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RESEARCH ARTICLE

The Risk Analysis of Malnutrition by Tooth Loosing Among Elderly

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ABSTRACT

Introduction: *Tooth loss occurs mostly in the elderly, especially loss of occlusal support can cause disruption of the mastication process and the swallowing of food, so the chewing function is reduced and causes the elderly to prefer soft foods and foods that are easy to chew. The lack of fulfillment of all nutrients needed by the body as the risk of malnutrition in the elderly increases.**Purpose:*** *To evaluate the analysis of tooth loss in the elderly with mal-nutrition based on Mini Nutritional Assessment in Social House Tresna Werdha Kasih Sayang Ibu, Batusangkar.* ***Materials and Methods:*** *Cross-Sectional approach. The total number of the sample was 46 elderly. The Eichner index measured the tooth loss, besides the MNA questionnaire estimated the risk of malnutrition. Data analysis was done using Chi-square* ***Results:*** *76.1% of the elderly have tooth loss (all of the occlusal support) and 69.7% of the elderly at risk of malnutrition. 85.7% of the elderly have tooth loss (all of the occlusal support) with risk malnutrition. The statistical result analyzed by using Chi-square obtained p-value <0.005.* ***Conclusion:*** *There is a risk of malnutrition in the elderly who experience tooth loss*

Keywords:*Tooth loss, malnutrition risk, mini nutritional assessment*

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INTRODUCTION

The elderly age group is growing faster than other age groups. World Population Aging (WPA) projected between 2015 and 2030 expected the elderly population would increase by 56% from 901 million to 1.4 billion. By 2050 it is projected that the number of elderly will double, reaching 2.1 billions.[1]In Indonesia, it is estimated that by 2020 will enter the period of elderly, where 10% of the population will be aged 60 years.[2]The aging process is the process of the disappearance of tissue functions to improve themselves and maintain their standard structure and function, which decreased body endurancein the elderly characterized with partial or complete loss of teeth.[3]

The results of Baseline Health Research stated that the number of teeth lost at the age of ≥65 years was 17.05, at the age of 45-55 years at 5.65 and at the age of 56-64 at 10.13. Tooth loss can lead to disruption of the chewing process and ingestion of food, especially loss of posterior teeth because the performance of digestion based on occlusal contact of the teeth, so that the mastication function becomes reduced. Some authors suggested that individuals with no teeth tend to eat unhealthy foods.[4] Individuals who lose teeth cause decreased efficiency of mastication so they prefer foods that are soft-textured and foods that are easily chewed. Foods consumed are foods that are high in carbohydrates, cholesterol, and calories, but low in fiber, protein, iron, calcium, and essential vitamins. Individuals who lose teeth cause decreased efficiency of mastication so they prefer foods that are soft-textured and foods that are easily chewed. Foods consumed are foods that are high in carbohydrates, cholesterol, and calories, but low in fiber, protein, iron, calcium, and essential vitamins. This causes the lack of fulfillment of all nutrients needed by the body so the risk of malnutrition in the elderly increases.[5]

Malnutrition was defined as "a state of nutrition in which a deficiency, excess or imbalance of energy, protein, or other nutrients, including minerals and vitamins, causes a measurable adverse effect on body function and clinical outcome".[6] Nutritional problems faced by the elderly are closely related to decrease the physiological activity of the body. The lack of balance in food consumption will cause the condition of the elderly to decline naturally.[5] Based on research on the nutritional status of the elderly in Public Health Center according to MNA (Mini Nutritional Assessment), as many as 59.2% have a risk of nutrition, as many as 37.6% are not at risk of malnutrition and as much as 3.2% are experiencing malnutrition.[7]Based on data from the Health Service of West Sumatra Province in 2018 that many elderly people fall into the category of malnutrition in Tanah Datar District, which is 1,228 elderly from the total number of elderly, namely 3,064 elderly.

Based on those above, authors were interested to know The risk analysis of malnutrition by tooth loss among the elderly.

