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Jengkol Toothpaste Downstream Agribusiness Innovation in Increasing the Strength of Older Age Teeth

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Abstract: *Jengkol-based toothpaste is an innovation to reduce bad breath and strengthen old teeth. Because it is made from natural ingredients, this jengkol-based toothpaste is expected to be a safe toothpaste and can be used by the elderly > 60 years old. The purpose of this research is that jengkol agricultural commodities can be utilized in the world of dental health for the elderly, so that they can stay healthy, when they are vulnerable to decreased calcium levels. Not only that, this research is also expected to eliminate the stigma of jengkol which is often avoided because of its smell, it can actually be used to strengthen teeth in the elderly. The method used in this study, namely using a simple laboratory approach and literature analysis. The results of the first conclusion of testing in researchThis, which is the result of the sulfur content in the manufacture of jengkol toothpaste which can be removed by adding elements of lime and mint leaves, although the final result is temporary due to technological limitations, showing that the texture of the paste's thickness is not suitable or not yet similar to toothpaste in general. The second conclusion shows that jengkol toothpaste contains anti-microbial, anti-tumor,and anti-allergic, which directly inhibits the growth of microbespathogens. The third conclusion point is that there is a content of calcium, phosphorus, alkaloids, and iron which are also useful for strengthening the teeth of the elderly.*

Keywords: *elderly, calcium, jengkol, mint leaves, toothpaste*

INTRODUCTION

Dental and oral health is part of overall body health and cannot be separated from the body in general. Dental health can affect quality of life, including the function of speech, mastication and self-confidence performance. Dental and oral health diseases occupy the first place of the top 10 list of diseases that are often suffered by Indonesian people. Indonesian people's perception and behavior towards dental and oral health is still poor. This can be seen from the large number of dental caries and oral diseases in Indonesia which tends to increase. Using toothpaste can help prevent dental and oral diseases and keep your teeth strong. Jengkol fruit or better known as the Jering plant, belongs to the Fabaceae family category (grain tribe). Compound structure, shaped like bunches, at the tips and axils of the leaves, round stalks, ± 3 cm long, purple skin color, fruit shape resembling cup petals, yellow stamens, cylindrical pistils, oval crown yellow, yellowish white. Flat round blackish brown, two pieces and single (Surya, 2017)It should be noted that based on several studies, jengkol *(Arichidendron pauciflorum)* is rich in nutrients, including carbohydrates, protein, vitamin A, B vitamins, phosphorus, calcium, alkaloids, essential oils, steroids, glycosides, tannins and saponins which are beneficial for dental health (Sinaga et al., 2018).

There are several kinds of problems that are often found in teeth, such as bad breath, discolored teeth, and reduced strength in the teeth (brittle teeth). The process of increasing one's age is accompanied by changes in the structure of the oral cavity tissue, especially tooth loss and

oral mucosal structures. The occurrence of tooth loss can result in orofacial structures, such as bone tissue, innervation, muscles, and reduced orofacial function (Sunarto et al., 2021). Factors that can influence the emergence of dental and oral health problems can be factors originating from the elderly themselves, family factors and environmental factors. Factors from the elderly themselves consist of gender, age, education, occupation, marital status and economic status. The family factors referred to include family support, family economic status and community behavior in maintaining dental and oral health while environmental factors consist of cultural conditions and dental health service factors (Pili et al., 2018) .Dental health is what is fatal if not handled properly, will result in bad breath.

Based on this description, a toothpaste made from jengkol is made which can reduce bad breath and strengthen the teeth of the elderly. Because it is made from natural ingredients, this jengkol-based toothpaste is expected to be a safe toothpaste and can be used by the elderly aged > 60 years. This is so that they can remain in good health, at a time when they are vulnerable to reduced calcium levels. If this is not handled seriously, it will affect psychological feelings such as feeling tense, embarrassed, losing appetite. It's hard to socialize, sleep is disturbed, so you can't work productively. This study aims to determine the extract of the phytochemical compounds of jengkol fruit and to clinically test its effectiveness on oral and dental health. For the community themselves, they can take advantage of jengkol fruit, an added value in the processing of toothpaste products. have new solutions in maximizing environmentally friendly products.

