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Evaluating Oral Hygiene and Caries Prevalence among Deaf and Hard of Hearing Orphans at Karya Murni Orphanage in Medan

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ABSTRACT

Access to equal oral health attention is the right of all human beings, including orphan children with hearing loss or deaf and hard of hearing (DHH) conditions. Therefore, this study aimed to determine the correlation between the level of oral hygiene and caries indexing among the sub-population of DHH orphans receiving special care at Karya Murni orphanage in Medan City. A cross-sectional design was used with non-probability sampling to select 58 orphans willing to engage in the Oral Hygiene Index-Simplified (OHI-S) and mean of Decayed, Missing, and Filled Permanent Teeth **(**DMFT**)** assessment during dental and oral cavity screening after participating in counseling activities. Furthermore, the results showed a positive correlation (p=0.007) between oral hygiene and caries, suggesting that OHI-S impacted DMFT by approximately 34.9%, with both index scores presenting proportional equivalence. There is a need to conduct regular dental health monitoring along with education on visual methods and sign language among DHH orphans. Additionally, DHH orphan caregivers should actively engage in enhancing personal health behaviors, particularly to maintain oral and dental health.

Keywords: Hearing Loss, Oral Hygiene, Dental Caries Susceptibility

ABSTRAK

Salah satu hak seluruh umat manusia, termasuk anak yatim piatu penyandang tuna rungu dan gangguan pendengaran (DHH) adalah memperoleh perhatian kesehatan gigi dan mulut yang setara. Penelitian ini bertujuan untuk mengetahui hubungan tingkat kebersihan gigi dan mulut dengan indeks karies pada sub populasi anak yatim DHH di panti khusus tunarungu di kota Medan. Penelitian ini merupakan penelitian cross-sectional dengan non-probability sampling pada lima puluh delapan anak yatim piatu yang bersedia mengikuti asesmen OHI-S dan DMFT setelah mengikuti penyuluhan kesehatan gigi dan mulut dari Fakultas Kedokteran Gigi Universitas Sumatera Sumatera. Terdapat korelasi positif (p=0,007) antara kebersihan mulut dan karies pada penelitian ini. OHIS dapat berdampak pada DMF sekitar 34,9%, dengan skor OHIS yang lebih tinggi berkorelasi dengan skor DMF yang lebih tinggi. Penting untuk melakukan pemantauan kesehatan gigi secara berkala serta pendidikan metode visual dan bahasa isyarat pada anak yatim piatu DHH. Pengasuh DHH yatim piatu juga harus terlibat aktif dalam rangka meningkatkan perilaku kesehatan diri khususnya dalam menjaga kesehatan mulut dan gigi.

Kata kunci: Orang Dengan Gangguan Pendengaran, Karies, Kebersihan Rongga Mulut

1. Introduction

Adequate physical and mental health is a significant challenge to attain among orphan children, particularly in meeting the objectives of the Global Sustainable Development Program (SDGs). In addition, all institutions should accept responsibility and address the divergent views concerning certain behaviors as a strategy for care reform to achieve well-being that potentially enhances effectiveness in advancing global priorities. [1] The Constitution plays a crucial role in upholding the existence of human rights for individuals with disabilities. This comprises the rights mandated at every level of the regulatory hierarchy, specifically addressing the needs and protections of individuals with disabilities. [2,3] Individuals with special needs known as disabilities often have physical, mental, intelligence, or sensory limitations. Therefore, assistants such as professional sign language interpreters, are required to facilitate accessibility to public facilities and social interaction. The independence and welfare aspect includes fulfilling disability rights, as regulated in the Indonesia Constitution number 19/2011. [4]

The factors contributing to disease development often stem from a complex chain of environmental events, which may have started over time. Children living in orphanage homes, being underprivileged, lack the care primarily provided by parents or families. The presence of communication impairments, particularly hearing loss, significantly impacts satisfaction with healthcare experiences. Introducing medical school training on methods to enhance the diagnosis and treatment of patients with communication impairments can enhance patient-provider interactions, leading to increased satisfaction with both professionals and the care offered. Healthcare providers should consider allowing extended appointments for patients with communication impairments. These time accommodations tend to prevent misunderstandings about diagnosis and treatment methods that may have detrimental consequences. [5] A previous study reported improvements in dental and oral health knowledge among deaf and hard of hearing (DHH) students at Karya Murni special care orphanage after watching a sign language cartoon video. [6] The impact of lacking family support on the general and oral health behavior as well as knowledge of DHH children has been reported through different responses in understanding certain information. Efforts to develop accessible dental health programs are crucial to address a range of dental and oral health problems, including the treatment for caries (tooth decay) as the most prevalent, followed by gingivitis (gum inflammation) and malocclusion (misalignment of teeth). [7,8]

