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Conformity Study of DMF-T Index for Young Elderly, Middle Elderly, and Old Elderly

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ABSTRACT

Background: The most commonly used indicator for dental caries level is the DMF-T index. The DMF-T index is the index for assessing dental health status due to caries in permanent teeth. The DMF-T index was first used by Henry Klein et al. is the sum of the D/decay (dental caries), M/missing (missing teeth), and F/filling (caved teeth). Physical and cognitive changes in the elderly resulted in the assessment of the DMF-T index corresponding.

Materials and Methods: This is an analytic observational study, using a cross-sectional approach to four elderly communities. The elderly community selected in Jember were Karangrejo Village, Karangharjo Village, Karangsono Village, and Mojosari Village. This research used 2 DMF-T indexes: the DMF-T Klein index and the real DMF-T index. Research subjects were the young elderly (45-59 years old), middle elderly (60-74 years old), and old elderly (75 years and over). Data were collected in February-March 2021. The data were compared between the DMF-T Klein index and the real DMF-T index. Data then analyzed using Wilcoxon Signed Rank test

Results: This study found that there was a significant difference in the DMFT Index in the middle and old elderly. Whilst, in the young elderly, there is no significant difference in their DMFT index. This result indicates that the Klein DMF-T index can still be used at the age of 45-59 years old.

Conclusion: DMF-T Klein index is still appropriate for young elderly (45-59 years), but not for middle elderly (60-74 years) and old elderly (75 years and over).

KEYWORDS: DMF-T Klein; young elderly; middle elderly, old elderly

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I. INTRODUCTION

The elderly, according to the World Health Organization (WHO), is someone who has entered the age of 60 years and over. At the biological level, aging results from the impact of the accumulation of a wide variety of molecular and cellular damage over time, leading to a gradual decrease in physical and mental capacity and a growing risk of disease.[1] The elderly experience a decrease in organ function and various physical changes. The elderly not only experience physical decline but also experience cognitive decline. Cognitive decline causes older people to forget and lack cleanliness, especially oral hygiene, quickly. The elderly are prone to caries and periodontal disease due to decreased oral cavity and cognitive function. Caries and periodontal disease are the causes of tooth loss in the elderly.[2]

Dental caries is the single most prevalent chronic condition in the world, affecting slightly more than a third of the world's population.[3,4] Dental caries is generally caused by poor oral hygiene, resulting in the accumulation of plaque, which contains various kinds of bacteria. Dental caries is chronic and takes a long time to develop.[5] Dental caries can worsen if left untreated, causing pain and potentially causing tooth loss.[6] Periodontal disease in Indonesia ranks second, still a societal problem. This disease that attacks the gingiva and supporting tissues of the teeth is a severe infectious disease, and if proper treatment is not carried out, it can result in tooth loss.[7]

The 2013 Basic Health Research data from the Ministry of Health of the Republic of Indonesia shows that East Java has a relatively high caries prevalence with a DMF-T value of 5.5. DMF-T will increase with age. The DMF-T value in

the age group 45-54 years is very high (7.9), and for the age group 60 years and over, the DMF-T reaches 18.9, with the most significant component of M-T (average missing teeth) of 17.05 per person.[8] Basic Health Research data on DMF-T status in the elderly still does not describe the state of the oral cavity of the elderly because the M (missing) assessment in the elderly cannot be sure that the tooth loss is due to caries or other causes.[9]

The indicator often used to assess the level of dental caries is the DMF-T index from Henry Klein et al. The DMF-T index, according to Henry Klein et al., is the sum of the D+M+F indices, which shows the amount of tooth decay that a person has experienced due to dental caries in the form of D/decay (cavities/caries), M/missing (missing teeth) and F/filling (tooth filling). In older people, the DMF-T score is always significant due to being dominated by the M component (missing) compared to the other components.[9] Previous studies have linked the DMF-T index to dental health in children and adults. However, more needs to be studied about how it is used in older people. This study examines the suitability of using Klein's DMF-T index for the elderly.

