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INFLUENCE OF AUDIO MEDIA ON DENTAL HEALTH KNOWLEDGE OF VISUALLY IMPAIRED STUDENTS AT SLB-A JAKARTA INDONESIA

(PENGARUH MEDIA AUDIO TERHADAP PENGETAHUAN KESEHATAN GIGI PADA SISWA TUNANETRA DI SLB-A JAKARTA INDONESIA)

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ABSTRACT

Oral health is an integral part of overall health. Children with special needs, including the visually impaired, require appropriate information media to improve their knowledge of oral and dental health. This study aims to assess the effectiveness of audio-based counselling for visually impaired children. The method was quasi-experimental study used a pre-test and post-test design on 67 visually impaired students at SLB-A Pembina Tingkat Nasional Jakarta, selected through total sampling. Dental and oral health education was delivered via audio media, and knowledge was assessed using Braille-format questionnaires. Responses were recorded by the researcher. Inclusion criteria included adequate hearing, cognitive ability, and consent, while exclusions were similar ongoing studies, hearing impairment, additional disabilities, or communication difficulties. Data were analyzed with SPSS using normality tests, followed by the Wilcoxon test due to non-normal distribution. The results show that audio media is effective in increasing knowledge of oral and dental health, with $\rho=0.000$ ($\rho<0.05$), although other research factors did not have a significant effect. Conclusion: Audio media effectively improves dental and oral health knowledge of visually impaired students, independent of demographic factors, with strong support from parents

and schools.

Keywords: audio media; blind; knowledge of dental and oral health

ABSTRAK

Kesehatan mulut merupakan bagian integral dari kesehatan umum. Anak dengan kebutuhan khusus, termasuk tunanetra, memerlukan media informasi yang sesuai untuk meningkatkan pengetahuan kesehatan gigi dan mulut. Penelitian ini bertujuan menilai efektivitas penyuluhan berbasis audio pada anak tunanetra. Metode yang digunakan adalah Penelitian kuasi-eksperimen ini menggunakan desain pre-test dan post-test pada 67 siswa tunanetra di SLB-A Pembina Tingkat Nasional Jakarta yang dipilih secara total sampling. Edukasi kesehatan gigi dan mulut diberikan melalui media audio, dan pengetahuan diukur dengan kuesioner Braille. Data dianalisis menggunakan SPSS dengan uji normalitas dan uji Wilcoxon karena distribusi data tidak normal. Hasil penelitian menunjukkan peningkatan pengetahuan kesehatan gigi dan mulut yang signifikan setelah edukasi melalui media audio (p = 0.000). Terdapat perbedaan pengetahuan tidak dipengaruhi oleh faktor demografi seperti jenis kelamin, usia, pendidikan ibu, atau status pekerjaan ibu. Kesimpulan: Media audio secara efektif meningkatkan pengetahuan kesehatan gigi dan mulut siswa tunanetra, terlepas dari faktor demografis, dengan dukungan signifikan dari orang tua dan sekolah.

***Kata kunci** : media audio; pengetahuan kesehatan gigi dan mulut; tunanetra*

INTRODUCTION

Health is an essential need that humans must fulfil at every stage of life because it is the foundation for living a good and productive life. Someone who is physically and mentally healthy can function optimally in various aspects of their life, such as working, interacting with others, and enjoying their daily activities. The goal of public health is to achieve the highest possible level of health, which cannot be realised without meeting the need for dental and oral care. Oral health is significant for overall health and quality of life. It includes being free from throat cancer, infections, thrush, gum problems, tooth decay, loose teeth, and other issues. It allows a person to perform their daily

activities without hindrance, such as biting, chewing, smiling, talking, and improving their psychosocial well-being[1].

