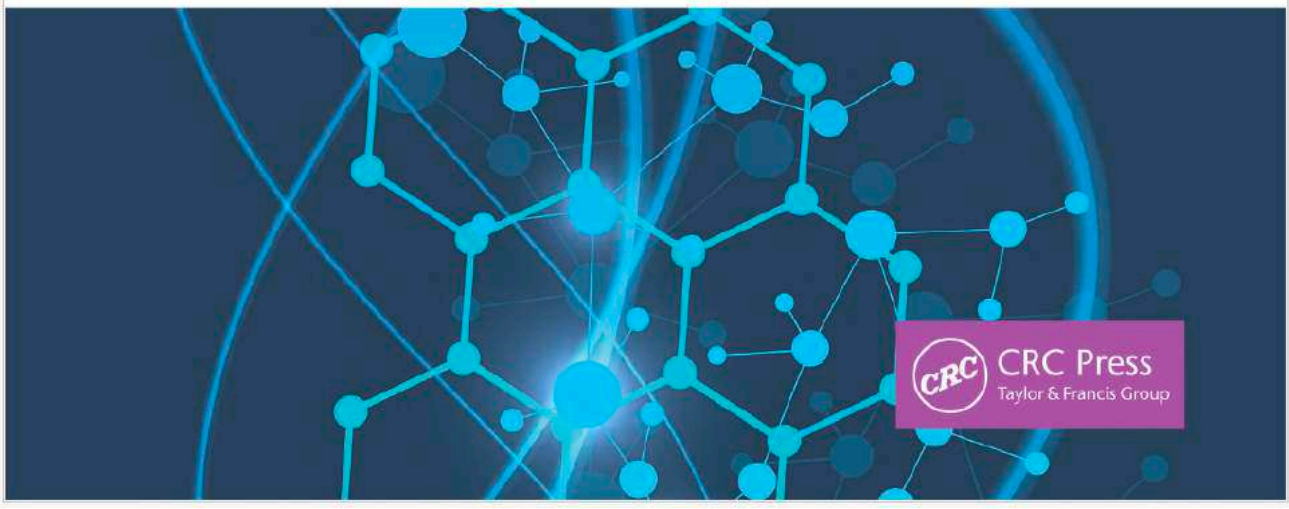
QUALITY IMPROVEMENT IN DENTAL AND MEDICAL KNOWLEDGE, RESEARCH, SKILLS AND ETHICS FACING GLOBAL CHALLENGES

Edited by
Armelia Sari Widyarman, Muhammad Ihsan Rizal,
Moehammad Orliando Roeslan & Carolina Damayanti Marpaung



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The proceedings of FORIL XIII 2022 Scientific Forum Usakti conjunction with International Conference on Technology of Dental and Medical Sciences (ICTDMS) include selected full papers that have been peer-reviewed and satisfy the conference's criteria. All studies on health, ethics, and social issues in the field of dentistry and medicine have been presented at the conference alongside clinical and technical presentations. The twelve primary themes that make up its framework include the following: behavioral epidemiologic, and health services, conservative dentistry, dental materials, dento-maxillofacial radiology, medical sciences and technology, oral and maxillofacial surgery, oral biology, oral medicine and pathology, orthodontics, pediatrics dentistry, periodontology, and prosthodontics. This proceeding will be beneficial in keeping dental and medical professionals apprised of the most recent scientific developments.

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Preface

Faculty of Dentistry Universitas Trisakti (Usakti) presents FORIL XIII 2022 Scientific Forum Usakti conjunction with International Conference on Technology of Dental and Medical Sciences (ICTDMS) on December 8th–10th 2022. The theme of the conference is "Quality Improvement in Dental and Medical Knowledge, Research, Skills and Ethics Facing Global Challenges".

The triennial conference has served as a meeting place for technical and clinical studies on health, ethical, and social issues in field medical and dentistry. It is organized around 12 major themes, including behavioral, epidemiologic, and health services, conservative dentistry, dental materials, dento-maxillofacial radiology, medical sciences and technology, oral and maxillofacial surgery, oral biology, oral medicine and pathology, orthodontics, pediatrics dentistry, periodontology, and prosthodontics.

The most recent findings in fundamental and clinical sciences related to medical and dental research will be presented in the conference that will be published as part of the conference proceeding. This proceeding will be useful for keeping dental and medical professionals up to date on the latest scientific developments.

