

Quality Evaluation and Development of value-added Healthmix (Porridge) using Mappillai Samba and Carrot powder

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Abstract— Ancient varieties of rice are the most important crops to the tribal people, which give them a high nutritional value. People have benefitted from the nutritional properties of this rice for thousands of years. Even though the production of many varieties of rice takes place in India, particular varieties of rice are not used widely. The Mappillai samba is one of the ancient varieties of rice which contains a high amount of protein, fiber, vitamin B12, iron, calcium and antioxidant properties. In addition to this, vegetable consumption is also considerably reduced among people. The aim of this paper is to introduce new food products by using mappillai samba incorporated with carrot powder. The objective of this study is to formulate, develop, standardize and estimate the physiochemical, nutritional composition and shelf-life of the product by using Mappillai samba incorporated with carrot powder. The Mappillai samba and carrot were obtained as raw material. Carrot powder was prepared by the sundry method. Mappillai samba, carrots and pulses were processed into health mix powder. The proportion of Carrot powder and Mappillai samba with pulses was 25:75, 50:50, and 75:25. The MSCCP health mix powder is used in the form of MSCCP porridge. This MSCCP product was analysed for its physiochemical properties, nutritional properties and shelf life. Results revealed a report of moisture content (10.02%), crude fibre (2.91%), acidity (0.10%) and total plate count (4.68×10^2 cfu/g) in health mix powder. The value added product was evaluated organoleptically for acceptability. A 5-point hedonic organoleptic evaluation was used for studying the acceptability. The mean organoleptic score for control and MSCCP porridge was 2.9 ± 0.5 and 4.3 ± 0.5 respectively. The results indicated that a proportion of 25:75 of composite powder was highly accepted. This study observed that the value-added porridge can be formulated by using Mappillai samba, pulses and carrot (MSCCP health mix powder) to enrich the porridge. This

products is high in fibre and iron and it has a low glycemic index. Therefore, this product is capable of controlling blood glucose levels in diabetic patients, helping with weight loss for obese patients and improving iron status among anaemic patients. It is suitable for children and can be suggested as a weaning formula for infants too.

Index Terms— Crude fibre, Diabetes, Iron, Low glycemic index, Mappillai samba, Porridge.

I. INTRODUCTION

Ancient varieties of rice are the most important crops to tribal which gives high nutritional value to them. It has extensive curative properties known from the ancient days [1]. People have benefitted from the nutritional properties of this rice for thousands of years. Even though the production of many varieties of rice takes place in India, particular varieties of rice are not used widely. Many people today are unaware that the importance of ancient rice contributes to destroy of its origin. The Mappillai samba is one of the ancient varieties of rice which contains a high amount of protein, fiber, vitamin B12, iron, calcium and antioxidant properties. It was grown extensively in the South Indian states from August to January particularly referred to as the “samba season”. It is well suit for organic farming because it is hard in nature and does not need the utilization of any pesticides and fertilizers. This variety of rice is red in color and rich with Zinc and Micro minerals which can help for the production of hemoglobin and myoglobin in the human body [2]. It is high in fiber which can helps for easy digestion, increase absorption of

nutrients, relive constipation, reduce over weight and best food item for diabetic patients. It can increase energy level and induces growth in children, strengthen the kidneys and helps in lowering the cholesterol level in our body [3]. It contains 49 grams of carbohydrates; 10% proteins and glycemic index is 53 [2]. It has highest Vitamin E content [4]. It has high iron content. Iron has a major role in human body. It has various functions such as oxygen transport, DNA synthesis, electron transport, etc., [5].

It has antihypercholesterolemic effect, anticancer activity, ability to improve fertility in men as well as anti diabetic and antineurological properties [6]. In addition low glycemic index foods have been associated with improved insulin sensitivity and increased colonic fermentation [7]. This rice has a low glycemic index that helps in reducing the blood glucose level which results in management of diabetes mellitus. Based on that, the health mix was developed, which can be used in day-to-day life. The health mix porridge was introduced, which is more appetizing to children and other age groups. In the present scenario, the consumption of vegetables is also being reduced among children and people. So, the product was developed by using carrots, which were made into dry powder and incorporated with Mappillai Samba Rice.

