

# The Development of Innovative Herbal Extract Oral Film for the Unpleasant Mouth Odour

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**Abstract**—The development of innovative herbal extract encapsulated in quick-dissolving films for the unpleasant mouth odor derived from the encapsulated Mangosteen extract nanoparticles incorporated into pullulan-alginate films and using solvent casting as film formation. The oral blend films were prepared from a mixture of pullulan and alginate. Encapsulated mangosteen extract nanoparticles (15 and 20% w/w), mint oil (0.2%, w/w) and glycerol (10%, w/w) were incorporated in the films to act as natural antimicrobial agent and plasticizer, respectively. The oral blend films exhibited antibacterial activity against *S.mutan*, *S.sanguinis* and *P.gingivalis* by using by macro broth dilution assay. Percent encapsulated mangosteen extract on antibacterial activity was investigated. The increasing in growth inhibition (%) was found when percent encapsulated mangosteen extract was increased. When 15% and 20% encapsulated mangosteen extract content its was shown that growth inhibition of more than 99 % were found for all (*S.mutan* *S.sanguinis* and *P.gingivalis*). Acceptance of innovative products and films suspended mouth odor herbal extract from a sample 50 found that overall satisfaction with the product. Prototype than product innovation in existing products on the market. In terms of convenience in use. Ingredients of products. Effectively suspended mouth odor, Nutrition, Innovation.

**Index Terms**—Quick-dissolving films, pullulan-alginate, encapsulated mangosteen extract.

## I. INTRODUCTION

In the present behavior of consumers to focus more on his personality and the care of their health. Resulted in a product that is relevant products in cosmetics. Skin. Various beauty products. Become an important part of everyday life for today's consumer. However, in contrast to oral health care products, which is a new product on a relatively high growth rate increased steadily [1]. The growth of these products increased up to 10-15 percent per year, accounting for a combined market value in the country, about 1000-1500 million or growth of at least 10 percent. Since 2550, not only the growth rate increases in the domestic market as well as export markets for health care in the mouth, which is likely a relatively bright, with market value of about 400 million, or a growth rate of more than 60 percent.

The developed oral films including encapsulated herbal extract as an innovative products with bio-base material are interesting trend [2]. The pullulan and alginate as well as bio-polymer organic substances film would melt in the mouth

easily. In this study the incorporation of encapsulated mangosteen extract as anti-bacterial and have sweet taste of herbs are produced with provide long-lasting freshness [3]. Botanical extracts from plants and herbs can be useful in terms of helping to suppress unwanted breath and help reduce some of the inflammation in the oral cavity due to the antiseptic properties, is an ingredient of some herbs.

Therefore, oral health care products. Group of films curb bad breath herbal extract. It tends to be quite bright and clear. It is a product that is innovative. Is different from the other products available in the market which is prepared from synthetic. Because oral health care products. It is a product that has become an increasing role in daily life in order. It is a blend of herbal ingredients is an important ingredient in the product. Extraction production and supply of quality material so that it is recognized that there are many within the country and can be found easily. Also, the production quality. Or the standard product. As a result, the film would stop bad breath herbal extract. That will be the benefits. Innovative and unique product worthy of consumption.

## II. OBJECTIVE

- To prepare films suspended mouth odor herbal extract that has good physical characteristics.
- Effect of anti-bacterial product after preparing the film.
- Study of acceptance Prototype product innovation.

## III. MATERIALS AND METHODS

### A. Materials

Glass ware, Hot plate Stirrer, Hot oven and acrylic plate are use in this experimental process

### B. Chemicals

Encapsulated mangosteen extract, sodium alginate, pullulan, mint oil and glycerol all of chemical are commercial and food grade.

### C. Methods

- 1) The encapsulated mangosteen extract are prepared from previous method (Krisana.s, 2011) and used as mainly ingredient for antibacterial agent.
- 2) Preparation of encapsulated mangosteen extract incorporated in pullulan-alginate blend films using solvent casting method.

Pullulan and alginate with an exactly ratio (3 gram) was add in distilled water (150 ml) with slowly dissolve. Then encapsulated mangosteen extract (10 and 20% w/w) and mint

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oil(0.2%v/w) coloring agent and glycerol (10%) were added into the solution mix together as well . The mixture solution was pour into acrylic mold and dry for 24 hrs. the dry films were collected and keep in desicator for further analysis.

### 3) Antibacterial activity

Antimicrobial activity was examined by determining the minimal bactericidal concentration (MBC) using In-house method based on WHO/CDS/CSR/RMD/2003.6 [4].

