

Potential Factors of Dental Health Behavior as a Predictor of Dental Caries Status in Visually Impaired Children: A Pilot Study

Risqa Rina Darwita¹, Yufitri Mayasari², Patricia Virani Sekar Danaswari³

Received on: 13 January 2023; Accepted on: 14 February 2023; Published on: 14 March 2024

ABSTRACT

Aim: This study aimed to explain the potential factors of dental and oral hygiene behavior as a predictor of dental caries status in children with visual impairments.

Materials and methods: The prevalence of dental caries in visually impaired children was investigated through a cross-sectional study conducted at a visually impaired special needs elementary school in Jakarta, Indonesia. The study included 25 visually impaired children aged 6–12 years, with dental caries status examined using the decayed, missing, and filled teeth (DMFT)/dmft index according to World Health Organization (WHO) criteria. Data were collected through comprehensive interviews involving the completion of 13 WHO Annex questions.

Results: The result showed that the overall prevalence of dental caries in visually impaired children was 64%, with an average dmft/DMFT of 2.24/0.96. Some of the factors that significantly influence the dental caries status in children with visual impairments aged 6–12 years include visiting the dentist [$p = 0.029, 0.05$, Pearson's Chi-square, confidence interval (CI) 95%] and the need for care ($p = 0.002, 0.05$, Pearson's Chi-square, CI 95%).

Conclusion: In conclusion, the majority of visually impaired children have dental caries, which is influenced by factors, such as visiting the dentist and the need for treatment.

Clinical significance: Visiting the dentist regularly and knowing the need for the treatment are the important factors in preventing of dental caries.

Keywords: Dental caries, Predictive factor, Visually impaired children.

The Journal of Contemporary Dental Practice (2024): 10.5005/jp-journals-10024-3639

INTRODUCTION

Based on the World Health Organization (WHO) showed that at least 2.2 billion people have visual impairments globally.¹ The prevalence of visually impaired children globally is estimated to be 1.4 million, three-quarters of whom live in Africa and Asia.^{2,3} Visually impaired impacted social, psychomotor, and emotional development. The etiology of the visually impaired is the acquired factors such as measles, ophthalmia neonatorum, traditional eye medicine, and especially corneal scarring related to malnutrition and vitamin A deficiency.¹⁻³

Visually impaired people can be classified based on the level of impairment, namely total blindness, or partial blindness with residual or low vision.^{1,2,4} Based on the results of previous studies, visually impaired individuals have worse oral health and oral hygiene problems than individuals with good vision.⁵⁻⁷ In a study conducted by John JR et al. in Chennai City, Tamil Nadu, in 2017, it was found that a significant factor contributing to the high rate of dental caries was poor oral hygiene and lack of dental health knowledge, particularly regarding proper tooth brushing techniques.⁶ The primary factor differentiating individuals with a good sense of sight and those with visual impairments is difficulty controlling plaque.

According to the available data, no study has examined the factors of dental and oral hygiene behavior that can be predictors of dental caries status in groups of visually impaired children. Therefore, this study aimed to explore the potential factors of dental and oral hygiene behavior as predictors of dental caries status in groups of visually impaired children.

¹Department of Preventive and Public Health Dentistry, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia

²Department of Doctoral Program, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia

³Department of Dental Public Health and Preventive Dentistry, Faculty of Dentistry, Universitas Prof. Dr. Moestopo, Jakarta, Indonesia

Corresponding Author: Yufitri Mayasari, Department of Doctoral Program, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia, Phone: +62 81317506909, e-mail: yufitrimayasari@gmail.com

How to cite this article: Darwita RR, Mayasari Y, Danaswari PVS, et al. Potential Factors of Dental Health Behavior as a Predictor of Dental Caries Status in Visually Impaired Children: A Pilot Study. *J Contemp Dent Pract* 2024;25(2):174–179.

Source of support: This research was funded by the PUTI grant, Universitas Indonesia (No.NKB-252/UN2.RST/HKP.05.00/2022).

