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OPTIMIZATION OF CATHECHIN EXTRACTION FOR DEVELOPMENT OF LIQUID HAND SOAP MADE FROM GAMBIER

Daimon Syukri*, Rini, Adhitya Jessica

Departemen of Food and Agriculture Technology Andalas University
*Corresponding at: dsyukri@ae.unand.ac.id

ABSTRACT

This study has aimed to determine the potential use of catechins derived from gambier as an anti-microbial raw material in the manufacture of hand washing liquid soap. The study started from the purification process of catechins from gambier and continued with the addition of gambier to the soap formula looking for hand washing. In this study, there were some difficulties in obtaining catechin extracts that could dissolve in water due to the character of catechins that did not dissolve completely in water. Therefore, the optimization of the catechin extraction process is optimized first. The catechin extraction process was carried out in two ways, namely by using a homogenizer at a speed of 15000 rpm for 30 minutes and a reflux process with hot water (temperature 70 degrees Celsius) for one hour. It was found that the concentration of catechin dissolved in water both in the homogenizer and reflux results was relatively the same, therefore for the manufacture of hand washing liquid soap, the process with the reflux technique would be recommended because of the cheaper operational costs.

Key words: liquid, purification, west sumatra, indigenous.

INTRODUCTION

Gambier is a unique agricultural commodity due to its high catechin content. In addition, gambier is a commodity produced by West Sumatra Province with almost 80% of the world's population. However, the industrial use of gambier is not so much even though gambier is known to have excellent effectiveness due to the presence of catechins. Gambier derivative products are still dominated by food-based products such as tea and herbal drinks. Therefore, further development of gambier-based industrial products is needed [1]. (Syukri et al., 2021).

Catechin is the main component of gambier that has been known to have many bioactivities. Based on its chemical structure, catechin has a phenolic group that is the source of the bioactivity of catechin. In addition, the structure of catechin which has a flavonoid skeleton also strengthens the origin of the bioactivity of catechin [2, 3] (Rahman et al., 2018; Zainal et al.,2020). Due to its anti-oxidant properties, catechins are very popular as raw materials for the development of food products. In addition to these anti-oxidant properties, it turns out that many studies have mentioned that gambir has the ability as an anti-microbial substance [4]. (Melia et al., 2015). The use of gambir-based products has been carried out for the development of toothpaste products that are expected to be effective from catechins to overcome bacterial

growth on teeth. In addition, gambir is also used for the development of feminine products and anti-acne products based on its protective properties from microbial growth.

Therefore, in this study, an attempt was made to develop a hand washing liquid soap product with the addition of catechins from gambier. The developed product is expected to draw the anti-microbial effect of the existing liquid soap so that the soap produced will be very powerful with a large anti-microbial effect. This is considered important because of the high level of public need for hygiene due to the many unfavorable conditions for health in the current post-pandemic era.

MATERIAL AND METHODS

This research was conducted in the laboratory of the department of food technology and agricultural products, University of Andalas from October to December 2022. In this study used purified catechins obtained from the laboratory at Andalas University. In addition to catechins, other materials used in this study are water. The tools used include a homogenizer and a set of reflux tools. Catechin levels were checked using a spectrophotometer.

The process of dissolving catechins is done by extracting catechins with a water solvent. This was done because the liquid sabin formula to be produced is water-based. All ingredients used to make liquid soap are water-soluble materials, therefore, the added catechins must also be able to blend with the water fraction. The extraction process of the first method, carried out by extracting catechins with water where the extraction process is carried out using a homogenizer. The extraction process was carried out at 15000 rpm for 30 minutes. After the homogenization process, the catechins in the aqueous solution were separated from the insoluble catechin solids using a spectrophotometer. In the second extraction process, catechins were extracted using a reflux process with water solvent. The reflux process was carried out at a temperature of 70 degrees Celsius for 1 hour. Similar to the first method, the catechin content taken by the water fraction was then measured with a spectrophotometer. Water which was containing catechins then mixed with other ingredients according to the formula needed for making liquid soap.

