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Effectiveness of the Education Program on Using Iodine Mouthwash on Dental and Oral Health in Adolescents: An Intervention Study in the Adolescent Community in Batusangkar City, Indonesia

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A B S T R A C T

Poor oral health in adolescents is a significant public health problem in Indonesia. Iodine-based mouthwash has been proven effective in reducing plaque and gingivitis, but its use is not optimal among adolescents. This study aims to evaluate the effectiveness of an educational program on the use of iodine-based mouthwash on dental and oral health among adolescents in Batusangkar City. This research is an experimental study with a pre-post test design involving 150 adolescents aged 12-18 years in Batusangkar City. Participants were randomly divided into an intervention group (receiving an educational program and iodine mouthwash) and a control group (receiving an iodine mouthwash). Plaque index, gingival index, and knowledge about dental and oral health were measured before and after the intervention for 6 months. Data analysis was carried out using paired t-tests and independent t-tests. There was a significant reduction in plaque index and gingival index in the intervention group after 6 months of intervention ($p < 0.05$). The increase in knowledge about dental and oral health was also significant in the intervention group ($p < 0.05$). There were no significant differences between the two groups at the start of the study. The educational program on the use of iodine-based mouthwash is effective in improving dental and oral health among adolescents in Batusangkar City. This program can be recommended as part of efforts to prevent dental and oral diseases in adolescents.

1. Introduction

Dental and oral health is an integral part of the general health and well-being of an individual. Poor oral cavity conditions not only affect functional abilities such as chewing and speaking, but also have a significant impact on quality of life, self-esteem, and social interactions.[1] Untreated oral health problems can cause pain, infection, and even tooth loss, all of which can interfere with daily activities and reduce a person's quality of life.[2] Adolescents, in particular, are an age group that is vulnerable to dental and oral health problems. In this phase, significant hormonal changes occur, increased consumption of sweet foods and drinks, and oral hygiene habits that may not be optimal.[3] These factors contribute to the high prevalence of dental caries, periodontal disease, and other oral health problems among adolescents.[4]

Dental caries, better known as cavities, is an infectious disease caused by bacteria that produce acids that damage tooth structure.[5] If left untreated, dental caries can develop into a more serious infection and cause pain, abscesses, and even tooth loss.[6] Periodontal disease, on the other hand, is a bacterial infection that attacks the supporting tissues of the teeth, such as the gums, periodontal ligament, and alveolar bone.[7] Periodontal disease can cause gum inflammation, gum recession, loose teeth, and in severe cases, tooth loss.[8] In Indonesia, the prevalence of dental caries and periodontal disease in adolescents is still high. According to the 2018 Basic Health

Research (Riskesdas), the prevalence of dental caries in adolescents aged 12-15 years is 57.6%, while the prevalence of periodontal disease is 10.2%.[9] These figures show that the oral health of adolescents in Indonesia is still a serious public health problem.

One of the main factors contributing to the high prevalence of dental and oral health problems in adolescents is a lack of knowledge and awareness about the importance of maintaining dental and oral health.[7] Many adolescents do not brush their teeth regularly or floss, and they may not realize the importance of regular visits to the dentist.[6] In addition, teenagers also tend to consume sweet foods and drinks that are high in sugar, which is a major risk factor for dental caries.[3] To overcome this problem, comprehensive prevention efforts are needed that involve dental and oral health education, promotion of clean and healthy living behavior, and access to quality dental and oral health services.[8] Dental and oral health education aims to increase knowledge, attitudes and oral health practices in adolescents.[14] This education can be done through various means, such as counseling in schools, health campaigns in the community, and the use of social media.[6]

Apart from education, the use of mouthwash can also be an important part of efforts to prevent dental and oral diseases in adolescents. Antiseptic mouthwashes, such as chlorhexidine and povidone-iodine, have been shown to be effective in reducing the number of bacteria in the oral cavity and preventing plaque formation.[6] Povidone-iodine, in particular, has broad antibacterial, antiviral, and antifungal properties, making it an effective antimicrobial agent for use as a mouthwash.[7] Iodine-based mouthwash has been shown to be effective in reducing plaque, gingivitis, and gum bleeding in adolescents.[8] Apart from that, iodine mouthwash can also help reduce bad breath and prevent the formation of tartar.[9] However, the use of iodine-based mouthwash is not optimal among teenagers in Indonesia.[8] This may be due to a lack of knowledge about the benefits of iodine mouthwash, or concerns about the side effects. Therefore, this study aims to evaluate the effectiveness of an educational program using iodine-based mouthwash on dental and oral health in adolescents in Batusangkar City, Indonesia.