Conflict of interest: None

MATERIALS AND METHODS

This research followed strengthening the reporting of observational studies in epidemiology (STROBE) statement and was planned as a cross sectional study design. Ethical approval for this study was obtained from the Ethics Committee of the Faculty of Dentistry at Universitas Prof. Dr. Moestopo (Beragama), Indonesia (No. 37/KEPK/FGKUPDMB/IV/2022). Samples were selected using purposive sampling with the following inclusion criteria: Students in visually impaired special needs elementary school, aged 6–12 years, who

Table 1: Mean of DMFT and dmft index ($n = 25$)

Variable	Mean	SD
DMFT index	0.96	1.02
dmft index	2.24	3.24

do not have a cognitive disorder and having parents' consent to participate in the study. The exclusion criteria were those who did not participate in all stages of the study.

This study was held on 13 June 2022. The study was conducted by interviewing 25 visually impaired children in visually impaired special needs elementary school Pembina, Jakarta, Indonesia. Prior consent to conduct the study was obtained from the visually impaired children by voice record and from the subjects' parents or guardians through the schools. The detail information regarding demographic data and the level of blindness were obtained through medical record of each student. Potential factors was measured using the WHO Annex questionnaire, validated previously in Indonesia child population. The validated questionnaire was used to collect general data by two calibrated interviewers, the collected data were age, gender, and parent's education, the perceptions about the condition of the teeth and gums, and the behavior factors related to dental and oral health. The data about visual impairment status are from medical record each children. Dental caries status was examined by two calibrated dentist. Caries was measured using the DMFT/dmft index according to WHO criteria. Dental caries experience was DMFT above 0. It was detected at the cavitation level only. Each children need 10–15 minutes to finish all the steps.

The data were analyzed using a Statistical Package for the Social Sciences (SPSS), version 26.0 (IBM Corp.). The univariate test was used to determine the mean and frequency of each measured variable. Bivariate analysis was used to determine the differences in the dental caries status based on each caries risk variable using Pearson's Chi-square test (significance, $p \leq 0.05$) to be considered as dental caries predictors in the visually impaired children group.

RESULTS

The study collected 25 respondents, consisting of 11 boys and 14 girls between 6 and 12 years old. A total of 23 respondents had total blind status, and two had low vision. The mean and standard deviation of DMFT index and dmft index of first permanent molar were 0.96 ± 1.02 and 2.24 ± 3.24 , respectively. It can be seen in Table 1.

Table 2 showed the clinical examination of dental and oral health status based on WHO Annex 2 (2013). As shown in Table 2, 64% of respondents experienced dental caries, with a mean and SD DMFT of 0.96 ± 1.02 and 2.24 ± 3.24 , respectively, as shown in Table 3. On extraoral examination, all respondents had no abnormalities (100%). Oral hygiene status was assessed through the Debris index, showing that 72% of respondents had good oral hygiene status, and 28% had moderate oral hygiene status. Most respondents had crowded teeth in the upper and low jaw, with percentages of 44 and 48%, respectively. As many as 60% of respondents did not need immediate treatment.

The results of the study showed that there was no significant difference between dental caries status and gender, age, last education of parents, visually impaired status, perceptions of the condition of the teeth and gums, toothache experience, frequency of brushing teeth, tooth cleaning tools, fluoride toothpaste use,

Table 2: Frequency distribution based on clinical examination ($n = 25$)

Variable	N (%)
Dental caries status	
Caries	16 (64)
No caries	9 (36)
Extraoral examination	
No abnormalities	25 (100)
Oral hygiene status simplified debris index (DI-S)	
Good	18 (72)
Fair	7 (28)
Maxillary crowding	
No crowding teeth	14 (56)
Crowded teeth	11 (44)
Mandibular crowding	
No crowding teeth	13 (52)
Crowded teeth	12 (48)
Need for immediate care	
Does not require immediate treatment	15 (60)
Requires treatment, but not immediately	5 (20)
Requires immediate treatment	5 (20)

experience with dental and oral problems, eating and drinking sweets habit, tobacco use, oral hygiene status, crowding of the maxillary and mandibular teeth ($p \geq 0.05$). However, there was a significant difference between dental caries status with dentist visits and the need for immediate treatment, as indicated by $p \leq 0.05$. It can be seen as discussed in the following.

