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Correlation Between Caries Status and Quality of Life Among Elderly at Dangung-Dangung Public Health Center

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Abstract

Global demographic changes are increasing the number of elderly people at risk of experiencing significant oral health problems. Dental caries (DMF-T) is a major issue in the elderly caused by decreased oral hygiene, which can potentially lower their quality of life. Objective This study aims to analyze the relationship between dental caries status and quality of life in the elderly at Dangung-Dangung Health Center, Payakumbuh. Method This quantitative study with a cross-sectional approach was conducted in 2018 at Dangung-Dangung Health Center, Payakumbuh. The study sample consisted of 35 elderly people selected based on inclusion and exclusion criteria. Caries status was measured using the DMF-T index, while quality of life was measured using the OHIP-14 questionnaire. Data analysis was performed using Pearson correlation test ($p < 0.05$). Result The study results showed an average DMF-T index of 23.20 ± 4.70 and an average OHIP-14 score of 26.57 ± 8.98. There is a significant positive relationship with a strong correlation strength between the DMF-T index and OHIP-14 scores ($r = 0.637$; $p = 0.000$). Conclusion: There is a significant positive correlation between caries status (DMF-T) and quality of life (OHIP-14) in the elderly. The higher the dental caries index, the lower the quality of life (the higher the OHIP-14 score) in this elderly population.

Keywords: Elderly, caries, quality of life

1. Preliminary

Currently there has been a change in demographics throughout the world including Indonesia, the number of elderly population is estimated to increase from 690 million in 2010 to almost 1.5 billion in 2050.[1], [2]. Demographic changes occur because, among other things, increasing life expectancy and decreasing birth rates[3], [4].

The international population demographic data released by the USA Bureau of the Census reports that Indonesia from 1990-2025 will have an increase in the elderly population by 414%, the highest figure in the entire world.[5] The population of the elderly in Indonesia is in the top five in the world, reaching 18.1 million in 2010 and will double to 36 million by 2025. The life expectancy of the Indonesian population reaches the age of 67.8 years in the period 2000-2025, increasing to the age of 73.6 years in the period 2020-2025

Data of the 2014 West Sumatra Central Statistics Agency (BPS), the population in West Sumatra in 2013 was 5.06 million people, there were 420,238 people were elderly residents (8.3%) [6]. According to the Act of the Republic of Indonesia No.13 of 1998 concerning the welfare of the elderly, the

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elderly are is someone who has reached the age of 60 years and over[7].

In the elderly, dental caries is a dental and oral health problem that often occurs[8]. This is due to a decrease in the level of cleanliness of the oral cavity so that the amount of tooth decay is increasing in the elderly. Caries in the elderly are is a major problem in dental and oral health in various countries. Caries is a demineralization process caused by an interaction between microorganisms, saliva, food derived parts and email. The main indicator for assessing caries used is the DMF-T index.[7]

Oral health plays an important role in getting general health and quality of life for the elderly. Poor oral health condition such as the number of missing teeth as a result of being treated, will interfere with the function and activity of the oral cavity, so that it will affect nutritional status and will have an impact on quality of life. Anwar, (2014) in his study reported that there was a significant positive correlation (P = <0.05) between DMF-T and OHIP-14 (r = 0.170). [9] Another study by [10], [11] reported that there was a significant positive correlation (P = <0.05) between DMF-T and OHIP-14 (r = 0.135).

Quality of life according to the World Health Organization (WHO) is a person's perception in the context of culture and norms that fits the place of life of the person and is related to goals, hopes, standards and concerns throughout his life.[9]. Furthermore, [12] in connection with the concept of oral health associated with the quality of life, states quality of life as an individual response in his daily life to physical, psychological, and social functions due to caries and periodontal disease.[12]. Quality of life related to oral health is multidimensional according to the impact of oral health or disease on one's daily function, overall quality of life. [13]. Some studies show that a bad mouth condition has a negative impact on daily life, especially in the elderly.[14]