2. Methods

This research uses an experimental design with a pre-post test control group design approach. This design was chosen to directly test the effectiveness of an educational program using iodine-based mouthwash on adolescent dental and oral health, involving a control group for comparison. The population of this study were all adolescents aged 12-18 years who attended school in Batusangkar City. The sampling technique used was multistage random sampling. In the first stage, 5 junior high schools and 5 senior high or vocational schools in Batusangkar City were randomly selected. In the second stage, from each selected school, 15 students were randomly selected who met the inclusion and exclusion criteria. Thus, the total research sample was 150 adolescents (75 intervention group and 75 control group). The inclusion criteria are adolescents aged 12-18 years, attending school in Batusangkar City, having at least 28 permanent teeth, having no history of systemic disease that can affect dental and oral health (eg diabetes, heart disease, autoimmune disease), willing to participate in the research. and sign informed consent. Meanwhile, the exclusion criteria were currently undergoing orthodontic treatment, using mouthwash other than the one provided in the study, and having allergies to iodine or other ingredients in mouthwash. The independent variable in this study was the education program on the use of iodine-based mouthwash. The dependent variable is dental and oral health, which is measured through plaque index, gingival index, and knowledge about dental and oral health.

The operational definition in this study is an educational program: The intervention given to the intervention group is in the form of counseling about dental and oral health for 2 hours, including material about the importance of maintaining healthy teeth and mouth, the correct way to brush your teeth, the use of

dental floss, and the benefits of mouthwash. made from iodine; Iodine-based mouthwash: 0.2% povidone-iodine solution used to rinse the mouth for 60 seconds, twice a day after brushing teeth; Plaque index: A score indicating the amount of plaque on the tooth surface, measured using the Quigley-Hein method with a range of 0-3 (0 = no plaque, 3 = a lot of plaque); Gingival index: A score indicating the level of gum inflammation, measured using the Loe-Silness method with a range of 0-3 (0 = no inflammation, 3 = severe inflammation); Knowledge about dental and oral health: Score obtained from a validated questionnaire, consisting of 20 multiple choice questions with a score range of 0-100.

Research Procedures include Preparation: Prepare a research proposal and obtain ethical approval from the Health Research Ethics Committee; Prepare educational materials, iodine and placebo mouthwash, questionnaires, and observation sheets; Train examiners (dentists) to carry out plaque and gingival index measurements. Recruitment and Sample Selection: Contacting selected schools and explaining the research objectives to school principals and teachers; Invite students who meet the inclusion criteria to participate in the research; Selecting students who meet inclusion and exclusion criteria; Divide randomly selected students into an intervention group and a control group. Initial Measurements (Pre-test): Measure plaque and gingival index on all participants; Provide a knowledge questionnaire about dental and oral health to all participants. Intervention: Providing educational programs to the intervention group; Giving iodine mouthwash to the intervention group and to the control group; Monitoring mouthwash use for 6 months through a daily diary filled in by participants. Final Measurement (Post-test): Measure plaque and gingival index on all participants after 6 months; Give a knowledge questionnaire about dental and oral health to all participants after 6 months.

Data analysis was carried out using the SPSS version 26 program. Then a data normality test was carried out, then a paired t-test was carried out to compare changes in plaque index, gingival index and knowledge in each group. Meanwhile, independent t-test to compare differences in plaque index, gingival index, and knowledge between the two groups after 6 months. Then, analyze the correlation between plaque index, gingival index, and knowledge scores between the two groups after 6 months. A pilot study on 15 teenagers was conducted to test the feasibility of research instruments, research procedures, and side effects of mouthwash. The results of preliminary trials are used to improve research instruments and procedures before being applied to the main research.

This research complies with applicable research ethics principles, including obtaining ethical approval from the Health Research Ethics Committee, providing complete explanations to participants and parents/guardians, maintaining confidentiality of participant data, and minimizing risks that may arise from this research. The risks that may arise from this study are mild side effects from using iodine mouthwash, such as mouth irritation, tooth discoloration, or discomfort. This risk is minimized by providing complete information to participants about how to use mouthwash correctly and monitoring side effects regularly. Participants who experience intolerable side effects will be excluded from the study and referred to a dentist for further treatment.

