

The Effectiveness of Salt Solution Gargle to Reduce Pain through Monitoring the PUFA Index at Dr. Dradjat Prawiranegara Serang, Banten in 2018

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Abstract— Background: Dental caries is a non-communicable disease but can affect human life. Most untreated dental caries have a significant impact on general health, quality of life, productivity, and also education. To assess the severity of untreated caries, the PUFA / pufa index (pulp, ulceration, fistula, abscess) was used. Untreated dental caries will continue to affect the pulp tissue which can cause pain due to irritation of the nerve fibers in the pulp where this pain can be started from the lowest level (rheumatic pain) to the highest level, namely a throbbing feeling which can interfere with activities. Many ordinary people use a saltwater solution to reduce pain, but whether it is effective enough to use the salt solution still needs to be proven. **Objective:** To determine the effectiveness of salt solution mouthwash to reduce pain through monitoring the PUFA index at dr. Dradjat Prawiranegara, Serang, Banten, in 2018. **Methods:** This study used a quasi-experimental design by performing a dental examination (PUFA index), and conducting treatment with salt solution gargles, the number of samples was 74 respondents. **Results:** The results of data analysis showed a decrease in pain. Before rinsing the salt solution and afterward, the significance value of p-value = 0.000 means that gargling saline solution can reduce pain due to toothache. **Conclusion:** The use of saline solution to reduce pain due to tooth decay is proven to be quite effective so that it can be used by the general public before they get treatment from professionals to treat tooth problems and without causing negative effects from using the salt solution.

Keywords— Salt Solution Gargle, Caries, PUFA.

I. INTRODUCTION

Tooth and mouth disease is a disease suffered by all groups of people, including in Indonesia. Based on the results of Riskesdas 2007, the national prevalence of dental health problems is 23.5%. brushing teeth every day 91.1% and active caries 43.4% and according to Riskesdas (2013), there is an increase in the prevalence of dental caries in Indonesia, namely patients with active dental caries increased from 43.4% in 2007 to 53.2% in 2013, Meanwhile, patients with caries experience from 67.2% in 2007 increased to 72.3% in 2013, the prevalence of the DMF-T Index according to Riskesdas (2013) data was 1.4%. This exceeds the WHO target, namely DMF-T of only 1%, so it can be said that our country has still not succeeded in meeting the WHO target.

Dental caries is a non-communicable disease but it can affect human life. Untreated dental caries can cause pain, abscess formation and can become a center of infection for other organs in the body which can result in loss of work time or cause children to miss school which can interfere with the child's learning process. (Kidd, Joyston, 2012). Most untreated dental caries has a significant impact on general health, quality of life, productivity and also education. Several studies suggest that untreated dental caries can affect a child's growth and general health and can cause children to be underweight and fail to develop.

To measure one's experience of caries in 1938, Klein, Palmer and Knutson introduced the DMFT index (*Decay, Missing, Filling Tooth*) which was used worldwide to measure and compare the prevalence of dental caries in various populations. This index provides information about tooth decay and its treatment but does not provide information about

the consequences of untreated/treated dental caries which may have a more severe impact than dental caries itself such as pulp inflammation, abscesses and so on. To assess the severity of untreated caries, the PUFA/pufa index (pulp, ulceration, fistula, abscess) introduced by Bella Monse was used. This index includes P/p, U/u, F/f and A/a where capital letters indicate permanent teeth while lowercase letters indicate the results of examinations on baby teeth. The assessment is made visually without tools provided that only 1 score for each tooth.

Dental caries is a disease that often occurs in all groups of people. The results of a study conducted by Jotlely et al. Showed that the PUFA index in the Papuan community consisted of 5 cases of pulpitis and 10 cases of ulcers from 54 respondents with an average PUFA index of 0.3 (27.7%). [2] Some research results show that the PUFA index results are quite high, such as at SDN Tunjungsekar 1 Malang, the PUFA index is found to be 37.8% with an average PUFA index of 32.7% in children aged 10-11 years (Widodorini, 2016). Research conducted in India on schoolchildren aged 5-6 years in urban areas found a prevalence index of 38.6% pufa where the largest contribution was in the p component. (Mehta, 2014).

Untreated dental caries will continue to affect the pulp tissue which can cause pain due to irritation of the nerve fibers in the pulp where this pain can be started from the lowest level (rheumatic pain) to the highest level, namely throbbing - throbbing which can interfere with activities. Many ordinary people use a saltwater solution to reduce pain, but whether it is effective enough to use the salt solution still needs to be proven.

