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Effect of Peppermint Extract (Mentha Piperita) on Halitosis Problems in Active Smokers

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Abstract:- Background: The results of the Basic Health Research (Riskesdas) in 2018 stated that the largest proportion of dental problems in Indonesia was damaged / perforated / diseased teeth 45.3%. While the majority of oral health problems experienced by the Indonesian population are swollen gums and abscesses at 14% 2. Dental caries is one of the many factors that can cause halitosis or bad breath3. Based on the above statement, an innovation is needed to overcome the problem of halitosis, one of which is with peppermint extract (mentha piperita). Research Objective: Proving that peppermint extract mouthwash (mentha piperitha) with a concentration of 10% has an effect on changing the level of halitosis in active smokers. Methods: This type of research uses a pre-experimental method with a pretest-posttest research design with control group design consisting of 2 (two) groups, namely the intervention group and the control group. The sampling method used was purposive sampling. The sampling method used was purposive sampling. Results: Based on the results of the Wilcoxon test, it shows that the average holistosis before and after the intervention group obtained a p-value of 0.001 <0.005, which means that gargling using peppermint extract mouthwash can affect the decrease in halistosis in smokers, while in the control group a p-value of 0.005>0.005 is obtained, which means that gargling using chlorhexidine is not very influential to reduce halistosis in smokers. Conclusion: There is an effect of giving peppermint extract (mentha piperita) with different concentrations on reducing the level of halitosis in active smokers.

Keywords:- *Halitosis; Peppermint Extract; Mentha Piperita; Active Smokers.*

I. INTRODUCTION

Smoking is the activity of smoking or inhaling cigarette smoke using a pipe or cigarette that is carried out permanently and formed through four stages, namely: preparation, initiation, becoming a smoker, and maintenance of smoking. Smoking is a bad habit that affects many children and adolescents in Indonesia. The percentage of active smokers in Indonesia reaches 67% (male) and 2.7% (female) of the total population. Central Java Province is one of the provinces that has a high number of smokers in Indonesia. The proportion of smokers in Central Java Province is 22.9% of daily active smokers. For the Semarang area, the prevalence of smokers is 34.2% with the number of cigarettes smoked 8.2 cigarettes per day [1]. Smoking can cause various health problems, especially in oral health.

Oral health is a part of body health that cannot be separated from one another because it will affect overall body health. Teeth are one part of the body that functions for chewing, speaking and maintaining the shape of the face, so it is important to maintain dental health as early as possible so that it can last a long time in the oral cavity. Maintenance of oral hygiene is one of the efforts to improve health. Therefore, oral health plays a very important role in supporting one's health.

The results of the Basic Health Research (Riskesdas) in 2018 stated that the largest proportion of dental problems in Indonesia was damaged/perforated/diseased teeth 45.3%. Meanwhile, the majority of oral health problems experienced by the Indonesian population are swollen gums and abscesses at 14% [2]. Dental caries is one of the many factors that can cause halitosis or bad breath [1].

Halitosis is a general term used to describe the unpleasant odor of breath that comes out of the oral cavity regardless of whether the odorous substance is of oral or non-oral origin [3]. Halitosis causes embarrassment in socializing so that it has a psychological impact which results in a sense of inferiority and loss of self-image [4].

Penyebab halitosis adalah multifaktorial, diantaranya 10% berasal dari ekstra oral seperti penyakit ginjal, diabetes, infeksi paru dan saluran pernapasan, radang sinus, bronkitis kronis, dan gangguan saluran pencernaan serta faktor risiko seperti tembakau, alkohol, makanan, minuman, dan obat, sedangkan 90% berasal dari intra oral yang disebabkan oleh oral hygiene buruk, karies besar, gingivitis, periodotitis, impaksi makanan, xerostomia, ulser, dan tongue coating. Penyebab utama haliltosis yaitu terbentuknya Volatile Sulfur Compounds (VSCs)[5].

