subdistrict, Jember Regency.

METHODS

The study has obtained a certificate of ethical clearance No.1970/UN25.8/KEPK/DL/2023. Observational analytical research with a cross-sectional approach on people aged 17 years in

Sucopangepok villages, Jelbuk Subdistrict, Jember Regency in total of 1.529 populations conducted on February to March 2023. Simple random sampling of 318 respondents using the sample size formula from Slovin. Inclusion criteria are respondents, domiciled since birth in Sucopangepok Village and willing to become research subjects. Exclusion Criteria are There are obstacles in communication when filling out questionnaires and respondents experiencing mental / psychiatric disorders.

The study variables were dental caries severity and dental pain stress. The severity of caries is measured by the PUFA Index calculated based on the number of pulpitis teeth (P), ulceration (U), fistula (F), and abscess (A). The severity of dental caries is categorized into: PUFA positive (PUFA > 0) and PUFA negative (PUFA = 0). PUFA index is calculated based on the number of teeth with pulpitis (P), the number of teeth with ulceration (U), the number of teeth with fistula (F), the number of teeth with abscess (A). The individual PUFA index = Total number of P + U + F + A. The population PUFA index is calculated from the average individual PUFA and has a decimal value. Dental caries severity is categorized into positive PUFA (PUFA > 0) and negative PUFA (PUFA = 0).[10]

Dental pain stress measured using a modification of the Kessler Psychological Distress Scale questionnaire with Perceived Stress Scale.[11,12] The questionnaire assessment level is in the form of a 1-5 scale.

- Score 1 if you do not feel the emotion at all.
- Scored 2 if you rarely feel the emotion.
- Scored 3 if you sometimes feel the emotion.
- Scored 4 if you often feel the emotion.
- Scored 5 if you very often feel the perceived emotion.

Dental pain stress categorized as:

- Good (20-38)
- Minor stress (39-48)
- Medium stress (49-58)
- Major stress (>59%)[13]

Data collection steps: Prior to data collection, the Dental pain stress questionnaire was tested for validity and reliability on 30 respondents in Arjasa Jember District. The validity test uses product moment correlation which results in all valid items and reliability test using Cronbach's Alpha which shows reliable results (0.853). Data collection was carried out from house to house by the research team assisted by students. The research team explained the purpose and objectives of the study, after which respondents were asked to sign informed consent if they agreed. Respondents examined dental caries severity with the PUFA index and measured dental pain stress using a modification of the Kessler Psychological Distress Scale questionnaire. The data obtained was input into an excel program. The data obtained were tabulated and analyzed with descriptive statistics and continued with the Spearman correlation test to analyze the correlation between Caries Severity and Dental Pain Stress Level with an ordinal data scale.

RESULTS

Respondent distribution

The general description in this research was analyzed based on age, gender, last education, and occupation.

Table 1. The distribution of respondents based on age, gender, last education, and occupation

Characteristic	Frequency	Percentage
Age		
17-25	42	13.20%
26-35	115	36.16%
36-45	84	26.41%
46-55	74	23.27%
56-65	3	0.94%
Gender		
Male	136	42.77%
Female	182	57.23%
Last Education		
No Education	43	13.52%
Elementary School	133	41.82%
Middle School	71	22.33%
High School	69	21.70%
Undergraduate	2	0.63%
Occupation		
Employee	13	4.09%
Driver	3	0.94%
Teacher	2	0.63%
Self employed	10	3.14%
Breeder	6	1.89%
Labor	3	0.94%
Housewife	126	39.62%
Farmer	121	38.05%
Trader	29	9.12%
Student	4	1.26%
Unemployment	1	0.31%