- Pullulan-alginate films and 15% and 20% encapsulated mangosteen extract in pullulan-alginate films were tested against Streptococcus mutans Streptococcus sanguis and Porphyromonas gingivalis.
- Preparation of films suspended mouth odor herbal extract tested.

Prepared films suspended mouth odor herbal extract. By bringing the film to be cut to size 2x3 cm film prepared by three different formulas, including films suspended mouth odor without the addition of encapsulated mangosteen extracts [5]. Films suspended mouth odor with 15 and 20% encapsulated mangosteen extracts.

TABLE I: THE COMPOSITION AND FUNCTIONS OF FILMS

Substances	function
Encapsulated mangosteen extracts	Active ingredient
Mint oil	Flavoring agent
Pullulan	Polymer
Alginate	Co-Polymer
glycerol	Plasticizer
Honey	Sweetening agent
distilled water	Solvent

- Antibacterial susceptibility assay.

The test isolate was grown in Muller-Hinton Broth (MHB, Merck) medium at 37 °C for 24 h. Final inoculum bacterial numbers were adjusted to 10<sup>8</sup> CFU/ml with reference to the McFarland turbidometry. The optical density at 625 nm was recorded by spectrophotometrically following centrifugation of the assay mixture [6], [7]. The inhibitory effect was expressed as percentage activity of control assay (no inhibitor).

- Study of acceptance Prototype product innovation

#### 1) Research method

Firstly, Documentary Research study of information and documents including. Various papers. Related to the product.

Secondly, Quantitative research focuses on the needs of the product films suspend mouth odor herbal extract. Consumer behavior in the use of films suspended mouth odor herbal extracts [8]. Factors influencing the decision to use film and not suspended mouth odor herbal extract. By the Questionnaire for the People aged between 22-45years, with a survey

#### 2) Questionnaire

Instruments used to collect data samples are divided into four sections.

Section 1: Study of consumer acceptance of innovations Prototype by using the innovative tools used in research samples. Contains general information of the respondents. Information products suspended mouth odor. Innovative

Prototype for satisfaction with the products consumers use their existing. And acceptance level of innovation.

Section 2: The appropriateness of Prototype product innovation of the respondents to comment or suggestion. Which is characterized by Open-Ended Question.

## IV. RESEARCH RESULT

### A. Effect of Anti-Bacterial Product after Preparing the Film

TABLE II: THE EFFICIENCY OF INHIBITION OF BACTERIA

Sample	culture	Times	CFU/ml	differ	%
Pullulan film	Sm	Start	4.15x10 <sup>6</sup>	-3.37 x10 <sup>8</sup>	-1.02x10 <sup>4</sup>
		24hrs	3.40x10 <sup>8</sup>		
	Ss	Start	3.30x10 <sup>6</sup>	-5.19 x10 <sup>8</sup>	-4.7 x10 <sup>4</sup>
		24hrs			
	Pg	Start	5.20x10 <sup>8</sup>	-2.29 x10 <sup>8</sup>	-2.08x10 <sup>4</sup>
		24hrs	1.10x10 <sup>6</sup> 2.30x10 <sup>8</sup>		
Pullulan film+15% clued extracts	Sm	Start	4.15x10 <sup>6</sup>	4.15 x10 <sup>6</sup>	>99.99
		24hrs	6		
	Ss	Start	15	3.30 x10 <sup>6</sup>	>99.99
		24hrs	3.30x10 <sup>6</sup>		
	Pg	Start	6	1.07 x10 <sup>6</sup>	96.86
		24hrs	125 1.10x10 <sup>6</sup> 34,500		
Pullulan film+20% clued extracts	Sm	Start	4.15x10 <sup>6</sup>	4.15 x10 <sup>6</sup>	>99.99
		24hrs	6		
	Ss	Start	8	3.30 x10 <sup>6</sup>	>99.99
		24hrs	3.30x10 <sup>6</sup>		
	Pg	Start	6	1.10 x10 <sup>6</sup>	>99.97
		24hrs	115 1.10x10 <sup>6</sup> 6 350		

Pullulan films without the addition of herbal extracts. The results shown in Table III

TABLE III: THE GROWTH OF BACTERIA IN PULLULAN FILMS WITHOUT THE ADDITION OF HERBAL EXTRACTS.

Test items	Test Results	Test Method
Inhibition test for S.mutans	Not detected	In-house method based on WHO/CDS/CSR/RMD/2003.6
Inhibition test for S.sanguinis	Not detected	
Inhibition test for P.gingivalis	Not detected	

Pullulan films with added herbal extracts yielded 15% as shown in Table IV.

TABLE IV: THE GROWTH OF BACTERIA IN PULLULAN FILMS ADDED HERBAL EXTRACTS YIELDED 15%.