The community of individuals with hearing impairments relates to DHH population and has shown several adverse health outcomes over time. [9] Lack of knowledge among DHH children in understanding procedures for maintaining oral and dental health leads to a very high risk of experiencing problems.[6] DHH individuals face challenges with lower levels of health literacy and reading comprehension compared to healthy counterparts, thereby complicating health information dissemination in this community. Additionally, healthcare professionals often need more training to address the specific needs of DHH individuals, such as communication and cultural considerations. This gap leads to patient dissatisfaction, reduced accessibility to healthcare services, insufficient information, and lower quality of education and communication. [10,11]

Individual limitations will influence the dental status and knowledge for healthy living among DHH orphans in obtaining and understanding information about oral health. Providing information through counseling for DHH population is slightly different from the method applied to healthy individuals. However, hearing loss can be addressed through visual and touch senses [6,12], such as using cartoon videos for dental and oral health education. The videos proved effective in enhancing knowledge and reducing the Oral Health Impact Profile (OHIP) scores among DHH students at Karya Murni School in 2017. [12] Therefore, this study aimed to determine the correlation between the level of oral hygiene and caries indexing among the sub-population of DHH orphans in deaf special care at Karya Murni orphanage.

2. Materials and Methods

The conduction of this cross-sectional study along with the community service program at Karya Murni DHH orphanage foundation conducted accidental sampling technique, in HM Joni Street, Medan City was approved by the Health Research Ethics Committee of Universitas Sumatera Utara (No. 770/KEPK/USU/2023). (A total of 58 orphans including 25 males and 33 females) with complete teeth were selected as subjects. Additionally, the level of oral hygiene was assessed using the OHI-S and caries scores with DMFT index, respectively. The applied OHI-S was based on Debris Index-Simplified (DI-S) and Calculus Index-Simplified (CI-S) scores.

Statistical tests were conducted to determine the difference between the level of oral hygiene and caries indexing. Additionally, the data normality was analyzed using the Kolmogorov-Smirnov Test before performing the Spearman correlation test.

3. Results

Gender characteristics of the subjects showed the highest distribution of good OHI-S among 25 males and 33 females (Table 1).

Table 1. Dental and Oral Hygiene Levels Based on Gender in the Karya Murni DHH Orphanage

OHI-S	**Gender**		**Total**
	Male	**Female**	
Good	13 (52%)	17 (51.5%)	30 (51.72%)
Fair	10 (40%)	16 (48.5%)	26 (44.83%)
Poor	2 (8%)	0 (0%)	2 (3.45%)
Total	**25**	**33**	**58**

Table 2. The average score of dental and oral hygiene as well as the average level of caries based on sex in children at the Karya Murni DHH orphanage.

	Gender		
Index	**Male**	**Female**	**Total**
OHI-S	1.46	1.14	1.28 (Fair)
DMFT	3.44	3.79	3.64 (Medium)

Table 2 shows the average level of oral hygiene and caries indexing among all DHH orphans assessed in this study. The OHI-S score for males and females was 1.46 and 1.14 belonging to the fair and good category, respectively, while the average of both was 1.28, categorized as fair. Additionally, the respective DMFT score for males and females were 3.44 and 1.14, both averaging 3.64, which all belonged to the medium category.

Table 3. Normality test results

Variable	**Kolmogorov-Smirnov test**
OHI-S Index	0.200
DMF Index	0.000*

Note: *Significant

Table 3 shows that the caries data examined using the DMF index has a significance value of 0.000 ($p < 0.05$), suggesting abnormal distribution. Subsequently, the resulting abnormally distributed data were tested for Spearman's correlation, as presented in Table 4.

Table 4. Spearman's correlation test results

Variable	**N**	**r**	***p***
OHI-S Index	58	0.349	0.007*
DMF Index			

Note: *Significant correlation

Table 4 shows the analysis results of Spearman's correlation test with a significance value of 0.007 ($p < 0.05$. The test identified a significant but weak correlation ($r=0.349$) between dental and oral hygiene as well as caries among DHH orphans at Karya Murni orphanage. Therefore, OHI-S can influence DMFT by approximately 34.9%, where a higher OHIS score will lead to a greater DMF score.

4. Discussion

DHH presents a significant communication obstacle in healthcare environments, leading to compromised quality of care for affected individuals. Considering this situation is essential because ineffective healthcare communication can detrimentally impact numerous health outcomes. [13] Physical limitations in terms of hearing and speaking lead to impaired psychological, physiological, and anatomical structures initiating the experience of social problems. Deafness affects the ability y of children to absorb any information including some simple knowledge such as dental and oral health education. Sign language serves as the primary mode of communication in this community [14,15], enabling effective interaction despite challenges with hearing and speech. Moreover, it acknowledges the humanity of those suffering from DHH and facilitates active participation in the affairs of society. Proficiency in sign language empowers individuals with hearing impairment to more confidently engage in social interactions. [4] Mobile software applications that provide relevant information about dental care have been developed to address the communication challenges experienced by DHH individuals during dental care. This initiative includes collaboration among dentists, members of the deaf community, and sign language interpreters. The incorporation of pre-recorded sign language videos in the applications aims to enhance the diagnosis and treatment process, thereby improving the general oral healthcare experience for DHH individuals. Funding for this project was provided by the National Disability Service in Chile [16], and a DHH outpatient clinic service was also successfully offered in France. [17]

