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Increasing oral hygiene behavior through correct habits of miswak on students of secondary school

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Abstract

Background: Poor oral hygiene increases the risk of dental caries. One of the efforts to improve oral hygiene is to remove plaque regularly by using miswak.

Purpose: The purpose of this study is to analyse the effectivity of correct habits of miswak in improving oral hygiene behaviour in school children.

Material and methods: Study was given to 31 participants with an age range of 10-15 years at secondary school at Kediri, East Java, Indonesia. The method is carried out through 3 stages, which were the field data collection, field intervention, and the establishment of a sustainability program. Field data collection was carried out through a questionnaire method and skill assessment using miswak with a pre-test and post-test design. The intervention uses poster media, and to ensure the sustainability of program implementation, collaboration with institutions is carried out in the procurement of miswak facilities and mandatory miswak programs in the Madrasah environment. Indicator analysis was carried out through a paired 2-group comparative test with a 95% confidence level processed with IBM SPPS 21.

Results: Wilcoxon statistical test before and after the delivery of intervention materials showed an increase in knowledge and skills ($p < 0.05$) of the participants. Increased awareness of oral hygiene behavior in intervention participants is known through increasing both knowledge and skills in maintaining oral hygiene before and after intervention**.**

Conclusion: It can be concluded that miswak is effective in improving oral hygiene behavior in school children aged 10-15 years.

Keywords: Miswak; Oral hygiene; Behavior; School children; Students

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1. Introduction

The Global Burden of Disease Study in 2015 stated that dental caries is a disease that affects almost half of the world's population (3.58 billion people) [1, 2]. Meanwhile in Indonesia, most of the Indonesian population has dental and oral health problems with a prevalence rate of 57.6%. Based on data from Riskesdas 2018, reports that the prevalence of caries in Indonesia tends to be high at 88.8% with the prevalence of dental caries in children aged 10-14 years at 55.6%, and at the age of 15-24 years at 51.9% [2, 3].

Poor oral hygiene increases the risk of dental caries. Dental caries contribute to achieving a good quality of life and has been described as an infectious disease of the hard tissues of the teeth caused by the attachment of *Streptococcus mutans* bacteria to the tooth surface. The risk of dental caries is not only controlled by the antibacterial substances in the saliva, but it is also determined by environmental factors. An acidic oral environment due to excessive consumption of foods and drinks containing carbohydrates and sugar results in the fermentation of carbohydrates and sugars by bacteria. This condition can lead to continuous demineralization of tooth enamel, thereby increasing the risk of dental caries [2, 4, 5].

One of the efforts to improve oral hygiene is to remove plaque regularly. Until now, the most effective mechanical way to clean plaque is by brushing teeth [6]. One alternative in brushing teeth that is usually used by Muslims is miswak. Miswak is a plant from the *Salvadoraceae family* [7]. Several previous studies have reported the presence of antibacterial substances in miswak against cariogenic bacteria and periodontal pathogens, especially *Bacterioides* species [8, 9]. Another study showed that miswak extract (*Salvadora persica*) has antibacterial activity against *Streptococcus mutans* and *Streptococcus faecalis* [10]. Miswak activity in reducing the growth of *S. mutans* bacteria is caused by the content of SCN- which will cause bacterial death [11], so the acid products are not formed and plaque pH does not decrease [12].

The use of miswak itself tends to be identical with the teachings of Islam, which has been recommended to maintain dental and oral health. Using miswak is a behavior in cleaning teeth in countries where the majority of the population is Muslim, including: Middle East, Pakistan, Nepal, India, Africa and Malaysia [13]. In Indonesia, although it is limited to certain circles, the habit of miswak is still practiced [14]. Previous research on the behavior of using miswak based on the theory of behavior in countries with the largest Muslim population stated that the perception of behavioral control is the most dominant tendency factor in increasing the intention and behavior of using miswak. If there are many supporting factors for miswak such as knowledge and understanding of religion and the level of faith, it will have the opportunity to improve oral hygiene maintenance behavior [15]. Therefore, this study was purpose to analyse the effectivity of correct habits of miswak in improving oral hygiene behaviour in students of secondary school ages 10-15 years in Kediri, East Java, Indonesia.

