RESEARCH ARTICLES

Differences in Oral Health-Related Quality of Life (OHRQoL) among the Elderly Population in Rembang Regency

Shafira Nur Amalia Zulva*, Avina Anin Nasia*, Setyo Gundi Pramudo**, Yosef Purwoko***✉

*Department of Dentistry, Faculty of Medicine, Universitas Diponegoro, Semarang, Central Java, Indonesia
**Department of Internal Medicine, Faculty of Medicine, Universitas Diponegoro, Semarang, Central Java, Indonesia
***Department of Physiology, Faculty of Medicine, Universitas Diponegoro, Semarang, Central Java, Indonesia
***Jl Prof Soedarto SH, Semarang, Central Java, Indonesia; ✉ correspondence: yosefpurwoko@gmail.com

ABSTRACT

Epidemiological studies have shown that several factors, such as age, gender, tooth loss, socioeconomic status, cultural background, psychological stress of dental visit, and smoking can influence OHRQoL. Oral health is strongly age dependent, therefore OHRQoL differences are predicted to exist in the elderly group according to WHO. This condition is especially true for Rembang Regency due to the high population of the elderly and the shared ignorance on oral health given an overemphasis on other priorities, which will have an impact on their quality of life. The objective of this study is to know the OHRQOL difference in the elderly group in Rembang Regency with cross-sectional design. The research subjects were selected by inclusion and exclusion criteria with online informed consent. The questionnaire related to age and GOHAI was distributed and filled out online. Data were processed and analyzed using the Kruskall Wallis followed by Mann-Whitney post-hoc analysis and multiple linear regression test. A total of 222 respondents were involved (n= 222) consisting of 102 male and 120 female. The majority level of their OHRQoL were moderate (65.3%). The most affected dimension was physical function since it limits the type or amount of food intake (30.4%). The Kruskall-Wallis test showed significant OHRQoL differences in middle-age, elderly, old, and very old groups (p<0.05). The OHRQoL difference between middle-age and old and middle-age and very old obtained a significant result in the Mann-Whitney post hoc test with p value <0.05. Multiplelinear regression test showed a significant effect of age on OHRQoL with tooth loss as a confounding variable. Thus, Oral Health Related Quality of Life (OHRQoL) of the elderly group is significantly different.

Keywords: age; elderly; GOHAI; OHRQoL; quality of life; Rembang

INTRODUCTION

The world's older population constantly grows every year at an unprecedented rate. Globally, the proportion of those aged over 60 years old will almost double from 12% to 22% from 2015-2050.[1] The World Health Organization (WHO) declares that the elderly age group consists of the middle age (45-59 years), elderly (60-74 years), old (75-90 years) and very old (>90 years).[2] In 2018, life expectancy in Indonesia increased to 69.3 years, with details of women reaching 71.4 years and men reaching 67.3 years.[1]

The high life expectancy causes Indonesia to face tremendous challenges in maintaining the health status of the elderly population due to a shift in disease patterns towards chronic disease. Aging is a gradual process that reduces the ability of the tissue for self-repair or replace and maintain its normal function.[3] The deteriorating health status of the elderly along with their age will affect their quality of life.[4] Therefore, it is necessary to take some measurements given the increasing number of the elderly by increasing their quality of life, as a way to help them to live a healthy, productive, and independent life style.

The aging process also occurs in the mastication system, especially the oral cavity, in line with the general decline in body function. Tooth decay, loose teeth, caries, halitosis, gingivitis, gingival recession, loss of periodontal adhesions, and alveolar bone are common periodontal tissue changes in the elderly.[5] The elderly population who have lost most of their teeth suffer from functional limitations and cause serious nutritional problems. The number, location, and distribution of missing teeth affect the severity of the problem, so the

presence of dental caries can cause oral infection, pain, and discomfort.[6]

Oral Health Related Quality of Life (OHRQoL) is a multidimensional concept that corresponds to the impact of oral health or disease on an individual's daily functioning, well-being or overall quality of life.[7] The Locker concept states that there are five consequences of oral diseases, namely impairment, functional limitations, pain or discomfort, and disability.[7] These domains are sequentially linked so that any decline in bodily functions (structural abnormalities such as caries) leads to functional limitations (restrictions in bodily functions, for example, difficulty in chewing), pain or discomfort (physical symptoms) and self-reported psychology), which can lead to disability (limitations in carrying out daily activities, such as unsatisfactory diets and social disadvantages, such as social isolation).[7] This OHRQoL measurement can later help health workers identify the care needs of the elderly, measure the success rate of health programs on the elderly, and increase the productivity of the elderly.