Food that is important for human growth and development enters through the mouth. Inadequate dental and oral health can be a gateway to other health problems. Poor dental health can be the beginning of deteriorating health conditions for children now and in the future. The effects of dental caries in children can cause acute infections, mouth pain, and discomfort, leading to a loss of appetite, speech, learning, and sleep. Dental and oral problems also affect growth and development, impacting school attendance and educational achievement [1] [2]

Dental and oral diseases remain a global burden, causing pain, discomfort, and even death in many countries, despite being preventable, and an estimated 3.5 billion people worldwide are affected [3]. At the ages of 6 and 12 years, children usually experience dental and oral problems. One of the leading causes of this problem is the lack of awareness among parents and children about the correct and proper way to brush teeth [4]. A child needs to be taught about the importance of dental health at an early age so that they can understand the importance of maintaining their teeth and mouth. Parents must actively monitor their children's growth and development. The active role of parents is necessary to guide, understand, remind, and provide facilities for their children [5]. The results of the Basic Health Research survey in 2018 showed that only 2.8% of people over the age of 3 brush their teeth, and 94.7% do it correctly [6]. Due to limited visuospatial abilities and a lack of understanding of oral hygiene techniques, visually impaired children in Indonesia face many dental and oral health issues. Riskesdas data (2018) [7] shows that proper tooth brushing behaviour is still low in the general population; specifically, visually impaired individuals rely on touch and hearing to find the correct way to brush their teeth [8]. The lack of supervision from carers, the lack of motor skills, and the lack of access to information designed explicitly for disabilities exacerbate this condition [9].

According to Recca [10], during the elementary school years, children can develop their motor skills, including the ability to brush their teeth well. Besides other factors such as brushing methods, frequency, and several other factors, the ability to brush teeth correctly and properly is crucial for maintaining oral health. In several interventional studies in Indonesia, multisensory education methods, including audio media, have proven to be more effective than braille-based methods in improving the understanding and brushing skills of visually impaired children [8].

Based on the WHO (2023)11, it is stated that the eye health status and eye care in Southeast Asian countries, including Indonesia, have the highest prevalence of blindness, at 1.5 per cent, or approximately 2,948,761 blind people. At the beginning of the VISION 2020 program, the WHO estimated that about 19 million children under the age of 15 had visual impairment and 1.4 million children had irreversible blindness, while predicting that half of all blindness cases could be prevented. The reported prevalence of blindness in low- and middle-income countries ranges from 0.2 to 7.8 per 10,000 people, and in developed and industrial nations, the annual incidence is 6 per 10,000 in the under-15 age group. According to available information, the causes of visual impairment (Vision Impaired = VI) differ based on the location of the population studied (urban compared to rural) or in different countries (developed, underdeveloped, or developing), as well as the prevention strategies in each health system [12]. India contributes approximately 6 million blind individuals out of 38 million blind people worldwide [13].

Someone who is no longer able to use their sense of sight for educational and teaching purposes is called blind. The hearing sense of blind children replaces their sense of sight, so the intelligence level of blind children is the same as that of normal children if their surrounding environment supports their development [14]. Due to the physical limitations experienced by the visually impaired, they tend to neglect oral hygiene [15]. Dental and oral problems are very prone to occur in children with disabilities, such as the visually impaired [16]. The oral health of children and adolescents with visual impairments is worse than that of those without visual impairments. Children with visual impairments are 3.86 times more likely to experience dental trauma, have higher/worse plaque scores, gingivitis, calculus, and high DMFS scores [17]. Children's lack of awareness of the importance of maintaining dental and oral health, particularly among those who are visually impaired, may lead to poor oral hygiene and an increased risk of dental problems such as tooth decay. Additionally, their visual limitations can make it difficult for them to maintain oral hygiene.

Dental and oral problems in people with visual impairments have a higher risk than those who can see normally [18]. The prevalence of dental caries among the visually impaired reaches more than 80.6%, and the prevalence of oral hygiene among the visually impaired reaches 50% with an average Oral Hygiene Index Score (OHI-S) of 2.3 (moderate category),[19]. Goud's

(2021) study found that the oral health of visually impaired children was poorer than that of deaf and mute children. Deaf and mute children had a significantly higher percentage of healthy periodontium compared to visually impaired children. The reason might be that blind children cannot visualise deposits on the surfaces of their teeth, which prevents them from understanding oral hygiene actions and practices, even when applied[13]. A comparative oral health study between blind and normal schoolchildren found a prevalence of 60% among blind children and only 31.5% among normal schoolchildren [20]. Blind individuals often experience poor oral hygiene due to factors such as cariogenic food, dental structure and position, and a lack of knowledge about dental and oral care [21].