2. Material and methods

The participants are 31 students of secondary school at Kediri Regency, East Java, Indonesia with an age range of 10-15 years. Participants is carried out in the first week and second week of June 2021 through 3 stages, those are field data collection, field intervention, and the establishment of a sustainability program. Field data collection was carried out through the questionnaire method and skill assessment using miswak correctly in the form of a checklist sheet with pre-test and post-test designs. In the second stage, intervention was carried out using poster media which will also be posted in the classroom/information board/madding, direct delivery of material, discussion and question and answer as well as simulation of how to use miswak properly and correctly. The third stage is the establishment of a sustainability program so as to ensure the sustainability of program implementation by collaborating with institutions in the procurement of miswak facilities as well as mandatory miswak programs in the Madrasah environment by establishing regulations of miswak.

The success of this intervention is assessed through indicators of increasing scores on both written cognitive tests and practical psychomotor tests that are carried out before and after intervention. The indicator analysis was carried out through a paired comparative test of 2 groups with a 95% confidence level which was processed with IBM SPPS 21. The student's skills in carrying out the miswak procedure were assessed by observing the participants who were able to correctly demonstrate the miswak procedure.

3. Results and discussion

Each participant is given 1 notebook and writing utensil, a correct miswak technique sheet, and 1 miswak. The delivery of intervention materials was carried out by dentists. The assessment of skills using miswak is carried out by classroom teachers and dentists who have been trained and a shared perception of the technique of miswak.

A description of the characteristics of the empowerment program is obtained which can be seen in table 1. Based on the data, it can be seen that the majority (64.52%) of the participants are aged 10-11 years. The majority of the participants were male (54.83%) and resided in rural areas (87.09%). About 58.06% and 74.19% of participants had a history of toothache and had the wrong brushing behavior. The participation of parents and the school environment in the OH behavior of school children respectively shows a fairly high percentage, that was 54.83% and 80.64%.

Table 1 Characteristics of participants

Characteristic	Category	Total (N)	Percentage (%)
Participants		**31**	**100**
Age	10-11 years old	20	64.52
	12-13 years old	8	25.80
	14-15 years old	3	9.68
Gender	Male	17	54.83
	Female	14	45.17
Education	Primary school	20	64.52
	Junior high school	11	35.48
Residence	Urban	4	12.91
	Rural	27	87.09
History of toothache	Yes	18	58.06
	Not	13	41.94
Correct tooth brushing behaviour	Right	8	25.81
	Wrong	23	74.19
Parents participants	Yes	17	54.83
	No	14	45.17
Dental health education at school	Once	25	80.64
	Not yet	6	19.36
Visit the dentist regularly every 6 months	Yes	3	9.68
	No	28	90.32

Wilcoxon statistical test before and after the delivery of intervention materials showed an increase in knowledge and skills ($p<0.05$) of the participants (table 2). The ability of students to demonstrate procedures for maintaining oral hygiene with good and correct miswak shows an increase in students' skills.

In this study, it was found that there was an increase in oral hygiene behavior in the participants which was known to be through an increase in both knowledge and skills in maintaining oral hygiene before and after the intervention. Approximately 58.06% of participants have a history of toothache. This percentage is quite high and not much different from the results of basic health research in 2018 which showed the prevalence of dental caries in children aged 10-14 years was 55.6%, and at the age of 15-24 years was 51.9% [3].

Study from [16] explained that the chance of toothache is higher with increasing age of the child, due to the period of caries in the primary teeth. In line with these findings, the age range of school children is around 10-15 years, at which time the school children experience the mixed dentition stage. The mixed dentition stage occurs in elementary school-aged children, characterized by malocclusion and tooth decay, which allows food retention as the main cause of dental caries [17].

