# THE FEATURES OF DEGENERATIVE DISEASES AND THEIR ASSOCIATION WITH THE LOSS OF TEETH IN THE ELDERLY OF EAST JAKARTA (INDONESIA)

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Abstract. This epidemiological survey was conducted to find features of degenerative diseases associated with loss of teeth in the elderly. One hundred sixty-seven elderly (≥60 years old) people from local government health centers in East Jakarta, Indonesia were included in the study. The degenerative diseases (DM, hypertension, heart disease) were determined by physical examination, laboratory testing and questionnaires. Tooth loss was measured by the DMF-T (decay, missing, filling teeth) index. Oral hygiene condition was based on OHI-S (oral hygiene index simplified) index. The most common degenerative disease was hypertension (45.5%). DM was found a few (3.6%). Approximately 55% of respondents had moderate oral hygiene problems. The demand for professional dental care was low. There was no significant association between degenerative diseases and the loss of teeth. In conclusion, the loss of teeth was not associated with degenerative diseases, but may have been influenced by local factors such as a low demand for dental hygiene.

## INTRODUCTION

The human mouth needs more care than any other part of the body. The products of food decay in the oral cavity are often injurious to the teeth and the supporting tissue and gums. Dentists surveyed believed the principal motivating factor for success in oral hygiene is the patient's desire to keep his teeth and the second most important factor is the patient's previous dental problems. Patient apathy has been considered the main cause for poor oral hygiene (Stoll, 1977). It is sufficient to state that dental health education is one of the most important approaches toward a solution to the problem. Additional evidence is found in numerous studies which reveal the wide gap between dental care needs and dental treatment in all economic groups of the population. A study of oral health among 169 elders in west and south Jakarta showed a low awareness regarding good oral hygiene. A lack of dental health consciousness, dental health education, and appropriate dental care facilities results in poor oral hygiene (Sudiono *et al,* 2004).

Life expectancy in Indonesia is expected to increase to 65 years (Indonesian Department of Health, 1998). An Indonesian Social Department statement in 1998 revealed that people age 60 and older will be categorized as elderly (Indonesian Department of Health, 1998). Medical and dental health problems increase with increasing age in the population.

The physiology of human organs changes with the aging process, and involves physical, biological, mental, social and economic processes. Medical and dental research has shown that systemic and orodental diseases have a significant impact on humans and society (Dolan, 1997).

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Diseases in the elderly are not different from those in younger people, however they are more frequent due to physiological changes. Therefore, diseases in the elderly are classified as degenerative diseases due to the degenerative changes (Morely, 1986). The elderly are more likely to develop degenerative diseases, such as hypertension, atherosclerosis, DM, digestive disorders, cerebrovascular disease, and heart disease (Umino and Nagao, 1993). A study in the elderly found a significant relationship between severe tooth decay and hypertension as a results of bacteremia from the dental infection with a relative risk of 1.39 (Sudiono, 2000).

The oral cavity may have secondary manifestations of systemic diseases. It can be examined directly regarding its two important functions, namely speech and mastication. Its condition can be evaluated by the number of lost teeth and the presence of appropriate professional rehabilitative treatment.

Disturbance of carbohydrate metabolism in the elderly, including glucose intolerance and DM is common in the elderly. DM can disturb oral and dental health through microangiopathy, neuropathy, and salivary derangements. It manifests in poor oral hygiene, calculus formation, caries, dento-alveolar abscesses, periodontal disease, loss of supporting bone resulting in loose and missing teeth, oral mucosa ulceration and *Candida albicans* proliferation (Ranakusuma, 1987; Darmojo, 1999). These pathological conditions may be a result of lack of dental hygiene or dental care resulting in the loss of teeth.

Caries and periodontal disease are two of the most prevalent diseases. The most common cause of tooth loss is poor oral hygiene. Caries are a significant problem in the elderly (Lynch, 1984). The reduction of salivary flow (xerostomia) has an important role in the pathogenesis of caries, especially in DM patients (Beck *et al*, 1990; Burt, 1994). Periodontal disease is also an important problem in the elderly, especially those with DM. Sub-gingival calculus, which is easily formed in DM, may act as a local etiological factor for the rapid progression of periodontal disease. DM reduces the defense mechanisms of gingival and periodontal tissue against infection (Lynch, 1984).

In Indonesia, studies in the elderly regarding dental health are insufficient, therefore this study was carried out of evaluate the association between degenerative diseases and oral health in the elderly. This study was conducted in east Jakarta among a mixed population of rural and urban subjects. The results of this study will be used to develop and expand the Regional Elderly Health Program Plan needed to fulfill the Indonesian Health Department Objectives to improve the Elderly Oral and Medical Health Services Program. This study will also be used to develop the groundwork for further research in the elderly.

## MATERIALS AND METHODS

This was a cross-sectional observational epidemiological study. The subjects were those ≥60 years old attending local government health centers in east Jakarta. The total sample size was 167 subjects.