II. METHODS AND MATERIALS

A. Preparation of Mappillai Samba Carrot Composite Powder (MSCCP)

Purchase fresh, high-quality rice and a carefully selected carrot from the local market as raw materials. Carrot was washed with tap water to remove dust and other particles, peeled and then grated into slices. The sliced materials are kept for sundry (traditional method) to dehydrate completely for more than 5- 10 days at 36 degree Celsius. After being dehydrated, carrot slices are ground into a fine powder. On the other hand, the Mappillai Samba was roasted and allowed to cool for 30 minutes. After reaching normal temperature, the roasted Mappillai Samba rice and pulses are ground into powder, and then it is mixing up with a proportion of 25%, 50% and 75% carrot powder in it and made into three variations (V1, V2, and V3). These mixed powders were called Mappillai Samba Carrot Composite Powder (MSCCP). Then 3 variations of products were stored in a zip lock cover.



Figure1 Three Variation Packs of MSCCP Powder

B. Analyzing MSCCP health mix

A normal health mix powder which was purchased from the market was kept as a control sample and the MSCCP health -mix prepared as porridge under 3 different variations such as V1 (25%), V2 (50%), and V3 (75%) for sensory evaluation by the panel members.

C. Preparation of MSCCP Health-Mix Porridge



Figure 2 MSCCP Porridge

The first step for the preparation of porridge is to add 100gms of roasted MSCCP health-mix into a sauce pan, add 50 ml of water into it, and stir well to avoid lumps. Then it should be cooked until slightly thick and add jaggery at last. The porridge is allowed to cook on a low flame for 10 minutes. Then the MSCCP porridge is transferred into the bowl for serving. The organoleptic evaluation of porridge was assessed by 30 semi-trained panel members by using a score card with a 5-point hedonic scale [9]. Semi-trained panel members judged the quality of the porridge in various sensory characteristics like color, texture, flavor, taste and overall acceptability for variations (V1, V2, and V3) with control. The variation V1 was selected through organoleptic evaluation as it acknowledged higher acceptability than other 2 variations and control. The study of nutrient analysis and shelf life of the health-mix of variation V1 was given to the food laboratory. Nutrition analysis refers to the process of determining the nutritional content of foods and products. Various nutrient analyses such as energy, protein, fats, carbohydrates, iron and fiber were performed. To estimate the health-mix quality in case

of storage conditions, the shelf life was analysed by using the total plate count method for 0-day, 14th and 30th days. The numbers of microbial growths in samples were lower when compared with the normal range.

Table 1 Formulation of MSCCP Health – Mix Porridge

Ingredients	Control	Variation 1	Variation 2	Variation 3
Millets and Cereals	82g	-	-	-
Mappillai Samba Powder	-	50g	33g	17g
Carrot Powder	-	25g	50g	75g
Common Ingredients (Pulses)	12g	25g	17g	8g

III. RESULTS AND DISCUSSION

A. Product Development

In this current study, a health-mix was developed with the incorporation of 2 major ingredients, ie., Mappillai samba rice and carrot powder. This composed mix, prepared as porridge, which contains a very high amount of macro nutrients with iron and fibre compared to market health mix powder. Nutrient analysis and sensory evaluation were done for the control and selected test sample products with 3 variations.

B. Sensory Analysis

The below table represents the organoleptic properties of the sample compared with the standard (control). From the statistics obtained, it was observed that variation 1 had the highest overall acceptability compared with variation 2 (V2), variation 3 (V3) and control (C) products.