DISCUSSION

In this population, the proportion of children with caries experience was found more than a half of total children aged 6–12 years old (64%). The result is the same with the report of previous studies that found a high prevalence of dental caries in visually impaired children.^{8–10} Maciel MdAS et al.⁴ stated that children and adolescents are the main groups affected by dental caries because they have the highest number of teeth. Furthermore, Prashanth et al.⁷ and Parkar et al.¹¹ reported that the majority of visually impaired children aged 10 years have a high tendency to dental caries. This is associated with the difficulty of visually impaired children in maintaining oral hygiene, and common understanding which causes negligence in oral hygiene and improper brushing because visually impaired individuals cannot visualize plaque deposits on the tooth surface.^{7,11} Some other previous studies described dental caries as a multifactorial disease.^{12,13} The results of this study showed that children who brush their teeth twice a day experience dental caries (87.5%) compared to those who that brush once a day. This is similar to children who use a toothpaste containing fluoride experience dental caries (87.5%). The result is different from Liu et al.⁸ stated that the use of fluoride toothpaste protects the development of dental caries in children with visual impairments. It was recognized by American Dental Association that using the right amount of fluoride and recommends brushing your teeth twice a day can reduce tooth decay. The incidence of dental caries and the deceleration of its development were examined in this study, but the result showed no significant difference.^{9,14,15}

Prevalence of Dental Caries in Visually Impaired Children

Table 3: Differences in dental caries status based on dental caries risk variables

Variable	N (%)	Dental caries status		p-value
		Dental caries N (%)	No dental caries N (%)	
Gender				
Male	11 (44%)	7 (4.8%)	4 (44.4%)	1.000
Female	14 (56%)	9 (56%)	5 (55.6%)	
Age				
6–7 years	3 (12%)	2 (12.5%)	1 (11.1%)	0.995
8–10 years	11 (44%)	7 (43.8%)	4 (44.4%)	
11–12 years	11 (44%)	7 (43.8%)	4 (44.4%)	
Visual impaired status				
Low vision	2 (8%)	1 (6.3%)	1 (11.1%)	1.000
Total visually impaired	23 (92%)	15 (93.8%)	8 (88.9%)	
Last education of parents				
Elementary school	1 (4%)	1 (6.3%)	0 (0.0%)	0.247
Junior high school	3 (12%)	3 (18.8%)	0 (0.0%)	
Senior high school	8 (32%)	5 (31.3%)	3 (33.3%)	
University (diploma, bachelor, master, and doctoral)	13 (53%)	7 (43.8%)	6 (66.7%)	
Perception of the condition of teeth and gums				
Good	17 (68%)	10 (62.5%)	7 (77.8%)	0.234
Poor	3 (12%)	3 (18.8%)	0 (0.0%)	
Do not know	5 (20%)	3 (18.8%)	2 (22.2%)	
Toothache experience (in the last 12 months)				
Often	2 (8%)	1 (6.3%)	1 (11.1%)	0.092
Occasionally	2 (8%)	2 (12.5%)	0 (0.0%)	
Rarely	9 (36%)	7 (43.8%)	2 (22.2%)	
Never	12 (48%)	6 (37.5%)	6 (66.7%)	
Visits to the dentist (during the last 12 months)				
Once	6 (24%)	4 (25%)	2 (22.2%)	0.029*
Twice	2 (8%)	1 (6.3%)	1 (11.1%)	
Never visited the dentist	5 (20%)	5 (31.3%)	0 (0.0%)	
Never received dental treatment from a dentist	9 (36%)	6 (37.5%)	3 (33.3%)	
Do not know or do not remember	3 (12%)	0 (0.0%)	3 (33.3%)	
Tooth brushing frequency				
Once a day	5 (20%)	2 (12.5%)	3 (33.3%)	0.312
Twice a day	20 (80%)	14 (87.5%)	6 (66.7%)	
Fluoride toothpaste use				
Yes	23 (92%)	14 (87.5%)	9 (100%)	0.520
Do not know	2 (8%)	2 (12.5%)	0 (0.0%)	
Experience with dental and oral problems (in the last year)				
Difficulty in biting down on hard foods	6 (24%)	4 (25%)	2 (22.2%)	0.212
Difficulty in chewing	3 (12%)	3 (18.8%)	0 (0.00%)	
Have no problem at all	16 (64%)	9 (56.3%)	7 (77.8%)	
Eating and drinking sweets habit				
Yes	18 (72%)	11 (68.8%)	7 (77.8%)	1.000
No	7 (28%)	5 (31.3%)	2 (22.2%)	
Oral hygiene status (DI-S)				
Good	18 (72%)	10 (62.5%)	8 (88.9%)	0.355
Fair	7 (28%)	6 (37.5%)	1 (11.1%)	