According to the American Dental Association (ADA) about 50% of adults have occasional complaints of halitosis [6]. The prevalence of halitosis sufferers in each country is different. Halitosis is common in the community and more than 50% have halitosis complaints. A study in Sweden stated that of 840 men, only 2% had halitosis. According to a study in China who experienced halitosis as much as 27.5% of 2500 people [7]. Research conducted in America shows that the prevalence of halitosis sufferers is quite high, reaching 50% of the total population in America [3]. Meanwhile, halitosis data in Indonesia has not been found [4].

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Bad breath or halitosis occurs due to changes in polysaccharides to acids, this occurs because these substances are broken down by bacteria [5]. Halitosis is closely related to oral hygiene that is not maintained, causing cavities, gum infections and xerostomia to maintain oral hygiene in general, people overcome this by brushing their teeth, using mouthwash, chewing gum and using medicinal plants as an effort to overcome health problems that have been widely applied in Indonesia.

Mouthwash can be used to help clean the oral cavity from plaque and microorganisms that can cause damage to teeth and supporting tissues. The antibacterial properties of mouthwash are determined by the content of its active ingredients, one of the active ingredients that can be used is peppermint leaves (mentha piperita).

Indonesia has a very high plant diversity and is almost found in all plains of Indonesia. Plants themselves have a very important role for human life, one of which is the peppermint plant. Pepermint plants (Mentha piperita) are the mint family of Labiatae and are herbaceous perennial plants that have rhizomes, a height of about 30-60 cm and smooth stems [8].

Mint plants belong to the Lamiaceae family, and are one of the plants that are widely utilized for their essential oils. This plant grows and is widely distributed in tropical and subtropical areas throughout the world, including in Indonesia. Essential oil from Mentha x piperita leaves contains a mixture of monoterpenoid compounds that are widely used in the field of medicine, as a flavoring agent, perfume mixture, toothpaste and cosmetics. In addition, based on research that has been done that mint oil has activity as an insecticide, anti-fungal and anti-microbial [9]. The inside of the mint plant contains essential oil, which contains a large number of chemicals in the form of aromas such as menthol, menthone, isomenthone and menthofuran [10].

Peppermint is one of the essential oil-producing plants that produces peppermint oil (mentha piperita) and is widely used as an aroma and flavor enhancer in food and beverages, medicine, perfumes, cosmetics, and other refreshing products [11]. Peppermint oil produced by M. piperita, contains menthol, menthone, menthyl esters. Menthol in peppermint oil is spicier than menthol produced by other menthe varieties. Mentha piperita leaves also have a high antioxidant content, especially in fresh leaves [12].

Mint leaves have been widely used as a folk remedy in Western and Eastern states for toothpaste, aromatherapy, irritation and inflammation. Mint leaves are one of the most famous herbs in Asia and especially in China. The air-exposed part of the plant known as “Bo He (Mint Herb)” has been used in Traditional Chinese Medicine for influenza, headache, red eyes, fever and sore throat. Traditional medicine in the United States also uses mint as a carminative in antacids, anti-itch in sunburn creams in topical analgesics, decongestant in inhalants and lozenges. Mouthwash using 10% mint extract had the largest inhibition zone diameter against Streptococcus sanguinis, which is one of the bacteria that acts as a trigger for plaque formation that causes most oral diseases.

Based on the statements above, it is necessary to conduct research on the potential of peppermint extract (mentha piperita) to reduce the level of halitosis in active smokers.

II. RESEARCH METHODS AND SAMPLE

This type of research uses a pre-experimental method with a pretest-posttest with control group design consisting of 2 (two) groups, namely the intervention group and the control group. The sampling method used was purposive sampling with a pretest and posttest with control group design.

The sample population used is active smokers and the target population in this study are 30 people with the criteria of active smokers over 17 years. the sampling technique used in this study is the non-random sampling technique method (non-probability sample methods in the form of purposive sampling). This sampling method is a sampling technique that is carried out based on the characteristics set against the target population.