II. MATERIAL AND METHODS

This type of analytic observational research uses a cross-sectional approach. This research was conducted in the elderly community in Karangharjo Village, Karangsono Village, Karangrejo Village, and Mojosari Village, Jember Regency. Provision of information and signing of informed consent by research subjects. Examination and calculation of the DMF-T Index score in older people. Data were collected twice for the Klein DMF-T index and the real DMF-T index to compare the value of Klein's DMF-T and the real DMF-T value, which is more suitable for the elderly. Data grouping according to WHO. However, there was no value for the oldest old group because it was difficult for subjects aged 90 years or older to gather. The researcher divided the age groups into three: youngest old (45-59 years), middle old (60-74 years), and oldest old (75 years and over).

Statistical analysis

The data were tested for normality using the Lelliefors Test and the homogeneity test using Levene Test. After the normality and homogeneity tests were carried out. it was continued with the Wilcoxon Signed Rank test to find out whether there were differences between the study groups.

III. RESULT

The Klein DMF-T index and the real DMF-T index can be seen in table 1.

Table 1. Klein DMF-T index and real DMF-T index in three different elderly age groups

Ages	N	DMF-T Klein Index	DMF-T Real Index
45-59	36	8,63	7,47
60-74	33	14,91	9,77
>74	12	23,67	12
Total	81	47,21	29,24

The DMF-T index data were then subjected to statistical tests. The data were first tested for data normality with the Kolmogorov Smirnov and further data correction with the Lelliefors Test and a data homogeneity test using the Levene test. The data were then analyzed using the Wilcoxon Signed Rank different test to see the difference between the Klein DMF-T index and the real DMF-T index. The results of the Wilcoxon Signed Rank test analysis can be seen in Table 2.

Table 2. Statistics analysis of the Klein DMF-T index and the real DMF-T index

Ages	N	DMF-T index difference	P
45-59	36	1,16	0,222
60-74	33	5,14	0,000*
>74	12	11,67	0,018*

*** = significant different**

IV. DISCUSSION

A high DMFT index score indicates the development of dental caries and further reflects the deterioration of oral hygiene.10 The major caries problem occurs in adults, not in children, and there is an unabating increase in caries as people get older.[11] The Wilcoxon Signed Rank different test showed a significant difference in the age group of 60-74 years and those over 74 years. There is no significant difference at the age of 45-59 years. These results indicate that the Klein DMF-T index can still be used at 45-59 years but is not suitable for use at the age of 60 years or more.

The age group of 45-59 years is still suitable for using Klein's DMF-T index because there have not been significant changes in the oral cavity or they are still in the early stages of old age. The Klein DMF-T index is unsuitable for those aged 60 years or older because it has deficiencies that cannot yet describe the state of the oral cavity. Weaknesses in the DMF-T index in the elderly are seen in caries, missing teeth, and fillings assessment. The total number of permanent human teeth is 32. Thus, the maximum DMFT index is 32, and the minimum value is 0. However, the index varies with geographical and ethnic differences.10 WHO categorizes DMFT > 4.5 and DMFT > 13.9 as a high level of caries experience in children
(below 12) and adults (35–44), respectively; however, no definition has been established for application to the older adult group.[12]

Aging, multimorbidity, and polypharmacy may increase caries risk in older adults.[13] Caries is a preventable disease, and various preventive measures are available.[14] In planning oral health promotion and prevention programs, understanding the current global caries burden is vital. The World Health Organization (WHO) recommends conducting clinical oral health surveys every five to six years within the same community to monitor disease patterns and trends effectively.[10] Caries in the elderly are different from adults because the elderly have experienced abrasions due to using long teeth. Root caries often occur in the elderly due to the aging process of the periodontal tissues, attrition, abrasion, and erosion of the teeth. Loss of teeth in the elderly is not necessarily due to caries; it can be caused by periodontal or other diseases that manifest in the oral cavity. There are very few fillings in the elderly because they prefer to pull out their teeth with caries rather than filling them. This behavior is due to prolonged treatment and relatively expensive treatment costs. This reason causes the difference in the assessment of the Klein DMF-T index to be inappropriate when used in older people.