Regular dental visits form the basis of oral healthcare, signifying the necessity for dentists to possess fundamental knowledge and skills to provide adequate dental care to DHH population. Despite being a crucial aspect of general health, oral hygiene is often neglected in discussions about public health, leading to a limited understanding of the oral health status of DHH community, In addition to the communication challenges experienced, dentists encounter barriers in delivering appropriate oral healthcare to DHH individuals. [15] This study focused on the population residing in orphanage homes due to previous results showing the impact of regular monitoring on dental and oral hygiene levels as well as general health. [18] The use of more playful learning media can ignite the enthusiasm and interest of children in learning. Selecting methods with intriguing and enjoyable concepts is essential to prevent boredom, accelerate the teaching and learning process, and ensure that counseling materials are easy to remember. An example of a method identified with an engaging concept is playing educational games before conducting the sampling process.

The study included 58 DHH orphan children comprising 25 males with better dental and oral hygiene levels compared to 33 females. Furthermore, a higher caries rate was found in males, and females had a greater average caries rate. This was consistent with previous literature suggesting an elevated prevalence of dental caries in females [19], which might stem from misconceptions about a healthy diet, leading to hidden sugar consumption. Additionally, earlier teeth eruption exposes females to cariogenic products in the oral cavity for a longer duration, contributing to the higher caries prevalence. [20] The lower average OHI-S score in females could be attributed to the tendency to prioritize appearance, promoting more consistent oral hygiene maintenance. [21]

The fair OHI-S level and medium DMF index score observed were attributed to the lack of DHH orphans awareness about the appropriate timing and technique for tooth brushing, leading to the presence of debris, plaque, and calculus in the oral cavities. Moreover, limited knowledge and communication barriers among the subjects might contribute to untreated caries due to not recognizing or communicating about dental issues requiring professional intervention. Special care among DHH population should be conducted due to the limitation of communication and dental professional assistance in orphanage homes [14,17,22] The OHI-S levels and scores of orphan children in this study were slightly different, suggesting the need for special oral health maintenance method based on gender despite living in the same environment.

The correlation of dental and oral hygiene as well as caries showed a significant but weak correlation in Karya Murni DHH orphanage. This was consistent with a previous investigation that reported dental health status and knowledge of healthy living among deaf individuals to be influenced by limitations in obtaining

and understanding information about dental and oral health. Providing counseling for DDH individuals requires different methods compared to healthy counterparts but can be effectively achieved by using other senses, such as sight and touch. [4] Comparative studies on malocclusions and periodontal health among non-DHH population were insufficient to determine potential associations. Additionally, there is a lack of consensus on the index used, leading to challenges in making accurate comparisons across studies. Despite DHH population generally experiencing poorer oral hygiene, successful cases showed this trend could be reversed through appropriate oral health education using visual methods. [6,12,22]

The limitation of this current study is specifically the lack of classification regarding the severity and etiology of hearing loss. However, the subjects examined had similar demographic characteristics as those residing in orphanage homes. Another study identified a higher prevalence of detrimental oral habits, such as thumb sucking, mouth breathing, and tongue thrusting. [16] Additionally, malocclusion status could impact the development of oral hygiene and caries among DHH population, suggesting the need for further investigation. Potential factors contributing to the described disparities include hearing loss constitutes a significant source of miscommunication in healthcare settings. The miscommunication impacts various health-related outcomes, including health knowledge, behavior, treatment adherence, and patient satisfaction. Multiple investigations have reported lower health knowledge among DHH individuals across a variety of medical topics.[3] The deficit of specialized oral health personnel for DHH individuals in primary care is attributed to the absence of training in dental health professional curricula, leading to minor adequate preparation. Consequently, this study recommends incorporating a special needs patient method into the curricula of health professions as part of dental community services. Education for children with disabilities as well as the parents regarding oral health and hygiene is crucial, corresponding to Goal 3 (Good Health and Well-being) of the Global Sustainable Development Program. Continuous monitoring of oral hygiene in individuals with disabilities is essential for effective control which will influence the prevalence of caries, gingivitis, and malocclusion. Therefore, sustainable dental healthcare should be prioritized in the aspect of future health services for DHH community. The clinical results of this study signified the importance of regular dental health monitoring along with education on visual methods and sign language compared to non-DHH orphans. Additionally, DHH orphan caregivers should be actively engaged to enhance personal health behaviors, particularly in maintaining oral and dental health.

5. Conclusion

In conclusion, the results showed a positive correlation between oral hygiene and caries prevalence among DHH orphans at Karya Murni orphanage in Medan City. Therefore, regular dental health monitoring and education should be conducted in the future using visual methods and integrating sign language among DHH orphans. The engagement of caregivers was found to be crucial in enhancing personal health behaviors for better health outcomes.

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7. Conflicts of Interest

There was no conflict of interest among the authors.

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