The degenerative disease variables observed in this study were DM, hypertension, heart disease, and combinations of these. DM was diagnosed by glucometer as a random blood glucose ≥200 mg/dl or a history of receiving medical care for DM. Hypertension was determined by a blood pressure of ≥140/90 mmHg or a history of receiving medical care for hypertension. Heart disease was determined by examination of pulse, auscultation of the heart and/ or a history of receiving medical care for heart disease. Oral and dental health were determined by evaluating oral hygiene and the number of lost teeth. The number of lost teeth was recorded by the score for M (missing indecated or extracted teeth)

in the DMF-T (decay, missing, filling teeth) index. Oral hygiene was based on the OHI-S (oral hygiene index simplified) score which was categorized as good (score of 0-1.2), moderate (score of 1.3-3), or poor (score >3).

Each subject had physical and laboratory examinations, including measurement of blood pressure, pulse, cardiac auscultation, random blood glucose level, and evaluation of oral and dental health. An interview was performed to fill in a questionnaire regarding symptoms and habits related to degenerative disease variables.

## RESULTS

The subject ages ranged from 60 to 85 years old (mean age 64.02 ± 5.36 years). The distribution and frequencies of degenerative diseases based on the age group are shown in Tables 1 and 2.

Table 3 shows the distribution of degenerative disease variables by the number of lost teeth.

The one-way ANOVA test of degenerative disease variables and the number of lost teeth showed no significant differences (Table 4), while the chi-square test of degenerative disease variables and their habits and symptoms (Tables 5, 6, 7) showed significant differences.

Table 8 shows the oral hygiene of respondents.

Table1
Distribution of degenerative disease variables by age group (N=167).

| Degenerative diseases | Age | | Total |
|---|---|---|---|
| | (60-64 ) | (65-85) | |
| Healthy | 40 | 21 | 61 |
| DM | 5 | 1 | 6 |
| Hypertension | 44 | 32 | 76 |
| Heart disease | 2 | 3 | 5 |
| DM and hypertension | 7 | 3 | 10 |
| DM and heart disease | 1 | 0 | 1 |
| Hypertension and heart diseases | 4 | 3 | 7 |
| DM and hypertension and heart disease | 1 | 0 | 1 |
| Total | 104 | 63 | 167 |

Table2
Frequencies and percentages of degenerative disease variables (N = 167).

| Degenerative diseases | Frequency | % | % Cumulative |
|---|---|---|---|
| Healthy | 61 | 36.5 | 36.5 |
| DM | 6 | 3.6 | 40.1 |
| Hypertension | 76 | 45.5 | 85.6 |
| Heart disease | 5 | 3.0 | 88.6 |
| DM and hypertension | 10 | 6.0 | 94.6 |
| DM and heart disease | 1 | 0.6 | 95.2 |
| Hypertension and heart disease | 7 | 4.2 | 99.4 |
| DM and hypertension and heart disease | 1 | 0.6 | 100 |
| Total | 167 | 100 | |

Table 3
The distribution of degenerative disease variables by number of lost teeth (N=167).

| Degenerative diseases | The number of lost teeth | | | Total |
|---|---|---|---|---|
| | 0-10 | 11-20 | 21-32 | |
| Healthy | 24 | 22 | 15 | 61 |
| DM | 3 | 1 | 2 | 6 |
| Hypertension | 28 | 28 | 20 | 76 |
| Heart disease | - | 3 | 2 | 5 |
| DM and hypertension | 3 | 4 | 3 | 10 |
| DM and heart disease | 0 | 1 | 0 | 1 |
| Hypertension and heart disease | 4 | 3 | 0 | 7 |
| DM and hypertension and heart disease | 1 | 0 | 0 | 1 |
| Total | | | | 167 |

Table4
One-way ANOVA test of degenerative diseases and the number of lost teeth.

| Degenerative diseases | df | f | Significant |
|---|---|---|---|
| DM | 31 | 0.68 | 0.89 |
| Hypertension | 31 | 0.79 | 0.77 |
| Heart disease | 31 | 0.83 | 0.72 |
| DM and hypertension | 31 | 0.63 | 0.93 |
| DM and heart disease | 31 | 0.48 | 0.99 |
| Hypertension and heart disease | 31 | 0.65 | 0.65 |
| DM and hypertension and heart disease | 31 | 0.36 | 0.38 |

Table 9 shows the frequency of denture wearers and evidence of dental treatment among edentulous respondents.

## DISCUSSION

In this study, 61 of 167 respondents (36.5%) did not have any degenerative diseases (Table 1). Among the degenerative diseases, hypertension was the most common (45.5%), followed by DM-hypertension (6%), hypertension-heart disease (4.2%), DM (3.6%), heart disease (3%), DM-heart disease (0.6%), and DM-hypertension-heart disease (0.6%). These results are different from those found by Darmojo (1999) who found the incidences of DM, hypertension and heart disease in cities were higher than in the villages. The mixure of urban and rural respondents in this study may be a reason for the large number of patients with hypertension (45.5%) compared to the other degenerative diseases. Urban living may be a predisposing factor for hypertension. According to Ranakusuma (1987), the greater number of diseases found in the urban population may be due to dietary patterns and overall health.