Dr. Aryadi Subrata
Chairman FORIL XIII conjunction with ICTDMS

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The relationship between age with caries status and periodontal treatment needs on visually impaired individuals

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ABSTRACT: Poor periodontal conditions could affect health in general. Age, sex, control plaque habits, and other factors influence periodontal health conditions. Limitations for visually impaired people to control plaque could also affect the tooth's condition and periodontal health. This study aims to analyze the relationship between age with caries status and periodontal treatment needs in visually impaired people. This is a cross-sectional study conducted on 60 people with the visually impaired. Research process conducted with health protocol during a pandemic. Caries' status was measured by measuring DMFT score, and Periodontal treatment needs using the Community Periodontal Index of Treatment Needs (CPITN). This study shows that age-related to periodontal status ($p = 0.001$) but is not related to caries status ($p = 0.805$) and needs periodontal treatment ($p = 0.205$). Procedure control of less plaque appropriate could trigger plaque formation because of limitations of visual. Age is a factor involved in changing periodontal tissue so that it is more susceptible to experiencing a periodontal breakdown. Age is one contributing factor affecting periodontal health in visually impaired people.

1 INTRODUCTION

The Basic Health Research 2018 reports that the largest proportion of dental health problems in Indonesia is cavities (45.3%), while the majority of dental and oral health problems experienced by the Indonesian population are swollen gums or abscesses (14%) (Kementerian Kesehatan RI 2018). This dental and oral health problem requires healthcare facilities to provide comprehensive medical measures, but the COVID-19 pandemic has disrupted public access to health services. According to the United Nations (2020), the coronavirus pandemic poses a serious threat to persons with disabilities since they are already socially and economically marginalized and have restricted access to information and public services, including those for the visually impaired. Visually impaired, according to the Indonesian Blind Association (*Persatuan Tunanetra Indonesia*/PERTUNI) (2021), are individuals who cannot see (totally blind) and people who still have a residual vision but are unable to use their vision to read 12-point ordinary writing with normal light conditions and normal distances, although assisted by using glasses (less alert/*low vision*). Global Blindness and Visual Impairment in 2015 reported that there were 253 million people with visual impairments, and of that number, 217 million people had moderate to severe visual

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impairment, and the rest were blind (Ackland *et al.* 2017). Southeast Asia is the region with the fourth highest number of blind people in the world, and Indonesia is in the third highest position with a prevalence of 0.9% in Southeast Asia. The current population of Indonesia is around 250 million, meaning that currently, there are at least 3,750,000 blind people, both blind and *low vision categories* (Lisinus & Sembiring 2020).

Visually impaired individuals have limited functional conditions, so they find it difficult to get information from the surrounding environment through their vision and have a higher challenge in carrying out daily activities, including maintaining hygiene and dental and oral health (Dioni *et al.* 2014; Husniyah 2019; Puteri *et al.* 2020). The poor condition of the oral cavity of blind people is due to the lack of ability to see in, understand, and do dental and oral hygiene practices. Poor oral hygiene in blind people is caused by cariogenic food, the shape of the tooth position, and the lack of knowledge about oral dental health due to a lack of education on how to maintain dental and oral hygiene, resulting in plaque buildup (Sabilillah *et al.* 2016).

Plaque plays an important role in the process of damage to the hard tissues of the teeth and the soft tissues around the teeth and oral cavity. The bacteria in plaque will ferment glucose and sucrose to form acids which will cause demineralization of the teeth, leading to caries (Park *et al.* 2018). The bacteria in plaque will produce toxins that stimulate the gingiva so that inflammation occurs, and the gingiva bleeds easily. Plaque that undergoes remineralization will form calculus and migrate into the gingival sulcus, which can cause inflammation, alveolar bone resorption, formation of periodontal pockets, and finally, tooth loss, all of which are signs of periodontal disease (Angelino *et al.* 2017; Utama *et al.* 2017). Periodontal disease is an inflammatory process that occurs due to an unbalanced interaction between plaque microorganisms and the immune response that causes irreversible damage to the periodontal tissue (Cunha *et al.* 2015).

Various studies on the condition of caries and periodontal tissue in blind people have been carried out. Research by Liu *et al.* (2019) conducted to assess the oral health condition of visually impaired individuals found that blind individuals had a high prevalence of caries, poor periodontal health, and severe malocclusion. The prevalence of visually impaired persons with caries is 78.64%, 44.66% have gingival bleeding, and 67.96% have calculus. Research results by Turkistani & Elmarsafy (2019) also showed that the prevalence of caries in blind people was 78.7%. Research by Reddy & Sharma (2011) showed that the prevalence of caries in blind people was higher at 40%, while in normal individuals, it was only 11.5%. Increasing age will increase a person's susceptibility to periodontal disease due to degenerative changes. This relates to the duration of a person's exposure to other risk factors that trigger the occurrence of periodontal disease (Soulissa 2020; Wulandari *et al.* 2022).