Oral health related to quality of life can be measured using 14 items Oral Health Impact Profile (OHIP-14).12 OHIP-14 is a short form in the form of a questionnaire that is most often used in the elderly to assess oral health related to quality of life. This questionnaire measures the impact of dental problems that include physical, psychological and social dimensions of everyday life.[9]

However, most studies on the correlation between caries and the quality of life of the elderly in Indonesia still focus on urban populations with relatively complete access to healthcare facilities. There is a significant research gap regarding this condition in elderly communities in suburban or rural areas, particularly in the working area of Dangung-Dangung Health Center, Payakumbuh. Differences in dietary patterns, education levels, and limited accessibility to preventive services in these areas have the potential to produce data characteristics that are different and have not yet been mapped in the current health literature.

Based on this background, this study was conducted with the aim of knowing the correlation between of caries status (DMF-T) to the quality of life (OHIP-14) of elderly in Dangung-Dangung Health Center Payakumbuh.

Elderly are is a natural process that cannot be avoided. Biologically there will be physical setbacks in the elderly, signs of physical deterioration, among others: a) the skin begins to relax and wrinkles and permanent lines appear on the face; b) hair starts graying and turns white; c) teeth slowly from date to toothless; d) sharpness of vision and hearing decreases; e) easily tired; f) movement starts slowly and is less agile; g) body slimming disappears and fat deposits occur in several parts of the body.[15]. According to RI Law No.13 of 1998 concerning the welfare of the elderly, the elderly are is someone who has reached the age of 60 years and over.

Dental and oral health problems that often occur in the elderly are an increase in dental caries and periodontal disease. The majority of dental caries in the elderly are is root caries.[8], [16]. In the elderly, dental caries is a dental and oral health problem that often occurs, due to a decrease in the level of cleanliness of the oral cavity so that the amount of tooth decay, such as caries, is increasing in the elderly.[17], [18].

Dental caries is a disease of the hard tissues of the teeth, namely email, dentine and cementum caused by the activity of a microorganism in a fermentable carbohydrate[19]. Dental caries is an interaction of 4 factors, namely the host, agent, environment and time which results in damage to the hard tissues of the teeth that can recover, namely email, dentine and cementum.[20]. Risk factors for dental caries include experience of dental caries, lack of use of fluorine, poor oral hygiene, number of bacteria, saliva, and diet and type of food.[21]

Plaque is a soft, sticky layer that sticks to the teeth. When chewing, the plaque easily attaches to the surface of the tooth. The process of losing minerals is called the demineralization process, while the increase in minerals is called the remineralization process. Tooth decay is caused by greater demineralization than the remineralization process.[20].

The pathophysiology of dental caries according to Miller, Black and William is initially acid formed because there are sugars and bacteria in the plaque. The sugar undergoes bacterial fermentation in the

plaque to form acid and dextran. Desxtran will attach acids formed on the enamel surface of the tooth. If only one meal of sugar, only a little acid is formed. When consuming sugar often, acid will form until the pH of the mouth becomes ± 5. The email surface contains more fluorapatite crystals which are more resistant to acid attack. The incoming acid will dissolve the existing hydroxyapatite crystals. If there are many acids, the reaction will occur repeatedly. The amount of Ca released increases and over time will come out of the email. This process is called subsurface decalcification. [20]

The main indicator for assessing dental caries used is the DMF-T index. DMF-T is the sum of the indexes of D-T, M-T and F-T, which indicate the amount of tooth decay experienced by a person due to caries.[7] D (Decay) is the number of cavities due to caries, the number M (Missing) is the tooth removed because of caries, the number F (Filled) is teeth that are patched because of caries.[22]

Oral Health Impact Profile (OHIP-14) is a short form that is most often used to measure quality of life in elderly people related to the impact of dental problems and which includes physical, psychological and social dimensions of daily life.[23]

The quality of life of the elderly are is measured using OHIP-14 assessment which includes 7 domains, domain 1 is a function limitation which includes difficulty saying the word and not being able to taste it well; domain 2 is physical pain that includes pain in the oral cavity and uncomfortable chewing; domain 3 is psychological discomfort that includes anxiety and tension; domain 4 is a physical disability which includes a diet that is unsatisfactory and stops when eating; domain 5 is a psychic ability which includes difficulty in relaxing and feeling ashamed; domain 6 is social incompetence which includes irritability and difficulty in carrying out daily activities, and domain 7 is a handicap that covers life feels less satisfying and difficult to do anything. Each question has five ranks from rank 0 to rank 4, with consecutive criteria never = no complaints (0), very rare = if complaints are felt almost once a year (1), sometimes = if complaints are felt almost twice a year (2), often = if complaints are felt almost four times a year (3), and very often = if complaints are felt almost every month (4)[9].