III. RESULT AND DISCUSSION

A. Pretest and Postest Test Results

Table 1 Average Halitosis Reduction in the Intervention Group and Control Group

Variable	Group	Pretest	Postest	Difference
Halistosis	Intervention	0,30	0,16	0,14
	Control	0,28	0,15	0,13

Based on table 1, the difference in halistosis in the pretest and posttest intervention group was found to be 0.14. While in the pretest and posttest control group, the difference value was 0.13. From the results obtained, it can be seen that gargling using peppermint extract mouthwash decreases halistosis in smokers.

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B. Data Normality Test and Data Variance Homogeneity Test

Table 2 Normality of Pretest and Postest Group Data

Variable	Pre/Post	Group	
		Intervention	Control
Halistosis	Pretest	0,001	0,001
	Postest	0,000	0,001

Based on the results of the normality test using Shapiro Wilk, all pairs (pretest and posttest) in each group have non-normally distributed data. This is evidenced by the sig value which is less than 0.05. With this, the next test uses a non-parametric test.

After conducting a data normality test, a data variance homogeneity test was carried out using the Levene test. This test is carried out to determine whether the data analyzed has the same data variant or not.

Table 3 Hasil Uji Homogenitas

Variable	Pre/Post	Group	
		Intervention	Control
Halistosis	Pretest	0,790	0,093
	Postest		

Based on the results of the homogeneity test using the Levene test, all pairs (before and after) in the Intervention group have a sig value of 0.790 which shows homogeneous data (p>0.05) and the control group has a sig value of 0.093 which shows homogeneous data (p>0.05). Based on these results, the Wilcoxon test can be used as a paired t-test.

C. Differences in Halitosis Level Before and After the Use of Peppermint Mouthwash and Clorhexidine Mouthwash

Group	Pretest	Postest	Δ	P
	(Mean±rank)	(Mean±rank)	(Mean±rank)	
Intervention	0,3067±45	0,1633±15	0,1434±30	0,001
Control	0,2733±45	0,0933±20	0,18±25	0,005

Based on the results of the Wilcoxon test, it shows that the average holistosis before and after the intervention group obtained a p-value of 0.001 <0.005, which means that gargling using peppermint extract mouthwash can affect the decrease in halistosis in smokers, while in the control group the p-value is 0.005>0.005, which means that gargling using chlorhexidine is not very influential in reducing halistosis in smokers.

IV. DISCUSSION

One way to overcome bad breath caused by various diseases in the mouth is to use mouthwash that can kill or inhibit dental plaque-forming bacteria. Oral pathologies that can cause halitosis include cavities, periodontal disease, tongue coating, exposed dental pulp, wound healing, food impaction in the teeth, dentures that are not cleaned regularly, cysts with fistulas flowing into the mouth, oral cancer and ulceration. Most of these factors can cause halitosis due to tissue damage, amino acid decay and decreased salivary flow. All these conditions trigger the release of volatile sulphure compound (VSC). These pathologies cause halitosis mainly due to the action of bacteria that cause tissue decay and VSC production[13]. The bad odor that appears from the mouth is the result of microbial decay of food debris, cells, saliva and blood. Oral microbes that cause halitosis are Gram-negative and Gram-positive bacteria Bacterial interactions are most likely to occur in gingival crevices and periodontal pockets, but unpleasant odors can also arise from the back of the tongue. This confirms that bad breath can sometimes occur in people with good oral hygiene[14].

Some of the advantages of using this pepper mint preparation in the form of mouthwash are from the 'flavor and active ingredients' which contain peppermint essential oil consisting of various secondary metabolites. The main chemical compounds in mint plants consist of limonene, sineole, menthone, menthofuran, isomenthone, menthyl acetate, isopulegol, menthol, pulegone and carvone. In this case, menthol acts as the main component because of its largest percentage in the mint plant (often exceeding 50%) and plays a role in providing the distinctive flavor and cold sensation of peppermint [15].

A. Effectiveness of Peppermin (mentha piperitha) Extract Mouthwash with 10% concentration in Reducing the Level of Halitosis in Active Smokers

The results showed that there was a difference in the average decrease in halitosis before and after in the intervention group and control group, showing the average intervention group before and after had a difference of 0.14 while the control group before and after had a difference of 0.13. This shows that the reduction in halitosis levels occurs due to the function of mouthwash which can inhibit dental plaque-forming bacteria that cause halitosis. Oral pathologies that can cause halitosis include cavities, periodontal disease and it is stated that these factors can cause halitosis due to tissue damage, decay of amino acids

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and decreased salivary flow which triggers the release of volatile sulphure compound (VSC) [13].