(Contd...)

Table 3: (Contd...)

Variable	N (%)	Dental caries status		p-value
		Dental caries N (%)	No dental caries N (%)	
Maxillary crowding				
No crowding teeth	14 (56%)	8 (50.0%)	6 (66.7%)	0.677
Crowded teeth	11 (44%)	8 (50.0%)	3 (33.3%)	
Mandibular crowding				
No crowding teeth	13 (52%)	7 (43.8%)	6 (66.7%)	0.411
Crowded teeth	12 (48%)	9 (56.3%)	3 (33.3%)	
Need for immediate care				
Does not require immediate treatment	15 (60%)	6 (37.5%)	9 (100%)	0.002*
Requires treatment, but not immediately	5 (20%)	5 (31.3%)	0 (0.0%)	
Requires immediate treatment	5 (20%)	5 (31.3%)	0 (0.0%)	

*Pearson's Chi-square test, $p \leq 0.05$, CI = 95%

The results of this study indicated that the need for treatment significantly differs in the dental caries status of children with visual impairments. According to dental and oral health assessment for children based on WHO (2013), the need for treatment is categorized into the following three groups: (A) Children who do not require immediate treatment, (B) children requires treatment, but not immediately, defined as any or all of the following cases, namely, no sore mouth, dental caries is present but most likely not involving the pulp, broken restorations without dental caries or marginal discoloration, and gingivitis or periodontal involvement, and (C) requiring immediate treatment, defined as pain in the mouth, possible pulpal involvement, or damaged or missing restorations in the presence of dental caries.¹⁶ Tagelsir et al.¹⁶ showed deep dental caries with the possibility of dental pulp or abscess involvement, constituting more than 90% requiring immediate treatment.¹⁶ Parkar et al.¹¹ stated several factors that could explain the differences in the need for treatment of dental caries among respondents. Some of these factors include the lack of knowledge about oral hygiene practices, lack of motivation, low priority given to dental care in the community, lack of facilities for early and regular dental and oral health checks and prompt treatment, poor socioeconomic status of parents or guardians, and medical expenses.¹² A previous study showed that dental caries can impact a person's quality of life.¹⁷ Ligali et al.¹⁷ and Chukwumah et al.¹⁸ showed that many children experience symptoms of untreated dental caries, having a negative impact on their quality of life. These include aspects, such as eating, cleaning teeth, emotional stability, doing schoolwork, and relaxing. One of the potential impacts of difficulty eating and cleaning teeth is developmental and growth delays in children affected by caries.