This research was conducted at the Serang Regional General Hospital Dr. Dradjat Prawiranegara for reasons Data

collection at the hospital is to determine the severity of dental disease in the community who live far from the capital Jakarta because several previous studies have obtained index numbers the severity of the untreated dental disease is quite high.

II. METHODS

This study used a quasi-experiment design by performing a dental examination (PUFA index), and treating it with a salt solution gargle to evaluate the decrease in pain. The population in this study were patients who came to the dental polyclinic at dr. Dradjat Prawiranegara Hospital, Serang, Banten in October 2018. The sample of this study consisted of 74 respondents who were willing to intervene in the form of gargling with salt solution if teeth or soft tissue were found in the oral cavity, which feels sick/sore.

III. DISCUSSION

Data collection was carried out at the dental polyclinic of Dr. Dradjat Prawiranegara Hospital which is located in Serang, Banten. The reason for collecting data in that area was because he wanted to find out how high the PUFA index value, namely the index that states the severity of untreated dental caries. Until now there has been no WHO target for the PUFA index as well as the caries experience index (DMF-T) which according to WHO, 2010 is ≤ 1 .

Data were collected from 17 September 2018 to 6 November 2018, obtained 74 respondents who met the criteria inclusion is having untreated tooth decay and feeling pain due to the tooth decay.

TABLE 1. Frequency distribution of the characteristics of research respondents

Characteristics of Respondents	N	%
Gender		
Male	19	25,7
Female	55	74,3
Age		
≤ 45 years	64	86,4
≥ 45 years	10	13,6
Education level up		
s/d SMA	49	66,21
> SMA	25	33,79
Time of visit		
< 6 month	25	33,78
≥ 6 month	49	66,22

In the table above, it can be seen that from 74 respondents, there were more female respondents, namely 74.3% (55 people) while male respondents were 25.7% or 19 people. Most of the respondents (86.4%) were under 45 years old and only 10 respondents (13.6%) were over 45 years old.

In this study, we wanted to analyze how effectively the use of a saline mouth rinse can reduce the pain caused by untreated cavities. The method of collecting data is by examining respondents who have complaints of pain in their teeth and measuring the level of pain using the Wong Baker scale.

After measuring the pain level according to the scale, the respondent is asked to rinse a warm salt solution made of 1 teaspoon of salt dissolved in 250 ml of warm water and the solution is held in the oral cavity for 3-5 minutes. Ten minutes

later the pain was checked again if there was a change in the level of pain from before rinsing with after gargling warm salt water.

The results of observations on respondents before and after gargling salt solution are as follows:

TABLE 2. Recapitulation of pain levels (Wong Baker scale) before and after gargling salt solution

No	Pain level before gargling salt solution	Pain level after gargling salt solution	Frequency (N)	%
1	6	5	4	5.4 %
2	6	4	3	4.1 %
3	5	4	8	10.8 %
4	5	3	6	8.1 %
5	4	3	14	18.9 %
6	4	2	7	9.45 %
7	3	3	3	4.1 %
8	3	2	17	22.9 %
9	3	1	10	13.5 %
10	2	2	2	2.7 %
	Mean: 3.39	Mean : 2.62	74	100 %

The table above shows that 5 respondents did not experience changes in pain after gargling with salt solution, namely 5 people (6.8%). With the results of the data above, a statistical test was carried out to see if there was a significant change in the level of toothache pain after rinsing with salt water, shown in the table below:

TABLE 3. T-test for pain before and after rinsing with salt solution

	Mean	N	Std Deviation	Correlation	Std Error Mean	Sig.
Pair 1 Nyeri1	3.39	74	1.180	.858	.137	.000
Nyeri 2	2.62	74	1.069		.124	

From the analysis of data obtained from the reduction of pain before and afterward gargle salt solution which found a significant value of $p = 0.000$ which means that the saline mouthwash can reduce pain due to toothache.

This situation can occur because of the mineral content found in salt (Sodium Chloride). Salt solution at high concentrations can kill bacterial growth by absorbing the water from the bacterial cells causing lysis (destruction) of the bacterial cells. This situation is related to the high osmotic pressure of saltwater (Cawson & Spector, 1982). The saltwater solution is believed to have anti-inflammatory properties and can reduce bacteria present in the teeth. By gargling salt water there will be an increase in the pH balance in the oral cavity which will create an alkaline environment that will inhibit the growth/proliferation of bacteria (Shapira, E. 2008).

