

## Optimization of Guava Chewable Toothpaste Tablets

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### ABSTRACT

The idea of this project is to innovate the guava chewable toothpaste tablets against oral bacteria. The guava fruit were processed to a fine powder. 3 different formulas were developed; tablet with charcoal, tablet without charcoal and tablet without humectant. Each tablet, total weight of 1 g,  $13.25 \pm 0.67$  mm diameter and  $6.20 \pm 0.24$  mm thickness, were formulated by incorporated the sea salt, stevia, sodium bicarbonate, sodium benzoate, glycerol and peppermint. Using disk diffusion method, the antibacterial sensitivity of the tablets was evaluated. The largest zone of inhibition was observed in formulated tablet with and without charcoal; 2.6 and 2.5 cm respectively, while 1.8 cm in tablet without humectant. Comparing to the positive control (commercialized toothpaste), the zone of inhibition observed was  $3.2 \pm 3$  cm. The hardness and pH value of the tablets were also tested. The hardness was 0 (with charcoal), 0.13 (without charcoal) and 0.27 (without humectant) kN. The pH values of all tablets were in between 6 to 7.

KEYWORDS: *Psidium guajava* L., Guava Chewable Toothpaste Tablets, Oral Bacteria

## 1 INTRODUCTION

Living in zero-waste lifestyles may seem difficult yet it is not impossible to do so. Zero-waste lifestyles entail the recyclable whole waste and the utilization of plastic is frowned upon. One of the initiatives that can be practised is through the transformation of toothpaste. The existing situation in Malaysia of disposal toothpaste tubes waste to landfills is not posing an environmental friendly management [1], due to the non-biodegradable form of the toothpaste tubes. In the current years, the use of plant extracts have resurfaced and grownup popularity to enhance health and for medicinal purposes. The guava (*Psidium guajava* L.) has an extra tremendous medicinal value and it has been used in folklore implementations to nurture oral hygiene. It also for long has been known for its anti-inflammatory, antimicrobial, antioxidant, antidiarrheal, antimutagenic properties [2]. Therefore, by merging the therapeutic effects of guava and the instilling of living in zero-waste lifestyles, a new formula of chewable toothpaste tablets is developed.

## 2 OBJECTIVE

The objective of this project was to innovate a new formulation of guava chewable toothpaste tablets. Additional objectives of this research were to determine the antimicrobial activities of guava chewable toothpaste tablets against oral bacteria and to evaluate the physical properties of the new formulation tablets.

## 3 SIGNIFICANCE (S)

The significance of the new formulation chewable toothpaste tablets resides in the features of medicinal values of guava as shown in the representations. It is tangible to modify the bioactive components of guava in the form of tablets in order to improve existing toothpaste in the market. We believe that production goals will largely benefit from this local Malaysia fruit toothpaste tablets that is nontoxic to all consumers.

## 4 METHODOLOGY/TECHNIQUE

The variety of guava that has been used in this project is GU9 and widely known as guava clone in Malaysia. This variety has less seed, round shape, sweet taste with white and thick flesh. The fruit of guava were collected, sliced thinly and baked in oven (56°C) and processed to a fine powder. 3 different formulas were developed; tablet with charcoal, tablet without charcoal and tablet without humectant. Each guava chewable toothpaste tablet were formulated by incorporated the sea salt, stevia, sodium bicarbonate, sodium benzoate, glycerol and peppermint. The tablets were moulded by pressing down the mixture of all ingredients using the hydraulic pressure Gauge. Using disk diffusion method, the antibacterial sensitivity of the guava chewable tablets against oral bacteria was evaluated. Each formulation of tablets was weight, test for their pH level and calculate for the hardness using hydraulic ram (MF40).

## 5 RESULT

3 different formulations of guava chewable toothpaste tablets were developed; tablet with charcoal, tablet without charcoal and tablet without humectant. Tablets without charcoal were created to evaluate the function of guava powder itself as antimicrobial agents. Many charcoal-related oral products were claiming to have antibacterial activities [3]. Tablets without the humectants were aimed to determine the necessity of humectant towards toothpaste tablets. The largest zone of inhibition was observed in formulated tablet with and without charcoal; 2.6 and 2.5 cm respectively (**Fig. 1**), while 1.8 cm in tablet without humectant. Comparing to the positive control (commercialized toothpaste), the zone of inhibition observed was  $3.2 \pm 3$  cm. The toothpaste tablet without humectant showed smallest zone of inhibition may due to the factor decreasing concentration of antimicrobial agent in order to increase the concentration of binding agents. The hardness was 0 (with charcoal), 0.13 (without charcoal) and 0.27 (without humectant) kN and it showed tablets with and without charcoal is within the range of standard hardness [4]. The pH values of all tablets were in between 6 to 7. The pH value is reasonably similar to the commercialize toothpaste. The pH value showed that the toothpaste is neutral and weak acid. The environment in the mouth need to be in range of 6.7 to 7.3 to make sure the teeth is healthy [5].

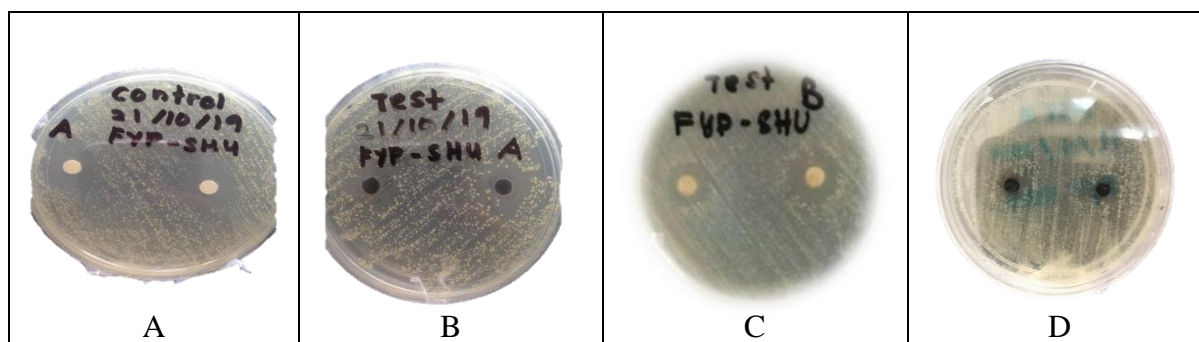


Fig. 1 Antimicrobial Sensitivity Testing (A) Commercialized toothpaste (positive control) (B) With charcoal (C) Without charcoal (D) Without humectant

## 6 CONCLUSION

While these results support the antimicrobial properties of guava chewable toothpaste tablets for oral bacteria and it has a great potential to be commercialized, further study is warranted to assure that the formula are safe with definitely no adverse effects.

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