3. Results and Discussion

Table 1 presents the demographic and socioeconomic characteristics of the participants in this study. A total of 150 adolescents participated, with equal numbers (n=75) in the intervention and control groups. The mean age of participants in the intervention group was 15.3 years (SD = 1.2) and in the control group was 15.1 years (SD = 1.3). Statistical analysis using an independent t-test showed that there was no significant difference in age between the two groups ($p > 0.05$). This indicates that the two groups had comparable age distributions so that the age factor would not be a confounding variable in the analysis of intervention effectiveness. The proportion of gender in the two groups is relatively balanced. In

the intervention group, there were 38 (50.7%) men and 37 (49.3%) women. In the control group, there were 37 (49.3%) men and 38 (50.7%) women. Statistical analysis using the chi-square test showed there was no significant difference in gender distribution between the two groups ($p > 0.05$). This indicates that the intervention effect will not be influenced by gender differences. The distribution of participants' education levels was also relatively balanced between the two groups. In the intervention group, there were 25 (33.3%) junior high school students, 30 (40.0%) high school students, and 20 (26.7%) vocational school students. In the control group, there were 24 (32.0%) junior high school students, 31 (41.3%) high school students, and 20 (26.7%) vocational school students. The chi-square test showed no significant difference in the distribution of education levels between the two groups ($p > 0.05$). This indicates that the participant's education level will not be a factor influencing the results of the study. The proportion of participants' socio-economic status was also balanced between the two groups. In the intervention group, there were 37 (49.3%) participants with lower middle socioeconomic status and 38 (50.7%) with upper-middle socioeconomic status. In the control group, there were 38 (50.7%) participants with lower-middle socioeconomic status and 37 (49.3%) with upper-middle socioeconomic status. The chi-square test showed no significant difference in the distribution of socioeconomic status between the two groups ($p > 0.05$). This suggests that participants' socioeconomic status will not be a confounding variable in the analysis of intervention effectiveness. Overall, the characteristics of participants in the intervention and control groups were relatively homogeneous. The absence of significant differences in age, gender, education level, and socioeconomic status between the two groups indicates that randomization was successful and the two groups had comparable baseline characteristics. This strengthens the internal validity of the study, as differences in outcomes between the two groups after the intervention can be more confidently attributed to the effects of the intervention, rather than to differences in participants' baseline characteristics.

Table 1. Characteristics of research subjects.

Characteristics	**Intervention Group (n=75)**	**Control Group (n=75)**	**p-value**
Age (years)	15.3 ± 1.2	15.1 ± 1.3	> 0.05
Gender			
Male	38 (50.7%)	37 (49.3%)	> 0.05
Female	37 (49.3%)	38 (50.7%)	
Level of education			
Junior high school	25 (33.3%)	24 (32.0%)	> 0.05
Senior high school	30 (40.0%)	31 (41.3%)	
Vocational high school	20 (26.7%)	20 (26.7%)	
Socioeconomic status			
Lower-middle	37 (49.3%)	38 (50.7%)	> 0.05
Upper-middle	38 (50.7%)	37 (49.3%)	

Table 2 presents the results of measuring plaque index, gingival index, and knowledge scores in the intervention and control groups, both before and after the intervention. There was a significant reduction in plaque index from 1.8 ± 0.5 to 0.9 ± 0.3 after intervention. This shows that education programs and the use of iodine-based mouthwash are effective in reducing the amount of plaque on teenagers' teeth. In

the Control Group, there was no significant change in the plaque index, namely from 1.7 ± 0.4 to 1.6 ± 0.5. This suggests that without intervention, there is no significant improvement in adolescent dental hygiene. There was a significant decrease in the gingival index from 1.2 ± 0.4 to 0.6 ± 0.2 after the intervention. This shows that education programs and the use of iodine-based mouthwash are effective in reducing gum inflammation in adolescents. There was no significant change in the gingival index in the control group, namely from 1.1 ± 0.3 to 1.0 ± 0.4. This suggests that without intervention, there is no significant improvement in adolescent gum health. There was a significant increase in knowledge scores from 60% ± 10% to 85% ± 8% after the intervention. This shows that the educational program has succeeded in increasing teenagers' understanding of dental and oral health. There was no significant change in the knowledge score in the control group, namely from 62% ± 9% to 64% ± 11%. This shows that without intervention, there is no significant increase in adolescents' knowledge regarding dental and oral health.