Epidemiological studies have shown that several factors such as age, gender, tooth loss, socioeconomic status, cultural background, psychological stress of dental visit, and smoking can influence OHRQoL.[6] Differences in oral health status are obvious when comparing the data derived from different regions in a country or between countries and geographic locations.[8] Oral health is one of the factors that is strongly age-dependent, and thus there have been some significant differences in the OHRQoL of children and adults.[9] Therefore, differences in OHRQoL are also predicted to exist in the elderly age group, which according to WHO, covers the middle-age, elderly, old, and very old. This research seeks to find differences in OHRQoL in the elderly age group in Rembang Regency using the GOHAI questionnaire due to the high population of the elderly in this area and the shared ignorance on oral health due to an overemphasis on other priorities. Such condition will have an impact on their quality of life and thus this study is expected to provide some fruitful inputs for further researches.

MATERIALS AND METHODS

This study used an observational analitic with cross-sectional design. It was conducted in Rembang Regency from September to December 2020. This study was approved by the Health Research Ethics Commission of the Faculty of Medicine of Universitas Diponegoro (244/EC/KEPK/FK-UNDIP/X/2020).

The sample of this study was all the elderly population in Rembang Regency from September to December 2020 who had met the inclusion criteria (age ≥ 45 years, received informed consent to participate in the study, had comorbid systemic disease, were able to fill out questionnaires online or with a companion) and those who couldn't answer 3 or more questions were excluded. Subjects were required to indicate their willingness to participate in the study by signing an online informed consent. The standardized questionnaire related to age and GOHAI was distributed and filled out online.

This study refers to WHO age group classification, which is divided into 4 groups, namely 45-59 years old (middle-age), 60-74 years old (elderly), 75-90 years old (old), >90 years old (very old). GOHAI questionnaire consists of 12 question items and was scored in Likert scale of 0 = never, 1 = very rare, 2 = sometimes, 3 = often, 4 = very often, 5 = always. All answer were summed up, with the score ranging between 0-56 classified as 0-18 = good, 19-37 = moderate, and 38-56 = poor. The higher the GOHAI score, the better the OHRQoL.

Data were collected and analyzed using the Kruskall-Wallis difference test followed by Mann-Whitney post-hoc analysis. The final step was multiple linear regression test with the significancy criteria of $p<0.05$ using SPSS version 24 software.

RESULTS

A total of 222 respondents were involved in the study. Initially, 230 people were recruited from 34 urban village in Rembang Regency, but 8 were excluded due to their inability to finish the questionnaire. The samples consist of 102 men (45.9%) and 120 women (54.1%). The age

Table 1. Frequency distribution of the overall characteristics of the respondents

Variables	Frequency	%
Age		
Middle-age (45-59)	100	45.0
Elderly (60-74)	100	45.0
Old (75-90)	12	5.4
Very old (>90)	10	4.5
Gender		
Male	102	45.9
Female	120	54.1
Education		
No education	23	10.4
Elementary school	96	43.2
Junior high school	16	7.2
Senior high school	43	19.4
University	44	19.8
Systemic diseases		
1 – 3	199	89.6
> 3	23	10.4
Anterior tooth loss		
0	101	45.5
1 – 3	60	27.0
> 3	61	27.5
Posterior tooth loss		
0	30	13.5
1 – 5	98	44.1
> 5	94	42.3
OHRQoL		
Good	64	28.8
Moderate	145	65.3
Poor	13	5.9

distribution consists of 100 people aged 45-59 years (45%), 100 people aged 60-74 years (45%), 12 people aged 75-90 years (5.4%), and 10 people aged >90 years (4.5%). The education level of the most respondents was elementary school level (43.2%) followed by university level (19.8%). Most of the respondents had 1-3 (89.6%) systemic diseases, with the dominant loss of anterior teeth of 0 teeth (45.5%) followed by >3 teeth (27.5%). The most frequent loss of posterior teeth was 1-5

teeth (44.1%) followed by >5 teeth (42.3%) and the respondents' OHRQoL level as indicated by the GOHAI score was dominated by moderate level (65.3%).