2. Method

This type of research is quantitative with a cross-sectional design using an observational approach. The study was conducted at Dangung-Dangung Community Health Center, Payakumbuh. The population in this study consisted of all elderly individuals visiting the health center. This study has obtained ethical approval from the Research Ethics Committee of Andalas University, as evidenced by the Ethical Review Clearance letter No. 641/KEP/FK/2018.

The sampling technique used in this study was non-probability sampling with a purposive sampling method. This technique was chosen to ensure that the selected sample precisely matched the research objectives, namely elderly groups with specific characteristics related to dental health conditions and the use of prostheses.

Based on this technique, the selected sample consists of individuals who meet the inclusion and exclusion criteria. The inclusion criteria include: elderly aged ≥ 60 years, having dental caries in the oral cavity, using Removable Partial Dentures (RPD), and willing to participate by signing informed consent.

The exclusion criteria include having healthy teeth (free of caries) and the use of complete dentures (CD). The sample size was determined using the sample size formula for a single correlation, resulting in a minimum sample of 29.02 respondents. To minimize errors and improve data representation based on gender, the sample size was increased to 35 people, consisting of 15 men and 20 women.

The research instrument for assessing caries status used the DMF-T index (Decayed, Missing, Filled Teeth), while quality of life was measured using the Oral Health Impact Profile-14 (OHIP-14) questionnaire. Data processing was conducted statistically using SPSS 21.0. Normality testing was performed using the Kolmogorov-Smirnov test. The relationship between DMF-T and OHIP-14 scores was analyzed using Pearson correlation (for normal data) or Spearman correlation (for non-normal data) with a significance level of $p < 0.05$.

3. Results

Table 1 presents a characteristic description of 35 research subjects. Characteristics include age, sex, education and work.

In this study the average age of the study subjects was 70.63 years with a standard deviation of 6.54 years (70.63 ± 6.54 years). The research subjects were 35 people consisting of 15 men (42.90%) and 20 women (57.10%).

The education level in this study consisted of Elementary and Secondary Schools. The research subjects who had an elementary school education level were 31 people (88.60%) and junior high school as many as 4 people (11.40%).

In this study, work was obtained on the subjects of the study were 8 housewives (22.90%), 6 traders (17.10%), 2 workers (5.70%), 1 driver (2.90%).)

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and the highest number of jobs is 18 farmers (51.40%).

Table 1. Basic Characteristics of Research Subjects

Variabel	n %	Average
Years		70,63±6,54
Gender		
Man	15 (42,90)	
Women	20 (57,10)	
Education		
primary school	31(83,60)	
Junior high school	4 (11,40)	
Senior High School	0	
work		
housewife	8 (27,90)	
the farmer	18 (31,40)	
trader	6 (17,10)	
laborer	2 (5,70)	
driver	1 (9,90)	

In this study the average DMF-T index in the elderly was 23.20 with a standard deviation of 4.70 (23.20 ± 4.70). The results of the Kolmogorov Sminorv normality test showed that the DMF-T Index data in this study were normally distributed with a value of P> 0.05. In this study obtained a P value = 0.757.

In this study the mean OHIP-14 score in the elderly was 26.57 with a standard deviation of 8.98 (26.57 ± 8.98). The results of the Kolmogorov Sminorv normality test show that the OHIP-14 Score data in this study were normally distributed with a value of P> 0.05. In this study P = 0.829 was obtained.