For visually impaired children, auditory skills are essential in the learning process to obtain information because these skills compensate for visual impairments, and the use of hearing as a medium is twice as much as other skills. Visually impaired children utilise hearing as a medium twice as much as reading to compensate for their visual impairments. Therefore, the purpose of audio media is to facilitate all skill development activities, especially those related to auditory skills. Additionally, the use of audio recordings helps visually impaired children better understand topics. The words that are heard are clearer and can be repeated multiple times, making them easier to understand and remember. Moreover, research results indicate that the use of audio media has a significant impact on students' ability to understand the material [22]. Their natural ability to process and understand spoken language exceeds their ability to read both print and braille. Additionally, the speed of processing and understanding spoken language in blind children is comparable to that of sighted students [23].

Visual signals are central to social interaction, providing cues through facial expressions and body language; loss of vision limits access to these cues, making effective participation in social interactions more difficult. It leads to anxiety and depression in people with visual impairments and blindness. Generally, rehabilitation for low vision and blindness focuses on improving reading speed, training in the use of assistive technologies such as magnifying glasses, developing orientation and mobility skills, and enhancing assistive computer skills (e.g., JAWS) [24]. The results of Chit's (2024) [25] research on the use of the 3D-Haptic-Audio-Olfactory application in the learning process of visually impaired children. The 3D-Haptic-Audio-Olfactory application is a tool that combines audio and

olfactory haptics with three-dimensional (3D) capabilities for the visually impaired to learn shapes in a virtual learning environment. The research results indicate that sound is the most influential factor in shape identification within a virtual environment, thereby enhancing the learning experience. Researchers can conduct further studies to enhance the abilities of visually impaired children in a learning environment by providing greater access and facilitating their learning process.

Dental and oral health in children is essential due to the adverse effects that can arise if adequate dental and oral health is not achieved. Additionally, the higher risk of dental and oral health issues in children with visual impairments or blindness necessitates appropriate, effective, and efficient methods to reduce the incidence of dental and oral diseases. This study aims to determine the effectiveness of audio counselling on knowledge about dental and oral health maintenance in visually impaired children. Thus, this research is expected to provide input to healthcare workers on the selection and proper use of audio media when teaching visually impaired children about dental and oral health maintenance. Dental and oral health in children is vital due to the adverse effects that can arise if adequate dental and oral health is not achieved.

Additionally, the higher risk of dental and oral health issues in children with visual impairments or blindness necessitates appropriate, effective, and efficient methods to reduce the incidence of dental and oral diseases. This study aims to determine the effectiveness of audio counselling on knowledge about dental and oral health maintenance in visually impaired children. Thus, this research is expected to provide input to healthcare workers on the selection and proper use of audio media when teaching visually impaired children about dental and oral health maintenance.

METHOD

This research is quantitative in nature and employs a quasi-experimental method with a pre-test and post-test design. The provision of dental and oral health education materials through audio media to the same group by comparing the results of knowledge about dental and oral health before and after using the audio media for education. Respondents answer the Braille format questionnaire and then convey their answers to the researcher, who records them. The researcher has determined that this population subject possesses certain qualities and characteristics as the focus of

the study. Researchers can draw conclusions or generalisations from that population in accordance with the objectives of the ongoing research. In this study, the researcher used a population of 67 visually impaired respondents at SLB-A Pembina Tingkat Nasional Jakarta. The sampling technique used in this study is the Total Sampling technique, a non-probability sampling technique in which all members of the target population who meet the specified criteria are taken as research subjects. The use of this sampling technique is due to the relatively small population size. The number of research samples used is less than 100 respondents, specifically 67 respondents. Age range based on the study's aim, appropriate hearing function, sufficient cognitive ability, willingness to attend, and willingness to sign an informed consent form are all requirements for inclusion. Exclusion criteria are currently participating in a similar study, refusing to participate in the study, moderate to severe hearing impairment, having additional disabilities, or difficulty communicating due to oral cavity pain. The collected data were processed through normality tests in SPSS with a p-value threshold of > 0.05, and then tested with the Wilcoxon test since the data were not distributed normally. Subsequently, univariate and bivariate statistical analyses were performed.

