Research Paper

Volume : 4 | Issue : 11 | November 2015 • ISSN No 2277 - 8179

Formulation and evaluation of convenience food mixes from malted millets

Food Science

KEYWORDS : pearl millet, finger millet, sorghum, convenience food mixes

Shunmukha Priya, S — Ph.D Scholar, Department of Food Science and Nutrition, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore – 641043, Tamil Nadu

Kowsalya, S — Professor, Department of Food Science and Nutrition, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore – 641043, Tamil Nadu

ABSTRACT

Millets are the first grains consumed by man and also known as nutri-grains because they contain most nutrients. Methodology: Using three major - pearl millet, finger millet, and sorghum convenience food mixes were formulated by incorporating green gram, roasted Bengal gram and groundnut. Nutritional and shelf-life evaluation was carried out. From the mixes, three breakfast and three snacks were prepared and sensory evaluation was done. Results: The mean energy content of the mixes were in the range of 388.09 kcal - 372.35 kcal, pearl millet based mix contains iron content 7.78 mg and zinc content of 3.01 mg and calcium content of ragi based mix was 284.78 mg. Conclusion: The throws the importance of formulating convenience mixes by incorporating malted millets with pulses and nuts which would result in micronutrient-rich mixes which will serve as a sustainable solution to solve the problem of hidden hunger.

1. INTRODUCTION

Millets are the traditional foods were known and grain consumed by the human. They are small seeded grasses with a tough outer covering, grown in areas with minimal rainfall, under marginal conditions of soil fertility with an added advantage of the short growing period of only 65 - 75 days from planted seeds to a fully grown and ready to harvest plants. If stored properly, whole millets will stay for more than two years (Asharani *et al*., 2010). They have been called nutri-grains because of their rich micronutrient contents like iron, calcium, phosphorus and B-complex vitamins. Earlier studies on household processing methods like malting of pearl millet and finger millet reduce protein content, but improves protein efficiency ratio (PER) and enhances the bioavailability of micronutrients by lowering anti-nutrients (Desai *et al*., 2010).

At present, modern Indian women are engaged in dual roles as working women and home makers. Their time for preparing foods as done in traditional times has been reduced. Moreover, working women are mostly relying on commercial mixes to prepare dishes. Considering the above factors as well as the increased prevalence of non-communicable diseases among the population, the present study was taken up with the specific objective to formulate and evaluate convenience food mixes from millets.

2. MATERIALS AND METHODS

i. Selection of Ingredients

Three major millets namely, Bajra or pearl millet (*Pennisetum glaucum*), Ragi or finger millet (*Eleusine coracana*) and Jowar or Sorghum (*Sorghum vulgare*) were selected as the major ingredient. These millets were procured from local market and were subjected to visual inspection, removed stones, dirt, present in it. It was washed in water three times and later these millets were as malted as per the standard procedures of Gokavi and Malleshi (2000). Malted millets were dry roasted separately for a period of 10 to 15 minutes in a medium flame. When the millets get dried completely, it was removed from the fire. On cooling, the millets were powdered in a blender and kept in air tight containers. For preparing 100 g of convenience mix, 65 g of malted millet flour was taken. To this, green gram (*Phaseolus aureus*) (roasted and powdered), roasted Bengal gram (*Cicer arietinum*) (powdered) and groundnuts (*Arachis hypogaea*) (roasted and powdered) were added in the ratio 20g: 10g: 5g respectively to each of these malted millet flours to form the 100 g mix. Thus, three convenience food mixes were developed.

Here, Fig. 1 showing the composition of the malted millet based convenience mixes.

a) Nutritional evaluation of the food mixes

The developed food mixes were analyzed for nutrient contents by AOAC methods. The nutrients analyzed were moisture, ash, fat, fibre, protein, carbohydrate, β - carotene, vitamin C, iron, calcium, phosphorus and energy

b) Shelf – life evaluation of the food mixes

The shelf-life of the food mixes were analyzed by storing them in airtight containers at room temperature for a period of 0 days, 30 days, and 90 days respectively. The shelf–life was determined by the serial dilution 1:100 and plated from 10^{-2} using spread plate technique as stated by Jideani and Jideani (2006). The parameters analyzed were moisture content, peroxide value, total bacterial count and total fungal count.

c) Development and standardization of recipes

From the three convenience food mixes, three commonly consumed breakfast items such as dosa, puttu and roti and three snack items such as murukku, ladoo and kolukattai were prepared.

d) Sensory evaluation of the food

Sensory evaluation of a food depends on the criteria's like appearance, flavour, taste, texture, doneness and overall acceptability. It gives an index of the overall acceptability of food (Nambiar *et al*., 2010). Sensory evaluations of the prepared convenience foods were carried out by a panel of 25 semi-trained members on a 9 point hedonic scale for the sensory characters such as colour, taste, texture, flavour, doneness and overall acceptability.

