

**DEVELOPMENT OF A BITTER MELON BASED
SUPPLEMENTARY CAPSULE**

BY

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of Master of Food Science and Technology, Department of Food Science
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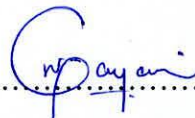
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DECLARATION

The work described in this project was carried out by me at the University of Sri Jayawardenepura, under the supervision of Prof. K. K. D. S. Ranaweera, Department of Food Science and Technology, University of Sri Jayawardenepura; Director, Bandaranaike Memorial Ayurvedic Research Institute, Nawinna, Maharagama; and this thesis has not been submitted in whole or in part of any University or any other institution for another Degree/ Diploma.

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I certify that the above statement made by the candidate is true and that this thesis is suitable for submission to the University of Sri Jayawardenepura for the purpose of evaluation.

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**Dedicated to my beloved mother, father and brother for their
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Abbreviations

CAM	-	Complementary and Alternative Medicine
DSHEA	-	The Dietary Supplement Health and Education Act
FDA	-	Food and Drug Administration
GMP	-	Good Manufacturing Practices
IUPAC	-	International Union of Pure and Applied Chemistry
ROS	-	Reactive Oxygen Species
HIV	-	Human Immunodeficiency Virus
USDA	-	United States Department of Agriculture
AMPK	-	Adenosine 5 Mono Phosphate Kinase
DM	-	Diabetes Mellitus
LDL	-	Low Density Lipo-protein
CLnA	-	Conjugated Linolenic Acid
MAP30	-	Momordica Anti-human Immuno virus Protein
AIDS	-	Acquired Immuno Deficiency Syndrome
SMS	-	Sodium Meta-bi Sulphate
WHO	-	World Health Organization
AOAC	-	Association of Analytical Communities
AHPA	-	American Herbal Product Association
ICP	-	Inductively Coupled Plasma

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Development of a Bitter Melon Based Supplementary Capsule

By: Panadura Arachchige Nadi Gayani Perera

ABSTRACT

Bitter Melon (*Momordica charantia*) fruits are consumed by mankind since centuries as a vegetable and herb. But most people are reluctant to consume it due to its undesirable taste of bitterness. The objectives of the present study were to develop a bitter melon based supplementary capsule which was in the progress of masking bitterness, to nutritionally and microbiologically analyze the finished product, to evaluate its medicinal value and to evaluate the hypoglycemic activity by the assay of alpha amylase inhibitory activity.

The triangular type of *M. charantia* fruits dried at 50 °C was selected to prepare capsules. In the development of capsules, usage of only dried powder was not applicable, as the WHO recommended daily dose of dried powder ranges from 2g – 15g. On the other hand, despite the recommended daily dose of aqueous extract ranges from 300 mg to 600 mg, aqueous extract alone cannot be the best presentation as it lacks fibre, minerals and some other phytochemicals. Therefore, the dried powder enriched with aqueous extract with the ratio of 7:1 (350mg: 50mg) was considered as a beneficial formulation to meet the recommended daily requirement.

Hence, 1g of extract was mixed with 7g of dried powder to prepare capsules. Required millilitres of water extract which resembled 1mg of solid extract was determined according to the extraction method of Harbone, (1998). According to the results obtained, 1mg of solid extract was equivalent to 0.11 ml of water extract of dried bitter melon powder. Therefore, needed water extract was 110 ml to have 1g of extract. A volume of 110 ml of water extract was mixed with 7g of dried powder of *M. charantia* and kept in a dryer at 50 °C for several days. A finished capsule was weighed approximately about 400mg which resembled 50mg of extract and 350mg of dried powder and the determined beneficial dose was 2 capsules three times per day.

Finished products were tested nutritionally (on dry basis) and microbiologically to assess the nutritional value and microbial quality. The developed supplementary capsule had 50.79% of carbohydrate, 28.50% of protein, 13.77% of fiber, 5.72% of fat, 7.96% of moisture, 7.03% of ash, 7.52% of reducing sugar, 9.88% of total sugar and 54mg/100g of

vitamin C respectively. It was also found to contain 5432.4mg/100g of potassium, 698.5mg/100g of phosphorus, 474.5mg/100g of calcium, 295.9mg/100g of magnesium and 8.14mg/100g of iron in dry basis. Total energy value was 368.64 kcal/100g. The total plate count (2.6×10^1 cfu/g), Yeast and moulds (7.9×10^2 cfu/g) and coliforms (0.2×10^1) were in the range of acceptable values according to American Herbal Products Association (AHPA). No faecal coliforms were detected in the product.

Phytochemical analysis was done qualitatively according to Harbone (1998) and Evans, (1989) to determine and compare the bioactive phyto-compounds in raw fruit and the dried powder of *M. charantia* by using aqueous and methanol extracts. It was revealed that the dried powder of bitter melon fruits were found to be rich with flavonoids, alkaloids, tannins, saponins, glycosides, phenols and steroids as same as the fresh fruit and accordingly it can be suggested to have potential medicinal values in it.

Supplementary capsules were subjected to the assay of alpha amylase inhibitory activity and the results obtained indicated some sort of inhibitory activity.

Hence, developing a bitter melon based supplementary capsule with higher nutritional value, medicinal value, keeping quality, cost effectiveness and lower microbial activity can be considered successful.