

Relation between Tooth Loss and Denture Wearing toward Nutritional Status

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Abstract

Tooth loss and denture wearing can affect a person's food intake. The purpose of this study was to analyze the relation of tooth loss and denture wearing on nutritional status.

The study was conducted with a cross-sectional method on 129 subjects aged 34-80 years. Subjects had their teeth checked and interviewed using Mini Nutritional Assessment (MNA) questionnaire. Data was analyzed using statistical software.

The result of chi-square analysis showed no significant relation between tooth loss and nutritional status ($p=0.71$) and between denture wearing and nutritional status ($p=0.25$). Relation was found between age and nutritional status, educational level and nutritional status, and age and denture wearing.

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Introduction

Dental and oral problems are still suffered by many Indonesian. According to Basic Health Research (RISKESDAS) conducted by Ministry of Health Republic of Indonesia, 25.9% of Indonesia's population have problem with their teeth and mouth, with DMF-T index score of 4.6 which means the prevalence of dental health problems in Indonesia is still high¹. Among the three indicators considered in the DMF-T index, tooth loss is the highest value. This indicates that most common dental problem experienced by the population in Indonesia is losing teeth.

The worst impact of tooth loss is the disruption of the function of mastication. It can affect the selection of food², which will affect a person's food intake and nutritional status. Nutritional status can develop into malnutrition which when left untreated can lead to increased incidence of disease.

To overcome the problems due to loss of

teeth, individuals who suffered ideally wear dentures. Loss of teeth and denture wear as sociated with nutritional status remains unclear. In the process, there are factors which will affect the individual loss of teeth, denture wear, and nutritional status, such as age, gender, educational level, and economic status. In this study we will investigate the relation between tooth loss and denture wearing also nutritional status with regard to the relationship of sociodemographic factors on all three.

Materials and methods

This study is a cross-sectional analytical study that analyzes the relationship of tooth loss and denture wearing on nutritional status, which seen and measured only once at the time of inspection. The independent variables in this study are tooth loss and denture wearing. The dependent variable is nutritional status. In addition, there are four confounding variables were considered: age, gender, educational level, and economic status.

The study was conducted in an event by Centre for Ageing Studies, Universitas Indonesia. Inclusion criteria to be the subject is able to communicate and can be measured height,

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weight, arm circumference and calf circumference. Subjects who did not sign the informed consent will be excluded as a research subject. The research was already approved by Faculty of Dentistry, Universitas Indonesia ethic committee with number 6 / Ethical Clearance / FKGUI / 1 / 2013.

In this study, researcher was helped by 10 people to take the data directly on the subject with calibration before hand. Data collection done as the following. Research subjects who have met the inclusion criteria sign the informed consent. There after, oral cavity examination to determine the loss of teeth and denture wearing done by the operator. To classify tooth loss, this research uses Eichner index (A: 4 support zones; B: 1-3 support zones; C: 0 support zones for occlusal contacts), while for denture wearing, the subject is classified into wear or not wear dentures only. After that, the measurement is done by interviewing subjects' nutritional status using Mini-Nutritional Assessment questionnaire³.

Height measurement using stature meter, weight using analog scales, as well as arm circumference and calf circumference using a meter of fabric made to meet some point questionnaire.

The collected data were analyzed using analytical data software. Univariate data analysis conducted to determine the frequency and percentage distributions of each variable in a population of subjects, then analyzed using analysis of hypothetical comparative test(chi-square or Fischer's exact test) to see the relationship between variables.

Results

Subjects are visitors at the event, the majority live in the city of Depok. There are 131 subjects who performed dental examinations and interviews, but two subjects did not complete their personal data so only the 129 datas were processed. Research subjects has an average age of 59.98 years, has lost teeth as much as 7.12 teeth and monthly expenses of IDR 1,829,395. Distribution of subjects is showed in Table 1.

Variable	N	%
Age		
Adult (20-44)	11	8.5
Pre elderly (45-59)	38	29.4
Elderly (60-69)	80	62.1
Gender		
Male	23	17.8
Female	106	82.2
Educational Level		
Primary (ES-JHS/equivalent)*	31	24.1
Secondary (SHS/equivalent)**	55	42.6
Higher	43	33.3
Economic Status		
Below average	72	55.8
Above average	57	44.2
Denture Wearing		
Not wearing	104	80.6
Wearing	25	19.4
Tooth Loss (Eichner)		
A (4 support zones)	55	42.6
B (1-3 support zones/anterior only)	68	52.7
C (0 support zones)	6	4.7
Nutritional Status		
Malnutrition	4	3.1
Risk of malnutrition	50	38.8
Normal	75	58.1

Table 1. Distribution of Subjects.