RESULT

Univariate and bivariate analyses were employed to examine the effect of audio media on maintenance knowledge before and after counselling, considering variables such as gender, age, mother's educational attainment, and mother's employment status. The results of the analysis are presented below:

Univariate Analysis

The analysis of descriptive statistical data describes the variables according to the research title based on a total of 67 respondents (100%). Researchers use univariate analysis to describe the characteristics of each research variable before conducting further analysis. The table below presents the frequency distribution of the study.

Table 1. Univariate analysis

Variable	N Percentage (%)
Gender	
Man	43 (64.2%)
Woman	24 (35.8%)
Age (years)	
5-11 years	15 (22.4%)
12-25 years	52 (77.6%)
Mother's Education	
Elementary School	3 (4.5%)
Junior High School	7 (10.4%)
Senior High School	7 (10.4%)
Bachelor	32 (47.8%)
Mother's Employment Status	
Unemployee	37 (55.2%)
Employee	30 (44.8%)

Based on the results of the pre-test and post-test, the data obtained can be seen in the following table:

Table 2. Knowledge of dental and oral health

Variable	Good	Fair	Poor
	N (%)	N (%)	N (%)
Pre-test	50 (74.6)	13 (19.4%)	4 (6%)
Post-test	61 (91%)	6 (9%)	-

Bivariate Analysis

Researchers use bivariate analysis to examine the influence of audio media on maintenance knowledge before and after counselling. The initial step taken in the study is conducting a normality test. The results of the normality test by examining the *Kolmogorov-Smirnov value showed that the p-value <0.05, indicating that the data is not normally distributed, so the Wilcoxon test was conducted. The analysis results also suggest a p-value of 0.000, which is less than 0.05; thus, it can be said that Ha is accepted and Ho is rejected, meaning there is an effect of using audio media on the improvement of knowledge about dental and oral health maintenance in visually impaired children at SLB-A Pembina Tingkat Nasional Jakarta.

Table 3. Normality test

Variable	df	Sig.
Pre-test	67	0.000
Post-test	67	0.000

**Kolmogorov-Smirnov*

Table 4. Wilcoxon test

Variable	n	Mean	Std deviation	Sig.
Pre-test	67	81.19	14.824	0.000*
Post-test	67	90.60	9.829	

**Wilcoxon test significant*

Table 5. Chi-Square test

Variable	N	df	Asymp. Sig. (2-sided)
Gender	67	1	0.894
Age	67	1	0.500
Mother's Education	67	1	0.328
Mother's Employment Status	67	1	0.555

The results of the Chi-Square test (Table 5) show that all demographic variables, including gender (p = 0.894), age (p = 0.500), mother's education (p = 0.328), and mother's employment status (p = 0.555), have significance values greater than 0.05. These results indicate that there is no significant relationship between the respondents' demographic characteristics and their level of knowledge. Therefore, the increase or difference in knowledge levels among respondents in this study does not appear to be influenced by these demographic factors, but is somewhat more related to interventions or other factors that are homogeneous across the research group.