Table 2 Mean Organoleptic Scores of Control and MSCCP Porridge

Ingredients	Mean Score of Variations			
	Control	Variation 1	Variation 2	Variation 3
Appearance	3.9 ± 0.6	4.3 ± 0.5*	4.1 ± 0.60	4.0 ± 0.66
Color	3.3 ± 0.71	4.6 ± 0.5*	3.9 ± 0.32	3.4 ± 0.5
Flavour	2.0 ± 0.7	4.1 ± 0.7*	3.6 ± 0.71	2.4 ± 0.62
Texture	4.0 ± 0.5	4.4 ± 0.5*	4.2 ± 0.58	4.2 ± 0.48
Taste	3.2 ± 0.5	4.7 ± 0.5*	4.6 ± 0.66	3.3 ± 1.1
Overall Acceptability	2.9 ± 0.5	4.3 ± 0.5*	3.7 ± 0.63	3.0 ± 0.41

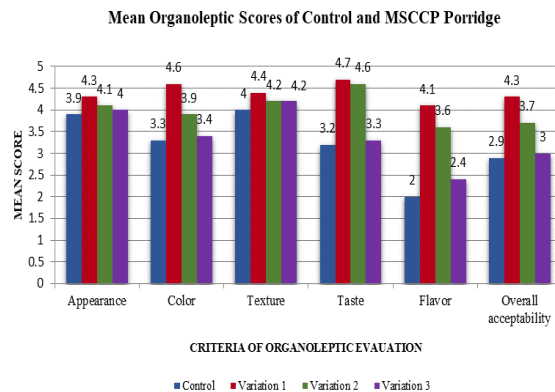


Figure 3 Mean Organoleptic scores of Control Product and MSCCP Porridge

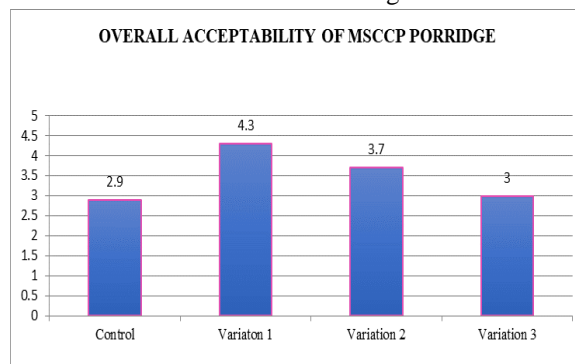


Figure 4 Overall acceptability of MSCCP porridge

Table 3 Comparison of the highest two variation of MSCCP Porridge

S. No	Criteria	Mean Scores of Variation 1	Mean Scores of Variation 2	“t” value
1	Color	4.6 ± 0.48	3.9 ± 0.32	3.4444**
2	Texture	4.4 ± 0.5	4.2 ± 0.58	0.015676**
3	Taste	4.7 ± 0.58	4.6 ± 0.66	0.244418**
4	Flavor	4.1 ± 0.71	3.6 ± 0.71	0.000315*
5	Overall acceptability	4.3 ± 0.59	3.7 ± 0.63	0.000194*

Significant at 1% level

**Significant at 5% level

Not significant

The result of a t-test comparing the organoleptic scores of the MSCCP porridge was given in the table. Variation 1 and 2 were selected for comparison because they have the highest mean scores. Results of the comparison show that color, texture and taste have significant differences (p<0.01) and flavour and overall acceptability have significant differences (p<0.05) between the variations V1 and V2.

C. Nutrient Analysis of MSCCP Health-Mix

This MSCCP health mix powder is extremely important to our body because it provides a lot of

energy while having a low glycemic index. It is a good source of protein, fats, iron, and fiber. This Health-Mix powder can also be prepared as porridge, dosai, idli, adai, and roti with more green leafy vegetables, which are good for health, easy to prepare for breakfast and consumable for therapeutic conditions also.

Table 4 Nutrient Analysis of Control and Test Sample V1 (Variation 1)

Nutrients	Control Product (100g)	Sample incorporated with 25% carrot powder, Variation 1 (100g)
Energy (Kcal)	380	243.48
Protein (g)	10	9.41
Fats (g)	4	1.184
Carbohydrate (g)	76	52.8
Iron (mg)	3.5	6.2
Crude Fiber (g)	5	10