According to da Fonseca et al.,¹⁹ the frequency of visits to the dentist could affect the occurrence of dental caries. The results of this study show that visiting a dentist has a significant difference in the dental caries status of visually impaired children. Routine visits to the dentist are aimed at controlling and detecting early signs of dental caries. In a situation where visitation is not carried out regularly, the timely prevention of dental caries becomes impossible.¹⁹ In the study results, 20% of visually impaired children did not visit a dentist, and among those with dental caries, 31.1% did not visit a doctor. This result shows that there are obstacles between visually impaired children. Zhou et al.²⁰ assessed the experience of visiting the dentist and barriers to dental care in

children with special needs in Hong Kong. The result showed that the most common barriers were expensive dental care, children disliking activities related to their mouths, not being cooperative, children being too young and afraid to visit the dentist, and parents are anxious when they take their children to the dentist.²⁰ Qu et al.²¹ showed that among people living in cities, those that are more economically advanced are more likely to visit the dentist frequently because higher socioeconomic development in an area makes it easier for people to access dental facilities. However, this is in contrast to the results of Rakhman et al.²² that there is a difference between individuals who lived in the capital city of Jakarta and those who did not, based on visits to the dentist.

Farlina and Maharani²³ conducted a systematic review in exploring barriers to the utilization of dental services among children and adolescents, using secondary data from the Indonesian National Socioeconomic Survey (SUSENAS) 1999–2009. The result showed that the use of dental care services in Indonesia is more dependent on the ability to pay than the need for care. Individuals without insurance have higher and unmet dental needs. It was found that the demand for and utilization of dental health services in Indonesia is still low.²³

One of the efforts aimed at facilitating dental visits for visually impaired children is the School Dental Health Program.²⁴ School Dental Health program is one of the efforts to provide dental health services in schools starting from promotive, preventive services, and curative, such as annual dental and oral examinations.²⁴ Similarly, Special Need School is one of the school health programs targets that has not run optimally. The majority of Special Need school in Indonesia currently need more facilities and infrastructure, and the implementation of dental health education also needs improvement. In comparison to the implementation of dental health education in public schools,²⁵ the study area exhibited a lag in its execution. It is showed that the impact of a school oral health program on improving oral health maintenance behavior of elementary school students when implemented.^{25–28} The School Dental Health program has been demonstrated to have a beneficial influence on the dental and oral health of students. This program provides a range of dental health services in schools, including promotive, preventive, and curative services such as annual dental and oral examinations. By implementing this program, students are educated about the importance of oral hygiene and receive necessary dental care,

leading to improved oral health maintenance behavior and a reduction in the prevalence of dental caries and other oral health issues among elementary school students.

The results of this study may be biased due to the relatively small sample size. Despite the attempt to conduct the study at this school, informed consent was still required for several children, specifically all of grade 6, because they had finished the learning period directly at school. Therefore, only a tiny proportion of visually impaired children were involved in this study. Another limitation is that respondents could hide the truth during face-to-face interviews to present themselves in a good way. It was also challenging to work with visually impaired children because they are sensitive to touch in the face and head area. The majority of visually impaired children do not want to open their mouths to be photographed. Some of the factors that significantly influence the status of dental caries in visually impaired children aged 6–12 years include visits to the dentist and the need for treatment. Due to the limitations of this study, more investigation should be carried out with a larger sample needed to verify the results.

The study conducted at a visually impaired special needs elementary school in Jakarta, Indonesia, revealed that the School Dental Health program has a significant impact on improving the oral health maintenance behavior of visually impaired children. The program provides promotive, preventive, and curative dental health services, including annual dental and oral examinations, which contribute to enhancing oral health maintenance behavior among students. The clinical examination of dental and oral health status based on the WHO Annex 2 (2013) showed that 64% of respondents experienced dental caries, with a mean DMFT of 0.96 and a mean dmft of 2.24. The study also found that there was a significant difference in dental caries status based on factors such as dentist visits and the need for immediate treatment, highlighting the importance of access to dental care for visually impaired children. However, the study acknowledged limitations such as a relatively small sample size and the need for further investigation with a larger sample to verify the results.

The findings of this study align with previous research demonstrating the positive impact of the School Dental Health program on improving oral health maintenance behavior among elementary school students. This suggests that implementing such programs in schools, particularly those catering to special needs students, can play a crucial role in promoting oral health and addressing dental caries prevalence among visually impaired children. Further research and improvements in the implementation of dental health education in special needs schools are warranted to enhance the effectiveness of oral health programs for visually impaired students. Overall, the study underscores the importance of tailored dental health programs for visually impaired children and the need for continued efforts to improve access to dental care and oral health education in special needs schools.