Gargling with 0.2% chlorhexidine has long-lasting, broad-spectrum antibacterial activity and has been shown to reduce plaque accumulation, gingival inflammation and bleeding. Chlorhexidine, which is a positively charged cationic molecule, is quickly attracted towards the negatively charged bacterial cell wall by specific and strong adsorption of phosphate-containing compounds and then chlorhexidine molecules will attach to bacteria that colonize the tooth surface pellicle. This interaction can change the integrity of the bacterial cell membrane and chlorhexidine is attracted to the inner membrane and makes damage to the bacterial cell wall [4].

The mechanism of damage to Chlorhexidine mouthwash is because chlorhexidine will bind to phospholipids in the bacterial cell membrane which causes an increase in the permeability of the inner membrane and damage to bacterial cells but this chlorhexidine effect is reversible, namely the excess chlorhexidine will be wasted and this allows the bacterial cell wall to recover [11].

Based on the Wilcoxon test, it shows that the mouthwash of peppermint extract 10% has a p-value of 0.001, while the use of chlorhexidine mouthwash 0.2% has a p-value of 0.005>0.005, which means that the ability of peppermint extract mouthwash is more influential in reducing halistosis. Furthermore, a non-paired t-test was conducted to compare the use of peppermint extract mouthwash 10% and chlorhexidine 0.2%, and the result was a P value of 0.00 this is because the active ingredients contained in peppermint are those that play a pharmacological role. Mint oil is able to inhibit the activity of elastase, which is a proteolytic enzyme that breaks down proteins that affect oral health and oral tissue integrity.

The bad odor that arises from the mouth is the result of microbial decay of food debris, cells, saliva and blood. Oral microbes that cause halitosis are Gram-negative and Gram-positive bacteria Bacterial interactions are most likely to occur in gingival crevices and periodontal pockets, but unpleasant odors can also arise from the back of the tongue. Several studies have shown that peppermint essential oil consists of various secondary metabolites. The main chemical compounds in mint plants consist of limonene, sineole, menthone, menthofuran, isomenthone, menthyl acetate, isopulegol, menthol, pulegone and carvone. In this case, menthol acts as the main component because of its largest percentage in mint plants (often exceeding 50%) and plays a role in providing the distinctive flavor and cold sensation of peppermint. peppermint leaves also have ingredients that are antibacterial and antialergenic [7]. Selin that peppermint leaves have antibacterial content because they contain flavonoids, tannins, saponins, terpenoids and steroids [8][11].

The mechanism of action of flavonoids as antibacterials can be through 3 ways, namely by inhibiting nucleic acid synthesis, inhibiting cell membrane function and inhibiting energy metabolism. The ability of tannin as an anti-bacterial agent is by its ability to pass through cell membranes. This is because tannins can precipitate on proteins. Tannin can also suppress the amount of glucosyltransferase enzyme. Saponins can increase the permeability of bacterial cell membranes so that they can change the structure and function of the membrane, causing denaturation of membrane proteins so that the cell membrane will be damaged and lysed [9].

The mechanism of terpenoids as anti-bacterial agents is to react with transmembrane proteins on the outer membrane of the bacterial cell wall and form strong polymer bonds resulting in damage to transmembrane proteins. The destruction of these proteins can reduce the permeability of the bacterial cell wall which will result in bacterial cells lacking nutrients, so that bacterial growth is inhibited or dead. The mechanism of steroids as antibacterial is related to lipid membranes and sensitivity to steroid components that cause leakage in lysosomes. Steroids can interact with cell phospholipid membranes that are permeable to lipophilic compounds, causing decreased membrane integrity and altered cell membrane morphology that causes cell fragility and lysis [14]. The role of these active components can suppress the growth of S. mutans so as to reduce the risk of caries [5].

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