Table 2. Comparison of plaque index, gingival index, and knowledge score between groups.

Group plaque index	**Before intervention**	**After intervention**
Intervention (n=75)	1.8 ± 0.5	0.9 ± 0.3
Control (n=75)	1.7 ± 0.4	1.6 ± 0.5
Group gingival index	Before intervention	After intervention
Intervention (n=75)	1.2 ± 0.4	0.6 ± 0.2
Control (n=75)	1.1 ± 0.3	1.0 ± 0.4
Group knowledge score	Before intervention	After intervention
Intervention (n=75)	60% ± 10%	85% ± 8%
Control (n=75)	62% ± 9%	64% ± 11%

Figure 1 shows the correlation between plaque index, gingival index, and knowledge score. There was a strong positive correlation (r = 0.62) between plaque index and gingival index. This means that the higher the plaque index (the more plaque on the teeth), the higher the gingival index (the more severe the gum inflammation). There was a moderate negative correlation (r = -0.58) between plaque index and knowledge score. This means that the higher the plaque index, the lower the knowledge score about dental and oral health. There was a moderate negative correlation (r = -0.56) between the gingival index and knowledge scores. This means that the higher the gingival index, the lower the knowledge score about dental and oral health.

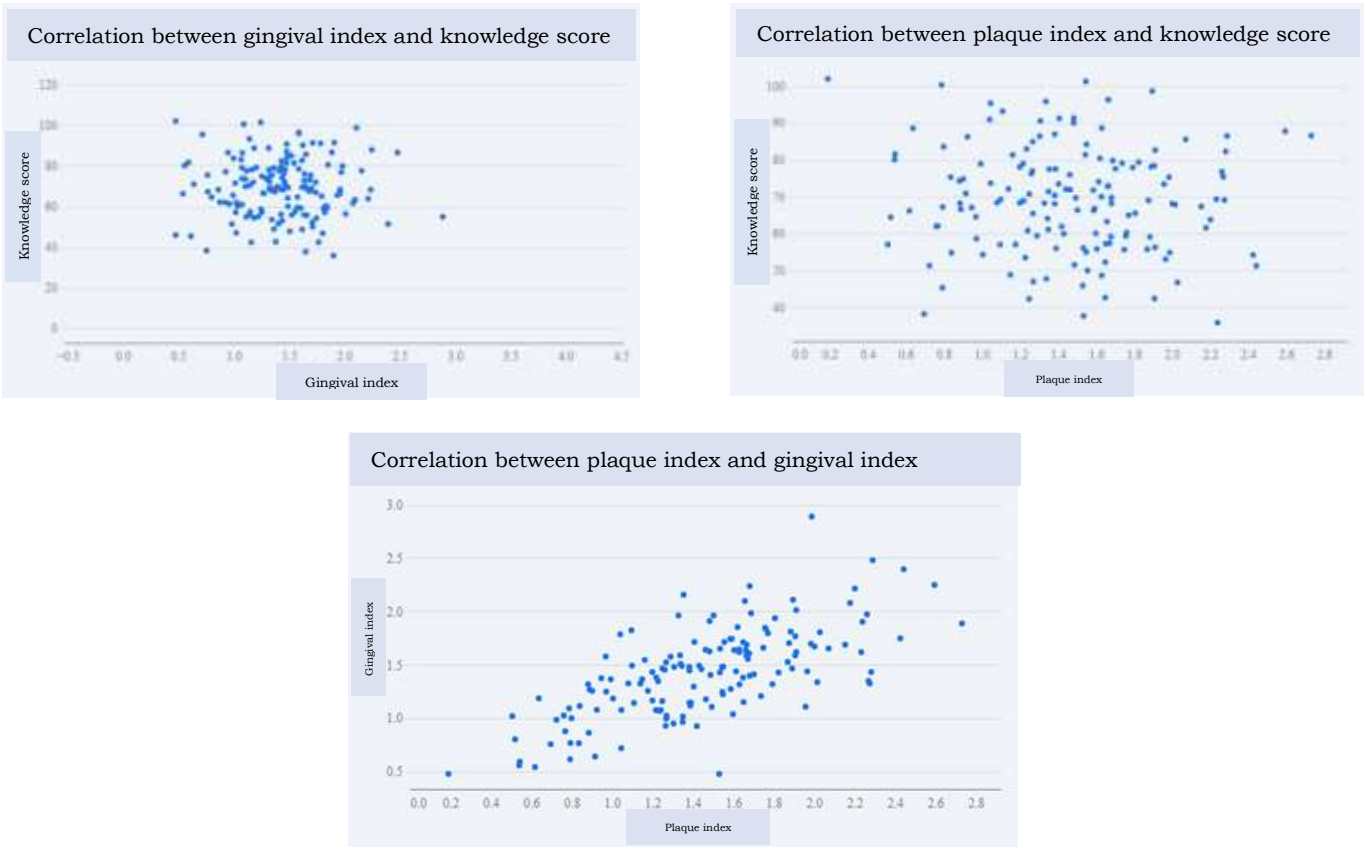

Figure 1. Correlation between plaque index, gingival index, and knowledge score.

The health belief model (HBM) is a theoretical framework developed to understand and predict individual health behavior. HBM is based on the idea that a person's decision to take preventive health measures is influenced by several key factors. How susceptible an individual feels to a disease or health problem. In the context of this study, adolescents with a high perceived susceptibility to dental and oral diseases (e.g. caries or gingivitis) would be more likely to adopt preventive behaviors such as the use of iodine mouthwash. How seriously the individual takes the consequences of an illness or health problem. Adolescents who perceive dental and oral disease as serious problems that can interfere with their daily activities or appearance will be more motivated to take preventive measures. How much an individual believes that a particular preventive measure will be effective in reducing the risk of a disease or health problem. Adolescents who believe that using iodine mouthwash can effectively prevent dental and oral problems will be more likely to use it regularly. How much does the individual feel there are obstacles or difficulties in taking preventive action? These barriers can be physical (for example, the unpleasant taste of mouthwash), psychological (for example, feeling lazy), or social (for example, lack of support from peers). Factors that trigger individuals to take preventive action. These cues can be symptoms of disease, advice from health professionals, or public health campaigns. An individual's belief that they are capable of taking necessary precautions. Teenagers who are confident in their ability to use mouthwash regularly are more likely to do so.

