

The Relation between Age and Depression on the Volume and Flow Rate of Saliva

Neneng Nurjannah¹, Hetty Anggrawati², Megananda H P³

^{1,2,3} Health Ministry Polytechnic of Bandung, Bandung, Indonesia

Jalan Prof. Eyckman No.40, Pasteur, Bandung, Jawa Barat, Indonesia 40161; Email :
hetty.anggrawati@gmail.com

ABSTRACT : The relation between age, and depression on the volume and flow rate of saliva.

The problem of dental and oral diseases in an elderly person is more related to physiological physical factors, this condition will result in tissue deterioration, one of which is a decline of the salivary gland function that experiences atrophy so that the production of saliva will decrease. This study aims to determine the relationship between age and depression in the elderly with volume and flow rate of saliva. The type of research conducted is analytical research, with a cross-sectional design. The population in this study were all the elderly in the Tresna Werdha Social Home Budi Pertiwi Bandung. Samples were taken in total sampling. The influence variables consisted of age and depression on salivary volume and salivary flow rate. Age and depression variables were measured using interviews made according to the Ordinal scale. The variables affected were saliva volume and salivary flow rate measured using the spitting method. Each data obtained from measurements directly will be processed and analyzed using the chi-square test. The results of the analysis for the relationship of age and elderly Saliva Volume on Budi Pertiwi Bandung Nursing Home with the chi square test showed p-value 0.020 (<0.05) which means that there is a significant relationship between age and elderly saliva volume in Budi Pertiwi Nursing Home Bandung . The conclusion of this study is that saliva is important to maintain its quality so that no changes in oral health and other changes occur in terms of quantity and quality that can cause changes in oral health status. As the age increases, changes and deterioration in the function of the salivary gland, wherein the parenchymal gland is lost, is replaced by connective tissue and fat. This situation causes a decrease in saliva production.

Keywords: Age, depression, salivary volume, salivary flow rate, elderly

INTRODUCTION

The population of the elderly in Indonesia in the past decade has experienced a significant increase in which this is due to the increasing life expectancy (UHH) of Indonesians. Sirait and Riyadina¹ (1991) argue that the increase in UHH should be accompanied by an improved quality of life for the elderly. Quality of life will last well if someone eats a balanced diet and has adequate rest as well as regular exercise, as well as an effort to increase the body's resistance that is typical for the elderly by providing certain vitamins, minerals.

The increase in the proportion of the elderly population needs to be watched out, because the prevalence of increasing functional disability in the elderly will increase. The number of disabilities (disabilitiesrate) increases according to age development. Increased functional disability in the elderly is a result of increasing a person's age and the

deterioration process followed by the emergence of physiological disorders, decreased function, cognitive disorders, affective disorders, and psychosocial disorders. These conditions can interfere with the elderly in meeting the needs of their daily activities (Palestine Bondan, 2006).

Elderly people who experience depression will cause difficulties in fulfilling their AKS, while elderly who experience dementia are also reported to have AKS deficits and activities of everyday life instruments (AKS) (Jorm, 1994). Conversely, the limitations of the elderly in fulfilling daily life activities (AKS) can be one of the factors causing depression (Eliopoulos, 1997; Roberts, Kaplan, Shema & Strawbridge, 1997 cit Palestine Bondan, 2006).

According to Palestine Bondan, 2006 functional capacity is a physical health condition that is very important for the quality of life and welfare of the elderly. The increase in functional disability is influenced by the aging process, multi-disease

(Guralnik, 4Croix & Abbott, 1993; Harris, Kovar, Suzman, Kleinman & Feldman, 1989), and psychosocial disorders (Oida, Kitabatake, Nishijima, Nagamatsu, Kohno, Egawa & Arao, 192003). The above conditions can also occur gradually as a result of members of the extremity not functioning or not being trained optimally.

Effect of functional disability of the elderly as a physiological response to primary (age) and secondary (depression and dementia) aging processes. Dementia is a clinical syndrome that includes loss of intellectual function and memory that is so severe that it causes daily life dysfunction.

Depression is an atmosphere of depressed mood which can be a diagnosis of a disease or as a symptom or response to other disease conditions and stress to the environment.

The aging process of the elderly is much influenced by physiological, psychological, developmental, socio-cultural and spiritual factors. The aging process is a process that occurs in the body that runs slowly but surely, in the aging process there is a gradual decline in bodily functions and eventually become humans with advanced age (Sunariani et al., 2007).