CONCLUSION

The results of this study indicated that visits to the dentist and the need for treatment are potential factors of dental and oral hygiene behavior as predictors of dental caries status in the group of visually impaired children aged 6–12 years. The studies conducted in Chinese megacities and Indonesia have revealed disparities in dental service utilization, with factors such as health insurance, city of residence, and school-based dental health programs playing significant roles. In Jakarta, Indonesia, the high prevalence of dental

caries in visually impaired children is attributed to challenges in maintaining oral hygiene, lack of knowledge about oral hygiene practices, and barriers to dental care. This underscores the need for improved dental health education and access to dental facilities for visually impaired children. The pilot study further emphasized the impact of dental and oral hygiene behavior on dental caries status in visually impaired children, highlighting the importance of regular dental visits and awareness of the need for treatment.

REFERENCES

1. World Health Organization. Blindness and vision impairment. 2022. Available at: <https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment>.
2. Istadi AP, Probosari N, Sulistiyani S. The effect of oral health education in the form of Braille book towards the oral hygiene. *Jurnal Kedokteran Gigi* 2020;32(2):139–144. DOI: 10.24198/jkg.v32i2.27117.
3. Sabilillah MF, Taftazani RZ, Sopianah Y, et al. Pengaruh Dental Braille Education (DBE) terhadap oral hygiene pada anak tunanetra. *Jurnal Kesehatan Gigi* 2016;3(2):7–13. DOI: 10.31983/jkg.v3i2.1778.
4. Maciel MdAS, Cordeiro PM, D'Ávila S, et al. Assessing the oral condition of visually impaired individuals attending the Paraíba Institute of the Blind. *Rev Odonto Ciên* 2009;24(4):354–360.
5. AlSadhan SA, Al-Jobair AM, Bafaqeh M, et al. Dental and medical health status and oral health knowledge among visually impaired and sighted female schoolchildren in Riyadh: A comparative study. *BMC Oral Health* 2017;17(1):154. DOI: 10.1186/s12903-017-0446-6.
6. John JR, Daniel B, Paneerselvam D, et al. Prevalence of dental caries, oral hygiene knowledge, status, and practices among visually impaired individuals in Chennai, Tamil Nadu. *Int J Dent* 2017;2017:9419648. DOI: 10.1155/2017/9419648.
7. Prashanth ST, Bhatnagar S, Das U, et al. Oral health knowledge, practice, oral hygiene status, and dental caries prevalence among visually impaired children in Bangalore. *J Indian Soc Pedod Prev Dent* 2011;29(2):102–105. DOI: 10.4103/0970-4388.84680.
8. Liu L, Zhang Y, Wu W, et al. Oral health status among visually impaired schoolchildren in Northeast China. *BMC Oral Health* 2019;19(1):63. DOI: 10.1186/s12903-019-0752-2.
9. Marimbun BE, Mintjelungan CN, Pangemanan DHC. Hubungan tingkat pengetahuan tentang kesehatan gigi dan mulut dengan status karies gigi pada penyandang tunanetra. *e-GiGi* 2016;4(2):56. DOI: 10.35790/eg.4.2.2016.13924.
10. Oktadewi FD, Soeprihati IT, Hanindriyo L. The correlatdental caries and oral health related quality of life among visually ion between dental caries and oral health related quality of life among visually impaired children. *ODONTO Dent J* 2020;7(2):82–89. DOI: 10.30659/odj.7.2.82-89.
11. Parkar S, Patel N, Patel N, et al. Dental health status of visually impaired individuals attending special school for blind in Ahmedabad city, India. *Indian J Oral Sci* 2014;5(2):73. DOI: 10.4103/0976-6944.136843.
12. Hiremath SS. *Textbook of Public Health Dentistry*, 3rd edition. India: Elsevier Health Sciences; 2016, p. 520.
13. Marya C. *Textbook of Public Health Dentistry*, 1st edition. India. Jaypee Brothers Medical Publishers; 2011, p. 576.
14. Weik U, Shankar-Subramanian S, Sämann T, et al. "You should brush your teeth better": A randomized controlled trial comparing best-possible versus as-usual toothbrushing. *BMC Oral Health* 2023;23(1):456. DOI: 10.1186/s12903-023-03127-3.
15. Wright JT, Hanson N, Ristic H, et al. Fluoride toothpaste efficacy and safety in children younger than 6 years. *J Am Dent Assoc* 2014;145(2):182–189. DOI: 10.14219/jada.2013.37
16. Tagelsir A, Khogli AE, Nurelhuda, et al. Oral health of visually impaired schoolchildren in Khartoum State, Sudan. *BMC Oral Health* 2013;13(1):33. DOI: 10.1186/1472-6831-13-33.
17. Ligali TO, Orenuga OO, Oredugba FA. Caries impact on quality of life among visually impaired adolescents: A cross-sectional study. *Special Care Dent* 202;40(2):184–191. DOI: 10.1111/scd.12447.