MATERIALS AND METHODS

This was an observational, analytical study with the Cross-Sectional Study approach that was approved by the ethical commission (150/KEP/FK/2018). The samples in this research were selected using a simple random sampling method. The number of samples in this study is 46 elderly in Social House Tresna Werdha Kasih Ibu Batusangkar were contributed to this study and selected by a simple random sampling method. *Simple random* sampling is such a sampling that each basic unit (individual) has the same opportunity to sample it. Characteristics of respondents were elderly people aged ≥ 60 years, without using artificial teeth and able to communicate well were eligible for this study.

Tooth loss can be classified by several methods, one of which is the eichner index. This eichner index classifies teeth according to occlusal support zones. The occlusal support zone is the area that contacts the posterior

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teeth. The occlusal support zone consists of natural teeth which are present in premolars and molars in the maxilla and mandible. In this classification there are as many as four support zones in the right molar, right premolar, left molar and left premolar.[8,9]Tooth loss examination was grouped according to Eichner index (Distribution of tooth loss in the elderly were divided by Eichner index into a group with occlusal supported by group A (having all occlusal support) and B (loss of 1-3 occlusal support), and group with no occlusal support is group C. Malnutrition risk data collection using the Mini Nutritional Assessment questionnaire, including six items cognitive impairment test (6 CIT) with the perceived scale-4 questionnaire. Score ≥12 refers to the risk of malnutrition, score ≤11 no risk.[10] The MNA®-SF was developed by Nestlé and leading international geriatricians and remains one of the few validated screening tools for the elderly. It has been well validated and reliable in international studies in a variety of settings5-7 and correlates with morbidity and mortality.The Mini Nutritional Assessment Short Form (MNA®-SF) is an effective tool to help identify patients who are malnourished or at risk of malnutrition.[11]

The six item impairement test has been validated.The 6 CIT questionnaire consisted of three types of tests namely temporal orientation, attention test, and short-term memory test. The temporal orientation test consists of three questions regarding the year, month and time. The attention test consists of two questions, counting backwards from 20 to one and reading the name of the month of the year from the last month, December to the first month, January. Memory test in the form of an order to remember the names of five items of street names and then respondents were asked to name the street The results of the 6 CIT interview are that if you answer the question correctly you will get a zero score and if the answer is wrong you will get a score of two to four. The total range of scores obtained from this examination is from zero to 28. If the assessment results are zero to seven indicates the respondent's cognitive condition is normal. Mild dementia is marked when getting a score between eight to nine and severe dementia if it scores ten to 28.[12] The data were analyzed by Chi-Square test.

RESULTS

The majority of the study population belonged to the 60-69 years age group (43.5%). More than 65.2% of the respondents is the man. The majority of the elderly live in the social house for less than ten years (58.7%). According to the 6 CIT score,the neuropsychological condition of the respondents was categorized into three groups: normal, mild, and severe. 47.8% of the elderly were severe dementia.

Table 1. Sociodemographcharacteristic

No	Category	Distribution frequency	
		n	%
1.	Age (years)		
	a. 60-69	20	43.5
	b. 70-79	19	41.3
	c. ≥80	7	15.2
2.	Gender		
	a. Man	30	65.2
	b. woman	16	34.8
3.	An extended stay at the social house (years)	27	58.7
	a. ≤ 10	19	41.3
	b. > 10		
4.	Neuropsychological conditions (dementia)	22	47.8
	a. severe	7	15.2
	b. mild	17	37
	c. normal		

Table 2. Classification of tooth loss based on index Eichner

Classification of IndexEichner	Frequency (n)	Percentage (%)
A1	0	0
A2	0	0
A3	0	0
B1	2	4.3
B2	1	2.2
B3	8	17.4

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C1	6	13.0
C2	16	34.8
C3	13	28.3
Total	46	100.0

The distribution A1, A2, A3, B1, B2, B3, C1, C2, and C3 subtype as shown in Table 2 The frequency distribution subgroup tooth loss based on the Eichner index could be seen in Table 1 Respondents in group A were not found in this study. In group B, most were in the B3 subgroup of 8 people (17.4%). In group C the respondents were the most in the C2 subgroup of 16 people (34.8%).