The problem of dental and oral diseases in an elderly person is more related to physiological physical factors, this condition will result in tissue deterioration, one of which is a decline of the salivary gland function that experiences atrophy so that the production of saliva will decrease. If the production of saliva decreases, it will result in a reduction in the amount of salivary flow, changes in composition (Kidd and Bechal, 1992; Sonis et al., 1995, Pedersen and Loe, 1986). In addition to deteriorating function of the salivary glands, saliva production can be reduced due to the influence of drugs. Various organs of the body can experience interference if a person experiences depression, including the production of salivary glands.

Depression is an atmosphere of depressed mood which can be a diagnosis of a disease or as a symptom or response to other disease conditions and stress to the environment.

A person's saliva is supported by three major salivary glands, the parotid, submandibularis, sublingualis gland and many minor salivary glands that are present throughout the oral mucosal surface. Depressed conditions can affect salivary gland function so that the volume of saliva produced will decrease. Saliva has a function to protect teeth from caries, provide oral mucosa comfort, swallow and

have a buffer effect so that the atmosphere in the mouth remains neutral. By reducing the amount and flow of saliva can cause problems in the teeth and mouth such as, causing the mouth to dry out, reduced sensory function of the taste, impaired swallowing function. The disruption of the coating protection of the teeth carried out by the acquired pellicle so that the acid produced by the plaque bacteria will easily cause dental attrition, root caries, oral cancer, inflammatory halitosis in the periodontal tissue and cause problems in prosthetic users (amerongen, 1992, Ganong 2010)

The purpose of this study was to determine the relationship between age and depression in the elderly with volume and flow rate of saliva.

MATERIAL AND METHODS

This study is an analytical study with a cross-sectional design. The population in this study were all the elderly in the Tresna Werdha Social Home Budi Pertiwi Bandung. Samples were taken in total sampling.

The influence variables in this study were age and depression on salivary volume and salivary flow rate. The variables affected were saliva volume and salivary flow rate in the elderly at the Tresna Werdha Social Home Budi Pertiwi bandung.

This research was measured using interviews and direct calculations. Age and depression with respect to salivary volume and salivary flow rate were measured by the Ordinal scale. Age adjusted for age grouping from WHO. While for depression measurements adjusted to 30 lists of depression scale questions for geriatric (T.L. Brink and Jerome A. Yesavage, Mc Dowell citations Ian and Claire Newell, 1996). Measurement of volume and flow rate of saliva is calculated by collecting saliva using the spitting method (Mallikha et al., 2008), namely, first how to measure saliva volume with the respondent sitting quietly and quietly while lowering his head, instructed not to swallow during the procedure, just before the procedure takes place , respondents were required to swallow all saliva in their mouths. Saliva was left in the mouth and every minute the saliva collected was released into the pot / cup that had been provided, salivary collection was carried out for 5 minutes, time was calculated using a stopwatch.

Saliva Volume Measurement Results <3 ml Bad

3ml – 5ml	Medium
>5ml	Good

And both ways of measuring the flow of saliva by calculating the length of time the first points of saliva come out of the vestibule / mucosa of the lower lip, by pulling the patient's lower lip. Remove existing saliva with a tampon that is clamped by tweezers to dry. Observe the first time the saliva dots come out of the vestibule.

Saliva Flow Rate Measurement Results >60 detik

	Bad
60 detik – 30 detik	Medium
<30 detik	Good

Each data obtained from measurements directly will be processed and analyzed using the chisquare test.

RESEARCH RESULT

Research has been carried out at the Tresna Werdha Social Institution in Budi Pertiwi, Jl Sancang Bandung in August 2018. The research subjects chosen were all elderly who were at the Social Institution and fulfilled the inclusion criteria.

1. Distribution of Frequency of Age of Respondents

The characteristics of the research subjects based on age in the elderly at the Tresna Werdha Social Institution in Budi Pertiwi, Bandung, can be seen in table 4.1 below.

Table 4.1 Distribution of Frequency of Age of Age Respondents.

	Age	
Criteria	Frequency	Percent
Elderly	5	20.8
Old	17	70.8
Very Old	2	8.3
Total	24	100.0

The results in the table above show that the majority of residents of Budi Pertiwi Nursing Home namely 17 out of 24 respondents (70.8%) according to WHO include the Old category, which is between 75-90 years old.

2. Distribution of Frequency of Depression

The frequency distribution of the level of depression in elderly residents of the Tresna Werdha Social Institution is shown in table 4.2 below **Table 4.2** Frequency Distribution of Respondents' Depression Levels.