Table 1 shows from 318 respondents the highest frequency is on respondents aged 26-35 years with a total of 115 (36.16%), followed by age 36-45 years with a total of 84 (26.41%), age 46-55 years with a total 74 (23.27%), age 17-25 years with a total 42 (13.20%), and the lowest frequency is on age 56-65 years with a total 3 (0.94%). From 318 respondents the majority is female with a total of 186 (57.23%) subjects followed by male respondents with a total of 136 (42.7%) subjects. The highest

frequency of last education is found in respondents with the last education of elementary school with a total of 133 (41.82%), followed by the last education of middle school with a total 71 (22.33%), the last education of high school with a total 69 (21.70%), no education with a total 43 (13.52%), and the lowest frequency with the last education of undergraduate with a total 2 (0.63%). The highest frequency of occupation was found in respondents with occupations as housewives with a total of 126 (39.62%), followed by occupations as farmers with a total of 121 (38.05%), traders with a total 29 (9. 12%), employees with a total 13 (4.09%), self-employed with a total 10 (3.14%), breeders with a total 6 (1.18%), students with a total 4 (1.26%), drivers with a total 3 (0.94%), teachers with a total 2 (0.63%), and the lowest frequency of not working with a total 1 (0.31%).

Caries severity according to PUFA index

Caries severity was measured by the PUFA index.

Table 2. Mean PUFA index of the research subjects

Σn (Number of subject)	ΣP	ΣU	ΣF	ΣA	PUFA (ΣP+U+F+A)	Mean PUFA	Std. Deviation
318	784	34	6	15	839	2.6	1.80

Based on table 2, it is known that the total number of PUFA is 839 with a number of pulpitis (P) as was 784, followed by ulcerative (U) was 34, fistula (F) was 6, and abscess (A) was 15. The severity of caries based on the PUFA index has an average of 2.6 included in the positive PUFA. The standard deviation is 1.80.

Dental Pain Stress

The dental pain stress measured based on the modified Kessler Psychological Distress Scale.

Table 3. Dental pain stress

Dental pain stress	Frequency	Percentage	Mean	Std. Deviation
Good	28	8.81%	54.91	12.08
Minor stress	64	20.13%		
Medium stress	118	37.11%		
Major stress	108	33.96%		
Total	**318**	**100%**		

Based on table 3, it is known that the frequency distribution of dental pain stress is dominated by medium stress with a total of 118 respondents (37.11%), followed by major stress levels with a total of 108 respondents (33.96%), minor stress levels with a total 64 (20.13%), and the lowest frequency is good with a total of 28 (8.81%). The mean is 54.91 and the standard deviation is 12.08.

Spearman Test

Table 4. Statistical test results of the relationship between caries and caries severity on dental pain stress in the community of Sucopangepok Village, Jelbuk District, Jember Regency

Variable	PUFA
Stress	0.000*

*: significance (p) <0.05

Based on table 4, it shows that the significance value is <0.05, meaning that there is a relationship between caries and caries severity on dental pain stress.

DISCUSSION

The majority of respondents were aged between 26-35 years with a percentage of 36.16%. According to the Indonesian Ministry of Health, the age of 26-35 is the age of early adulthood. The majority of respondents aged 26-35 years are due to young adults who are generally more active in socializing and working, making them easier to find. The majority of young adults have also completed their studies so not a few people have or are looking for work.[14,15] Despite of the prevalence of caries may increase along with rising age, but the age of 26-35 years can have the highest caries prevalence because age of 35 years above has started loss their teeth which can reduce caries assessment.[15,16]

Almost all of responders (41.82%) have completed elementary school. This indicates that the community in Sucopangepok village has a low level of education. Geographically, Sucopangepok village is located ± 21 km from the city with ± 50 minutes through a quite difficult road access and is directly adjacent to the Argopuro mountains.[17] Difficult access, lack of equitable distribution of education throughout the village, and inadequate physical facilities are factors that cause low education levels.[18]

Most of the participants in the Jelbuk Subdistrict community research were women. Men and women respond to stress differently, both mentally and physically. Gender is a significant predictor of human health.[19] Women are less able to cope with stress and feel stress more easily than men. Previous research has concluded that there are differences between men and women in their perception of stress and how to cope with stress.[20]