Based on table 3 it can be seen the majority of the respondents without occlusal support were 35 respondents (76.1%). According to the MNA score, more than 69.6% of those who were 'at risk of malnutrition.The psychological stress condition of the respondents can be seen in Table 3, where 25 respondents experienced psychological stress conditions (54.4%). Table 4 showed that the female experienced more loss of all occlusal support (Group C) (81.2%). Table 5 showed that respondents who experienced malnutrition risk most experienced at the age of 75-90 years (73.3%).

Table 3. Occlusal Support

Category	Yes		No	
	n	%	n	%
Available of Occlusal support	11	23.9	35	76.1
The Risk of malnutrition	32	69.6	14	3.4
a condition of psychological stress	25	54.4	21	45.6

Table 4. Frequency distribution of tooth loss based on gender

Gender	have occlusal support group A & B		No occlusal support Group C	
	f	%	F	%
Man	8	26.7	22	73.3
Woman	3	18.8	13	81.2

Table 5. Frequency distribution of Malnutrition risk based on age

Age (years)	No risk		Risk	
	f	%	f	%
60-74	10	32.3	21	67.7
75-90	4	26.7	11	73.3

The bivariate analysis evaluates, there is a a risk of malnutrition in the elderly who experience tooth loss. Table 6 shows 85,7 % who no occlusal support (tooth loss) are at risk of malnutrition in the elderly based on Mini Nutritional Assessment in Social House Tresna Werdha Kasih Sayang Ibu Batusangkar

Table 6. Risk of malnutrition in the elderly who experience tooth loss

Tooth loss	Risk of malnutrition			
	No risk		risk	
	n	%	n	%
Have occlusal support	9	81.8	2	18.2
No occlusal support	5	14.3	30	85.7
Total	14	30.4	32	69.6

DISCUSSION

The World Health Organization (WHO) in Fatmah (2010) classified elderly people into four groups, namely middle age aged 45-59 years; elderly aged 60-74 years; old aged 75-90 years and ancient age above 90 years.[6]The majority of the study population belonged to the 60-69 years age group (43.5%).

The results showed that most of the elderly (76.1%) in social institutions had lost all occlusal support, while those who lost one to three occlusal supports were 23.9%. In a study conducted by Ikebe et al (2012), there were 81% of respondents who entered the C and B groups losing occlusal support according to Eichner.[13]

The results showed that there were (4.3%) respondents who lost one occlusal support, (2.2%) two occlusal support, and (17.4%) three occlusal support. Loss of occlusal support especially on the posterior side affecting the mastication of each individual. According to Ikebe et al. that the less the number of posterior teeth the mastication function will be worse.[13]

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The results showed that the female respondent experienced more loss of all occlusal support (81.2%). This is due to post-menopausal women will undergo hormonal and musculoskeletal metabolism change. Decreased levels of estrogen also occur during menopause; this is associated with increased resorption of alveolar bone, loss of periodontal tissue adhesion and tooth loss. The length of menopause also affects the decrease in bone density resulting in loss of teeth resulting in a reduction of mastication ability.[14]

Malnutrition risk assessment is based on research conducted at Tresna Werdha Social Home, Ibu Batusangkar's compassion using a Mini Nutritional Assessment (MNA). The use of MNA aims to determine the risk condition for malnutrition in the elderly so that the risk of malnutrition can be prevented early on. MNA consists of full MNA and short form MNA in this study researchers used a Mini Nuritional Assessment Short Form (MNA-SF).This study using MNA-SF showed that more than 50% of the elderly were in high-risk of malnutrition (69.6%)and non-malnourished respondents as many as (30.4%). This is in line with research conducted by Nurfantriat Social House Tresna Werdha Minaula Kendari, that there are (58.9%) elderly who were at risk of malnutrition.[15]