RESEARCH METHODS

This type of research uses laboratory experiments and an empirical (digital) research approach, as well as field research in depth. Secondary data and information in this study were based on searching and selecting Semantic Scholar, Research Gates, and Sciencedirect literature which were then processed based on need. The application of this method can be seen in Figure 1 below:

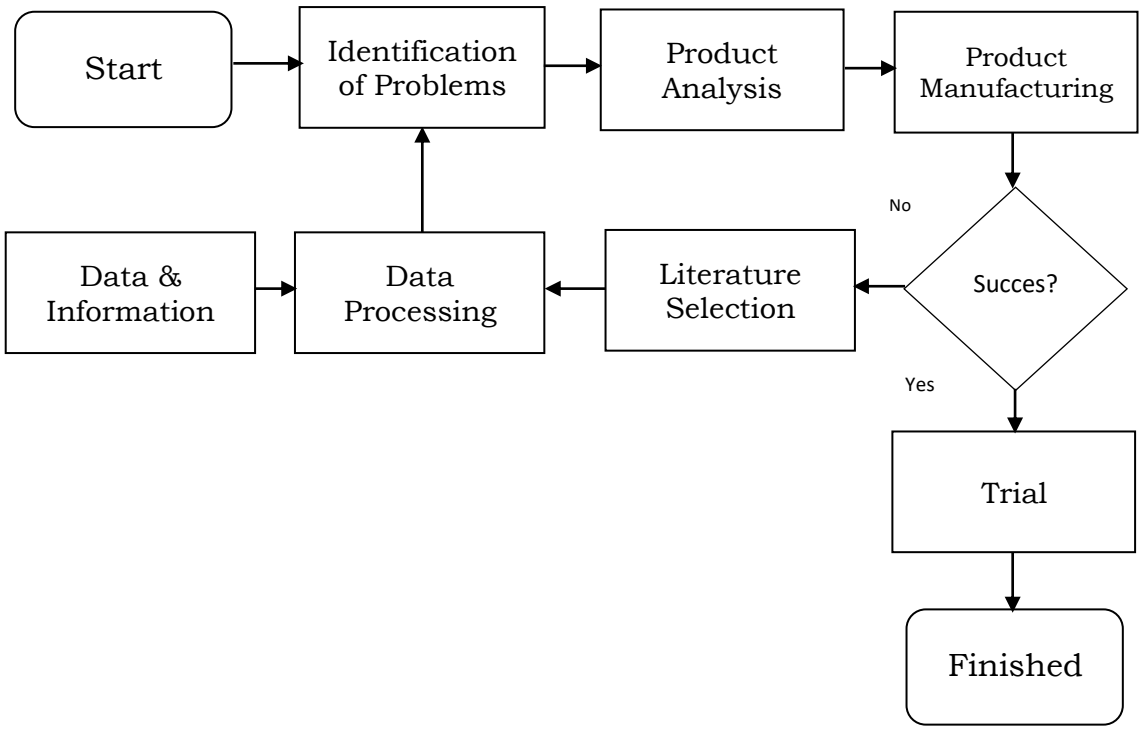


Figure 1. Research Methodology

1. Problem Identification and Information Data Analysis
   The research was traced through Semantic Scholars, Research Gates, and Sciencedirect using the keywords jengkol content, strengthening teeth, brushing teeth and jengkol toothpaste in different combinations. No limit to the literature review found. Titles and abstracts of all journals were carefully checked. If you are sure of the title and abstract, then download the full journal. Tracing the levels of jengkol fruit is complemented by checking the list of references from all the studies obtained. Then these results are linked to the identification of the main problem in jengkol, namely sulfur content.
2. Data Processing and Development Techniques
   At the data processing stage, the articles that have been collected and sorted are based on the secondary metabolites found in jengkol fruit such as flavonoids, phenolics, tannins. Then after obtaining a single data, this collection of analyzes is used to support the problem identification argument which then enters the experimental stage. This stage was carried out by one researcher, by prioritizing health protocols, such as wearing masks and washing hands with disinfectants.
3. Literature Selection
   In the selection of literature/journals, inclusion and exclusion must be determined because it can help focus on the relevance of research to the topic. Inclusion criteria can be determined by conformity with the objectives, while exclusion criteria can be identified by not meeting the objectives as well. Then mark the keywords, then proceed with checking the list of references taken from the first search results. Then the cycle is repeated. In each article only takes the essence / results that are in accordance with the research objectives. After most of the journals are obtained, the next selection is processed and the process is recorded in data processing and problem identification
4. Product Analysis
   This fourth stage is used in analyzing materials that need to be collected in conducting experiments in the laboratory.
5. Product Manufacturing
   Product manufacturing activity is the stage of determining innovation, with the condition that it must have the texture of toothpaste in general. This fifth stage must also pay attention to nutritional levels and safety for use by consumers. If this step fails, then a matching evaluation is carried out with the collected literature.
6. Trial
   The trial step was carried out by detecting calcium levels in jengkol toothpaste using xylene solvent. The use of organic solvents (xylene) can facilitate and simplify the preparation process compared to using solvent methods with acid (Cahyadi et al., 2020).