The salt solution is an isotonic liquid, meaning that it contains the same salt and minerals in our body so that it does not irritate the mucous membranes in the oral cavity, therefore it is safe to use in the mouth. To determine the severity of caries that was not treated, an examination of the respondent's oral cavity was conducted.

The results of data collection from 74 respondents to examine the condition of untreated teeth / PUFA index with the following details:

TABLE 4. Recapitulation of dental examination results with untreated caries severity (PUFA) in patients at the Dental Polyclinic of Dr. Drajat Prawiranegara Hospital, Serang in 2018

No	Type of Abnormalities	Number of Teeth	Percentage
1	Pulpitis	72	57.14%
2	Ulerate	2	1.58%
3	Fistula	24	19.04%
4	Abscess	28	22.22%
Total PUFA		126	100%
Mean indeks PUFA		1.74	

From table 4 above it can be seen that the average value of the teeth untreated / PUFA index was $126/74 = 1.74$. This shows that on average there are 2 teeth damaged due to caries and no treatment is done.

This result is worse than the research conducted in Manado which found the Papuan students living in Manado that the average PUFA index was 0.3. The difference in the PUFA index could be due to the type of food consumption that contains a lot of carbohydrates in urban areas (Serang) than in the regions. Papua, which consumes more fibrous foods and has a habit of using betel nuts to clean their teeth.

From the results of this study, it was found that the case most frequently encountered in patients was pulpitis (57.14%), a disorder involving the pulp causing pain due to the presence of nerve fibers in the pulp tissue. This result is not much different from a study on untreated caries severity in children in Pinrang, South Sulawesi which showed a high percentage (60.7%) of cases of pulp involvement (Pratiwi, R). A similar study conducted in India on children (12-14 years) also showed that pulp damage took the highest place with 31.1% of untreated caries-affected teeth.

TABLE 5. Distribution of respondents by sex and PUFA in patients in Dental Polyclinic of dr. Drajat Prawiranegara Hospital, Serang in 2018

Gender	PUFA				N	Total %	P value
	Low		High				
	N	%	N	%			
Women	29	51.7	27	48.3	56	100	0.248
Male	7	63.6	11	16.4	18	100	
Total	5	100	69	100	74	100	

From the table above, it can be seen that female patients have a high PUFA index of 48.3%, which means more than 16.4% of men. From the statistical results, there was no significant difference in the PUFA index between the male and female sex ($p > 0.05$). There was no difference in the severity of untreated dental caries between male and female respondents. Although more visits to the dental clinic were women than men, this study is almost the same as the results of a study in Pakistan where there was no significant difference for the Pufa index even though women found more severity levels. Because the severity of the disease is related to dental health behavior, namely the choice of food types and maintenance of oral hygiene (Ramsha K. et al).

The table below shows that there is a significant difference between young age (less than 45 years) and plants (> 45 years) the level of tooth decay that is not done carefully, $p < 0.05$. The results of this study are almost the same as research conducted in Sweden (Ingela GL, et al.). That the higher the age, especially the elderly, the more dependent on

others, so that they cannot go alone to do dental care so that the severity of dental caries will be higher. too. In the elderly, they will do a dental examination after causing a disturbing pain, which means that caries have expanded to the pulp tissue area.

TABLE 6. Distribution of respondents by age with an index relationship between PUFA on patients in hospitals Dental Polyclinic of dr. Drajat Prawiranegara, in 2018

Age	PUFA				Total %	OR (95% Confidence Interval)	P value
	Low		High				
	N	%	N	%			
< 45 years	33	91.6	3	8.4	100	4.481	0.023
≥ 45 years	27	71.05	11	28.95	100	1.134-17.710	
Total	60	100	14	100	100		

TABLE 7. Distribution of respondents based on the relationship between Education Level and PUFA index in patients at the Dental Polyclinic of dr. Drajat Prawiranegara Hospital, Serang in 2018

Level Education	PUFA				Total		OR (95% Confidence Interval)	P value
	Low		High		N	%		
	N	%	N	%				
≤ Senior High School	21	58.3	15	41.7	36	100	0.570	0.184
≥ Senior High School	27	71.05	11	28.9	38	100	0.217- 1.497	
Total	49	100	25	100	74	100		

There is no difference between low and high education levels about to with concerning dental care with caries. Respondents felt that their awareness of dental care was unnecessary or not a priority, because in reality they had only been treated after a disturbing pain.