Depression

Criteria	Frequency	Percent
Normal	20	83.3
Mild	3	12.5
Medium/Sevre	1	4.2
Total	24	100.0

The table above shows from 24 elderly people at Budi Pertiwi Bandung Nursing Home who became the research data that the majority of which were 20 (83.3%) elderly were in the normal category. While the remaining 3 elderly people were categorized as mild depression and 1 elderly person was categorized as moderate / severe depression.

3. Saliva Volume Frequency Distribution

Furthermore, taking salivary volume data taken by the non-stimulation method, was carried out once, the samples were instructed beforehand not to eat and drink beforehand for 60 minutes to reduce confounding variables. Salivary collection is carried out by pouring saliva into the salivary reservoir passively for 5 minutes. Saliva volume is measured by a measuring cup. All results of subsequent studies are recorded. The results of the research are shown in the distribution table as follows,

Table 4.3 Distribution of Respondents' Saliva Volume Frequency

	Saliva Volume	
Criteria	Frequency	Percent
Good	1	4.2
Medium	5	20.8
Bad	18	75.0
Total	24	100.0

The table above shows that 75% of elderly respondents to Budi Pertiwi Bandung Nursing Home have a poor volume of saliva, which has a volume of <3 ml, and which has a good salivary volume (> 5ml) with only 1 person (4.2%).

4. Distribution of Saliva Flow Rate Frequency

The table below shows that the Elderly Saliva Flow Rate in Budi Pertiwi Nursing Home Bandung 45.8% has a medium category Saliva Flow Rate, and 41.7% has a good category of Saliva Flow Rate. **Table 4.4** Frequency Distribution of Respondents' Saliva Flow Rate. **Saliva Flow Rate**

Criteria	Frequency	Persen
Good	10	41.7

Medium	11	45.8
Bad	3	12.5
Total	24	100.0

Pertiwi Bandung with the chi square test showed pvalue of 0.276 (> 0.05) which means that there was no significant relationship between Age and Depression elderly in Budi Pertiwi Nursing Home Bandung.

5. Relation between age and depression

Table 4.5 Cross Tabulation of relation between Age and Depression.

Table 4.6. Cross tabulation between the relationship of age and volume of saliva.

		Depression					Total	χ^2 p
		Volume of Saliva				Total	χ^2 p	
		N	Good	Medium	Bad			5
Age	Elderly	%	16.7%	0.0%	4.2%	5	20.8%	11,666 0,020
	Elderly Old	%	0.0%	4.2%	16.7%	20.8%	17	
Age	Old	N	58.3%	14.5%	13 0.0%	17	70.8%	
	Old	%	0.0%	16.7%	54.2%	70.8%	2	
Age	Very Old	N	8.3%	0.0%	0 0.0%	2	8.3%	
	Very Old	%	4.2%	0.0%	0.0%	8.3%	24	
Total		N	83.3%	13.5%	18 4.2%	24	100%	
Total		%	4.2%	20.8%	75.0%	100%		

The results in the table above show that most of the elderly in Budi Pertiwi Bandung Nursing Home are in the category of 70.8% old age and normal depression level (58.3%).

The results of the analysis for the relationship of Aged and Depressed Elderly at the Nursing Home of Budi The results in the table above show that the majority of 54.2% of elderly respondents to Budi Pertiwi Bandung Nursing Home included the old age category and the saliva volume was in the bad category.

The results of the analysis for the relationship of age and elderly Saliva Volume on Budi Pertiwi Bandung Nursing Home with the chi square test showed p-value 0.020 (< 0.05) which means that there is a significant relationship between age and elderly saliva volume in Budi Pertiwi Nursing Home.

6. Relationship of Age and Saliva Volume

The results in the table above show that the majority (37.5%) of the elderly in Budi Pertiwi Bandung Nursing Home are in the category of old age and the salivary flow rate is in the moderate category. The results of the analysis for the relationship of Age and Saliva Flow Rate of elderly respondents to Budi Pertiwi Nursing Home Bandung with chi square test showed p-value of 0.305 (> 0.05) which means there was no significant relationship between age and elderly saliva rate in Budi's Nursing Home Pertiwi Bandung.