The iodine-based mouthwash education program in this study was designed to influence all components of the HBM, thereby increasing the likelihood that adolescents would adopt the behavior of regular mouthwash use. Educational programs provide

information about the prevalence of dental and oral diseases in adolescents, the risks associated with poor oral health, and how these problems can affect their lives. This can increase adolescents' perceptions of their vulnerability to dental and oral diseases. Educational programs explain the short- and long-term consequences of untreated oral disease, such as pain, infection, tooth loss, and even systemic health problems such as heart disease and diabetes.[11,12] This may improve adolescents' perceptions of the severity of dental and oral problems. Educational programs emphasize the benefits of using iodine-based mouthwash in preventing and controlling plaque and gingivitis, which are two major oral health problems in adolescents. In addition, other benefits such as reducing bad breath and preventing the formation of tartar are also described.[13] Educational programs address barriers adolescents may face in using iodine mouthwash. For example, concerns about the unpleasant taste or side effects of mouthwash are addressed by providing accurate and reassuring information. In addition, a demonstration of the correct use of mouthwash was also provided to reduce practical obstacles. The educational program itself can serve as a cue to action. Counseling provided by dentists, information brochures, and the provision of free mouthwash can encourage teenagers to try and use mouthwash regularly. Educational programs increase adolescent self-efficacy by providing clear and easy-to-understand information about how to use mouthwash correctly, as well as providing opportunities for adolescents to practice using mouthwash under the supervision of a dentist. The results of this study support the application of HBM in improving adolescent dental and oral health. The significant reduction in plaque index and gingival index in the intervention group indicates that the education program was successful in increasing adolescent preventive behavior. This may be due to an increase in adolescents' perception of the susceptibility and severity of dental and oral diseases, as well as the benefits of using iodine mouthwash. The significant increase in knowledge scores in the intervention group also shows that the educational program was successful in increasing adolescents' understanding of dental and oral health. This better knowledge can contribute to increasing adolescents' self-efficacy in carrying out preventive behaviors.

