

Inhibitory Power of *Jatropha (Jatropha curcas L.)* Leaf Sap against *Streptococcus mutans* in Dental and Oral Care in Adults and Elderly

Bahtiar¹ (corresponding author), Nur Aita Akbar², Sulaeha³

¹Department of Nursing, Poltekkes Kemenkes Makassar, Indonesia; bahtiar.poltekkes@gmail.com

²RSUD Syech Yusuf Sungguminasa Gowa

³SMA Negeri Bikeru Kabupaten Sinjai

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ABSTRACT

Caries is one of the main problems of dental and oral health in adults and the elderly. Treatment of caries in adults and the elderly can be done using natural ingredients that contain anti-bacterial properties against streptococcus mutans bacteria, including *Jatropha curcas L.* This study aims to determine the effectiveness of *Jatropha* leaves as an inhibitor of *Streptococcus mutans* in dental and oral care in adults and the elderly. This study is a narrative review. Information is obtained from various scientific sources in the form of books, articles and other scientific sources. Based on the results of the narrative review above, it can be concluded that the inhibition of jatropha leaf latex (*Jatropha curcas L.*) against *Streptococcus mutans* is effective.

Keywords: *Jatropha curcas L.*; *Streptococcus mutans*; caries; adults; elderly

INTRODUCTION

Knowledge is very important in supporting behavior to maintain dental and oral hygiene and health in adulthood and the elderly. Increasing a person's knowledge will affect that person's ability to receive and respond to information. The better a person's level of knowledge, the ability to have attitudes and behavior will be better. Good knowledge will have an impact on healthy behavior, ⁽¹⁾ on the contrary, lack of knowledge is one of the factors in the occurrence of dental and oral health problems in adulthood and the elderly.

The development of science and technology has a positive impact on welfare as seen in life expectancy. ⁽²⁾ This can happen because science and technology enable better efforts for health maintenance, including for adults and the elderly.

The results of the 2018 Basic Health Research show that the most non-communicable diseases in the elderly are hypertension, dental problems, joint disease, oral problems, diabetes mellitus, heart disease and stroke; while for infectious diseases are ARI, diarrhea, and pneumonia. ⁽³⁾ It appears that dental and oral health is one of the health problems for the elderly, so it requires special attention in connection with the phenomenon that many adults and the elderly are already using dentures, thus requiring special attention or care with the guidance of related health workers in their maintenance. In addition, dental caries in adults and the elderly is also one of the most prominent dental health problems in Indonesia. The main bacteria that causes dental caries is *Streptococcus mutans* bacteria. ⁽⁴⁾

It has been mentioned above that caries is one of the main problems of dental and oral health in adults and the elderly, as well as the problem of denture care. Dental caries is caused by four factors, namely: teeth; substrate, microorganism and time. Food residue in the mouth that contains carbohydrates can be fermented by certain bacteria and form acids, so that the plaque pH will decrease to below 5 within 1 to 3 minutes. Repeated decrease in pH over time will result in demineralization of vulnerable tooth surfaces, and the process of caries will begin. It was found that *Streptococcus mutans* and *Lactobacillus* bacteria were the bacteria that played a role in the caries process. ⁽⁵⁾

Research on the treatment of caries in adults and the elderly by using natural ingredients that contain anti-bacterial properties against *Streptococcus mutans* bacteria has been widely carried out. Natural ingredients have been trusted by the public for a long time because they are able to treat diseases without side effects compared to drugs that use synthetic materials. ⁽⁶⁾ *Jatropha* is one of the natural ingredients that is often used as a medicine because it has many benefits to treat various diseases. ^(7,8) *Jatropha (Jatropha curcas L.)* is often used in traditional medicine in Minahasa, Indonesia.

Jatropha curcas L. leaf sap contains active compounds that function as antibacterial, namely, saponins, flavonoids, alkaloids and tannins. ⁽⁸⁾ The sap of the *Jatropha* plant is used by the community to treat acute pulpitis on the teeth by dripping the sap. The sap of the *Jatropha curcas* is an easy solution because this plant is often found in the yard of the house. ^(8,9) All parts of the *Jatropha* plant contain sap which contains an alkaloid called jatropin,

a kind of anticancer compound and up to 10% tannin as antibacterial. The content of these active compounds is most likely responsible for its use as medicinal ingredients. ⁽¹⁰⁾

Jatropha plant as an alternative medicine is often used by the people of Indonesia. This is possible because of the large number and easy to find. Various studies have been carried out to find out more about the benefits that can be obtained from the Jatropha plant.

Based on the description of the background above, it is necessary to conduct a literature study that aims to determine the effectiveness of Jatropha leaves as an inhibitor of *Streptococcus mutans* in dental and oral care in adults and the elderly.