7. Relationship of Age and Flow Rate of Saliva

Table 4.7 Cross Tabulation between the Age Relationship and Saliva Flow Rate

		Laju Alir Saliva			Total	χ^2 p
		Baik	Sedang	Buruk		
Usia	Lanjut	N	2	1	2	5
	Lanjut	%	8.3%	4.2%	8.3%	20.8%
Usia	Tua	N	7	9	1	17
	Tua	%	29.2%	37.5%	4.2%	70.8%
Usia	Sangat Tua	N	1	1	0	2
	Sangat Tua	%	4.2%	4.2%	0.0%	8.3%
Total		N	10	11	3	24
Total		%	41.7%	45.8%	12.5%	100%

8. Relationship between Saliva Depression and Volume

The results in the table above show that most (83.3%) that there was no significant relationship between **Table 4.8** Cross Tabulation between Depression Relationships and Saliva Volume.

		Saliva Volume				Total	χ^2 p
		Good	Medium	Bad			
Table 4.9 Cross Tabulation between the Relationship of Depression and the Flow Rate of Saliva		1	4	15	20		
		Flow Rate of Saliva					
Depression	Normal	N 1	N 4	N 15	N 20		
		% 33.3%	% 41.7%	% 8.3%	% 83.3%		
Depression	Mild	N 0	N 1	N 2	N 3		
		% 0.0%	% 12.5%	% 8.3%	% 12.5%		
Depression	Medium/Sevre	N 0	N 1	N 0	N 1		
		% 0.0%	% 12.5%	% 0.0%	% 12.5%		
Total		N 10	N 11	N 3	N 24		
		% 41.7%	% 45.8%	% 12.5%	% 100%		

of respondents) elderly in Budi Pertiwi Bandung Nursing Home were categorized as not depressed but had a poor saliva volume category.

The results of the analysis for the relationship of Age and Saliva Flow Rate of elderly respondents to Budi Pertiwi Nursing Home Bandung with chi square test showed p-value of 0.305 (> 0.05) which means The results in the table above show that most of the 41.7% elderly in Budi Pertiwi Bandung Nursing Home were in the category of normal depression and moderate category of salivary flow.

The results of the analysis for the relationship of Depression and the elderly Saliva Flow Rate in Budi Pertiwi Bandung Nursing Home with the chi square test showed p-value 0.087 (> 0.05) which means there was no significant relationship between Depression and the elderly Saliva flow rate in the Nursing Home Budi Pertiwi Bandung.

DISCUSSION

The age data of the study respondents showed that the elderly had the lowest age of 60 years and a maximum of 91 years old. The average age of respondents in Panti Wredha Budi Pertiwi Bandung is 78.79 years. The next researcher grouped the age into three (WHO), namely elderly: age 60 years - 70 years, old age (old): age 75 years - 90 years, and very old: more than 90 years; The results showed that 17 of the 24 respondents (91.7%) included the Old (old) category, aged between 75-90 years. This result is different from the results of the Palestin (2006) study at PSTW Abiyoso and PSTW Budi Dharma that most (50%) of the elderly are 60-

age and elderly saliva rate in the nursing home Budi Pertiwi Bandung.

9. Relationship between Saliva Depression and Flow Rate

69 years old, and only 15.6% of the elderly are 80 years and over;

Barnes (2006) states that the current growth of the elderly population starts to outstrip the growth of other age groups and it is estimated that there will still be growth of the total number of elderly people over the age of 65 between 2031. However, in this group there are clear change in age distribution. The proportion of elderly people over 75 years will increase, while those aged 65-75 years will decline

Changes in population structure and running during the 20th century can be caused by improving economic status of each individual, social environment, and health care (Barnes, 2006).

Furthermore, the results of the study on the level of depression showed that most (83.3%) of the elderly in Budi Pertiwi Nursing Home were included in the normal category, did not experience depression and the remaining 16.7% experienced mild and moderate / severe depression. This result is not the same as the results of the Palestinian study which found that some elderly (50.6%) had moderate / severe depression, and the rest experienced mild depression. However, the results of the study are in line with the results of Ayuni's study, which found

that 71.4% of the independent category in the Activity of Daily Living (ADL) were not depressed.

Jesten cit Ayuni, 2014 states that depression in the elderly occurs due to a decrease in body capacity, disability, a higher risk of falls, complications of the disease, adherence to treatment therapy and increased use of medical equipment. At the age of 56 years, many changes occur in terms of physical, psychological, economic, social and spiritual that affect the quality of life of the elderly. Elderly people begin to face various changes that can not be avoided, progressive, and can not be changed.