Periodontal disease that is not given proper treatment will cause loose teeth to lose teeth. One of the steps to overcome this is to examine the periodontal tissue to determine the status and need for periodontal treatment through the measurement of the Community Periodontal Index of Treatment Needs (CPITN) (Dewi *et al.* 2020). The Community Periodontal Index of Treatment Needs is an index used to describe and evaluate the status of periodontal tissues in the study population (Ermawati *et al.* 2012). The purpose of the CPITN is to estimate the prevalence of the disease, measure the level of patient need for periodontal treatment, and recommend the appropriate type of treatment (Gasner & Schure 2021).

Research conducted by Dewi *et al.* (2020) shows the periodontal tissue health status of blind people in Jember Regency by 50% is a score of two; namely, there is subgingival calculus and supragingival calculus. Indications for periodontal tissue treatment that are needed are improving oral hygiene and accompanied by professional scaling. Zero scores or normal periodontal health status are very rare.

The results of these studies indicate that blind people need special attention to their oral health because it also greatly affects the quality of life of the blind individuals themselves.

Therefore, this study aims to assess caries status, periodontal condition, and the need for periodontal treatment in blind people.

2 METHODS

This type of research is cross-sectional, with the number of research subjects as many as 60 people with visual impairments aged 13 to 65 years. This research has received ethical approval from the ethics committee of the Faculty of Medicine, Universitas Sumatera Utara. Before the study was conducted, all subjects who were willing to participate in the study signed and gave a thumbprint on the informed consent. Demographic data were obtained by questionnaire. Blind people who smoked actively, pregnant women, users of fixed orthodontic appliances, users of dentures and taking blood thinners, and who were taking periodontal treatment in the last six months were excluded from this study.

The status of the blind person was determined through interviews. All subjects who met the inclusion criteria were examined Caries status with Decay, Missing, Filled Tooth (DMFT) index, periodontal status, and the level of periodontal treatment needs with the CPITN index. Examination of caries status using the DMF-T index was carried out by looking at the number of carious teeth that could still be filled (decay), teeth lost due to caries (missing), and teeth filled with caries that appeared during fixed orthodontic treatment (filling). The average number of DMFTs was calculated by adding up the number of caries, missing and filling teeth, and then dividing by the total population. The caries status category is based on the average number of DMFTs according to the World Health Organization (WHO), ranging from very low (0.0 – 1.1), low (1.2 – 2.6), moderate (2.7 – 4.4), high (4.5 – 6.5), to very high (>6.6) (Hiremath 2011).

Examination of the level of need for periodontal treatment (CPITN) was performed by measuring gingival bleeding, the presence of calculus, and pocket depth. Examination of the level of need for periodontal treatment (CPITN) was performed on teeth 17, 16, 11, 26, 27, 37, 36, 31, 46, and 47 for subjects aged over 20 years, while for subjects aged 19 years or younger, on teeth 16, 11, 26, 36, 31, and 46. Subjects under 15 years of age were only examined and recorded for calculus and gingival bleeding to avoid the presence of false pockets. The examination is carried out once by one examiner with the help of an assistant to record data (Hiremath 2011; John 2017). Before carrying out the examination, an inter-examiner calibration test was carried out. The results of data analysis were carried out through statistical tests carried out with the Spearman correlation test for bivariate analysis, with a significance level of 5%.

3 RESULTS

The study was conducted on 60 blind people with an average age of 25.15 ± 13.23, where the number of male subjects (58.3%) was more than the number of female subjects (41.7%). Based on the DMFT index, most subjects experienced caries with an average of 3.07 ± 2.80, with the highest caries status at the moderate level (31.6%). Based on the CPITN index, the majority of the subjects' periodontal status level was at level two (71.7%), while the least was at level 0 (1.7%), and the majority of the subjects were at level II care needs (98.3%) (Table 1).

A significant relationship was found between age and periodontal status ($p = 0.001$), but there was no difference between age and caries status ($p = 0.805$) and the need for periodontal treatment ($p = 0.205$) (Table 2). Table 3 shows a significant relationship between sex and DMFT ($p = 0.034$), but there is no difference between sex with periodontal status ($p = 0.955$) and the need for periodontal treatment ($p = 0.250$).

Table 1. Subject distribution.

Variables (n = 60)	Mean ± SD	Frequency (n,%)
Age	25.15 ± 13.23	
Sex		
Males		35 (58.3%)
Females		25 (41.7%)
DMFT		
Decay	3.07 ± 2.80	
Missing	1.15 ± 1.76	
Filled	0.15 ± 0.63	
DMFT	4.37 ± 3.52	
Caries status		
Very low		12 (20.1%)
Low		6 (10%)
Moderate		19 (31.6%)
High		13 (21.7%)
Very high		10 (16.7%)
Periodontal status		
0 (Healthy)		1 (1.7%)
2 (Supragingival calculus)		43 (71.7%)
3 (Periodontal pockets of 4–5 mm)		16 (26.7%)
Periodontal care needs		
0 (No treatment needs)		1 (1.7%)
II (Oral hygiene improvement, scaling)		59 (98.3%)

Table 2. Relationship between age and caries status, periodontal status, and periodontal care needs.