METHODS

This study is a narrative review. Information is obtained from various scientific sources in the form of books, articles and other scientific sources. There are no specific limitations in the literature search. Both online and online searches were applied in this study.

After the information collected is considered adequate, then a simple synthesis is carried out and presented in a narrative manner.

RESULTS

Jatropha (*Jatropha curcas* L., *Euphorbiaceae*) is a woody shrub that is commonly found in tropical areas. This plant is known to be very drought tolerant and easy to propagate by cuttings. Although it has long been known as a medicinal and toxic substance, now this plant is getting more attention as a source of biofuel for diesel engines because of the oil content in its seeds. The role of jatropha can be further developed so that it is in line with its relative plant, namely jatropha (*Ricinus communis*), whose seeds produce mixed oil for lubricants. ⁽¹¹⁾

Jatropha sap contains flavonoids that can function as antifungal, antiseptic, and anti-inflammatory, also contains saponins that can stimulate collagen growth in the healing process and also have the effect of relieving pain and stimulating the formation of new cells. Jatropha sap also contains tannins (18%) which function as mouthwash and bleeding gums as well as wound medicine. Jatropha sap is antimicrobial so it can repel bacteria such as *Staphylococcus*, *Streptococcus*, and *Escherichia coli* types. ⁽¹²⁾

Streptococcus mutans as the main cause of caries, which has the ability to adhere to the tooth surface and produce acid and can also survive in acidic conditions. These gram-positive bacteria are nonmotile (non-motile), facultative anaerobes and are cocci-shaped alone, spherical or ovoid in shape and arranged like chains. These bacteria grow optimally at temperatures around 180C – 400C. ⁽¹³⁾

DISCUSSION

Tiwa, et al. reported a test of the effectiveness of the inhibition of jatropha leaf latex against *Streptococcus mutans*. The results showed that inhibition was carried out by measuring the inhibition zone produced on media containing *Streptococcus mutans* bacteria after incubation for 24 hours at 37°C. Bacterial growth after the incubation period was seen away from the well, meaning that there was an inhibition zone formation in well one filled with jatropha leaf sap and well two filled with erythromycin as a positive control, but there was no formation of an inhibition zone in well three filled with aquadest as a negative control. Based on the results of observations carried out on five tests in five petri dishes, it was seen that there was an inhibition zone formed around the well that was given jatropha leaf sap. The average diameter of the inhibition zone produced by Jatropha leaf sap was 19 mm. Jatropha leaf sap is included in the strong group in inhibiting the growth of *Streptococcus mutans* bacteria, according to the category of bacterial inhibitory strength. ⁽⁸⁾

Irmaleny et al. reported that jatropha leaf sap was effective in inhibiting the growth of *Streptococcus mutans* bacteria. This inhibition is strongly influenced by the presence of antibacterial substances contained in the sap of Jatropha leaves. In addition to inhibiting *Streptococcus mutans* in dental caries, castor gum can also inhibit the fungus *Candida sp.* contained in canker sores and can also be used as an analgesic drug. ⁽¹⁴⁾

In the research of Purnamasari et al., in the context of preventing dental caries, non-invasive treatment can be carried out, namely without taking dental hard tissue. Conditioning the atmosphere of a healthy oral cavity by controlling the growth of bacteria is one of the efforts to prevent caries. The bacteria that causes caries is *Streptococcus mutans* which is a facultative anaerobic bacterium and is a microflora of the oral cavity. ⁽¹⁵⁾

Sabir A. reported that Jatropha gum contains antimicrobial substances, namely saponins, tannins, and flavonoids, so that due to the large number of antimicrobial substances in the Jatropha gum, the zone of inhibition produced by Jatropha gum against *Streptococcus mutans* will appear. ⁽¹⁶⁾

Kaswan in his research on the effect of *Jatropha* sap on the growth of *Streptococcus mutans* bacteria isolated after tooth extraction, reported that *Jatropha* gum can inhibit bacterial growth and the most inhibiting concentration was 100% concentration with an average diameter of 12.73 mm, followed by a concentration of 75. % with an average of 12.13 mm, a concentration of 50% with an average of 11.40 mm and a concentration of 25% with an average of 10.67 mm. ⁽¹⁷⁾

Research conducted by Hidayat found that in castor sap, the clear zone produced was larger than the clear zone produced by snail mucus. Thus, castor gum is more effective at inhibiting the growth of *Streptococcus mutans* bacteria than snail mucus. This is because castor gum contains antimicrobial substances, namely saponins, tannins, and flavonoids; while snail slime contains peptides as proteins. The number of antimicrobial substances in the *jatropha* gum resulted in a wider inhibition zone than the inhibition zone produced by snail mucus. ⁽¹⁸⁾

CONCLUSION

Based on the results of the narrative review above, it can be concluded that the inhibition of *jatropha* leaf latex (*Jatropha curcas* L.) against *Streptococcus mutans* is effective.

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