The incidence of DM among respondents was low (3.6%), just 4.8% and 1.5% among 60-64 year olds and over 65 groups, respectively (Tables 1 and 2). This is similar to a study by Berkey *et al* (1996) who found fewer than 10% of 65 year olds patients were diagnosed with DM type 2, and a study by Ranakusuma (1987) found the incidence of DM in those over age 65 years increases yearly (0.5-1.0%).

The number of those with heart disease

Table 5
Chi-square test of DM and habits and symptoms

| Habits and symptoms of DM | $\chi^2$ | p-value |
|---|---|---|
| Under medical care | 25.45 | 0.000* |
| Exercises | 0.028 | 0.65 |
| Polyuria | 16.46 | 0.000* |
| Polydypsia | 31.29 | 0.000* |
| Polyphagia | 21.76 | 0.000* |
| Loss of weight | 15.687 | 0.000* |
| Delayed wound healing | 7.63 | 0.01* |
| Fatigue | 8.43 | 0.00* |
| Xerostomia | 0.005 | 0.814 |
| Loose teeth | 0.004 | 0.095 |

*Significant ($p<0.05$)

Table 6
Chi-square test of hypertension and habits and symptoms

| Habits and symptoms of hypertension | $\chi^2$ | p-value |
|---|---|---|
| Under medical care | 10.41 | 0.001* |
| Exercises | 1.57 | 0.21 |
| Fatigue | 0.02 | 0.89 |
| Xerostomia | 0.00 | 0.98 |
| Loose teeth | 1.72 | 0.19 |
| Smoking | 1.42 | 0.49 |
| Headache | 4.1 | 0.04* |

*Significant

Table 7
Chi-square test between heart disease and habits and symptoms.

| Habits and symptoms of heart disease | $\chi^2$ | p-value |
|---|---|---|
| Under medical care | 5.70 | 0.02* |
| Exercises | 0.005 | 0.95 |
| Fatigue | 3.15 | 0.08 |
| Xerostomia | 0.1 | 0.75 |
| Loose teeth | 0.35 | 0.056 |
| Smoking | 0.38 | 0.83 |
| Chest pain | 5.04 | 0.03 |
| Tachycardia | 6.20 | 0.01* |

*Significant

Table 8
Oral hygiene based on OHI-S.

| OHI-S | Frequency | % |
|---|---|---|
| Good (0-1.2) | 23 | 13.8 |
| Moderate (1.3-3) | 93 | 55.7 |
| Poor (>3) | 51 | 30.5 |

Table 9
Denture wearers and dental treatment facilities among edentulous respondents.

| Edentulous respondents | Frequency | % |
|---|---|---|
| Non-denture wearer | 131 | 78.4 |
| Professional/local health center | 15 | 9 |
| Non-professional facilities | 21 | 12.6 |
| Total | 167 | 100 |

in this study was low (3%). This is because the risk factors for heart disease, such as DM, were few in number. Hypertension, also a risk factor for heart disease, was found in moderate numbers (45.5%). The low incidence of heart disease may also be caused by the simple methods applied in this study (based merely on the patient's memory and a simple physical examination), therefore detection of disease had a low sensitivity. Heart disease had a significant association with habits and symptoms, such as inadequate medical care ($p=0.02<0.05$), chest pain ($p=0.03$), and tachycardia ($p=0.01$), as shown in Table 7. A similar situation was found among hypertension and headache ($p=0.04$) and inadequate medical care ($p=0.001$) as shown in Table 6, and among DM, polyuria ($p=0.00$), polydypsia ($p=0.00$), polyphagia ($p=0.00$), weight loss ($p=0.00$), fatigue ($p=0.00$), inadequate medical care ($p=0.00$), and delay wound healing ($p=0.01$), as shown in Table 5. This study assumed that the data collected by questionnaire was accurate and could be used as supporting data.

The one-way ANNOVA test showed no

association ($p>0.05$) between degenerative disease variables (DM, hypertension, heart disease, and their combinations) and the number of lost teeth (Table 4). This may be due to the small number of degenerative diseases among respondents (less than 10%) with the exception of hypertension (45.5%). The low number of degenerative diseases, excluding hypertension shows there was a good maintenance medical health care program at local government health centers in this district. However, the dental health in this study was poor as is seen in Tables 8 and 9. More than half of (55.7%) the respondents had moderately poor oral hygiene while only 13.8% had good oral hygiene. Around 78% (131 of 167) of respondent who were edentulous persons and needed proper rehabilitation treatment did not use dentures, while only 9% of denture wearers were treated by professionals or at local health centers. The rest of denture wearers were treated at non-professional facilities. Dental treatment at non-professional facilities is not recommended, especially for elderly who have decreased biological defense mechanisms against traumatic factors, such as poor prostheses. The reasons for the use of non-professional facilities among respondents were ignorance, social and financial reasons.

This study found that loss of teeth in the elderly, was not influenced by degenerative diseases, but by local factors, such as poor oral hygiene, apathy toward dental health, and an effort to maintain healthy teeth in the oral cavity. This is reflected in the high number of lost teeth due to poor oral hygiene in respondents who were otherwise healthy and had no degenerative diseases.

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