The average GOHAI score of all respondents was 22.76, which is included in the moderate level of OHRQoL. The highest negative responses to 'always' and 'often' had limited the type or amount of food intake (30.4%) and this was followed by difficulty of biting and chewing foods (27.27%). Meanwhile, the highest positive response was satisfaction on teeth appearance (57.27%) followed by the ability to swallow comfortably (52.27%). The most affected dimension was physical function, while the less was the psychosocial dimension. It was reported that only 1.81% of the elderly had limited contact with others because of dental problems and discomfort when eating in front of other people and 3.18% of the elderly felt unconfident because of dental or gum problems.

The analysis of differences in quality of life related to oral health (OHRQoL) through GOHAI scores from 4 elderly age groups was carried out using the Kruskall-Wallis test with significance of $p<0.05$ as presented in Table 2. The results obtained a $p<0.001$, which indicated that the four age groups had a significant difference in OHRQoL. The difference in OHRQoL based on confounding variables at educational level was analysed by dividing the samples into 5 groups of education levels (no school, elementary, junior high school, high school, university) and the process obtained $p=0.037$. These results indicated that there were significant differences in OHRQoL based on the different level of education. The no school groups had the lowest OHRQoL.

The difference in OHRQoL was also seen based on the missing anterior teeth, namely in 3 groups including the loss of 0 teeth, the loss of 1-3 teeth, and the loss of more than 3 teeth. Most of the respondents, especially those who had not lost their teeth, had good-moderate OHRQoL levels (49.5% -50.5%), the three groups obtained results of $p<0.001$. The analysis based on the loss of posterior teeth in 3 groups, namely the number of 0, 1-5, and more than 5 missing teeth revealed

Table 2. Difference in OHRQoL based on variables with Kruskall-Wallis and Mann-Whitney test

Variables	OHRQoL						p
	Good		Moderate		Poor		
	n	%	n	%	n	%	
Age-groups							
Middle-age	45	45	49	49	6	6	<0.001*
Elderly	15	15	81	81	4	4	
Old	3	25	7	58.3	2	17	
Very old	1	10	8	80	1	10	
Gender							
Male	26	25.5	67	65.7	9	8.8	0.135
Female	38	31.7	78	65	4	3.3	
Education							
No school	2	8.7	18	78.3	3	13	0.037*
Elementary school	25	26	64	66.7	7	7.3	
Junior high school	4	25	12	75	0	0	
Senior high school	15	34.9	28	65.1	0	0	
University	18	40.9	23	52.3	3	6.8	
Systemic disease							
1 – 3	64	32.2	122	61.3	13	6.5	0.016*
> 3	0	0	23	100	0	0	
Anterior tooth loss							
0	50	49.5	51	50.5	0	0	<0.001*
1 – 3	9	15	48	80	3	5	
> 3	5	8.2	46	75.4	10	16	
Posterior tooth loss							
0	22	73.3	8	26.7	0	0	<0.001*
1 – 5	36	36.7	60	61.2	2	2	
> 5	6	6.4	77	81.9	11	12	

*significance: p<0.05

that most of the respondents had lost more than 5 teeth and had moderate OHRQoL levels. The three groups could achieve p<0.001. Those who had less teeth had lower level of OHRQoL. These results demonstrated a significant difference in OHRQoL between the loss of anterior and posterior teeth in each group.

In terms of confounding sex variables, there were differences in OHRQoL in 2 groups, namely men and women. The Mann Whitney analysis test resulted in a significance of p<0.05, with p=0.134. This result means that there was no significant difference in the OHRQoL of men and women. Based on the number of systemic diseases suffered by respondents, the difference in OHRQoL was seen in 2 groups, namely groups with 1-3 systemic diseases and group with >3 systemic diseases suffered. The test obtained

Table 3. Comparison of differences in OHRQoL between variables with Mann-Whitney test

Variables	Variable I	Variable II	p
Age groups	Middle-age	Elderly	<0.001*
		Old	0.119
		Very old	0.040*
	Elderly	Old	0.927
		Very old	0.451
	Old	Very old	0.718
Education	No school	Elementary school	0.063
		Junior high school	0.062
		Senior high school	0.004*
		University	0.009*
	Elementary school	Junior high school	0.73
		Senior high school	0.123
		University	0.117
	Junior high school	Senior high school	0.474
		University	0.464
	Senior high school	University	0.883
Anterior tooth loss	0	1 – 3	<0.001*
		> 3	<0.001*
	1 – 3	> 3	0.035*
Posterior tooth loss	0	1 – 5	<0.001*
		> 5	<0.001*
	1 – 5	> 5	<0.001*

*significance: p<0.05

p=0.016, which means that there is a significant difference in OHRQoL between the respondent group with 1-3 systemic diseases and those with >3 systemic diseases. Those who had >3 systemic diseases had lower OHRQoL.