Most (83.3%) of the elderly in Panti Werdha Budi Pertiwi in normal conditions did not experience depression, because most of the elderly had lived in the orphanage for more than 10 years. In the early days of the elderly at Panti many experienced depression. This is due to the process of adaptation to the place, social environment, and new lifestyle in social institutions. (Ayuni, 2014). This can be seen in one elderly person who had just stayed at the Home for 3 weeks and was categorized as moderate / severe depression.

In addition to the length of stay, the elderly at the Social Institution generally felt comfortable because their basic needs were met, compared to when they had previously lived on the streets as one of the elderly had revealed. Most of the elderly in Panti can be independent in carrying out daily activities (eating, bathing, genital hygiene, dressing), even given the opportunity to do activities according to the interests of the elderly, such as farming, embroidery, artistic creativity such as singing and playing angklung. In addition to this, a routine schedule is made one day a week to get a spiritual shower, so the expression of almost all respondents during the interview is that they feel calm, comfortable, and willing to give up everything in the presence of Allah SWT. Furthermore, salivary volume data retrieval is taken by a method without stimulation, and the results of the research as listed in table 4.7 show that 75 respondents included having a bad volume of saliva (<3ml), with an average salivary volume of 2.5 ml. Furthermore, after being analyzed with SPSS version 16.0, the results of the study are shown in Table 4.6 which shows that most 54.2% of elderly respondents in Budi Pertiwi Bandung Nursing Home are in the old age category and the saliva volume is in the bad category.

The results of the analysis for the relationship of age and elderly Saliva Volume on Budi Pertiwi Bandung Nursing Home with the chi square test showed p-value 0.020 (<0.05) which means that there is a significant relationship between age and elderly saliva volume in Budi Pertiwi Nursing Home Bandung . The results of the study are in line with the results of research by Marasabessy, 2013 and Tampubolon, 2017.

Saliva is important to maintain its quality so that no changes in oral health and other changes in terms of quantity and quality can cause changes in oral health status. Saliva plays a role in protecting tissues in the oral cavity by mechanically cleaning to reduce plaque accumulation, lubricating the teeth , the effect of buffers, bacterial aggregation which can inhibit the colonization of microorganisms, antibacterial activity, digestion, retention, moisture and cleansing of food. Therefore saliva greatly affects the health of one's oral cavity (Amerongen, 1991).

In order to function properly, saliva needs to be produced in the oral cavity in sufficient quantities. Generally normal salivary secretions are 800-1500 ml / day. The amount of saliva secreted in the oral cavity is influenced by several factors, such as olfactory stimulation, seeing and thinking about food, mechanical stimulation, chemical, neuronal, pain, and consumption of certain drugs. In addition, a state of stress, depression, and anxiety can also affect salivary secretions.

In the elderly, there is usually a decrease in the level of oral hygiene, reduced number of teeth and decreased sensitivity of the oral mucosa to irritation. In addition there is also a weakening of the tooth supporting tissue so that the ability to chew becomes reduced.

All of these changes are degenerative processes which cause mucosal resistance to decrease. The oral mucosa becomes easily injured by hard food and the healing process is somewhat slowed. All these conditions are aggravated by dry mouth due to a decrease in salivary production (Amerongen, 1991, Barnes, 2006).

As age increases, an aging process occurs. There is a change and deterioration in the function of the salivary gland, where the parenchymal gland is lost which is replaced by connective tissue and fat. This situation causes a decrease in saliva production.

CONCLUSION

Based on the results of the research and discussion it was concluded that:

1. Elderly at the Panti Werdha Budi Pertiwi advanced category 20.8%, old 70.8%, and very old 8.3%
2. Depression Rate in the Elderly at Werdha Budi Pertiwi Institution are: 83.3% normal category, 12.5% mild depression, and 4.2% moderate / severe depression.
3. A. Salivary Volume of the Elderly at Panti Werdha Budi Pertiwi is a good category 4.2%, medium 20.8%, bad 75%
B. The flow of saliva at the elderly in Panti Werdha Budi Pertiwi is 4.2% good category, 20.8% moderate, 75% bad
4. A. There is no significant relationship between Age and Depression Lans in Budi Pertiwi Nursing Home Bandung. p-value of 0.276 (> 0.05)
B. There is a significant relationship between Age and Elderly Saliva Volume in Budi Pertiwi Nursing Home Bandung. p-value 0.020 (< 0.05)
C. There is no significant relationship between Age and Saliva Flow Rate in Budi Pertiwi Nursing Home Bandung. p-value of 0.305 (> 0.05)
D. There is no significant relationship between elderly Saliva Depression and Volume in Budi Pertiwi Nursing Home Bandung. p-value of 0.276 (> 0.05)
E. There is no significant relationship between Depression and the Elderly Saliva Flow Rate in Budi Pertiwi Nursing Home Bandung. p-value of 0.087 (> 0.05)

