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Home Science

"DEVELOPMENT, NUTRIENT ANALYSIS AND SHELF LIFE STUDY OF READY TO USE LOW COST HEALTH MIX FOR MALNOURISHED CHILDREN"

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ABSTRACT Malnutrition is persisting among tribal population in Attapadi, Kerala due to the lack of proper nutrient supplementation. In the current study highly acceptable ready to use health mix formulated by using locally available and acceptable food resources with the aim to ensure the availability of low cost health mix in Attapadi tribal area especially for malnourished children. Three types of cereals like Rice, Ragi, Bajra blended with Blackgram dhal and jaggery for this mix development. Three variations were made with various proportions of ingredients. Among three variations Variation I (Rice, Ragi, Bajra, Blackgram dhal and jaggery15:15:20:20:30) was highly accepted and nutrients were analysed for VI. Microbial load was analysed for 30 days. Organoleptic evaluation and feeding trails revealed that this health mix well accepted by tribal mothers. The cost of the developed health mix is considerably cheaper than the commercial health mixes and suitable for low income people in this tribal area.

KEYWORDS : .Malnutrition, Low cost, Health mix, Organoleptic evaluation.

Introduction

Inappropriate feeding Practices of infant and young children are the most serious obstacles to maintaining adequate nutritional status and contribute to levels of malnutrition. Poverty, malnutrition and disease are interlinked with each other. Malnutrition in children is the consequence of a range of factors, which are often related to poor food quality, insufficient food intake, Severe and repeated infectious diseases; or frequently it involves some combination of these three (Bhandari, 2006). The broad strategies that will be adopted to reduce malnutrition of preschool children in rural Kerala are as follows: Adopting life-cycle and rights based approaches to nutrition. The primary focus would be to strengthen family practices related to Infant and young child feeding, sick childcare with appropriate medical treatment and nutrition management, prevention of illnesses through immunization and hygiene/sanitation, appropriate cooking and dietary practices in the family, appropriate use of nutritional supplements and micronutrient supplements and diarrhoea management through ORT to be promoted within the family. In order to support the family based counselling and behaviour, change communication, local community based approach will be taken up at the neighbourhood and community level to enable a positive environment to promote the appropriate family practices as acceptable social norms (Ramachandran, 2010).

Supplementation of foods prepared from easily available and low cost ingredients is of vital importance to meet the requirements of the growing children (Devi, 2009). Therefore development of supplementary foods based on locally available cereals and legumes has been suggested by the Integrated Child Development Scheme and Food and Agriculture Organisation to combat malnutrition among mothers and children of low socio economic groups (Mohammed Asatter et al., 2013)

Diets based on ragi (Eleusinecorucum) to provide protein as the effects of such supplementation on the growth and nutritional status of twenty children fed on each diet were studied in a feeding trial lasting for 6 months. Nitrogen retention and apparent digestibility of the diets were also studied at one stage during the feeding trials. Supplementing ragi diets with any of the materials brought about improvement in all nutritional responses, i.e. height, weight, general nutritional status, apparent digestibility and Nitrogen retention. The supplementation led to the greatest response in growth, as measured by increase in height and weight (Chaturvedi, 2008)

Pearl Millets are a great source of starch, making it a high-energy food. It is also an excellent source of protein and fiber. It is said that the amino acids in the pearl millet are more easily digestible than the ones found in wheat. Pearl millet is a rich source of phosphorus, which plays an important part in the structure of body cells. Phosphorus, found in pearl millets, is a significant component of several necessary compounds including Adenosine Triphosphate (ATP). This element is also a crucial component of nucleic acids, which are the building blocks of the genetic code (Bashay, 2000).

Jaggery is described with various medicinal properties and other health benefits, A pure and wholesome food, it share the variety of essential amino acids, minerals and vitamins of the sugarcane juice and this is why it is considered a healthier option. It is also high in calcium which is required for maintenance of bone strength and is a healthy delicious snack. Being rich in iron, it prevents diseases like anemia and also contains essential nutrients like magnesium and potassium (Copland et al., 2004)

Rice contributes to 43 percent of total grain production and 46 percent of total cereal production. The major carbohydrate of rice is starch which is 72-75 percent. The protein content of rice is 7 per cent. The rice proteins are more rich in arginine compared to other cereal proteins. The biological value of rice protein is 80 whereas wheat protein has 66 and maize protein has 50 (Manay shakumthala et al.,2000).

Materials and Methods

The ingredients like Rice, Black gram dal, Ragi , Bajra and jaggery were purchased from the local market of Attappadi, Kerala.

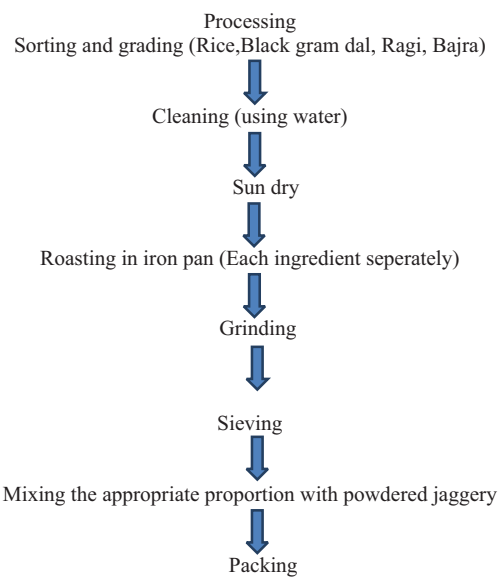

Table I. Standardisation of Health mix

Ingredients	Control	V-I	V-II	V-III
Rice	70	15	20	15
Bajra	-	15	20	20
Ragi	-	20	20	15
Blackgram dal	-	20	20	20
Jaggery	30	30	20	30

Organoleptic evaluation

The Organoleptic evaluation was conducted with 25 panel members. The sensory parameters such as appearance, colour, flavour, texture and taste and the overall acceptability were evaluated using five point hedonic scale. The Table II shows the organoleptic evaluation of formulated Health mix powder.