The differences in OHRQoL levels between several age groups, education, anterior and posterior tooth loss are shown in Table 3. This table displays the differences in OHRQoL between one age group and another. The results of the Mann Whitney test analysis showed that there was a significant difference in OHRQoL or p<0.05 between the middle-age and elderly groups with a result of p<0.001 and between the middle-age and very old groups with p=0.04. The gradual differences in OHRQoL between one level of education and another. The results showed that

there was a significant difference in the non-school and high school with p=0.004. A significant difference in OHRQoL was also seen in the comparison between non-school education levels and university levels with p=0.009. The difference in OHRQoL was seen from the comparison between groups of 0 anterior tooth loss with 1-3 and group of more than 3 and between those with the teeth loss of 1-3 and those with more than 3. The results showed a significant difference of the three groups with p<0.001, p<0.001, and p=0.035, respectively. The difference in OHRQoL was compared between the posterior tooth loss groups 0 with 1-5, 0 with more than 5, and 1-5 with more than 5. The results showed significant differences between the three group with all p<0.001. The lower OHRQoL had been found in the no school

Table 4. Factors affecting on OHRQoL

Variables	B	ß	t value	p
Age	-0.110	-0.156	-2.206	0.028
Anterior tooth loss	0.199	0.307	4.373	<0.001
Posterior tooth loss	0.329	0.418	5.823	<0.001

B : partial regression coefficient

ß : standardized partial regression coefficient

*significance : p<0.05

groups, the elderly, those who had less teeth, and those who had >3 systemic diseases. The multiple regression analysis with the backward elimination method revealed that age, loss of anterior and posterior teeth were the significant independent variables that affected the OHRQoL.

DISCUSSION

Based on the results of the study, the frequency distribution of the characteristics of the respondents by gender pinpointed that there were more number of women who participated in the study, namely 120 women as compared to 102 men. This is in accordance with the data on Indonesia's Life Expectancy in 2018, which increased to 69.3 years, with details of women reaching 71.4 years and men reaching 67.3 years,[1] which shows that the sex ratio of women is higher than men. Similar situation was seen in Rembang where the Life Expectancy increased to 74.43%.[1] The frequency distribution of the age group was dominated by the middle-age group (45-59 years) and the elderly (60-74 years), each of 100 people followed by the old group (75-90 years) of 12 people and finally the very old group (>90 years) with a total of 10 people. The data were also in accordance with Indonesia's Life Expectancy, namely 67.3 years and 71.4 years, where these ages are included in the elderly group.[1]

The most dominant level of education was those attending the primary school level at 43.2%. The 2012 National Socio-Economic Survey data shows that the education of the elderly population is relatively low because the percentage of the elderly population who have never attended school and have not graduated from elementary school is more than half of the elderly population in Indonesia due to the deprived living environment in rural areas and inadequate infrastructure.[10,11] In line with the previous finding, the low level of education of the elderly is due to economic factors and the scarcity of schools or educational institutions when they are still at school age.[12]

Based on their systemic diseases (such as diabetes mellitus, hypertension, rheumatoid arthritis, asthma, and renal disease), the majority have 1-3 systemic diseases and approximately 55% of older adults reported at least two chronic diseases. The majority of anterior teeth were absent or there were 0 teeth while the posterior teeth were dominated by 1-5 teeth.[13] A study found that, almost of the elderly population are at least partially toothless.[13] This is also in accordance with the results of the 2018 Riskesdas highlighting the pretty high tooth loss rate in the elderly group (>65 years) of 30.6%.[14] Tooth loss in the elderly appear to be caused by contextual factors such as poor oral hygiene, lack of adequate access to dental care services, oral diseases such as caries, periodontal disease or trauma, including anodontic conditions which will have a high cumulative impact in that age group.[13]