Correlation analysis of DMF-T Index with OHIP-14 score in the elderly used Pearson correlation test at the confidence level p <0.05. The results of the analysis showed that there was a significant correlation between the DMF-T Index and the OHIP-14 score with a significance level of p <0,000 with a positive correlation direction (the higher the DMF-T value, the higher the OHIP-14 value (the worse the quality of life)) and the strength of a strong correlation is the correlation coefficient r = 0.637.

Table 2. Description of Caries (Related to Dental and Oral Health) in the Elderly at Dangung-Dangung Health Center Payakumbuh using DMF-T

Caries	Average
Delay	4,71 (2,57)
Missing	17,8 (6,36)
Filling	0,62 (1,00)

Table 2 presents a description of caries in the elderly, obtained a mean picture of respondents who experienced decay is 4.71 (2.57). In addition, the average data of respondents who experienced tooth loss was 17.8 (6.36). Meanwhile the average respondent who has patches is 0.62 (1.00).

Table 3. Description of Respondents' Answers About Quality of Life (Related to Dental and Oral Health) of Elderly at Dangung – Dangung Health Center Payakumbuh using OHIP-14

Kualitas Hidup	Rata-Rata (SD)	Tidak pernah (0) ŋ (%)	Sangat jarang (1) ŋ (%)	kadang - kadang (3) ŋ (%)	Sering (4) ŋ (%)	Sangat sering (5) ŋ (%)
1. Keterbatasan Fungsi						
a. Kesulitan dalam mengucapkan kata	3,97 (1,13)	0	6 (17,10)	9 (25,70)	15 (42,90)	5 (14,30)
b. Tidak dapat mengecap rasa dengan baik		0	1 (2,90)	9 (25,70)	19 (54,30)	6 (17,10)
2. Rasa Sakit Fisik						
a. Sakit di rongga mulut	3,50 (1,10)	0	10 (28,60)	16 (45,70)	8 (22,90)	1 (2,90)
b. Tidak nyaman saat mengunyah		0	1 (2,90)	8 (22,90)	18 (45,70)	10 (28,60)
3. Ketidaknyamanan Psikis						
a. Merasa khawatir /cemas	1,38 (1,25)	12 (34,30)	12 (34,30)	8 (22,90)	3 (8,60)	0
b. Merasa tegang		16 (45,70)	15 (42,90)	4 (11,40)	0	0
4. Ketidakmampuan Fisik						
a. Diet makanan kurang memuaskan	3,11 (1,07)	1 (2,90)	12 (34,30)	17 (48,60)	5 (14,30)	0
b. Terhenti saat makan		0	5 (14,30)	6 (17,10)	17 (48,60)	7 (20,00)
5. Ketidakmampuan Psikis						
a. Sulit merasa rileks	1,85 (1,29)	11 (31,40)	16 (45,70)	6 (17,10)	2 (5,70)	0
b. Merasa malu		6 (17,10)	7 (20,00)	12 (34,30)	9 (25,70)	1 (2,90)
6. Ketidakmampuan Sosial						
a. Mudah tersinggung	2,12 (1,37)	10 (28,6)	12 (34,30)	10 (28,60)	3 (8,60)	0
b. Kesulitan melakukan kegiatan sehari-hari		3 (8,60)	10 (28,60)	12 (34,30)	7 (20,00)	3 (8,60)
7. Handikap						
a. Hidup terasa kurang memuaskan	3,11 (1,35)	0	9 (25,70)	18 (51,40)	4 (11,40)	4 (11,40)
b. Susah untuk melakukan apapun		3 (8,60)	10 (28,60)	8 (22,90)	10 (28,60)	4 (11,40)

Table 3 shows a description of respondents' answers about quality of life in the elderly, obtained an average score of OHIP-14 on the domain as follows, domain 1 is 3.97, domain 2 is 3.50, domain 3 is 1.38, domain 4 is 3.11, domain 5 is 1.85, domain 6 is 2.12, and domain 7 is 3.11. While the OHIP-14 average total score is 26.57.