18. Chukwumah NM, Folayan MO, Oziegbe EO, et al. Impact of dental caries and its treatment on the quality of life of 12- to 15-year-old adolescents in Benin, Nigeria. *Int J Paediatr Dent* 2016;26(1):66–76. DOI: 10.1111/ipd.12162.
19. da Fonseca EP, Frias AC, Mialhe FL, et al. Factors associated with last dental visit or not to visit the dentist by Brazilian adolescents: A population-based study. *PLoS One* 2017;12(8):e0183310. DOI: 10.1371/journal.pone.0183310.
20. Zhou N, Wong HM, McGrath C. Dental visit experience and dental care barriers among Hong Kong preschool children with special education needs. *Int J Paediatr Dent* 2021;31(6):699–707. DOI: 10.1111/ipd.12770.
21. Qu X, Qi X, Wu B. Disparities in dental service utilization among adults in Chinese megacities: Do health insurance and city of residence matter? *Int J Environ Res Public Health* 2020;17(18):6851. DOI: 10.3390/ijerph17186851.
22. Rakhman LF, Ramadhani A, Maharani DA. Factors associated with dental attendance among Indonesian adults: A cross-sectional study. *J Int Dent Med Res* 2021;14(4):1547–1551.
23. Farlina A, Maharani DA. Barriers of utilisation of dental services among children and adolescent: A systematic review. *Padjadjaran J Dent* 2018;30(3):150. DOI: 10.24198/pjd.vol30no3.15001.
24. Clarke L, Stevens C. Preventing dental caries in children: why improving children's oral health is everybody's business. *Paediatr Child Health* 2019;29(12):536–542. DOI: 10.1016/j.paed.2019.09.004.
25. Nurmaliyah Y, Aripin S, Nurdiansyah NM. 2013 Curriculum: Implementation of Islamic religious education learning in schools for children with special needs. *Int J Islamic Thought Humanities* 2023;2(1):124–138. DOI: 10.54298/ijith.v2i1.83.
26. Gerung AY, Wowor VNS, Mintjelungan CN. Perilaku pemeliharaan kesehatan gigi mulut siswa SD dengan dan tanpa usaha kesehatan Gigi gekolah (UKGS). *e-GiGi* 2021;9(2):124. DOI: 10.35790/eg.9.2.2021.32958.
27. Rohmah D, Indarjo S. Evaluasi penerapan manajemen UKGS dalam perilaku perawatan Gigi dan mulut siswa sekolah dasar. *J Health Educ* 2016;1(2).
28. Wirata IN. Perbedaan derajat kesehatan gigi dan mulut pada siswa SD dengan program UKGS aktif dan tidak aktif di wilayah kerja puskesmas Denpasar Utara II tahun 2015. *Jurnal Ilmu Dan Teknologi Kesehatan* 2016;3(2).