The results of this study are not in line with research conducted in Malaysia which states that higher education has a higher knowledge and awareness of dental care so that it will have an impact on the lower number of untreated dental caries (Mani, SA et al).

In this study, we also analyzed the incidence of untreated cavities using the PUFA index associated with adherence to dental control/examination every 6 months. Regular dental examinations every 6 months are highly recommended to anticipate continuing tooth decay. Dental caries is a slow process, but if it is not immediately treated, it can have a negative impact in the form of gum swelling which can interfere with daily activities to reduce a person's quality of life.

The results of this study indicate that data analysis on respondents' adherence to control to a dental clinic is associated with the severity of dental disease experienced, with the following results:

TABLE 8. The distribution of respondents based on the time of the last visit and the PUFA index of patients at the Dental Polyclinic of dr. Dradjat Prawiranegara Hospital, Serang in 2018

Last time visit	PUFA				OR (95% Confidence Interval)	P value
	Low		High			
	N	%	N	%		
≤ 6 months	46	95.83	5	19.23	3.286	0.004
> 6 month	2	4.16	21	80.77	(2.30-4.69)	
Total	48	64.86	26	35.14		

Analysis of the data on the respondent's visit to the dental clinic showed that all respondents who were examined who underwent an examination for less or exactly 6 months were 48 respondents (64.86%) while those who performed dental examinations for more than 6 months were 26 respondents (35.14%) and it seems that there is a relationship which was significant with the untreated caries severity index ($p < 0.05$) where respondents who had their teeth checked for less than 6 months had a smaller PUFA index.

This situation indicates that respondents who had their teeth checked at least 6 months ago had a smaller caries severity index when compared to respondents who last attended more than 6 months ago.

Dental examinations every 6 months are always recommended by dentists in be able to detect tooth decay in advance. The early stages of tooth decay will be seen on the outside of the crown (enamel layer) and will be exacerbated by the presence of food residue and a layer of bacteria/plaque on the tooth surface. Poorly maintained dental hygiene will speed up the process of tooth decay and when it hits the pulp tissue it will cause annoying pain.

Based on research conducted by Clarkson JE, Stated that there are several factors why patients are reluctant to visit dental clinics, among others, because of fear or anxiety seeing syringes, dental tools and also the sound of bur machines for dental fillings. anxiety/fear cannot be avoided but should be minimized to achieve good oral and dental health.

Periodic dental examinations every 6 months can also protect the health of the gums so that they can prevent gingivitis because they can be seen immediately if there are signs of gum abnormalities.

TABLE 9. Relationship between pain levels and PUFA index in patients at the Dental Polyclinic of Dr. Dradjat Prawiranegara Hospital, Serang in 2018

Pain Level	PUFA				OR (95% Confidence Interval)	P value
	Low		High			
	N	%	N	%		
Slight Pain	4	80	1	20	9.80	0.036
Very Pain	20	28.9	49	71.1	(1.031-93.182)	
Total	24	32.4	50	67.6		

From the table above, it can be seen that the proportion of respondents who have a high level of pain and have a high PUFA index is also 71.1%, which means it is higher than those with less pain and high PUFA index which is only 20%. The results of statistical tests prove that the proportion is significant in the sense that pain is related to the PUFA index, where if the PUFA index is high, the pain response felt by the respondent is also sharper, and the p-value is 0.02 ($p < 0.05$). Obtained OR = 9.8, which means that the higher the PUFA index, the pain response will increase 9 times compared to

respondents who have a low PUFA index.

This study is in line with research conducted by Kamran, R et al. on orphans in Pakistan stated that in untreated caries / PUFA there were 49% of which almost half is caries affecting the pulp and also abscess formation which is usually accompanied by pain because it has hit the nerve cells in the pulp. Grund et al. also reported almost the same results that on children in Germany get 40% of the caries passage to the pulp giving rise to taste pain.

TABLE 10. Final results of factors related to PUFA Index and Pain in Patients at the Dental Polyclinic of Dr. Dradjat Prawiranegara Hospital

Variable	Koef	S.E	P value
Pain	0.119	0.058	0.045
Visit time	0.174	0.057	0.003
Contant	0.913	0.054	0.000

Based on the table above, it can be seen that the p-value of the time of visit (control to the dental clinic every 6 months) is 0.003 ($p < 0.05$). The conclusion is that the pain will be reduced if there are regular visits to the dental clinic at least every 6 months.