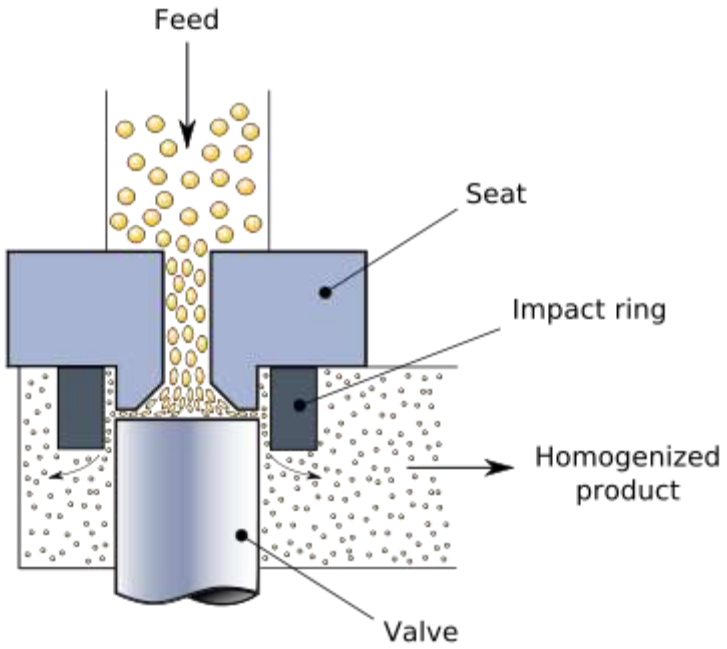
RESULT AND DISCUSSION

Extraction is the process of separating a substance from its mixture by using a solvent. The solvent used must be able to extract the desired substance without dissolving other materials. Broadly speaking, the extraction separation process consists of three basic steps such as addition of a mass of solvent to be contacted with the sample, the solute will separate from the sample and dissolve by the solvent to form the extract phase and separation of the extract phase with the sample [5]. (Gupta, et al., 2000).

Extraction is a process of separating the content of chemical compounds from plant or animal tissue using a particular solvent. Extract is a concentrated preparation obtained by extracting the active substance using a suitable solvent, then all or almost all of the solvent is evaporated and the remaining mass or powder is treated in such a way as to meet the specified standards.

Extraction is the process of separating a substance based on differences in certain properties, especially its solubility to solvents. properties, especially its solubility to two different insoluble liquids. In general, extraction is carried out using solvents that based on the solubility of components to other components in the mixture, usually water and others organic solvents. The material to be extracted usually in the form of dry material that has been crushed, usually in the form of powder or simplisia [6]. (Patel et al., 2021). The purpose of extracting natural materials is to attract chemical components contained in natural materials. Active ingredients such as antimicrobial and antioxidant compounds found in plants are generally extracted with solvents. In the solvent extraction process, the number and type of compounds that enter the solvent liquid is determined by the type of solvent used and includes two phases, namely the flushing phase and the extraction phase. In the rinsing phase, the solvent rinses the components of the cell contents that have been broken in the previous crushing process. In the extraction phase, first there is swelling of the cell wall and loosening of the cellulose skeleton of the cell wall so that the pores of the cell wall become wider which causes the solvent to easily enter the cell. The cell contents are then dissolved into the solvent according to the level of solubility and then diffuse out due to the force generated due to the difference in concentration of the solute contained inside and outside the cell.

In this study, two extraction techniques were compared, namely the use of a homogenizer and a reflux device. The mechanism of these two equipment is very different where the homogenization process uses a mechanical extraction process with a banging process. While the reflux process is almost the same as the boiling process but the volume of the solution is not reduced by the presence of a condenser. Images of these two tools can be seen in Figure 1 [7, 8]. (Szczepańska et al., 2018; Aditha et al., 2015)