*ES= elementary school, JHS= junior high school.

**SHS= senior high school.

	Nutritional Status						P
	Malnutrition		Risk of Malnutrition		Normal		
	N	%	N	%	N	%	
Tooth Loss (Eichner)							0.88
A	1	1.82	21	38.18	33	60.00	
B	3	4.41	26	38.23	39	57.36	
C	0	0.00	3	50.00	3	50.00	
Denture wearing							0.51
Not wearing	3	2.88	38	36.54	63	60.58	
Wearing	1	4.00	12	48.00	12	48.00	

Table 2. Bivariate Analysis of Relation of Tooth Loss and Denture Wearing towards Nutritional Status.

	Nutritional Status						P
	Poor		Good				
	N	%	N	%			
Tooth loss (Eichner)							0.71
A	22	40.00	33	60.00			
B dan C	43	43.24	42	56.76			
Denture wearing							0.25
Not wearing	41	39.42	63	60.58			
Wearing	13	52.00	12	48.00			

Table 3. Bivariate Analysis of Relation of Tooth Loss and Denture Wearing towards Nutritional Status (MNA) with Combined Categories.

	Nutritional Status				P
	Poor		Good		
	N	%	N	%	
Age					0.04*
Adult	15	30.61	34	69.39	
Elderly	39	48.75	41	51.25	
Gender					0.27
Male	12	52.17	11	47.83	
Female	42	39.62	64	60.38	
Educational Level					0.01*
Primary	15	48.38	16	51.62	
Secondary	15	27.27	40	72.73	
Higher	24	55.81	19	44.19	
Economic status					0.16
Below average	34	47.22	38	52.78	
Above average	20	35.08	37	64.92	

Table 4. Bivariate Analysis of Relation of Confounding Variables toward Nutritional Status (MNA) * p < 0,05.

Bivariate analysis was conducted to determine the relation between variables tooth loss and denture wearing toward variable nutritional status as seen in Table 2. Merging was done in analysis for Eichner index (merging B&C) and nutritional status (merging malnutrition & risk of malnutrition). The result showed a non-significant result between tooth loss and nutritional status (p=0.71) also between denture wearing and nutritional status (p=0.25) as seen in Table 3.

	Eichner Index				P
	A		B and C		
	N	%	N	%	
Age					0.25
Adult	24	48.98	25	51.02	
Elderly	31	38.75	49	61.25	
Gender					0.93
Male	10	43.47	13	56.53	
Female	45	42.45	61	57.55	
Educational Level					0.45
Primary	15	48.38	16	51.62	
Secondary	20	36.36	35	63.64	
Higher	20	46.51	23	53.49	
Economic Status					0.54
Below average	29	40.28	43	59.72	
Above average	26	45.61	31	54.39	

Table 5. Bivariate Analysis of Relation of Confounding Variables towards Tooth Loss (Eichner Index).

	Denture Wearing				P
	No		Yes		
	N	%	N	%	
Age					0.01*
Adult	45	91.84	4	8.16	
Elderly	59	73.75	21	26.25	
Gender					0.38
Male	17	73.91	6	26.09	
Female	87	82.08	19	17.92	
Educational Level					0.57
Primary	27	87.09	4	12.91	
Secondary	43	78.18	12	21.82	
Higher	34	79.07	9	20.93	
Economic Status					0.35
Below average	56	77.78	16	22.22	
Above	48	84.21	9	15.79	

Table 6. Bivariate Analysis of Relation of Confounding Variables towards Denture Wearing. *p < 0,05.

Analysis between confounding variables with the dependent variable (Table 4.) showed a significant relation between age and nutritional status (p=0.04) as well as educational level and nutritional status (p=0.01), but for the variable gender and economic status showed no significant relation to nutritional status. To determine the relationship between confounding variables and independent variables, the researchers did the bivariate analysis as in Table 5 and 6. Analysis between all the confounding variables and tooth loss did not show a significant association, while in analysis between the confounding variables and denture wearing showed significant correlation between age and denture wearing (p=0.012) while for other confounding variables did not show significant results. Merging was also done for variable age because the adult age group has a small amount so that it will be merged with the pre elderly age group into adult groups.

Discussion

Results of bivariate analysis between tooth loss (Eichner index) and nutritional status (MNA) shows the value of p=0.71 (p > 0.05), which means there is no relation between tooth loss and denture wearing toward nutritional status. In the group of poor nutritional status, 43 subjects (66.15%) have tooth loss in Eichner categories B and C. However, in the group of

good nutritional status, people who have categories B and C are also more than those who have A category, which is 42 out of 75 subjects (56%). This is in contrast to study conducted by Mc Kenna et al. which states that there is a relationship between the results of MNA questionnaire and number of posterior occlusal contacts⁴.

