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Development and quality evaluation of iron rich products

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Four different iron rich products namely kranky noodles, crunchy ball, nutri grans and nutri ribbon were developed to combat iron deficiency anaemia utilizing locally available, low cost and food stuffs rich in iron content. Developed iron rich products were evaluated organoleptically and nutrient content was determined. The periodical acceptability, nutrient content and microbial content was evaluated at 0, 3 and 6 months of storage period. Among the five developed iron rich products the iron content of developed product was in the range of 14.60 mg to 17.20 mg/100g. The results of storage study indicated that the developed products were acceptable while microbial content increased but it was in the safe range.

Key Words : Iron rich products, Anaemia

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INTRODUCTION

Anemia is a global public health problem affecting all over the world with major consequences on health, social and economic development. It occurs at all life stages of the human being but is more prevalent in pregnant women and young children (WHO, 2002). Micronutrient deficiencies are also expressed in terms of increased mortality, morbidity and disability rates (Narasinga Rao, 1997). Dietary factors have a significant role in the development of iron deficiency and consequent anaemia (Katheryn *et al.*, 2014).

To overcome iron deficiency anaemia a concentrated source of iron has to be supplemented in large amounts.

Increasing dietary diversification is one of the effective and sustainable interventions to prevent hidden hunger. At the same time, food fortifications with iron, iodine and vitamin A during processing have also proved to reduce micronutrient deficiencies (Zhou and Zhou, 2014.)

Therefore, the recipes rich in iron content were developed. The consumption of these developed recipes can improve the iron content of daily diet.

METHODOLOGY

Four iron rich products namely kranky noodles (soyaben, rajkeea seed, green gram dhal and rice flakes) and crunchy ball (Sesamum, rajkeea seed, roasted bengal gram), nutri grans (Sesamum, rajkeea seed, roasted bengal gram) and nutri ribbon (Bengal gram dhal, soyabean black gram dhal, roasted bengal gram, rice flour and rajkeera leaves powder) were developed to combat iron deficiency anaemia utilizing locally available, low cost

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food stuffs rich in iron content. The acceptability of the developed products was evaluated using 9 point hedonic scale (Shrilakshmi, 2005). The nutrient content *i.e.* proximate composition was determined as per procedures prescribed by A.O.A.C. (1975). Calcium was estimated by EDTA method. Iron content was estimated by Atomic Absorption Spectrophotometer (Perkin R. Elmer Model-3110). The products were stored in air tight container at room temperature and evaluated for acceptability and microbial content for 0, 3 and 6 months of storage period. The data was analysed by appropriate statistical methods (Panse and Sukhatme, 1985).

OBSERVATIONS AND ASSESSMENT

The results of the mean acceptability scores (Table 1) revealed that nutri grans and kranky noodles secured highest scores for colour (8.5 and 8.4, respectively), whereas nutri ribbon secured highest scores for taste (8.5). On the other hand the highest score for flavour was recorded by nutri ribbon whereas in case of texture (8.2) and overall acceptability (8.3), kranky noodles secured highest score (8.2).

The data regarding nutrient composition of Iron rich products developed per 100g on dry weight basis showed in Table 2. It was found that the moisture content of the developed iron rich products ranged from 3.26 to 3.98 g/ 100g. The highest fat (18.51g) and protein (20.56g) content was recorded by nutri ribbon followed by kranky noodles (13.80g) and (15.75g). The highest amount of ash was found in crunchy ball (2.36g) whereas kranky noodles contained highest amount of fibre (2.40g). However, highest calcium and zinc content was recorded by nutri grans 420 and 5.36 mg/100g, respectively while

Table 1: Mean acceptability scores of organoleptic characteristics of developed iron rich products

Products	Colour	Taste	Flavour	Texture	Overall acceptability
Crunchy ball	7.8	7.2	7.1	7.0	7.1
Nutri grans	8.5	8.2	7.8	7.8	8.1
Kranky noodles	8.4	8.2	8.1	8.2	8.3
Nutri ribbon	8.0	8.5	8.2	7.9	8.1

Table 2: Nutrient composition of iron rich products/100g

Name of the products	Moisture (g)	Ash (g)	Fat (g)	Protein (g)	Fibre (g)	Vit C (g)	Iron (mg)	Calcium (mg)
Crunchy ball	3.26	2.36	3.89	8.31	1.35	11.50	16.10	340
Nutri grans	3.34	2.29	3.96	11.82	1.30	11.75	16.60	420
Kranky noodles	3.98	1.83	13.80	15.75	2.40	10.01	17.20	204
Nutri ribbon	3.68	1.69	18.51	20.56	1.65	17.25	14.60	260

Table 3 : Mean overall acceptability of iron rich products (0-6 months) storage

Storage period	Overall mean acceptability			
	Crunchy balls	Nutri grans	Kranky noodles	Nutri ribbon
Initial	8.18±0.08	8.54±0.13	8.32 ±0.11	8.48± 0.33
3 months	7.54±0.11	7.1± 0.29	7.5 ±0.19	7.22 ± 0.34
6 months	5.16±0.31	5.28 ±0.24	4.88 ± 0.29	4.74 ± 0.13

Table 4 : Microbial count of iron rich products

Name of product	Bacterial count			Yeast and mould count		
	Initial	3 month	6 month	Initial	3 month	6 month
Crunchy balls	$4.50x10^4$	$4.50x10^4$	$5.36x10^4$	$4.40x10^4$	$5.4x10^4$	$6.2x10^4$
Nutri grans	$5.09x10^4$	$5.12x10^4$	$5.18x10^4$	$3.50x10^4$	$3.50x10^4$	$3.75x10^4$
Kranky noodles	$5.54x10^4$	$5.54x10^4$	$6.22x10^4$	$3.09x10^4$	$3.27x10^4$	$4.18x10^4$
Nutri ribbon	$4.18x10^4$	$4.54x10^4$	$4.68x10^4$	$4.00x10^4$	$4.18x10^4$	$4.54x10^4$

kranky noodles contained highest amount of iron (17.20mg/100g) followed by nutri grans (16.60 mg/100g).

The results of mean acceptability scores of organoleptic characteristics of Iron rich products stored for six months showed in Table 3 reveals that as the period of storage increased all the organoleptic scores decreased.

Microbial content of developed iron rich products stored for six months recorded periodically and given in Table 4. The microorganisms identified were bacteria, yeast and mould. In all the products, initial bacterial count was 4.5 cfu x 10^4 x g^n to 5.54 cfu x 10^4 x g^n and yeast and mould count was 3.09 cfu x 10^1 x g^n to 4.40 cfu x 10^1 x g^n, respectively. In the fresh state of the product the count of bacteria, yeast and mould was very less as compared to the stored samples. It was found that as the period of storage increased microbial count was increased. However, it was in the safe range.

Conclusion:

It is clear from the study that the iron content of developed product was in the range of 14.60 mg to 17.20 mg/100g. The results of storage study indicated that the developed products were acceptable while microbial content increased as the period of storage increased but it was in the safe range.

On the whole it can be said that, the consumption of developed iron rich products are recommended to be included in the daily diet so as to enhance the iron consumption which can ultimately helpful in improving the haemoglobin level and may prevent the iron deficiency anaemia.

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