This study showed that elderly people aged 60-74 years had lower malnutrition risk (67.7%) than the elderly aged 75-90 years (73.3%). This is because the chewing efficiency will be reduced due to tooth loss as age increased. As age increased, the need for carbohydrate and fat nutrients will also be decreased, while the demand for protein, vitamins, and minerals increase, while the foods consumed by the elderly are foods high in carbohydrates, cholesterol, and calories but low in fiber, protein, iron, and essential vitamins. This causes the non-fulfillment of all the nutrients the body needs so that the risk of malnutrition in the elderly increases.[5] Factors that can affect a person experiencing the possibility of malnutrition in the elderly are found in the MNA-SF questionnaire, namely decreased food intake, weight loss, mobilization, neuropsychological problems or acute illness, neuropsychological problems and the results of BMI calculations.[15]

This study showed that (54.4%) elderly experienced psychological stress. This is in line with the research conducted by Saha et al. in nursing homes of south Suburban Kolkata, India and Indriana et al. in Pustang Gading Parang Ward that there was a high incidence of stress experienced by the elderly. According to Saha et al. a high proportion of at risk of malnutrition and malnutrition associated with the presence of psychological stress[16]. According to Indriana et al. the stress experienced by the elderly in the orphanage was due to changes in daily activities, changes in family associations, partner and family member deaths and changes in the choice of recreation and work.[17]

Table 7. Frequency distribution of condition of psychological stress

condition of psychological stress	Frequency (f)	Percentage (%)
No	21	45.6
Yes	25	54.4
Total	46	100.0

Based on the results of the study (47.8%) respondents experienced severe dementia and (37%) did not have dementia. The presence of dementia disorders in a person can also affect his nutritional intake because dementia can cause the person to forget to eat and they are also not concerned with the nutrients the body needs.[3]Yildiz's research results also showed that dementia especially advanced dementia stage was associated with malnutrition experienced by a person. Malnutrition also seemed to be associated with sleep turbances, psychological problems, immobility, falls and increased hospitalization risk in these patients.[18] So that nutritional intake in the elderly is not fulfilled and if this continues it will cause malnutrition.

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Table 8. Frequency distribution of neuropsychological conditions

Neuropsychological conditions	Frequency (f)	Persentage (%)
Severe dementia	22	47.8
Mild dementia	7	15.2
Normal	17	37
Total	46	100.0

The results showed that respondents who experienced a loss of one to three occlusal support, on average had no risk of malnutrition while respondents who experienced a loss of all occlusal support, on average had a risk of malnutrition. Loss of occlusal support will affect the chewing of the respondent which results in insufficient nutrition needed by the body, so the risk of malnutrition increases. This is in line with research conducted by Zelig et al in 2016, that there is a significant relationship between tooth loss and the risk of malnutrition. Respondents who have less occlusal support will have a greater risk of experiencing malnutrition compared to respondents who have more occlusal support.[19]

Changes in physiological function in the elderly can cause a decrease in food intake which results in a decrease in nutritional status. Decreased physiological function in the elderly has a close relationship with a decrease in nutritional status is decreased ability to chew food and reduced digestive enzyme secretions and result in a lack of food intake in the elderly[5]. The result of the statistical test showed that p-value <0.05, it can be concluded that there was a significant relationship between tooth loss and the risk of malnutrition. The results showed that respondents who experienced one to three occlusal losses, on average did not have malnutrition risk while respondents who lost all occlusal support averaged had the risk of malnutrition. Loss of occlusal support will affect the mastication process and lead to nutrient insufficiency of the body needs, so the risk of malnutrition is increasing

CONCLUSION

There is a significant relationship between tooth loss and the risk of elderly malnutrition based on the Mini Nutritional Assessment at the Tresna Werdha Kasih Sayang Ibu Social House Batusangkar.

Almost of elderly have a high risk of loss occlusalsupport.The more teeth are lost, the risk of malnutrition will increase, so it is recommended to meet nutritional needs.

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