This difference can occur because in their research, they did not categorize occlusal contacts based on Eichner index, but based on the number of occlusal contacts and then they analyze the relationship with a score of MNA. In addition, the results of our study are also different from the results of research by Ikebe et al. which states that the number of posterior occlusal contacts associated with the ability of mastication that would be related to nutritional status⁵. The result of our study can also be caused due to the study design is a cross-sectional so that it could not see a causal relationship between the two variables. Therefore, further research is needed with prospectively study method to determine the relationship of tooth loss and denture wearing on nutritional status within a certain time frame.

Chi-square test between denture wearing and nutritional status showed a non-significant result ($p = 0.25$). This result is contrary to research by Cousson et al. which compares the MNA scores on full denture wearers and complete toothed individuals³. It is also contrary to the results of research by Soini et al. which states that there is a relationship between denture wearing and nutritional status⁶ and also some markers of nutritional status and intake of nutrients changed after treatment, regardless of prosthetic treatment type.⁷ It can be caused due to the small number of denture wearers on the subject, that only 25 of the 129 subjects, so it will affect the data analysis. In the study Cousson et al., the subject compared to full denture wearers while in this study only one person wore full denture so that the effect can be different. Among the 25 denture wearers, almost all used removable partial dentures (RPDs) which according to research, the mastication ability is lower than fixed denture⁸.

In addition, nutritional status is not only influenced by the ability and efficiency of mastication which can be enhanced by denture wearing, but to be multifactorial⁹. A study by Wöstmann et al. also concluded that no significant changes were observed regarding

MNA, anthropometric data or energy supply after implant-prosthetic rehabilitation.¹⁰

In the bivariate analysis between the confounding variables and nutritional status, it appears that age has a relation to nutritional status ($p=0.04$). It is contrary to previous study that said there was no relationship between age and nutritional status¹¹. The number of malnourished elderly is more than adults which is consistent with research by Cousson et al. which states that the higher the age, the higher the risk of malnutrition occur³. This could be due to a decreased function of the body in the processing of nutrients, both in terms of absorption, transport, metabolism and excretion with age¹².

Muscle weakness in the elderly also may cause a decrease in the ability of mastication so that the intake of nutrients that the body will be limited³. The educational level also has a statistically significant association with nutritional status ($p = 0.01$). Some studies show that the higher the level of education a person, the better the diet, nutrient intake, and nutritional status¹³. It is associated with increased knowledge about nutrition and also earn better so that the ability to meet the nutritional needs can be met. However, in this study the proportion of subjects with higher education levels has poor nutritional status is more than the good one. It can be caused due to the proportion of subjects who are highly educated has more on the elderly group than adult group, while the test result shows the relationship between age and nutritional status with a tendency the older person, the worse nutrients are. In this study, gender and nutritional status does not have a meaningful relationship. It can be caused due to unbalance amount of male and female subjects. Test analysis of the relationship between economic status and nutritional status also showed no association, which can be caused because the average expenditure on a subject which is used as the point of intersection is quite high (IDR 1,829,395) so that the subjects having lower economic status still have good nutritional status (52.78%) than poor (47.22%). Future studies may try to use the median value to be used as a cut off point.

The result of the analysis of the relation ship between tooth loss and the confounding variables showed no significant relationship. Although not statistically significantly different, there are differences in the proportion of worse

tooth loss status (Eichner index B and C) more in the elderly, women, the secondary education level, and below average economic status. This is consistent with RISKESDAS¹ stating that tooth loss increases with increasing age and occurs more in women, also research by Jiang et al.¹⁴ which states that the prevalence of tooth loss is more experienced in people with low education and income levels.

Chi-square test showed that age associated with denture wearing, with $p=0.01$. This is consistent with RISKESDAS¹ stating that denture wearing will increase with age. Increased denture wearing can be associated with an increased number of tooth loss in advanced age, so more and more in need of dentures. Meanwhile, gender, educational level, and economic status was not associated with denture wearing. This can be caused by too little proportion of subjects who wear dentures and uneven distribution characteristics.

Conclusions

Based on research, it can be concluded that:

- 1) There is a relation between nutritional status and age, nutritional status and education level, as well as age and denture wearing.
- 2) There is no association between tooth loss and nutritional status, denture wearing and nutritional status, nutritional status and gender, nutritional status and economic status, tooth loss and sociodemographic factors (age, gender, educational level, economic status), denture wearing and gender, denture wearing and education level, as well as denture wearing and economic status.

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Declaration of Interest

The authors report no conflict of interest.

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