The GOHAI dimension consists of three dimensions, namely physical, psychosocial function, pain or discomfort. Based on the results of this study, the most affected dimensions were physical function, especially in limiting the type of food and difficulty of biting or chewing food. The relationship between the impact of oral health

on quality of life and nutritional status has been established in several studies. It was found that most of the impacts were related to eating and chewing, so that impaired nutritional intake was clearly visible among the elderly group.[15] This fact is may be attributed to the reduction in the number of teeth with age, which worsens the ability to chew.[16] Beside oral health, chronic illnesses such as diabetes, hypertension, congestive heart failure, and coronary artery disease are treated with dietary restrictions and with medication that affects food intake, because sugar, salt, and fat contribute to the taste of food, dietary restrictions may make food unpalatable. Drugs affect nutritional status through side effects (e.g., anorexia, nausea, and altered taste perception) and through alteration of nutrient absorption, metabolism, and excretion.[17]

Tooth loss results in difficulty in biting or chewing food so that the elderly also tend to choose foods that are easy to eat. Restriction of food types can also be caused by discomfort due to hypersensitivity to hot, cold and/or sweet foods. The dimension that was the least affected was the psychosocial dimension with only 1.81% of the elderly limiting their contact with other people due to dental problems and uncomfortable feeling of eating in front of other people and 3.18% of the elderly felt insecure due to dental or gum problems. The psychosocial dimension was the least affected because the elderly population did not see their oral condition as a barrier to social communication.[18]

The majority of the oral health related quality of life (OHRQoL) of the elderly in Rembang Regency (65.32%) was in the moderate category. Similar result related to OHRQoL of the elderly was also revealed in some studies declaring that these were on moderate – poor category.[19,20] Significant differences in OHRQoL were found in all elderly age groups, especially between the middle-age and old and middle-age groups. The negative impact on OHRQoL is inversely related to age, that is, the higher the age, the lower the OHRQoL value.[21] Similar facts were also reported by several studies, in which the adults feel a better impact on OHRQoL than the elderly.[21] Another study found that the

older the age, the worse the quality of life.[22] The decrease in quality of life is due to psychosocial, mental, and physical changes that can have an impact on the ability of the elderly in doing activities, which in turn will affect the quality of life of the elderly.[10] The difference between the middle-age group and the old and very old groups may occur because at the age of 45-59 years (middle-age) the extreme intensity or too frequent number of changes in physiology, psychosocial, or mental aspect. Damage to the structure of the oral cavity hasn't occurred significantly in the middle-age age range compared to the old and very old age groups.

The difference in OHRQoL was not found in terms of different sex. This is in line with research that the average GOHAI score did not differ based on gender in any of the three cities studied.[13] The same point was found in a study indicating that there was no correlation between gender and OHRQoL.[23] This occurs because the OHRQoL levels in both genders are almost entirely moderate. A different statement was found that discomfort, disability, and complaints of oral status were more common in women than men, because of the higher sensitivity of women's emotions and their social problems, especially in the domains of social disability and physical pain.

The difference in OHRQoL was also found at the groups with the different level of education, especially between groups who did not attend school and those who finished high school and between those who did not attend school and those attending the higher level of education (university). This is related to the fact that the higher the knowledge, the better the quality of life. Those with higher level of education were more aware of their health and condition of their body. The higher the education, the higher the demand for health services, and the lower the level of education, the more difficult it is to get counseling.[12] It seemed that the high cost of oral health care had made people with low level of education to be less interested in using them and thus, low education was predictor of poor health life.[24] Based on systemic disease, differences in OHRQoL were also found to be significant between groups of respondents

who had systemic disease 1-3 and >3 (such as diabetes mellitus, hypertension, rheumatoid arthritis, asthma, and renal disease). These results are consistent with a research which states that the increase in the number of chronic diseases has decreased the average GOHAI in all three capitals, as proven by the fact that those with the worst dental conditions, such as tooth loss and not wearing dentures have the lowest average GOHAI score.[13] People with systemic problems are 44% more likely to experience psychological discomfort than people without systemic problems.[23]

The loss of both anterior and posterior teeth showed a significant difference in OHRQoL between the respective groups. OHRQoL was correlated strongly with at least 10 teeth in each jaw. A meta-analysis showed that the minimum number of teeth had the greatest effect on OHRQoL and with a decrease in the number of remaining teeth the effect got worse. In addition, it was seen that loss of anterior teeth had a more negative effect on OHRQoL than loss of posterior teeth.[6] Tooth loss would have an effect on decreasing one's quality of life. Tooth loss will disrupt the mastication function so that a person will find it difficult to eat food. In addition, loss of anterior and posterior teeth also affects some social changes in a person.[25] Loss of anterior and posterior teeth affects the quality of life of the elderly. Oral health conditions, due to loss of anterior and posterior teeth, affect physical function and to a lesser extent psychological conditions.[26] Multiple linear regression test was performed to see the effect of the most significant variables on the OHRQoL condition. The results showed that age, loss of anterior teeth, and loss of posterior teeth were the most influential factors in OHRQoL. In this case, it was found that the loss of anterior and posterior teeth was the strongest confounding variable or cofounding factor in this study.