RESULTS AND DISCUSSION

Analysis of Phytochemical Compounds

Phytochemical compounds are types of chemical substances or phytonutrients, in a broad sense, all types of chemical substances derived from plant sources, including vegetables and fruits. The nature of this component is used as an anti-bacterial, in the manufacture of toothpaste. And it is known that jengkol fruit contains phytochemicals as follows (Table 1) :

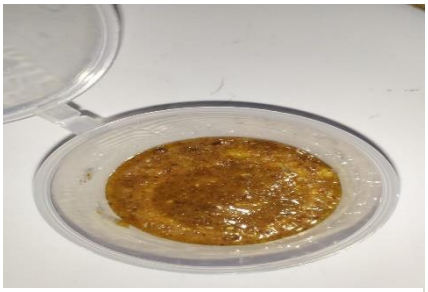
Table 1 Jengkol Phytochemical Content

Chemical Content	Information
Alkaloid	Positive
Flavonoid	Positive
Tanin	Positive
Steroid and Triterpenoid	Positive
Saponin	Positive

Alkaloids are compounds that are widespread in almost all types of plants. All alkaloids contain at least one nitrogen atom which is basic and forms a heterocyclic ring (Silla et al., 2021).This substance is assisted by flavonoids which are a class of polyphenolic compounds which act as free radical scavengers, inhibitors of hydrolytic enzymes and work as anti-inflammatory (Wahyusi et al., 2020). Unlike tannins, which are polyphenolic compounds with a very large molecular weight, which is more than 1000 g/mol and can form complex compounds with proteins (Ni Nyoman Wahyu Udayani et al., 2013) .While Steroids and Triterpenoids are a class of active compounds that can be identified together with the Lieberman-Buchard reaction (Halimah et al., 2019).Other compounds found are saponins which have foam characteristics so that when they are reacted with water and shaken they form froth or foam which can last a long time (Triwahyuni et al., 2019) In carrying out research in creating this product, the main problem was found, namely the emergence of the jengkol odor contained in the sulfur content. Based on the results of data processing, sulfur content can be removed by adding guava, coffee, and bay leaf. So this study, conducted research with three samples, among others

a. Jengkol washed clean, protected from dirt. Then cut into two parts. Then enter the boiling and draining stage.
b. Thinly sliced, and soaked with lime for 1 hour, then drained. Lime (Citrus aurantifolia Swingle) contains elements of useful chemical compounds, such as citric acid, amino acids (tryptophan, lysine), essential oils (citral, limonen, felandren, lemon camphor, kadinen, gerani-lasetat,linalil acetate, aktilaldehid, nonyldehid), resin (resinae), glycosides, citric acid, fat (saturated fat, monounsaturated fat, polyunsaturated fat), calcium, phosphorus, ferrum, sulfur, vitamins B1 and C (Lestari et al., 2018)
c. After that, put it in the oven until the yield of jengkol is 9.9 gram. Once dry, then go into the refining process using a blender and add mint leaves until it becomes a powder.
d. It is known for certain that the sulfur content of jengkol is removed by adding mint leaves and lime. Mint leaves have a high anti-oxidant content which is anti-microbial, anti-tumor, and anti-allergenic. It also includes menthol, mentonecanvone, methyl acetate and peperitone which act as antioxidants, stimulate bile acid secretion, improve growth rates, reduce ammonia production and inhibit the growth of pathogenic microbes such as Escherichia coli, Staphylococcus aureus, Salmonella enteridis and Candida albican (Djunaidi et al., 2018). Furthermore, the powder was refluxed at 60 – 65°C, until a concentrated extract was obtained.

The results of the jengkol toothpaste innovation research steps resulted in Figure 1 as follows:



Gambar 1 Research Trial Results

The smell of jengkol which comes from the sulfur content disappears, because it is mixed with mint leaves and lime, so that it smells fresh.

CONCLUSION

The test results in this study contain the results of the sulfur content in the manufacture of jengkol toothpaste which can be removed by adding elements of lime and mint leaves. However, the temporary final result due to technological limitations, shows that the thickened texture of this paste product is not suitable or similar to toothpaste in general. This research also yields and

hopes that jengkol, which is often avoided because of its smell, can actually be used to strengthen teeth in the elderly.

RESEARCH LIMITATIONS

The limitation of this research is not to test the content of jengkol toothpaste on elderly teeth, because they have to meet the elements of product safety and health ethics. For this reason, the research is still in the element of observation results and has not been said to be able to carry out large-scale production.

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