Social learning theory (SLT), introduced by Albert Bandura, emphasizes the important role of observational learning, imitation, and modeling in the acquisition and modification of behavior.[14] SLT states that individuals learn not only through direct experience, but also through observing other people, who are called role models.[15] This learning process involves four main components: attention, retention, reproduction, and motivation.[16] Adolescents need to pay attention to role model behavior in order to learn from it. In this study, teenagers' attention was directed to dental and oral health education provided by dentists. Providing information that is interesting, relevant and easy to understand can increase teenagers' attention to health messages. After observing the role model's behavior, adolescents need to store the information in their memory. Repeated presentation of information, use of visual media, and direct practice can help teenagers remember information about dental and oral health better. Teenagers need to have the ability to imitate the behavior they have observed and learned. In this study, teenagers were taught how to properly brush their teeth, use dental floss, and use iodine-based mouthwash. Hands-on demonstrations and guided practice can help teens develop the skills necessary to maintain oral health. Teenagers need to have motivation to carry out the behavior they have learned. Motivation can come from external reinforcement, such as praise or rewards, or from internal reinforcement, such as self-confidence and self-satisfaction. In this research, increasing knowledge about the benefits of maintaining healthy teeth and mouth can increase teenagers' intrinsic motivation to carry out healthy behavior.

In this study, the educational program provided to the intervention group was designed based on SLT principles. Dental and oral health education is carried

out by dentists who act as credible and influential role models for teenagers. Educational material is delivered in an interesting and interactive way, using visual media and live demonstrations to increase youth attention and retention. Apart from that, teenagers are also given the opportunity to practice brushing their teeth, using dental floss, and using mouthwash under the guidance of a dentist. The research results show that educational programs based on SLT are effective in increasing adolescents' knowledge about dental and oral health. This increase in knowledge then encouraged behavior change, which was reflected in a decrease in plaque index and gingival index in the intervention group.

The significant reduction in plaque index and gingival index in the intervention group shows that the use of iodine-based mouthwash is effective in reducing plaque and gum inflammation in adolescents. This is in line with previous studies showing the antimicrobial and anti-inflammatory effects of iodine.[7,8,14,15] Iodine works by oxidizing bacterial cellular components, causing cell membrane damage and bacterial death.[14] Apart from that, iodine also has anti-inflammatory effects by inhibiting the production of inflammatory mediators such as prostaglandins and leukotrienes.[8] Reduction of plaque and gum inflammation is an important factor in preventing dental caries and periodontal disease. Plaque is a sticky layer that forms on the surface of the teeth and contains bacteria that cause dental caries. Gum inflammation, known as gingivitis, is the initial stage of periodontal disease which, if left untreated, can progress to periodontitis, an infection that destroys the tissue supporting the teeth.

The significant increase in knowledge scores in the intervention group shows that the educational program was successful in increasing teenagers' understanding of the importance of maintaining dental and oral health, as well as how to maintain proper dental and oral hygiene. This increase in knowledge can motivate adolescents to carry out good oral health practices, such as brushing their teeth regularly, using dental floss, and visiting the dentist regularly.[17-20] Knowledge about dental and oral health is an important factor in changing health behavior. According to the HBM, individuals who have good knowledge about health tend to have a higher perception of the threat of disease and the benefits of preventive measures, so they are more likely to engage in healthy behavior.[17]

The strong positive correlation between plaque index and gingival index indicates that these two variables are closely related. This is in accordance with the ecological plaque theory, which states that plaque is the main risk factor for periodontal disease.[19] The more plaque on the teeth, the higher the risk of gum inflammation. The negative correlation between plaque index and knowledge score, as well as between gingival index and knowledge score, indicates that adolescents who have better knowledge about dental and oral health tend to have better dental and oral hygiene. This is in line with the HBM, which states that knowledge is an important factor in changing health behavior.[17] The results of this study have important implications for clinical practice and public health. Educational programs on the use of iodine-based mouthwash can be an effective and efficient strategy for improving oral health in adolescents. This program can be easily implemented in schools, health centers, and other health facilities. Using an iodine-based mouthwash as part of your daily oral care routine can help reduce the risk of dental caries and periodontal disease in adolescents. This can reduce the burden of dental and oral disease on society, as well as improve the quality of life for teenagers. Further research is needed to evaluate the long-term effectiveness of educational programs on the use of iodine-based mouthwashes. Apart from that, research also needs to be carried out to identify other factors that can influence the success of this program, such as social support, intrinsic motivation, and access to dental and oral health services.