Table 5 Physicochemical Analysis of MSCCP

Physicochemical Properties	Amount
Moisture (%)	10.02
Acidity (%)	0.10

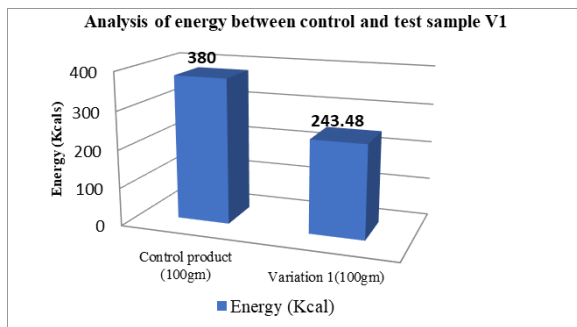


Figure 5 Analysis of energy between control and test sample

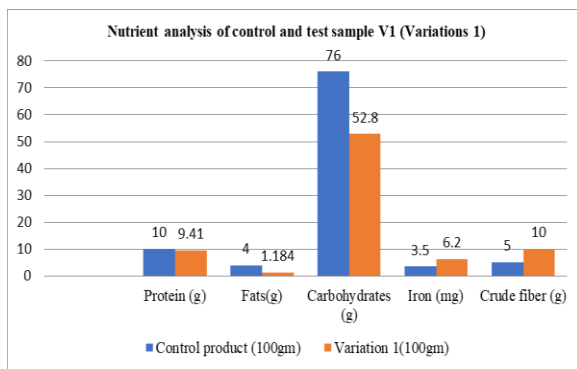


Figure 5 Nutrient analysis of control and test sample V1 (Variations 1)

From the above table, we can conclude that the energy in nutrient analysis of a sample incorporated with 25% of carrot powder was lower than the control product. The protein content of Variation 1 was the same as the control product. The fat and carbohydrate content in

Variation 1 was lower than in the control product. The iron content and crude fibre in Variation 1 were higher than in the control product. So the product we developed is well suited for the management of diabetes, dyslipidemia, obesity, anemia, constipation and other diseases too. This variety of traditional rice is especially rich in iron and zinc content, which gives red color, due to the presence of anthocyanin pigments, which are identified to have free radical scavenging and antioxidant capacities as well as other health benefits [10].

D. Shelf-Life Evaluation

Shelf-life is the purchaser’s guide to the period of time that food can be kept before it starts to contaminate, deliver any stated storage conditions have been followed. The estimation of shelf-life is therefore the time period of the product may be stored without becoming unsuitable for use or human consumption and is the responsibility of the producers. MSCCP Health Mix has antimicrobial activity against numerous microorganisms such as Streptococcus sp, Klebsiella sp and E. coli. The total plate count of MSCCP indicates 1×10^2 cfu/g on day 1, 4.68×10^2 cfu/g on day 14 and 7.56×10^2 cfu/g a day on day 30.

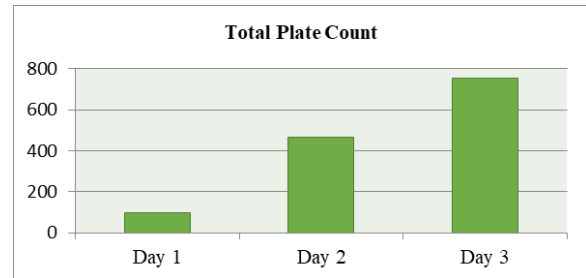


Figure 7: Total Plate Count of MSCCP.

IV.CONCLUSION

The present study was carried out by the preparation of value-added Mappillai Samba with carrot powder incorporated health mix porridge is low in glycemic index, which helps in controlling high blood glucose levels and can be advised to diabetic and obese patients since it provides low energy, decreases the desire to eat and makes one feel fuller for a long time. The product is rich in fiber which gives satiety, aids in digestion and prevents constipation. This value-added product helps in increasing High density lipoprotein (HDL) cholesterol and reducing low density lipoprotein (LDL) cholesterol and therefore this

product can be recommended to hyperlipidemic, cardiac and obese patients too. It is high in iron content and can be suggested to be consumed for adolescent girls and also for anaemic patients because Vitamin B12 is also rich in this health mix. It is suitable for children and can be suggested as a weaning formula for infants too.

ACKNOWLEDGEMENT

The authors would like to express their sincere thanks to the Department of Clinical Nutrition and Dietetics, PSG College of Arts & Science supported under the program of DST FIST

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