IV. CONCLUSION

The PUFA index of patients who went to Dr. Dradjat Prawiranegara Hospital was quite high because in each respondent's oral cavity 2 cavities were not treated. This illustrates that the respondents did not pay attention to dental health, causing pain that prompted them to take medication.

From the results of the data analysis, there was a decrease in pain from before rinsing the salt solution and afterward, where the significance value of $p = 0.000$ means that gargling salt solution can reduce pain due to toothache. The use of a salt solution to reduce pain due to tooth decay has proven to be quite effective so that it can be used by the general public before they get treatment from professional personnel to treat problem teeth and without causing negative effects from using the salt solution.

REFERENCES

- [1] Kidd E, Bechal S, Basics of Caries: Disease and Prevention, Jakarta, EGC 2012.
- [2] Jotley, FB, Wowor, Vonny NS, Gunawan, Paulina, Overview of Caries Status Based on index DMF-T and PUFA Index in Papuans in the Cendrawasih Dormitory, Manado City, *Jurnal e-Gigi*, vol 5, no 2, July December 2017.
- [3] Mehta A, Bhalla S, Assessing consequences of untreated carious lesion using pufa index among 5-6 years old school children in an urban Indian population, *Indian Journal of Dental Research*, 2014, vol; 25, issue: 2, page 150-153.
- [4] Bansal P, Sujlana A, Pannu P, Kour R, Dental discomfort Questionnaire: correlated with clinical manifestations of advanced dental caries in young children, *J Dent Specialition*, 2017,5 / 11: 2-7.
- [5] Kurniawati.D, 2% effectiveness of warm salt water against gingivitis gargling, *journal of health sciences Surya Medika*, vol7.no July 2, 2011
- [6] Llompert G, Marin GH, Silberman M, Merlo L, Zurriaga OGIS, Oral Health in 6 year old school children from Berriso Argentina, Falling far short of WHO goals, *J Med Oral Patol Cir Bucal* 2010.
- [7] Monse B, Heinrich-Weltzien R, benzian H, HolmgrenC, van Palenstein Helderman W, PUFA - An index of clinical consequences of untreated dental caries. *Community Dent.Oral Epidemiology*, 2010, 38: 77-82.
- [8] Pratiwi, R. Mutmainah R, The description of caries severity in children aged 6, 9 and 12 years in Pinrang District, South Sulawesi using the PUFA /index (pufalISSN: 1412-8926).



- [9] Basic Health Research, Health Research and Development Agency, Ministry of Health, Republic of Indonesia, National Report, 2013.
- [10] Sumual AI, Pangemanan DHC, Wowor, The severity of untreated dental caries in students of SD GMIM 31 Manado based on the PUFA index, *Journal e-GIGI (eG) vol4, no 7, July-December 2016*.
- [11] Ramsha Kamra, Warda Farooq, Mehreen Riaz Faisal Jahangir, Clinical consequences of untreated dental caries assessed using PUFA index and its covariates in children residing in orphanages of Pakistan. *BMC Oral Health BMC series, 2017*; 17: 108.
- [12] Ingela Grönbeck-Linden, Catharina Hägglin, Anita Petersson, Per O. Linander, and Lars Gahnberg, Discontinued dental attendance among elderly people in Sweden *J Int Soc Prev Community Dent. 2016 May-Jun*; 6 (3): 224–229.
- [13] Mani SA, Aziz AA et al, Knowledge, Attitude and Practice of Health Promoting Factors Among caretakers of children attending daycare centers in Kubang Kerian, Malaysia. *Journal of Indian Soc Pedod Prevent Dent (April-Jun2010)*, vol 28.
- [14] Clarkson JE, Worthington HV, Association between untreated caries and age, gender and dental attendance in adults. *Journal of Community Dent Oral Epidemiol, 1993 Jun*; 21 (3): 126-8.
- [15] Grund K, Goddon I, Schuler IM, Lehmann T, Heinrich-Weltzien R. Clinical consequences of untreated dental caries in German 5- and 8-year-olds. *BMC Oral Health. 2015*; 15 (1): 140. doi: 10.1186 / s12903-015- 0121-8.