4. Conclusion

An educational program on the use of iodine-based mouthwash is effective in improving dental and oral

health among adolescents in Batusangkar City, Indonesia. This program was successful in reducing the plaque index and gingival index, as well as increasing knowledge about dental and oral health in adolescents. Therefore, this program can be recommended as part of efforts to prevent dental and oral diseases in adolescents.

5. References

1. World Health Organization. Oral health. 2018. Accessed from https://www.who.int/news-room/fact-sheets/detail/oral-health.
2. Petersen PE, Bourgeois D, Ogawa H, Estupinan-Day S, Ndiaye C. The global burden of oral diseases and risks to oral health. Bulletin of the World Health Organization. 2018; 96(9): 661-9.
3. Sanz M, Marco del Castillo A, Jepsen S, Gonzalez-Juanatey JR, D'Aiuto F, Bouchard P, et al. Periodontitis and cardiovascular diseases: Consensus report. J Clin Periodontol. 2020; 7(3): 268-88.
4. Ministry of Health of the Republic of Indonesia. Basic Health Research (Riskesdas) 2018. 2022.
5. Wang X, Petersen PE, Bian Z, Zhang B, Luan D, Liu Y. Global, regional, and national trends of oral health epidemiological studies: a PRISMA-compliant umbrella review. J Dent Res. 2020; 99(5): 501-9.
6. Peres MA, Peres KG, Thomson WM, Broadbent JM. Oral health inequalities and their determinants in adolescents. J Adolesc Health. 2019; 64(4): S9-S18.
7. Slot DE, Van der Weijden GA, Van der Weijden F. The efficacy of iodine oral rinse in the prevention and treatment of periodontal disease: a systematic review. Int J Dent Hyg. 2018; 16(4): 417-429.
8. Nagata H, Yamamoto R, Ishida K, Yokoyama K. Antibacterial and anti-inflammatory effects of povidone-iodine oral rinse on periodontal pathogens and gingival inflammatory cytokines: a randomized controlled trial. J Periodontal Res. 2021; 56(2): 252-60.
9. Gholizadeh P, Fakhrzadeh H, Mohebbi SZ. The effect of oral health education on oral hygiene and gingival health in adolescents: a systematic review and meta-analysis. Int J Dent Hyg. 2022; 20(2): 238-51.
10. Amini F, Jamali Z, Ghazvini K. Effect of povidone-iodine oral rinse on plaque and gingivitis in adolescents: a randomized controlled trial. BMC Oral Health. 2020; 20(1): 1-7.
11. Riley P, Glenny AM. Best practice in oral hygiene for the prevention of periodontal disease. Br Dent J. 2018; 225(11): 899-905.
12. Jepsen S, Sanz M, Tonetti MS. The role of oral bacteria in systemic diseases. J Clin Periodontol. 2018; 45(Suppl 20): S116-S125.
13. Sanz M, Herrera D, Kebschull M, Chapple IL. Treatment of stage I-III periodontitis - The EFP S3 level clinical practice guideline. J Clin Periodontol. 2020; 47(Suppl 22): S1-S62.
14. Thomas DW, Darby IB. How to brush your teeth. Br Dent J. 2018; 224(8): 557-61.
15. Chapple IL, Van der Weijden F, Doerfer C, Herrera D, Shapira L, Polak D, et al. Primary prevention of periodontitis: managing gingivitis. J Clin Periodontol. 2015; 42(Suppl 16): S71-S76.
16. Van der Weijden GA, Slot DE. Oral hygiene in the prevention of periodontal diseases: The evidence. Periodontology 2000. 2018; 78(1): 109-33.
17. Petersen PE, Ogawa H. Strengthening the prevention of periodontal disease: The WHO approach. Periodontology 2000. 2019; 80(1): 70-84.
18. Glick M, Williams DM, Kleinman DV, Vujicic M, Watt RG, Weyant RJ. A new definition for oral health developed by the FDI World Dental Federation opens the door to a universal definition of oral health. J Am Dent Assoc. 2016; 147(12): 915-7.

19. Peres MA, Peres KG, Thomson WM, Broadbent JM. Oral health inequalities and their determinants in adolescents. J Adolesc Health. 2019; 64(4): S9-S18.
20. Benzian H, Gilson L, Kwan S, Hobdell M. Oral health knowledge and attitudes of adolescents in low- and middle-income countries: a systematic review. Community Dent Oral Epidemiol. 2021; 49(1): 1-14.