	Age	
Variables (n = 60)	Coefficient correlation	p-value
Caries status (DMFT)	−0.033	0.805
Periodontal status	0.427	0.001*
Periodontal care needs	0.166	0.205

Spearman Correlation Test; *significant p<0.05.

Table 3. Relationship between sex and caries status, periodontal status, and periodontal care needs.

	Sex	
Variables (n = 60)	Coefficient correlation	p-value
Caries status (DMFT)	0.274	0.034*
Periodontal status	−0.007	0.955
Periodontal care needs	−0.154	0.240

Spearman Correlation Test; *significant p<0.05.

4 DISCUSSION

The oral health condition of blind people is influenced by the lack of ability to see, understand, and master the practice of dental and oral hygiene. Dental plaque is the main cause of dental caries and periodontal disease. The buildup of plaque and debris causes gingivitis; if it occurs in the long term, plaque can cause the loss of periodontal attachment because plaque produces collagenase enzymes that can degrade collagen in the periodontal tissue; besides that, it can also cause demineralization and tooth decay by plaque microbes, resulting in caries (Alghamdi *et al.* 2018; John 2017).

The gender of the subjects of this study was mostly male (58.3%) because most of the subjects in this study came from schools. The culture and mindset of parents prioritize men for education and careers over women (Laksono & Nurchayati 2018; Prasad *et al.* 2020). This study is not in line with the results of research by Sabilillah *et al.* (2016), Samnieng *et al.* (2014), and Zahara & Andriani (2019). The Basic Health Research 2013 data shows that the highest disability in Indonesia is blindness, with the number of people with disabilities in women being higher than in men (Ministry of Health of the Republic of Indonesia 2014). The number of women with visual impairments is higher than that of men. This can be due to the longer average life expectancy of women and can be accompanied by macular degeneration, cataracts, and glaucoma. Women have low access to eye health services due to various socioeconomic and cultural factors (Prasad *et al.* 2020; Ulldemolins *et al.* 2019).

Based on research conducted by Shetty *et al.* (2010), 66% of blind people have difficulty brushing their teeth, so plaque cleaning is inadequate and has a poor level of oral hygiene. The results of this study showed that 31.6% of visually impaired persons had moderate caries rates and 21.7% had high caries rates, with a mean DMFT index score of 4.37 ± 3.52, and according to WHO, these results indicate a moderate category (Table 1). This may be due to the visually impaired's difficulty in carrying out plaque control properly and the limitations in carrying out the procedure. Oktadewi *et al.* (2020) in their research showed that the average DMFT score in blind students was 4.8 ± 2.74 (high category) and previous studies also showed that blind individuals had high caries scores and poor oral hygiene (Parkar *et al.* 2014; Prashanth *et al.* 2011). The occurrence of caries is influenced by four main factors, namely agent, host, substrate, and time. Supporting factors that can cause dental caries are rough tooth structure, crowded tooth arrangement, little saliva, and microorganisms (Wende 2019).

The results of the periodontal status examination in blind people showed that 71.7% of blind people had periodontal status with a score of two, 26.7% had periodontal status with a score of three, and 1.7% had a healthy periodontium (score 0), and none had periodontal status with a score of 4 (6 mm pathological pocket) (Table 1). The results of the periodontal status examination will determine the level of need for periodontal treatment in blind people. The results of this study showed that as many as 98.3% of blind people needed improved dental care at home/improved oral hygiene and scaling (TN II), only 1.7% did not require treatment (TN 0) and no blind people were included in the treatment categories of TN I and TN III. The high percentage of TN II care needs is because blind individuals cannot perform oral hygiene measures (brushing teeth) properly.

The results of this study are not in line with the research of Samnieng *et al.* (2014), which shows that 34.37% of blind people suffer from periodontal disease, 13.7% require scaling treatment (TN II), and 36.2% require professional treatment (TN III). This condition occurs because of the low physical ability of blind people, so it has an impact on the difficulty of brushing their teeth. The ability to brush the teeth of subjects who are totally blind tend to overbrush (brushing their teeth with too strong a pressure), besides the high gingival bleeding in the total blind is the result of the buildup and retention of plaque on the tooth surface that has occurred in the long-term, resulting in periodontal disease (Mohd-Dom *et al.* 2010).