Table 4. Correlation Between Caries Status Against Elderly Quality of Life in Dangung-Dangung Health Center Payakumbuh

Indeks DMF-T	Indeks OHIP-14						
	Domain 1	Domain 2	Domain 3	Domain 4	Domain 5	Domain 6	Domain 7
Decay	-0,460	-0,574	-0,334	-0,558	-0,175	-0,441	-0,294
Missing	0,686	0,696	0,353	0,802	0,327	0,431	0,310
Filling	-0,035	-0,013	0,152	-0,055	-0,019	0,206	-0,022

Table 4 presents an illustration of the correlation between of caries status with quality of life in the elderly, the results obtained there is a negative correlation between the decay index with the quality of life of elderly in domains 1 to 7 with a weak correlation strength at the domain of 3,5,7, and the strength of the correlation is in domains 1,2,4 and 6. In addition, the results obtained there is a positive correlation between the missing index with the quality of life of elderly in domains 1 to 7 with a weak correlation strength at the domain of 3,5,7, and the strength of the correlation that is currently in domain 6, and the strength of a strong correlation in domain 1, 2, and the strength of the correlation is very strong in domain 4. In this study also obtained results there is a negative correlation between filling indexes with the quality of life of

elderly in domains 1 to 7 with a weak correlation strength

4. Discussion

The mean age of the elderly in this study was 70.63 years with a standard deviation of 6.54 years (70.63 ± 6.54 years). The results of this study are slightly different from the research conducted by Anwar (2014) which reported the average age of the elderly in their study, which was 60.16 years old male with a standard deviation of 9.84 years (60.16 ± 9.84 years) and 68 female average, 6 years with a standard deviation of 6.9 years (68.6 ± 6.9 years). This difference occurs because Anwar in his study included the elderly with a wider age range with the lowest age of 50 years and the highest age, 92 years [9].

Research by [24] states that as a person ages, the health status of the teeth and mouth also decreases and the body's organs are also more susceptible to damage because they are more used or functioned.

In this study the male research subjects consisted of 15 people (42.90%) and 20 women (57.10%). The results of this study are not much different from the research conducted by [9] which reported a greater number of women than men, namely 52.8% women and 47.2% men.

In his study also reported that there were more women than men. Other studies also reported a greater number of women than men, namely women 70.4% and men 29, 6%. This is because women usually care more about dental health by often coming to dental services.[9][25]

In this study obtained low education is the level of elementary school (SD) as much as 88.60% and the highest education is junior high school (SMP) as much as 11.40%.

Education plays an important role in dental and oral health. [26][25] in his study stated that low education resulted in a lack of attention about dental and oral health so that it was neglected.[27] in his study reported that a person's education level affects his quality of life, where a person's higher education level helps in raising awareness about oral health.

In this study there were 18 people (51.40%) research subjects working as farmers, 6 people (17.10%) working as traders, 2 people (5.70%) working as laborers, 1 person (2.90%).) working as a driver, and 8 people (22.90%) as housewives (not working).

The mean elderly DMF-T index in this study was 23.20 with a standard deviation of 4.70 (23.20 ± 4.70). The results of this study are different from the results of the study reported by Anwar (2014) which obtained a mean DMF-T index lower than this study which was 11.11 [9]

Another study also reported a lower average DMF-T index compared to this study of 5.2. This difference may be due to residential areas that lack health care facilities, especially dental and oral health facilities, lack of attention and lack of funds to seek and obtain dental and oral health services. This resulted in a lack of attention about oral health, even neglected.[28]

The mean OHIP-14 score in the elderly in this study was 26.57 with a standard deviation of 8.98 (26.57 ± 8.98). The results of this study are not much different from the research conducted by Septiani (2014) which obtained an average OHIP-14 score of 24.02 with a standard deviation of 3.679 (24.02 ± 3.679). The Septiani (2014) study was conducted on the elderly in the village of Cimari, Cikoneng District, Ciamis Regency.[29]

The results of the Pearson test between the DMF-T Index and the OHIP-14 score in the elderly showed significant results (P <0.05) statistically with p = 0,000. The correlation between the DMF-T Index and the OHIP-14 Score shows a positive correlation, meaning that the higher the DMF-T Index, the higher the OHIP-14 score

The results of this study are similar to the research conducted by [9] regarding the relationship of dental health status to quality of life of seniors in Malili, East Luwu which states that there is a significant positive correlation between DMF-T scores and OHIP-14 scores.