The weakness of this study was the fact that the ratio between age groups could not be evenly distributed because the number of elderly people in the old and very old age groups was very small, especially for the very old group or those more than 90 years. Such uneven distribution can affect the generality of the study. However, it is noteworthy that the number of samples for this study were sufficient to generalize the elderly population in Rembang. The author tried to solve this problem by creating a ratio of 100:100:10:10 for the middle-age, the elderly, old, and very old age groups, respectively. Bias factor could happen while assesing data with online questionnaire. This bias could be controlled by determining the criteria, definition and using easy-to-understand sentences for the elderly. One of the greatest challenges facing the data collection process was the hit of the COVID-19 pandemic, which required the author to be very careful in making visits to respondents' residents by complying with strict health protocols.

Further research is needed on the effect of age in relation to anterior and posterior tooth loss on quality of life related to oral health (OHRQoL) due to the importance of teeth function and their effect on oral and systemic condition that could affect the quality of life. The relationship between dietary restrictions due to tooth loss in the elderly with nutritional status and the effect of tooth loss on depression in the elderly can be used as a topic for further research. A larger sample is needed to obtain more ideal and more generalized results with a balanced ratio between groups.

CONCLUSION

Oral health-related quality of life (OHRQoL) of the elderly in different age groups is significantly different, especially as proven by the data gap between the middle-age group and the elderly and between the middle-age and the very old. The majority of the elderly OHRQoL's for those in the middle-age, elderly, old, and very old age groups in Rembang Regency were in moderate level. It is expected that the elderly will be able to maintain their oral hygiene in order to achieve a better quality of life.

ACKNOWLEDGMENT

and the government officials of Rembang Regency for their supports and cooperation in the data collection by the research team.

REFERENCES

1. Bilqis UM, Sahar J. Pengalaman lansia dengan demensia ringan-sedang dalam melakukan komunikasi dengan pelaku rawat: Systematic Review. Jurnal Endurance: Kajian Ilmiah Problema Kesehatan. 2019; 4(2): 388-401.

2. Zaenurrohmah DH, Rachmayanti RD. Hubungan pengetahuan dan riwayat hipertensi dengan tindakan pengendalian tekanan darah pada lansia. Jurnal Berkala Epidemiologi. 2017; 5(2): 174-184.

3. Melati CA, Susilawati S, Rikmasari R. Gambaran kualitas hidup pasien lansia pengguna gigi tiruan lepasan di RSGM Unpad. Majalah Kedokteran Gigi Indonesia. 2017; 3(3): 133-138.
doi: 10.22146/majkedgiind.17834

4. Kiik SM, Sahar J, Permatasari H. Peningkatan kualitas hidup lanjut usia (lansia) di kota depok dengan latihan keseimbangan. Jurnal Keperawatan Indonesia. 2018; 21(2): 109-116. doi: 10.7454/jki.v21i2.584

5. Yellowitz JA, Schneiderman MT. Elder's oral health crisis. J Evid Based Dent Pract. 2014;14S: 191-200.
doi: 10.1016/j.jebdp.2014.04.011

6. Motallebnejad M, Mehdizadeh S, Najafi N, Sayyadi F. The evaluation of oral health-related factors on the quality of life of the elderly in Babol. Contemp Clin Dent. 2015; 6(3): 313-317. doi: 10.4103/0976-237X.161867

7. Thalib B, Ramadhani KN, Asmawati. Status gizi dan kualitas hidup pada lansia pengguna gigitiruan penuh di Kota Makassar. Jurnal MKMI. 2015; 11(2): 44-49.

8. Papaioannou WJ. Oulis C, Latsou D, Yfantopoulos J. Oral health-related quality of life of greek adults: a cross-sectional study. Int J Dent. 2011; 2011: 360292.
doi: 10.1155/2011/360292

9. Sischo L, Broder HL. Oral health-related quality of life: what, why, how, and future implications. J Dent Res. 2011; 90(11): 1266-1270. doi: 10.1177/0022034511399918

10. Indrayani, Ronoatmodjo S. Faktor-faktor yang berhubungan dengan kualitas hidup lansia di Desa Cipasung Kabupaten Kuningan tahun 2017. J Kes Reproduksi. 2018; 9(1): 69-78.