This study showed that there was a significant relationship between age and periodontal status ($p = 0.001$). The older the age, the higher the periodontal status value or the more

periodontal disorders (Table 2). The age of the subjects of this study was in the range of 13–67 years, where the increasing age, the higher the potential for the degeneration of the periodontal tissue, and age is one of the risk factors for the occurrence of periodontal disease (Lumentut *et al.* 2013; Tadjoedin *et al.* 2017; Wulandari *et al.* 2022). Various changes occur in the periodontal tissue due to the increased vulnerability to irritation from bacterial plaque. The accumulation of plaque in the elderly is getting faster because the older the age, the physiological changes in saliva occur, and the opening of the cementum, which has a rough surface, facilitates the formation of dental plaque (Setiawati *et al.* 2022).

In this study, there was no significant relationship between age and the level of need for periodontal care in blind people ($p = 0.205$); generally, the subjects of this study required improvement in dental care at home/improved oral hygiene and initial treatments such as scaling (Table 2). Based on the research of Chellappa *et al.* (2021) there is a significant relationship between age and the need for periodontal treatment. In this study, there was also no significant relationship between age and caries status ($p = 0.805$). As a person's age increases, dental caries will increase because teeth that are longer in the mouth have more interactions with caries-causing factors (Pitt Ford 1993).

A significant relationship was found between caries status and gender ($p = 0.034$) (Table 3). Suwelo & Sukarsono's (1992) study showed that tooth eruption was faster in women than in men. This is different from the results of Kiswaluyo (2010) study, which stated that the prevalence of caries in men was higher because men usually rarely paid attention to oral hygiene and were lazier at brushing their teeth compared to women. The results of this study indicate that there is no relationship between gender and periodontal status and the level of need for periodontal treatment. This study is not in line with Setiawati *et al.* (2022) research which states that there is a relationship between the occurrence of periodontitis and gender. Men have a high risk of periodontal tissue damage because they have bad habits such as smoking and consuming alcohol compared to women. Dental caries that continue to be left untreated and untreated periodontal conditions will cause further damage, and this will affect the health condition of the sufferer, especially the health condition of the oral cavity. Dental check-ups and care, as well as regular visits to the dentist, are very much needed for blind people to help overcome the damage and disorders that occur in their oral cavities. It is hoped that a healthy oral cavity will help improve the quality of life related to teeth and mouth in visually impaired people.

5 CONCLUSION

Dental and oral health is one topic that has an effect on people's quality of life. Caries or even tooth loss can disrupt masticatory function, which is a common complaint among the general population. Poor plaque management is one of the causes which the visually impaired frequently encounter because of their limited functional conditions. Age is one of the elements that affect periodontal disease in the visually impaired, whereas gender is one of the factors that affect caries status, necessitating intensive and collaborative treatment of the visually impaired.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

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The Relationship between Age with Caries Status and Periodontal Treatment Needs on Visually Impaired People

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The Relationship between Age with Caries Status and Periodontal Treatment Needs on Visually Impaired People

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Abstract

Introduction: Poor periodontal conditions could affect health in general. Age, gender, control plaque habits, and other factors influence periodontal health conditions. Limitations for visually impaired people to control plaque also could affect the tooth's condition and periodontal health. This study aims to analyze the relationship between age with caries status and periodontal treatment needs in visually impaired people. **Result:** This is a cross-sectional study conducted on 60 people with the visually impaired. Research process conducted with health protocol during a pandemic. Caries' status was measured by measuring DMFT score, and Periodontal treatment needs using the Community Periodontal Index of Treatment Needs (CPITN). This study shows that age-related to periodontal status (p=0.001) but is not related to caries status (p=0.805) and needs periodontal treatment (p=0.205). **Discussion:** Procedure control less plaque appropriate could trigger plaque formation besides because of limitations of visual. Age is a factor involved in changing periodontal tissue, so that is more susceptible to experiencing a periodontal breakdown. **Conclusion:** Age is one contributing factor affecting periodontal health in visually impaired people.
Keywords: Age, visually impaired, Periodontal Status, Plaque Control, Dental Caries.

Introduction

The Basic Health Research 2018 reports that the largest proportion of dental health problems in Indonesia is cavities (45.3%), while the majority of dental and oral health problems experienced by the Indonesian population are swollen gums or abscesses (14%).[1] This dental and oral health problem requires health care facilities to provide comprehensive medical measures, but the COVID-19 pandemic has disrupted public access to health services.