The results are presented as the mean ± standard deviation.

3. RESULTS AND DISCUSSION

1. Proximate composition of the convenience food mixes from millets (100g)

Here, Table–I Proximate composition of millet based convenience food mixes (per 100g)

From table - I, it was observed that, the ash content which is a measure of the mineral content ranged from 2.57g, 2.85g and 3.23g respectively for pearl millet based mix, finger millet based mix and sorghum based mix. The moisture content of the mixes was in the range of 4.07g % to 4.63g %. The sorghum based mix contains the highest energy content of 388.09 K.Cal where as

the protein content of three mixes was in the range of 15.03g to 16.35g. The fat content of the pearl millet based mix was highest of 6.10g. Micronutrient content also, pearl millet based mix contains iron of 7.78g, zinc 3.01g, phosphorus 335.17mg / 100g. The finger millet based mix contains high calcium of 284.78mg. The nutrient content of the convenience food mixes formulated in the present was high when compared to the one formulated by Thilagamani and Mageshwari (2011). Earlier study by Singh and Sehgal (2008), on developing a ladoo from popped pearl millet, dehulled chickpea and groundnut also reported high iron content.

2. Shelf–life evaluation of the developed food mixes

The moisture content of the three food mixes ranged from 4.37 to 4.65 g % in the fresh samples (0^{th} day). After 30^{th} day, a slight increase in moisture was seen among all the food mixes 6.50, 6.65 and 6.80 g % and on the 90^{th} day; further increase was seen as 8.25, 8.40 and 8.40 g % in the order of pearl millet, finger millet and sorghum respectively.

The initial peroxide value of the food mixes were 1.01, 1.05 and 1.05 meq.02/kg respectively (pearl millet, finger millet and sorghum respectively). After 90 days, only a marginal increase in PV was observed for all the millet based food mixes.

Total bacterial count and total fungal count were within the safer limits till 90 days for all the three mixes. The present study points that with suitable processing methods and proper storage techniques, shelf-life of the convenience food mixes can be extended upto 90 days.

3. Sensory evaluation of the foods prepared from the mixes

Sensory evaluation of the three breakfast items such as dosa, roti and puttu, three snack items such as murukku, ladoo and kolukattai were carried.

3.a. Sensory evaluation of breakfast items

It was found that, from the breakfast recipes, appearance and colour of the sorghum based dosa had highest score of 7.50 and 7.70. For the attributes flavour, taste and doneness, pearl millet based dosa received the highest scores. Sensory evaluation of roti's prepared from three millet based mixes showed that for the attributes appearance, colour, taste, and texture sorghum based roti scored highest while for the food puttu prepared from three millet based mixes, for the attributes appearance, colour, flavour, taste, and texture pearl millet based mix received the highest scores.

Here, Fig.2

Fig.2 shows the overall acceptability of the breakfast items prepared from three mixes

b) Sensory evaluation of the snack items

The snack kolukkatai prepared from finger millet based mix scored highest for the criteria appearance. For the sensory attributes flavour, taste and doneness, pearl millet based kolukkatai had highest scores. Sorghum based kolukkatai had the highest score for texture. For the snack murukku the sensory attributes such as appearance, colour, and doneness sorghum based mix scored highest.

Here, Fig.3

Fig.3 shows the overall acceptability of the snack items prepared from three mixes

4. Summary and Conclusion

The present study shows that the incorporation of millets with pulses and nuts will enhance the nutrient content of the mixes than using a single flour preparing dishes. Moreover, household food processing methods such as soaking, malting, roasting and powdering enhances the nutrient content of the products.

Acknowledgement

None

Conflict of interest

Nil

Glossary

Breakfast items

Dosa - A pancake made from raw rice flour and urad dhal
Puttu – Steamed cylinders of raw rice with coconut in between
Roti - Soft unleavened bread made from sorghum alone

Snack items

Murukku – Crunchy savory snack made from besan flour.
Ladoo - A sweet made of a mixture of flour and sugar/ jaggery
Kolukattai- A dumpling made from raw rice flour with a filling of coconut grated

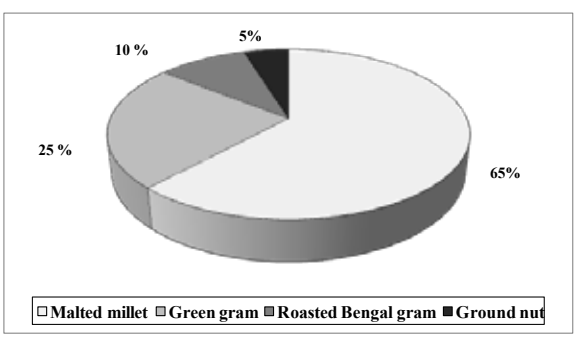

Fig. 1 Composition of the malted millet based food mix

Table–I Proximate composition of millet based convenience food mixes (per 100g)