[30] in their study also obtained results of research similar to this study that there was a significant relationship between DMF-T scores and OHIP-14 scores with a positive correlation.

Oral health is an integral part of the health of the body and cannot be separated from general health because it is interrelated with one another. Oral health is an important thing that needs to be maintained because the oral cavity is important for general health and quality of life. Poor oral health will affect diet, nutrition, sleep, psychological status and social interaction. [30]

Caries description in the elderly, obtained an average picture of data of respondents who experienced decay was 4.71 (2.57), missing was 17.8 (6.36), and filling was 0.62 (1.00). The results of this study are similar to the study conducted by Anwar (2014) who reported a mean decay of 3.34 (3.70), missing was 7.76 (7.56), and filling was 0.02 (0.16).

Description of respondents' answers to quality of life in the elderly, obtained an average score of OHIP-14 on the domain as follows, domain 1 is 3.97, domain 2 is 3.50, domain 3 is 1.38, domain 4

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is 3.11, domain 5 is 1.85, domain 6 is 2.12, and domain 7 is 3.11. While the OHIP-14 average total score is 26.57. The results of this study are almost the same as the research conducted by Anwar (2014) who obtained an average OHIP-14 score on domain 1 is 2.48, domain 2 is 3.17, domain 3 is 1.43, domain 4 is 2 , 96, domain 5 is 1.34, domain 6 is 1.27, and domain 7 is 1.17. While the OHIP-14 average total score is 13.82.[30]

In this study the correlation of caries status and quality of life in the elderly was obtained with the result that there was a negative correlation between the decay index and the quality of life of the elderly in domains 1 to 7 with a weak correlation strength at the domain of 3,5,7, and the strength of the correlation in domain 1 , 2.4 and 6. In addition, the results obtained there is a positive correlation between the missing index with the quality of life of elderly in domains 1 to 7 with a weak correlation strength at the domain of 3,5,7, and the strength of the correlation that is currently in domain 6, and the strength of a strong correlation in domain 1, 2, and the strength of the correlation is very strong in domain 4. In this study also obtained results there is a negative correlation between filling indexes with the quality of life of elderly in domains 1 to 7 with a weak correlation strength. It can be concluded that in this study there was a significant correlation between the index missing and quality of life, namely in the domain of psychological discomfort, psychic disability and handicap. There is a weak correlation between the index of filing and quality of life, namely the domain of psychological discomfort and social disability [30]

The results of this study are slightly different from the research conducted by [30] which obtained results in his study that there was a negative correlation between the decay index and the quality of life of elderly people in domains 1 to 7 with weak correlation forces. Besides that the results obtained there is a positive correlation between the missing index with the quality of life of the elderly in the domain 1,2,4,5, and the negative correlation on the 3 and 6 domains. In this study also obtained a negative correlation between the filling index and the quality of life in domains 1 to 7 with weak correlation forces. This difference occurs because [30] in his study grouped samples in the age group.

According to Locker quoted by [30] It was explained that indicators of quality of life in relation to oral health use measurements of how much dental and oral problems affect the normal functioning of a person's teeth. Biazevic's research, in Brazil, was quoted by [30]. Who used OHIP-14 to examine quality of life in relation to oral health. the result of edentulous, caries, periodontal disease, coupled with the effects of cormobidity, such as diabetes and serostomia, is felt by the elderly and has a significant effect on the physical, economic, and psychological. As a result of oral diseases that affect the quality of life of the elderly include a variety of circumstances including chewing and talking. Furthermore, it can have an impact in the form of decreasing social interactions, a sense of well-being, self-esteem and useful feelings.[31] [32].

5. Conclusion

1. The average DMF-T index in the elderly is 23.20 ± 4.70
2. The mean OHIP-14 score in the elderly is 26.57 ± 8.98
3. There is a significant positive correlation between the DMF-T index and the OHIP-14 score in the elderly, namely the higher the DMF-T value, the higher the OHIP-14 value (the worse the quality of life).

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