Global Blindness and Visual Impairment in 2015 reported that there were 253 million people with visual impairments, and of that number, 217 million people had moderate to severe visual impairment, and the rest were blind.[2] Southeast Asia is the region with the fourth highest number of blind people in the world, and Indonesia is in the third highest position with a prevalence of 0.9 % in Southeast Asia. The number of blind people in Indonesia is 1.5 % of the total population, according to the estimation of the Ministry of Health of the Republic of Indonesia. The current population of Indonesia is around 250

million, meaning that currently, there are at least 3,750,000 blind people, both blind and *low vision categories*.[3]

Blind people, according to the Indonesian Blind Association (Persatuan Tunanetra Indonesia/PERTUNI), are individuals who cannot see (totally blind) and people who still have a residual vision but are unable to use their vision to read 12-point ordinary writing with normal light conditions and normal distances, although assisted by using glasses (less alert/*low vision*).[4] The definition explains that the blind have no vision at all to distinguish light and dark, so they are referred to as "totally blind".[5] Blind people who have a residual vision that can still function are called "less alert," the general term is *low vision* .[5]

Blindness can be caused by prenatal factors, natal factors, and postnatal factors. Prenatal factors are related to history from parents, abnormalities during pregnancy that results in impaired growth of the child in the womb, such as pregnant women who are infected with or injured by the rubella virus or chickenpox, toxoplasmosis infection, or tuberculosis infection, which can damage certain blood cells. During fetal growth in the womb.[5,6] The natal factor (when the baby is born) occurs due to damage to the eyes or the optic nerve during the birth process, such as the impact of tools or hard objects during childbirth eyes, so the baby has a risk of loss of vision.[5] Postnatal factors (during growth and development / after birth) occur due to suffering from eye diseases, such as xeropthalmia, trachoma, cataracts, diabetic retinopathy, macular degeneration, and retinopathy of prematurity, hazardous chemicals, and other unforeseen events.[5]

Blind people have limited functional conditions, so they find it difficult to get information from the surrounding environment through their vision and have a higher challenge in carrying out daily activities, including maintaining hygiene and dental and oral health.[7–9]

The poor condition of the oral cavity of blind people is due to the lack of ability to see in, understand, and do dental and oral hygiene practices. Poor oral hygiene in blind people is caused by cariogenic food, the shape of the tooth position, and the lack of knowledge about oral dental health due to a lack of education on how to maintain dental and oral hygiene, resulting in plaque buildup.[10]

Plaque plays an important role in the process of damage to the hard tissues of the teeth and the soft tissues around the teeth and oral cavity. The bacteria in plaque will ferment glucose and sucrose to form acids which will cause demineralization of the teeth, leading to caries. The bacteria in plaque will produce toxins that stimulate the gingiva so that inflammation occurs, and the gingiva bleeds easily. Plaque that undergoes remineralization

will form calculus and migrate into the gingival sulcus, which can cause inflammation, alveolar bone resorption, formation of periodontal pockets, and finally, tooth loss, all of which are signs of periodontal disease.[12,13] Periodontal disease is an inflammatory process that occurs due to an unbalanced interaction between plaque microorganisms and the immune response that causes irreversible damage to the periodontal tissue.[14]

Various studies on the condition of caries and periodontal tissue in blind people have been carried out. Research by Liu et al. conducted to assess the oral health condition of visually impaired individuals found that blind individuals had a high prevalence of caries, poor periodontal health, and severe malocclusion. The prevalence of visually impaired persons with caries is 78.64%, 44.66% have gingival bleeding, and 67.96% have calculus.[15] Research results Turkistani et al., also showed that the prevalence of caries in blind people was 78.7%.[16] Research by Reddy et al. showed that the prevalence of caries in blind people was higher at 40%, while in normal individuals, it was only 11.5%.[17]

Periodontal disease that is not given proper treatment will cause loose teeth to lose teeth. One of the steps to overcome this is to examine the periodontal tissue to determine the status and need for periodontal treatment through the measurement of the Community Periodontal Index of Treatment Needs (CPITN).[18] Community Periodontal Index of Treatment Needs is an index used to describe and evaluate the status of periodontal tissues in the study population.[19] The purpose of the CPITN is to estimate the prevalence of the disease, measure the level of patient need for periodontal treatment and recommend the appropriate type of treatment.[20]

Research conducted by Dewi et al., shows the periodontal tissue health status of blind people in Jember Regency by 50% is a score of two; namely, there is subgingival calculus and supragingival calculus. Indications for periodontal tissue treatment that are needed are improving oral hygiene and accompanied by professional scaling. Zero scores or normal periodontal health status are very rare.[18]

The results of these studies indicate that blind people need special attention to their oral health because it also greatly affects the quality of life of the blind individuals themselves. Therefore, this study aims to assess caries status, periodontal condition, and the need for periodontal treatment in blind people.

Materials and Methods

This type of research is cross-sectional, with the number of research subjects as many as 60 people with visual impairments aged 13 to 65 years. This research has received ethical

approval from the ethics committee of the Faculty of Medicine, Universitas Sumatera Utara. Before the study was conducted, all subjects who were willing to participate in the study signed and gave a thumbprint on the informed consent. Demographic data were obtained by questionnaire. Blind people who smoked actively, pregnant women, users of fixed orthodontic appliances, users of dentures and taking blood thinners, and who taking periodontal treatment in the last six months were excluded from this study.