Test items	Test Results	Test Method
Inhibition test for S.mutans	>99.99%	In-house method based on WHO/CDS/CSR/RMD/2003.6
Inhibition test for S.sanguinis	>99.99%	
Inhibition test for P.gingivalis	96.86%	

Pullulan films with added herbal extracts yielded 20% as

shown in Table V.

TABLE V: THE GROWTH OF BACTERIA IN PULLULAN FILMS ADDED HERBAL EXTRACTS YIELDED 20%.

Test items	Test Results	Test Method
Inhibition test for S.mutans	>99.99%	In-house method based on WHO/CDS/CSR/RMD/2003.6
Inhibition test for S.sanguinis	>99.99%	
Inhibition test for P.gingivalis	>99.99%	

### B. Study of Acceptance Prototype Product Innovation

Table VI shows the compares the difference in the level of satisfaction of the consumer. Product films suspended mouth odor herbal extract [9]. Compared with the traditional model of innovation by using Paired sample t-test at 95% confidence level.

TABLE VI: THE COMPARES THE DIFFERENCE IN THE LEVEL OF SATISFACTION OF THE CONSUMER

reason	average satisfaction		t	P-Value*
	Products used	Prototype		
Appearance	3.46±0.813	3.96±0.832	-4.096	.000
Convenience	3.60±0.904	4.36±0.749	-5.161	.000
Ingredient	3.48±0.707	3.94±0.740	-3.496	.001
Scent	3.88±0.659	4.04±0.781	-1.273	.209
Flavor	3.82±0.774	3.98±0.714	-1.212	.231
Effectively	3.62±0.753	4.18±0.720	-4.164	.000
suspended mouth odor				
Nutritious	2.78±1.093	3.56±0.951	-5.429	.000
Safety	3.68±0.844	4.04±0.807	-2.701	.009
innovation	2.90±0.974	4.42±0.810	-8.962	.000
Price	3.26±0.853	3.58±1.012	-2.266	.028
Package	3.46±0.646	3.90±0.735	-3.271	.002
Overall satisfaction	3.70±0.544	4.20±0.670	-4.481	.000

\*(1-Sided test)

TABLE VII: QUANTITY AND PERCENTAGE OF DATA IN THE APPROPRIATE VARIOUS. PROTOTYPE OF INNOVATIVE PRODUCTS

Reason	Appropriate		Improved	
	quantity	%	quantity	%
Appearance	46	92.0	4	8.0
Flavor	34	68.0	16	32.0
Scent	43	86.0	7	14.0
Color	42	84.0	8	16.0
Dissolving	37	75.5	12	24.5
Package	39	78.0	11	22.0

## V. CONCLUSION

- 1) Test the effects of anti-bacterial effect that cause mouth odor.

Testing for antibacterial activity. The cause of the mouth odor of films suspended mouth odor herbal extract by In-house method based on WHO/CDS/CSR/RMD/2003.6.

Results showed that the films suspended bad breath herbal extract has activity anti bacteria that cause bad breath such S.mutan, S.sanguinis and P.gingivalis [10]. Was found that the film with no added herbal extracts that are found not to inhibit the growth of bacteria and the growth of many bacteria, as opposed to the film, with the addition of herbal extracts 15%. and 20% were found to be antibacterial

S.mutan, S.sanguinis more. And 99.99% for Bacteria P.gingivalis pullulan film formula with herbal extracts more than 15% inhibited bacteria. 96.86% and pullulan film formula with herbal extracts 20% to more than 99.97% anti-bacterial and also has advantages because the films curb bad breath herbal extract is derived from natural substances.

- 2) After the data collection was conducted in most of the new product, which is the product films suspended mouth odor herbal extract which is a product of the product in the mouth odor. The appropriateness of prototype innovation of the analysis of data as the prototype product innovation is found in the appearance of the product. Most of the sample that is appropriate. However, it should be designed to modern. The sheets should be big for easy handling. The taste of the product. Most of the sample that are appropriate to improve the taste too bitter, too spicy mint flavor should be added. And increased cooling. The scent of the product. Most of the sample that is appropriate. May be add herbal flavor. Also available in different scents. The color of the product, which is mainly to improve the natural of color. Wide variety. In the solubility of the product. To improve the dissolved too quickly. The cheeks bulge melt
- 3) Results of the analysis of the innovation.

Consumer satisfaction with oral deodorant products compared with existing prototype innovation. From the collection of questionnaire can be derived from the opinion of the consumer group found that satisfied the criteria in a manner convenient to use. Mixture of products. Effectively suppress bad breath. Nutrition, safety, innovation and packaging. Of the sample with a higher underlying product innovation with traditional products.

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