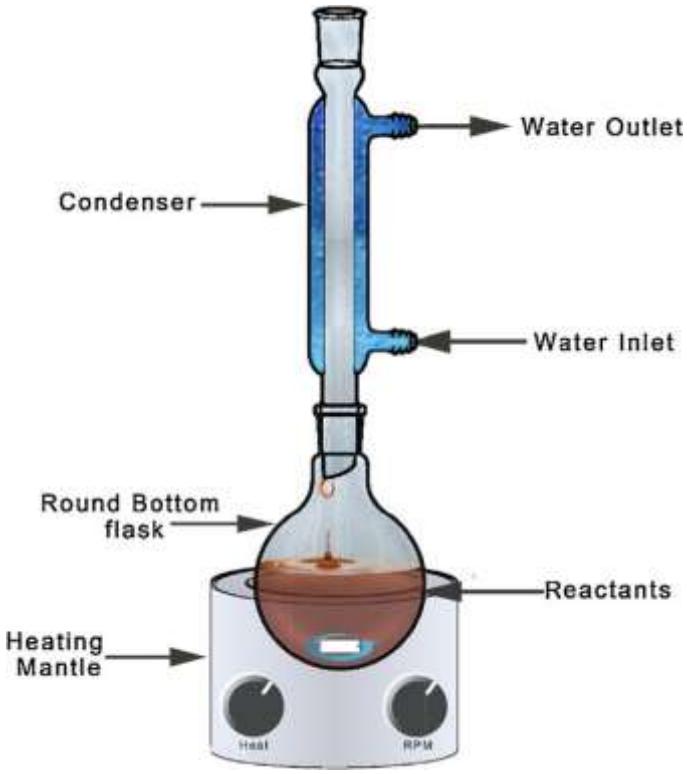


Fig. 1. Homogezation process (A); Reflux Process (B)

Based on the results of the analysis using a spectrophotometer, it is known that from a 5% solution of catechins in water, after the extraction process using either a homogenizer or a reflux process, relatively the same concentration of catechins is obtained. The concentration of catechins was found to be 0.4 percent in the aqueous solution resulting from both processes (Fig. 2). These results show that catechins have very little solubility in water. This is due to the semi-polar nature of catechin compounds. The solvent that is very suitable for dissolving catechins is ethyl acetate solvent, however, the use of this solvent for liquid soap product applications is not suitable because the raw materials for liquid soap are all water-based. Ethyl acetate cannot combine with water so that the soap product will not be homogeneous. With very large anti-microbial properties of catechins, it is highly expected that even though only 0.4% of catechins are present in the extracted water, the anti-microbial strength of the resulting hand washing liquid soap will still be greater.

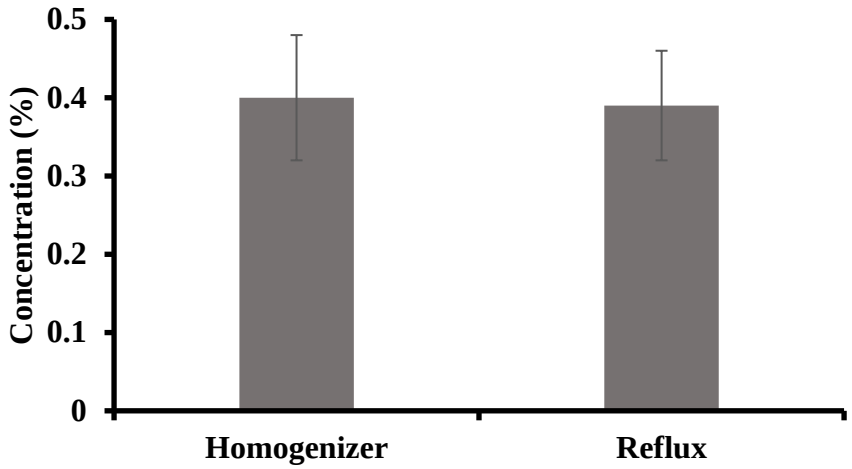


Fig 2. Cathechin concentration in water solution after axtraction by homogenizer and reflux

CONCLUSION

The process of extracting catechins using water is quite difficult because of the nature of catechins which are not soluble in water. However, this dissolving process is very important because catechins will be used as anti-microbial raw materials for liquid hand washing soap. The extraction process with the reflux technique seems to be able to replace the extraction process with a homogenizer because the results are the same but the operational costs are quite economical.

Conflicts of Interest: The authors declare no conflict of interest.

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