The difference in the value of the Klein DMF-T index and the real DMF-T index is caused by the missing component (M), which is difficult to determine because the elderly often experience disease manifestations that affect the periodontal tissues and cause tooth loss, not due to caries. The M-component of the DMFT index is the dominant component in most studies among the elderly population.[15] The missing component (M) is often directly assessed as tooth loss due to caries. The group of adults and children generally lose their teeth, often caused by caries, not due to other diseases, while caries, periodontal disease, or other causes can cause tooth loss in the elderly. Periodontal disease in the elderly can be caused by manifestations of systemic disease or changes in the oral cavity due to reduced cognitive abilities in maintaining oral health. The pre-elderly age group (45-59 years) tends to experience less severe periodontal tissue damage, and pockets have not yet formed, while the elderly (60-74 years) and old age groups (74 years and over) have many huge bags, deep until experiencing missing. This result is in line with Munfida's research (2013), which says that tooth loss in the elderly is mainly caused by periodontal disease, while at a young age, it is usually caused by caries.

In addition, periodontal disease is more common in the elderly. Cognitive changes also affect memory decline. Decreasing memory in the elderly also involves the DMF-T index assessment because the elderly have difficulty remembering or quickly forgetting the history of losing their teeth, so it is difficult to determine the cause of the missing component (M). In the real DMF-T index, the missing part (M) is assessed in more detail, supported by information and supporting data from specific interviews regarding the history of tooth loss. It aims to see the real causes of tooth loss in the elderly. The elderly experience changes in the tissues of the oral cavity in the form of a decrease in the mechanism of adaptation and the potential for regeneration of tissues, jaws, dental supporting tissues, oral mucosa, tongue, salivary glands, and dental tissues. Another cause of tooth loss can also be associated with dental caries, which is experienced by most ages.[16]

Based on previous studies in 2016–2020, the prevalence of caries in older adults was still high in most countries around the globe. Health policymakers should have better planning to relieve the increasing global burden of caries from the surging older adult population in the coming decade.[17] Other studies showed the DMFT index among the institutionalized elderly had one of the most significant values in the literature. The M-component was dominant and an indicator of the absence of many teeth.9 A review reported the risk of caries in older adults increases by 60% with low resting pH and low stimulated salivary flow rate.[18]

The increased risk of caries and periodontal disease may eventually lead to tooth loss.[19] Tooth loss also occurs due to changes in the psychology of the elderly. These diseases can negatively affect the health of the elderly, namely tooth loss, gum disease, xerostomia, and periodontitis. Xerostomia is a common oral problem in the older adult population, with a prevalence of 33%.[20] Patients with xerostomia have an increased risk of dental caries and periodontal disease. Research shows that in primary education, many experience severe tooth loss, this is due to a lack of public knowledge about the importance of dental and oral health, and they say that going to the dentist is expensive and more practical to go to a dentist. As many as 20 subjects (24.6%) who had been to the dentist came from the upper secondary level of education. This finding shows that the higher the level of education, the higher the demand for dental health services. The results of this study stated that the DMF-T index was unsuitable for use by the elderly aged 60 years and over. The DMF-T index is appropriate for the young-elderly, adult, and children age groups. These age groups generally do not have systemic disorders or severe periodontal disease that causes tooth loss, so the missing component (M) is typically due to caries.

CONCLUSION

Klein's DMF-T index is still appropriate to be used in the young elderly (45-59 years) but is not suitable for middle and old elderly (60 years old and over) because it does not describe the real condition of the oral cavity in the elderly so it requires an adjustment in the score for the elderly.

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