REFERENCES

- Abikusno. 2013. *Kesehatan gigi dan mulut pada lansia*, diunduh dari www.repository.unej.ac.id tanggal 30 januari 2015.
- Amelia, Kusuma, Wardani, Marunung. *Pengaruh xerostomia terhadap kesehatan gigi dan*

mulut terkait kualitas hidup pada usila.diunduh dari <http://eprints.undip.ac.id> tanggal 13 maret 2015.

- Amerongen A. 1991, *Ludah dan Kelenjar Ludah*, Gadjahmada University Press,Yogyakarta
- Ayuni Nurul Hidayatul, 2014, Perbedaan KejadianDepresi Pada Lansia Mandiri dan Keergantungan Dalam Activity of DailyLiving (ADL)di PSTW Yogyakarta Unit Abiyoso Pakem Sleman
- Azizah, lilik, ma'rifatul, 2011, *keperawatan lanjut usia*, yogyakarta : graha ilmu
- Barnes Ian E, Walls Angus, 2006, Perawatan Gigi Terpadu Untuk Lansia, EGC, Jakarta.
- Burt, B.A., Eklund SA, 2005. *Dentistry, Dental Practice and The Community*, St. Louis ; Elsevier Saunders.
- Edgar, W.M. Salivarysecretion, copotition and function.*Br. Dent. J*, 1992; 172(80); 305/12
- Kusumawardani, endah. 2011. *Buruknya kesehatan gigi dan mulut*. Siklus.Yogyakarta.
- Lampinen, P. & Heikkinen, E. 2003. Reduced mobility and physical activity as predictors of depressive symptoms among community-dwelling older adults: an eight-year follow-up study. *Aging Clin Exp Res*, 15(3):205-211.
- Lenze, E.J., Rogers, J.C., Martire, L.M., Mulsant, B.H., Rollman, B.L., Dew, M.A.,
- Marasabessy F Aprilya, 2013, Hubungan Volume dan PH Saliva.
- Salampessy Graceccylia R, Gambaran Xerostomia pada Kelompok Lansia yang menggunakan Gigi tiruan di Kabupaten Minahasa.*Jurnal e-GIGI (eG)*, Vol 3, Nomor 1, 2015
- Schulz, R., & Reynolds III, C.F. (2001). The Association of Late-Life Depression

and Anxiety With Physical Disability A Review of the Literature and Prospectus

for Future Research. *Am J Geriatr Psychiatry*, 9:113–135.

Lumentut, reyna agnes natassia. Paulina n gunawan. Christy n. Mintjelungan. 2013. *Status periodontal dan kebutuhan perawatan pada usia lanjut*. Jurnal e-gigi (eg), volume 1, nomor 2..

Palestine Bondan, 2006. Pengaruh Umur, Depresi, dan Demensia Terhadap Disabilitas Fungsional Lansia di PSTW Abiyoso dan PSTW BudiDharma Provinsi DI Yogyakarta. *Thesis*. Universitas Gadjah Mada Yogyakarta.

Polimpung Judith F, 2013, Pengaruh Stress, depresi, dan kecemasan terhdap Volume Saliva pada Mahasiswa Preklinik FKG Universitas Hasanuddin, *Makasar Dental Jurnal*

Putri, megananda hiranya. Eliza herijulianti. Neneng nurjannah. 2010. *Ilmu pencegahan penyakit jaringan keras jaringan pendukung gigi*. Egc. Jakarta.

Ratmini, ni ketut. Arifin. 2011. *Hubungan kesehatan mulut dengan kualitas hidup lansia*. Jurnal ilmu gizi. Vol 2 no 2 : 139-147.

Tampubolon Tresia, 2017, Dampak xerostomia Terhadap Kualitas Hidup Wanita di Poli Lansia Puskesmas Darussalaam Medan.

Undang Undang no 13 tahun 1998 tentang kesejahteraan lansia, diakses dari www.itptunimus.ac.id tanggal 02 februari 2015.

Who. 2010. *Prevalensi penyakit periodontal pada usia lanjut*, diunduh dari www.portalgaruda.org tanggal 12 desember 2014

Who. Penggolongan lansia, diakses dari www.itptunimus.ac.id tanggal 02 februari 2015