Table 2 The results of the assessment of knowledge and skills through pre-test and post-test

Evaluation	Test	Total	Median (Min-Max)	Shapiro-Wilk (Sig.)	Wilcoxon test (Sig.)
Knowledge	Pre-test scores	31	69 (46-94)	0.0000	0.0000
	Post-test scores	31	84 (64-100)	0.0000	
Skills	Pre-test scores	31	7 (0-15)	0.0000	0.0000
	Post-test scores	31	85 (40-100)	0.0000	

One of the risks of dental caries is determined by environmental factors. An acidic oral environment due to excessive consumption of foods and drinks containing carbohydrates and sugar results in plaque accumulation [2, 4, 5]. Efforts to remove plaque on a regular basis are intended to prevent plaque accumulation which can cause tissue damage in the oral cavity, both teeth and tissues around the teeth. Plaque is a biofilm that is firmly attached to the surface of the teeth and the tissues around the teeth that contain bacteria and cannot be cleaned only by gargling, but must also be cleaned by mechanical way [18].

Until now, the most effective mechanical way to clean plaque is tooth brushing [7]. One alternative in brushing teeth is using miswak [18]. In this study, the miswak method was chosen in an effort to remove plaque on a regular basis. Many previous studies have reported on the effectiveness of miswak in improving oral hygiene. The results of this empowerment program also prove the effectiveness of miswak in increasing oral hygiene behavior in empowerment program participants. This can be seen through the increase in the score of both knowledge and skills in maintaining oral hygiene before and after the empowerment program.

In line with this program, research conducted by [18] said that there was no difference between brushing teeth using miswak and brushing teeth using miswak toothpaste in its ability to inhibit the formation of dental plaque. There is no difference in brushing teeth using miswak compared to miswak toothpaste in inhibiting the formation of dental plaque because both are equally efficacious in inhibiting plaque formation. Therapeutic and prophylactic effects of miswak are caused by mechanical cleansing, release of active chemical substances contained in it and or a combination of both.

The advantages of miswak in cleaning teeth and mouth are caused by the mechanical effect of the stem fibers and also due to the ability of the miswak to release useful active compounds [11]. Miswak (*S. persica*) contains more than 20 substances (salvadourea and salvadorine, saponins, tannins, vitamin C, silica, resin, cyanogenic glycoside and benzylsothio-cyanate) which are needed to improve oral hygiene, including salvadorine which has antiseptic effect, tannic acid which is astringent and essential oils increase salivation. The antibacterial and cleaning effect of miswak is related to the high content of sodium chloride and potassium chloride [11].

Other researchers reveal that the advantages of miswak that are felt by most research subjects who use miswak are more practical, because there is no need to use toothpaste, no need to rinse your mouth, making it easier to use [18]. The use of miswak can give good results on dental and oral hygiene if used in the right way. Includes length, diameter, how to hold, and how to move the miswak. The length and size of the miswak must be adjusted to the recommended and according to the age of the user with the aim of making it easy to grip and easy to carry anywhere [15].

Holding the miswak properly is also important so that all tooth surfaces can be accessed and cleaned comfortably, and the movement of the miswak can be controlled in the oral cavity. The rubbing movement must be done gently and carefully so as not to cause soft tissue damage [15]. This has been recognized and supported by the World Health Organization Report Series which says that miswak can remove plaque without causing injury to the teeth [8]. So, the author recommends alternative efforts to improve oral hygiene by using miswak from an early age, especially starting when the child is 10 years old. It can be concluded that miswak is effective in improving oral hygiene behavior in school children aged 10-15 years.

4. Conclusion

The present results showed that miswak is effective in improving oral hygiene behaviour in school children. It was found that there was an increase in oral hygiene behavior in the participants which was known to be through an increase in both knowledge and skills in maintaining oral hygiene before and after the intervention.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors of this manuscript do not have any financial or personal conflicts of interest.

Statement of ethical approval

The study received ethical approval by the institutional review board of the Bhakti Wiyata Institute of Health Sciences, Kediri (147/PP2M-KE/April/2021).

Statement of informed consent

Written informed consent was collected from the school authorities and parents, and verbal consent was obtained from the subjects.

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