The status of the blind person was determined through interviews. All subjects who met the inclusion criteria were examined Caries status with Decay, Missing, Filled Tooth (DMFT) index, periodontal status, and the level of periodontal treatment needs with the CPITN index. Examination of caries status using the DMF-T index was carried out by looking at the number of carious teeth that could still be filled (decay), teeth lost due to caries (missing), and teeth filled with caries that appeared during fixed orthodontic treatment (filling). The average number of DMFTs was calculated by adding up the number of caries, missing and filling teeth, and then dividing by the total population. The caries status category is based on the average number of DMFT according to the World Health Organization (WHO), ranging from very low (0.0-1.1), low (1.2-2.6), moderate (2.7-4, 4), high (4.5-6.5), to very high (>6.6).[21]

Examination of the level of need for periodontal treatment (CPITN) was performed by measuring gingival bleeding, the presence of calculus, and pocket depth. Examination of the level of need for periodontal treatment (CPITN) was performed on teeth 17, 16, 11, 26, 27, 37, 36, 31, 46, and 47 for subjects aged over 20 years, while for subjects aged 19 years or younger, on teeth 16, 11, 26, 36, 31, and 46. Subjects under 15 years of age were only examined and recorded for calculus and gingival bleeding to avoid the presence of false pockets. The examination is carried out once by one examiner with the help of an assistant to record data.[21,22] Before carrying out the examination, an inter-examiner calibration test was carried out. The results of data analysis were carried out through statistical tests carried out with the Spearman correlation test for bivariate analysis, with a significance level of 5%.

Result

The study was conducted on 60 blind people with an average age of 25.15 ± 13.23, where the number of male subjects (58.3%) was more than the number of female subjects (41.7%). Based on the DMFT index, most subjects experienced caries with an average of 3.07±2.80, with the highest caries status at the moderate level (31.6%). Based on the CPITN index, the majority of the subjects' periodontal status level was at level two (71.7%) while the

least was at level 0 (1.7%), and the majority of the subjects were at level II care needs (98.3%) (Table 1).

Table 2 shows a significant relationship between age and periodontal status (p=0.001), but there was no difference between age and caries status (p=0.805) and the need for periodontal treatment (p=0.205). Table 3 shows a significant relationship between gender and DMFT (p=0.034), but there is no difference between sex with periodontal status (p=0.955) and the need for periodontal treatment (p=0.250).

Table 1. Subject Distribution

Variables (n=60)	Mean ± SD	Frequency (n,%)
Age	25.15±13.23	
Gender		
Man		35 (58.3%)
Woman		25 (41.7%)
DMFT		
Decay	3.07 ± 2.80	
Missing	1.15 ± 1.76	
Filled	0.15 ± 0.63	
DMFT	4.37 ± 3.52	
Caries Status		
Very low		12 (20.1%)
Low		6 (10%)
Moderate		19 (31.6%)
High		13 (21.7%)
Very high		10 (16.7%)
Periodontal Status		
0 (Healthy)		1 (1.7%)
2 (Supragingival calculus)		43 (71.7%)
3 (Periodontal pockets of 4-5 mm)		16 (26.7%)
Periodontal Care Needs		
0 (No treatment needs)		1 (1.7%)
II (Oral hygiene improvement, scaling)		59 (98.3%)

Table 2. Relationship between Age and Caries Status, Periodontal Status, and Periodontal Care Needs

Variables (n=60)	Age	
	Coefficient correlation	p-value
Caries Status (DMFT)	-0.033	0.805
Periodontal Status	0.427	0.001*
Periodontal Care Needs	0.166	0.205

Spearman Correlation Test; *significant p<0.05

Table 3. Relationship between Sex and Caries Status, Periodontal Status, and Periodontal Care Needs

Variables (n=60)	Gender	
	Coefficient correlation	p-value
Caries Status (DMFT)	0.274	0.034*
Periodontal Status	-0.007	0.955
Periodontal Care Needs	-0.154	0.240

Spearman Correlation Test; *significant p<0.05

Discussion

The oral health condition of blind people is influenced by the lack of ability to see, understand, and master the practice of dental and oral hygiene. Dental plaque is the main cause of dental caries and periodontal disease. The buildup of plaque and debris causes gingivitis; if it occurs in the long term, plaque can cause the loss of periodontal attachment because plaque produces collagenase enzymes that can degrade collagen in the periodontal tissue; besides that, it can also cause demineralization and tooth decay by plaque microbes, resulting in caries.[22,23]

The gender of the subjects of this study was mostly male (58.3%) because most of the subjects in this study came from schools. The culture and mindset of parents prioritize men for education and careers over women.[24,25] This study is not in line with the results of research by Sabilillah et al., Zahara et al., Samnieng et al.[10,26,27]