The results of the calculation of the total PUFA index from 318, it can be seen that a total number of 784 respondents' teeth suffered from pulpitis, 34 soft tissue respondents suffered from ulcers due to trauma to the sharp part of the tooth from dislocation with pulp or residual root involvement, 6 soft tissue respondents found a fistel, and 15 soft tissue respondents suffered from abscesses. Based on these results, the total number of PUFA indexes was 839 and the mean PUFA in 318 respondents was 2.6. According to the PUFA results, it can be seen that the population has low motivation for oral hygiene or it can be said that they have a severe caries category.[21]

Caries prevalence related to level of education, income, and the availability of dental facility.[22] This is in accordance with the majority of the people of Sucopangepok Village who have a low level of education, namely elementary school level. Low education levels are closely related to low knowledge. The low level of education makes it difficult for people to obtain decent work. The economic level of majority of the Sucopangepok Village community are housewives and farmers categorized into the

lower middle class, which has an impact on the cost constraints for dental health care and access to health centers or dentists is quite far with difficult terrain.[17] This results in oral health care not being a priority, because they think there are many more important things than just taking action on teeth.[23] Other factors that cause the high prevalence of dental caries can be caused by several factors, including lack of knowledge of oral hygiene behavior and low economic levels.

It is known that 37.11% of the people of Sucopangepok Village, Jelbuk Subdistrict, Jember Regency are categorized as experiencing medium stress levels due to toothache. This study is in line with research conducted by Dou et al., 2018 which states that patients can experience stress due to perceived toothache. The pain of a toothache plays a significant role in a person's emotional uplift, making them prone to stress. The high level of stress caused by toothache is likely due to the lack of awareness of people who do not treat their damaged teeth. This can happen due to the low level of education and also the lack of adequate health facilities around the resident area. In addition, the economic level which measured by occupation, and the majority are housewives and farmers facing cost constraints when seeking dental care. Teeth that have been damaged will more severely be damaged if not treated, so there will be pain arises and causes stress to the patient.[24]

The result of the statistical test (Spearman correlation) shows the correlation between dental caries severity level and dental pain stress. The more severe the dental caries level, the higher the dental pain stress. This is in line with research by Hariyani et al (2023), suggesting that people who suffer from toothache are more likely to experience stress and depression compared to people who do not suffer from toothache. Kyung & Moon (2020) in their research revealed that elderly people who experience toothache have a 1.3 times higher chance of experiencing anxiety/depression than those who do not experience toothache. More similar results were also shown by research conducted by Yang et al (2016), where patients with dental pain had a lower mental health status compared to those who did not experience dental pain.[9,25,26]

The International Association for the Study of Pain defines pain as an unpleasant sensory and emotional experience that promotes behavioral changes in a person and can hinder normal daily activities. This is a consequence of several diseases, one of which is dental caries.[27] The impact of dental caries is dental pain, decreased masticatory performance, dietary and nutritional changes, loss of working time, also unesthetic appearance and decreased social activity are direct and indirect symptoms of caries disease.[28] Some studies show people with caries experience have higher pain prevalence than caries free individuals.[29,30] Caries progresses through the enamel to the dentin. This can be seen from the cause of the pain, the initial trigger is sweet and cold food, then it increases to only being triggered by touch with bland food or water with normal temperature. The increased dental caries followed by the opening or deterioration of the tooth tissue structure can trigger dental pain because the nerves are more easily aroused. Increased caries followed by bacterial by products that diffuse towards the pulp through the dentinal tubules resulting in coronal pulp inflammation. There is a subsequent increase in vascularization, and activation and sensitization of A-fiber nociceptors, causing sharp pain on stimuli. In individuals who experience dental pain, the sensory neurons of the trigeminal nerve send signals from injured or inflamed tissue resulting in pain.[31,32]

CONCLUSION

Mean of caries severity was measured by the PUFA index is 2.6 included in the bad criteria. Mean of dental pain stress measured based on the modified Kessler Psychological Distress Scale is 54,91 included in the medium stress. There is a relationship between caries severity and dental pain stress.

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