11. Wikananda G. Hubungan kualitas hidup dan faktor resiko pada usia lanjut di wilayah kerja puskesmas tampaksiring I Kabupaten Gianyar Bali 2015. Intisari Sains Medis. 2017; 8(1): 41-49.

12. Thalib B, Rasyid R, Asmawati, Hasyim R, Thalib AM. The effect of oral health status on elderly quality of life in Makassar District, Indonesia. SRP. 2020; 11(11): 14-18.

13. Fuentes-García A, Lera L, Sanchez H, Albala C. Oral health-related quality of life of older people from three South American cities. Gerodontology. 2013; 30(1): 67-75.
doi: 10.1111/j.1741-2358.2012.00649.x.

14. Kementerian Kesehatan Republik Indonesia. Laporan nasional riskesdas 2018. Jakarta: Badan Penelitian dan Pengembangan Kesehatan; 2018. 182-183.

15. Rosli TI, Chan YM, Kadir RA, Hamid TAA. Association between oral health-related quality of life and nutritional status among older adults in district of Kuala Pilah, Malaysia. BMC Public Health. 2019; 19(4): 547.
doi: 10.1186/s12889-019-6867-1

16. Atieh MA. Arabic version of the geriatric oral health assessment Index. Gerodontology. 2008; 25(1): 34-41.
doi: 10.1111/j.1741-2358.2007.00195.x

17. Chen CC, Schilling LS, Lyder CH. A concept analysis of malnutrition in the elderly. J Adv Nurs. 2001; 36(1): 131–142.
doi: 10.1046/j.1365-2648.2001.01950.x

18. Rosli TI, Mun CY, Kadir RA, Hamid TAA. Oral status and its association with oral health-related quality of life in community-dwelling older adults. Malaysian Journal of Public Health Medicine. 2018; (1): 107-114.

19. Adhiatman AAGW, Kusumadewi S, Griadhi PA. Hubungan kehilangan gigi dengan status gizi dan kualitas hidup pada perkumpulan lansia di desa penatahan kecamatan Penebel Tabanan. Odonto Dent. 2018; 5(2): 145-151. doi: 10.30659/odj.5.2.145-151

20. Rizkillah MN, Isnaeni RS, Fadilah RPN. Pengaruh kehilangan gigi posterior terhadap kualitas hidup pada kelompok usia 45-65 tahun. Padjajaran J Dent Res Student. 2019; 3(1): 7-12. doi: 10.24198/pjdrs.v2i2.22135

21. Ulinski KG, do Nascimento MA, Lima AM, Benetti AR, Poli-Frederico RC, Fernandes KB, et al. Factors related to oral health-related quality of life of independent Brazilian elderly. Int J Dent. 2013; 2013: 705047.
    doi: 10.1155/2013/705047

22. Sutikno E. Hubungan antara fungsi keluarga dan kualitas hidup lansia. Med J Indones. 2011; 2: 73-79.

23. Mohammadbeigi A, Arsangjang S, Mohammadsalehi N, Anbari Z, Ghaderi E. Education-related inequity in access and utilization of oral health care in Iran. J Family Med Prim Care. 2015; 4(1): 35-38.
    doi: 10.4103/2249-4863.152248

24. Masood M, Newtonc T, Bakrib NN, Khalidd T, Masood Y. The relationship between oral health and oral health related quality of life among elderly people in United Kingdom. J Dent. 2017; 56: 78-83.
    doi: 10.1016/j.jdent.2016.11.002

25. Rizkillah MN, Isnaeni RS, Fadilah RPN. Pengaruh kehilangan gigi posterior terhadap kualitas hidup pada kelompok usia 45-65 tahun. Padjadjaran J Dent Res Student. 2018: 2(2); 1-7. doi: 10.24198/pjdrs.v2i2.22135

26. Umniyati H, Surachmin A, Ambarsati G. The relationship between anterior tooth loss and quality of life among elderly in Posbindu, Bojongnangka, Kelapa Dua Sub-District, Tangerang, Jakarta-Indonesia. Bali Med J. 2018; 7(3): 626-630.
    doi: 10.15562/bmj.v7i3.1192