Nutrient Analysis

The nutrients like energy, protein, carbohydrate, fat, fibre, ash, moisture, Calcium, Iron were analysed for the control and highly accepted Variation VI.The Table III shows the Nutrient analysis of Health mix.

Microbial load

Microbial load was analysed for the control and Variation I. The formulated products were kept in a zip lock cover. The bacterial count was analysed using spread plate method for 30days at 15 days interval. The total bacterial count from initial to 30th day was presented in the Table IV.

Results and discussion

From the mean Organoleptic evaluation the appearance of the Control (4.25±0.85), and Variation V1 were 4.25±0.85, V2 3.25±0.44, V3 4±0.79 respectfully. Colour of the Control 4.1±0.78 and Variation I, II and III were 4±0, 3.5±0.51 and 3.5±0.51. Flavour of the Control 4.75±0.44, Variation I, II and III were 4.85±0.48), 4±0, 4±0.79. Taste of the control 4.30.68 and Variation I, II and III were 4.4±0.94, 3.751.33 and 4±0.79. Texture of the control 4.75±0.44, Variation I, II and III were 1 4.8±0.41, 4.5±0.51. Overall acceptability of the control was 4.43±0.30, Variation I, II and III were 4.46±0.36, 3.8±0.48 and 4±0.48. From the Table I, the Organoleptic score of the Health mix Variation I was got highest score namely 4.25±0.85 in appearance,4±0 in colour, 4.85±0.48 in flavour, 4.4±0.94 in taste, 4.8±0.41 in texture and 4.46±0.36 in Overall acceptability.

TABLE II Mean Organoleptic Evaluation of the formulated Health mix

Sl No	Criteria	Control	V-I	V-II	V-III
1.	Appearance	4.25±0.85	4.25±0.85	3.25±0.44	4±0.79
2.	Colour	4.1±0.78	4±0	3.5±0.51	3.5±0.51
3.	Flavour	4.75±0.44	4.85±0.48	4±0	4±0.79
4	Taste	4.3±0.68	4.4±0.94	3.75±1.33	4±0.79
5.	Texture	4.75±0.44	4.8±0.41	4.5±0.51	4.5±0.88
6.	Overall acceptability	4.43±0.35	4.46±0.36	3.8±0.48	4±0.35

The nutrients were analysed for the Control and Variation I. Control got energy value (359.6kcal),Carbohydrate(84.1gm), Protein (4.7gm), Fat(0.2gm), Crude fibre(0.11gm), Ash(0.68gm), Moisture(4.83gm), Calcium(34mg) and Iron(3.2mg). Variation I contains energy of (370.02kcal),Carbohydrate(83.71gm), Protein (9.63gm), Fat(0.74gm), Crude fibre(2.16gm), Ash(1.36gm), Moisture(4.85gm), Calcium(262mg) and Iron(8.3mg). When compared with control all the nutrients were higher in Variation I.

TABLE III Nutrient content of the formulated Health mix

Sl no	Nutrients	Control (per 100 gm)	V -I(per 100 gm)
1.	Energy	359.6	370.02 Kcal
2.	Carbohydrate	84.1gm	83.71 gm
3.	Protein	4.7	9.63gm
4.	Fat	0.2	0.74gm
5.	Crude Fiber	0.11	2.16 gm
6.	Ash	0.68	1.36gm
7.	Moisture	4.83	4.85gm
8.	Calcium	34mg	262mg
9.	Iron	3.2	8.3mg

The total bacterial count of the control and Variation I were nil on first day. The fifteenth day of storage the total bacterial count was 8×10^4cfu/ml and 8×10^4cfu/ml and on 30th day the total bacterial count was 1410^{4}cfu/ml and 1210^{4}cfu/ml respectively. The fungal count was absent in first day of storage in Control and Variation I. On the 15th day of storage the fungal count was 110^{4}cfu/ml in control and Variation I. On the 30th day of storage the fungal count was 210^{4}cfu/ml in Control and Variation I.

Table IV Microbial analysis for formulated Health mix

S. no	Day	No of bacterial colonies per plate in dilution (CFU/ml)	Noof fungal per plate in dilution (CFU/ml)		
1	1st	-	-	-	-
2	15th	8×10^4	8×10^4	1×10^4	1×10^4
3	30th	14×10^4	12×10^4	2×10^4	2×10^4

Conclusion

The formulated health mix was highly nutritious and it contains traditional millets like ragi and bajra which are mostly liked by tribal population. Hence it was highly accepted by the tribal population in Attappadi. So this low cost nutritious health mix can be supplemented to malnourished children. Many studies reported that blending of cereals with pulses has the essential amino acids and it can be prevent the child malnutrition.

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