DISCUSSION

The analysis showed no significant relationship between the characteristic variables and the level of knowledge; however, these variables may still hold practical importance. A similar study conducted by Putri (2022) [26] states that, although not statistically significant, demographic factors are still crucial in designing targeted educational programs. Sari (2023) [27] emphasises that, compared to relying solely on demographic backgrounds, direct educational interventions, the use of digital media, and the implementation of school policies are more determining factors for access to health information. The results of this study support this finding, showing no significant relationship across all factors and indicating that knowledge has been evenly distributed across demographics. According to Rahmawati (2021), [28], health education in schools significantly increases adolescents' knowledge. A structured and age-appropriate interactive curriculum approach is an effective program. The results of this study highlight the importance of the school's role as a strategic medium in adolescent health education. Education, occupation, and the socio-economic status of parents greatly influence children's health habits. Kurniawan's (2021)[29] research results show that children of parents with good economic status and higher education are more likely to adopt healthy habits. It indicates that public health programs should focus on educational interventions and enhancing parental capacity to improve children's health.

In the era of inclusive education, sensory-based learning approaches are becoming increasingly crucial for visually impaired groups. A study conducted by Rios-Rincón (2020)[30] shows that the use of auditory media not only enhances the understanding of learners with visual impairments but also encourages them to become more active and participate. This research emphasises that voice-based interventions, when delivered systematically and consistently, provide equal learning opportunities for non-disabled students. Furthermore, Salinas (2021)[31] emphasises that the quality of narration and the messages conveyed affect the success of using audio methods in health education. In a study of special needs populations, conventional lecture methods were found to reduce information retention by up to 30% compared to professionally developed audio media, which feature a friendly tone, appropriate tempo, and engaging intonation. Researcher Alnahdi (2020)[32] noted that, in terms of educational technology, voice-based educational methods have proven to help visually impaired students in various developing

countries gain access to information. Voice technology used alongside basic curriculum materials has been proven to enhance students' cognitive knowledge as well as improve the affective aspects and emotional engagement of students in learning. In the effort to improve health literacy among children with disabilities, sensory approaches and social environmental support must work together. Researchers propose integrating audio media into formal and informal education systems. This can be achieved through the enhancement of school policies that support disabilities, teacher training, and family participation.[33] The Indonesian government also uses the Oral Health Promotion Program in Schools, launched by the Ministry of Health and integrated with the Caries Prevention Program since 2020. This program aims to reach children with special needs, such as those who are visually impaired, and encourages preventive activities in special schools by assisting teachers and healthcare workers in providing instructions.[34]

In Banda Aceh, community partnership programs also demonstrate the empowerment of parents through "home care quality," where parents are given direct training, demonstrations, and regular supervision to help them brush their teeth correctly at home [35]In South Sulawesi, civil society, through organisations like Save the Children Indonesia, launched the "Healthier Smiles" program in three special schools. This program includes teacher training, dental health campaigns in schools, and the distribution of pocket books to parents and children.[36] Therefore, as evidenced by data from various provinces, cooperation between the government, educational institutions, universities, and NGOs is crucial to building an inclusive, sustainable, and responsive dental and oral health ecosystem for visually impaired children in Indonesia.

Artificial Intelligence (AI) is increasingly developing in various aspects of life, such as in the fields of education and rehabilitation for children with special needs. AI-based object detection devices, in the form of mini cameras on smart glasses, are a relevant application of AI for visually impaired children. This tool can detect various visual elements in the surrounding environment, such as people's faces, text on boards or books, and other physical objects. After the visual information is processed, text-to-speech technology generates an audio output, allowing visually impaired children to understand the situation in real-time. This innovation greatly aids mobility, social interaction, and independent learning for visually impaired children. Therefore, the use of artificial intelligence technology not only allows children with normal vision

to access information and education but also enables visually impaired children to be more integrated and participate equally in social and academic activities.

CONCLUSION

This study shows that audio media effectively improves dental and oral health knowledge among visually impaired students at SLB-A Pembina Tingkat Nasional Jakarta, with significant post-test gains compared to pre-test results. Demographic factors such as gender, age, mother's education, and mother's occupation had no significant effect, while parental and school support played a greater role. Audio media can thus serve as an innovative, enjoyable, and accessible tool for oral health education, ensuring that visual limitations are no longer a barrier to learning.

CONFLICT OF INTEREST

There is no conflict of interest.

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