Criteria	Pearl millet based mix	Finger millet based mix	Sorghum based mix
Ash (g)	2.57 ± 0.05	2.85 ± 0.05	3.23 ± 0.15
Moisture (per cent)	4.37 ± 0.152	4.07 ± 0.11	4.63 ± 0.15
Energy (K.Cal)	374.84 ± 25.16	372.35 ± 10.58	388.09 ± 6.11
Protein (g)	16.35 ± 1.06	15.03 ± 1.40	15.90 ± 0.60
Fat (g)	6.10 ± 0.34	3.68 ± 0.25	4.17 ± 0.14
Carbohydrate (g)	63.02 ± 6.74	69.82 ± 2.29	71.74 ± 0.60
Fibre (g)	10.64 ± 1.21	9.90 ± 1.00	11.32 ± 0.86
Vitamin A (µg)	33.15 ± 1.10	15.82 ± 0.59	16.90 ± 0.36
Iron (mg)	7.78 ± 0.08	4.39 ± 0.43	5.52 ± 0.86
Zinc (mg)	3.01 ± 0.09	2.57 ± 0.09	2.07 ± 0.06
Calcium (mg)	66.07 ± 1.04	284.78 ± 2.20	58.36 ± 3.82
Phosphorus (mg)	335.17 ± 4.55	324.98 ± 4.52	283.61 ± 2.74

Volume : 4 | Issue : 11 | November 2015 • ISSN No 2277 - 8179

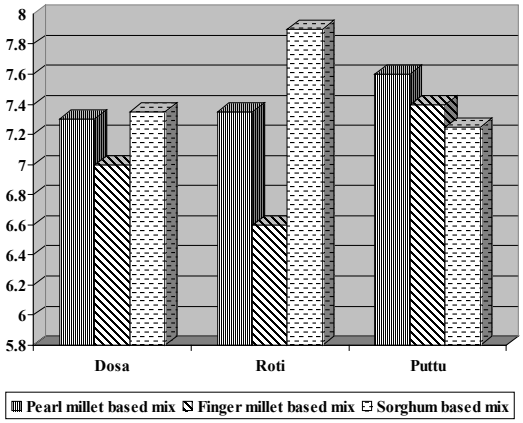

Fig. 2 Overall acceptability of breakfast items prepared from the convenience food mixes

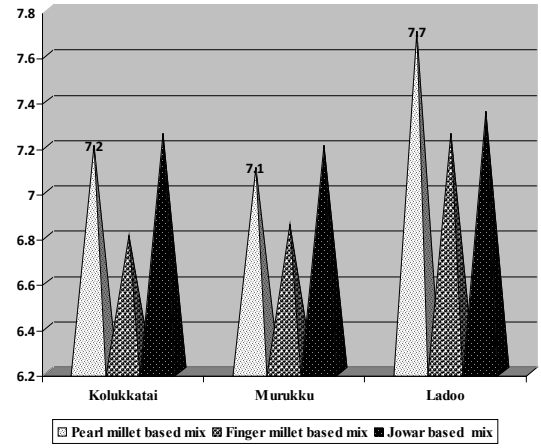

Fig.3 Overall acceptability of snack items prepared from the convenience food mixes

REFERENCE

Asharani, V. T., Jayadeep, A. and Malleshi, N. G. (2010)., Natural Antioxidants in Edible Flours of Selected Small Millets, International Journal of Food Properties, 13: 1, 41 – 50. Desai, A.D., Kulkarni, S. S., Sahu, A. K., Ranveer, R.C. and Dandge, P.B. (2010). Effect of supplementation of malted ragi flour on the nutritional and sensorial quality characteristics of cake. Adv. J. Food Sci. Tech., 2(1): 67-71 Gokavi, S. S. and Malleshi, N.G. (2000) Malting characteristics of a few Indian wheat and chickpea varieties. J. Food Sci. Technol., 37:586– 591 Jideani V. A, Jideani, I. A. (2006). Laboratory Manual of Food Bacteriology. Amana Printing and Advertising Ltd Kaduna, Nigeria. Pp. 96-108. Nambiar, V. S., Guin, P., Parnami, S. and Daniel, M. (2010). Impact of antioxidants from drumstick leaves on the lipid profile of hyperlipidemics. Health (San Francisco), 4(1), 165–172. Role of Millets in Nutritional Security of India. (2013) National Academy of Agricultural Sciences, New Delhi, 110012 Singh, G. and Sehgal, S., (2008) Nutritional evaluation of ladoo prepared from popped pearl millet. Nutr Food Sci., 38(4):310–315 Thilagamani, S. and Mageshwari, S.U. (2011) Effect of fibre and antioxidant rich supplement on lipid profile of young women at risk for cardiovascular disease, International Journal of Pure and Applied Sciences Technology, 2(1), 63–70.