The Basic Health Research 2013 data shows that the highest disability in Indonesia is blindness, with the number of people with disabilities in women being higher than in men. [28] The number of women with visual impairments is higher than in men. This can be due to the longer average life expectancy of women and can be accompanied by macular degeneration, cataracts, and glaucoma. Women have low access to eye health services due to various socio-economic and cultural factors.[24,29]

Based on research conducted by Shetty et al., 66% of blind people have difficulty brushing their teeth, so plaque cleaning is inadequate and has a poor level of oral hygiene.[30] The results of this study showed that 31.6% of visually impaired persons had moderate caries rates and 21.7% had high caries rates, with a mean DMFT index score of 4.37 ± 3.52, and according to WHO, these results indicate a moderate category (Table 1). This may be due to the difficulty of the visually impaired to carry out plaque control properly and the limitations in carrying out the procedure. Octadewi et al., in their research, showed that the average DMFT score in blind students was 4.8 ± 2.74 (high category) and previous studies also showed that blind individuals had high caries scores and poor oral hygiene.[31–33] The occurrence of caries is influenced by four main factors, namely agent, host, substrate, and time. Supporting factors that can cause dental caries are rough tooth structure, crowded tooth arrangement, little saliva, and microorganisms.[34]

The results of the periodontal status examination in blind people showed that 71.7% of blind people had periodontal status with a score of two, 26.7% had periodontal status with a score of three, and 1.7% had a healthy periodontium (score 0), and none had periodontal status with a score of 0. 4 (6 mm pathological pocket) (Table 1). The results of the periodontal status examination will determine the level of need for periodontal treatment in blind people. The results of this study showed that as many as 98.3% of blind people needed improved dental care at home/improved oral hygiene and scaling (TN II), only 1.7% did not require treatment (TN 0) and no blind people were included in the treatment categories of TN

I and TN III. The high percentage of TN II care needs is because blind individuals cannot perform oral hygiene measures (brushing teeth) properly.

The results of this study are not in line with the research of Samnieng et al., which shows that 34.37% of blind people suffer from periodontal disease, 13.7% require scaling treatment (TN II), and 36.2% require professional treatment (TN III). This condition occurs because of the low physical ability of blind people, so it has an impact on the difficulty of brushing teeth.[27] The ability to brush the teeth of subjects which are totally blind tend to overbrush (brushing their teeth with too strong a pressure), besides the high gingival bleeding in the total blind is the result of the buildup and retention of plaque on the tooth surface that has occurred in the long term, resulting in periodontal disease.[35]

This study showed that there was a significant relationship between age and periodontal status (p=0.001). The older the age, the higher the periodontal status value or the more periodontal disorders (Table 2). The age of the subjects of this study was in the range of 13 to 67 years, where the increasing age, the higher the potential for the degeneration of the periodontal tissue, and age is one of the risk factors for the occurrence of periodontal disease.[36–38] Various changes occur in the periodontal tissue due to the increased vulnerability to irritation from bacterial plaque. The accumulation of plaque in the elderly is getting faster because the older the age, the physiological changes of saliva occur, and the opening of the cementum, which has a rough surface, facilitates the formation of dental plaque.[39]

In this study, there was no significant relationship between age and the level of need for periodontal care in blind people (p=0.205); generally, the subjects of this study required improvement in dental care at home/improved oral hygiene and initial treatments such as scaling (Table 2). Based on the research of Chellappa et al., there is a significant relationship between age and the need for periodontal treatment.[40] In this study, there was also no significant relationship between age and caries status (p=0.805). As a person's age increases, dental caries will increase because teeth that are longer in the mouth have more interactions with caries-causing factors.[41]

Table three shows that there is a relationship between caries status and gender (p=0.034). Suwelo's study showed that tooth eruption was faster in women than in men.[42] This is different from the results of Kiswaluyo's study, which stated that the prevalence of caries in men was higher because men usually rarely paid attention to oral hygiene and were lazier at brushing their teeth compared to women.[43] The results of this study indicate that there is no relationship between gender and periodontal status and the level of need for periodontal treatment. This study is not in line with Setiawati's research which states that there is a relationship between the occurrence of periodontitis and gender. Men have a high risk of periodontal tissue damage because they have bad habits such as smoking and consuming alcohol compared to women.[39] Dental caries that continue to be left untreated and untreated periodontal conditions will cause further damage, and this will affect the health condition of the sufferer, especially the health condition of the oral cavity. Dental check-ups and care, as well as regular visits to the dentist, are very much needed for blind people to help overcome the damage and disorders that occur in their oral cavity. It is hoped that a healthy oral cavity will help improve the quality of life related to teeth and mouth in visually impaired people.

Conclusion

Age is one of the factors related to the condition of periodontal destruction, while gender is one of the factors related to caries status in blind people.

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