Research Article

QUALITY EVALUATION OF PEARL MILLET INCORPORATED CUPCAKES

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A R T I C L E   I N F O

A B S T R A C T

The present study was undertaken with the objectives of evolving cupcakes containing *bajra* to find out their acceptability, nutritive value, proximate composition and mineral content of standard and most acceptable *bajra* cupcakes. For the same purpose *bajra* was processed and evaluated for nutrient composition. Cupcakes was prepared by using refined flour, *bajra* flour, egg, sugar, ghee by substituting refined flour with *bajra* flour. The different sample prepared were Type A, Type B, Type C, Type D and Type E in the ratios of (Refined flour:*Bajra* flour) 100, 75:25, 50:50, 25:75, 100 respectively. The developed cupcakes were sensory evaluated using nine point hedonic scale. Highest energy, protein, carbohydrate, fibre, calcium and iron were observed in Type E i.e. (1183 Kcal), (24.9 g), (121.9 g), (1.2 g) (108 mg) and (10.1 mg) respectively. Fat content was observed in Type B (68.3 g). Cupcakes prepared with 25 per cent of *bajra* flour (Type B) was most acceptable and analysed for proximate content and mineral content along with standard cupcakes (Type A). Result shows that cupcakes prepared with *bajra* flour (Type B) was found to be high in protein (21.4±0.1 g), fat (32.4±0.4 g), fibre (1.2±0.3 g), calcium (52±0.7 mg) and iron (5.8±0.2 mg) than standard cupcakes (Type A). Addition of *bajra* flour increased nutrient density of cupcakes. Thus replacement of traditional food like refined flour with *bajra* for preparing cupcakes is feasible and beneficial too and also were very well accepted. *Bajra* is low cost cereal, so it is economical. It can be used as a healthy alternative to other grain to make our diet more wholesome and nutritious.

INTRODUCTION

In the recent years there has been an increasing recognition of the importance of millets as the substitution for major cereal crops. Almost whole of the pearl millet produced in India is consumed in the form of various foods depending on the region and their food habits. The percentage of crude protein, fat, crude fiber and ash content of pearl millet as reported in various analytical studies ranges from 7.02 to 13.67, 4.02 to 7.80, 0.54 to 3.00 and 0.25 to 2.54 per cent, respectively. Besides, the total quantity of protein, their amino acid composition is important for better nutritional quantity. The amino acids profile of pearl millet is better than that of sorghum and maize and is comparable to wheat, barley and rice (Hadimani *et al.*, 1995; Abdalla *et al.*, 1998). The consumption of pearl millet is very poor inspite of being nutritional superior to other crops. The majority of people in India are economically poor and thus, food choices for a

balanced diet are further restricted by poverty and insufficient supply of nutritious foods. Therefore, it becomes important to focu on promoting maximal use of locally available inexpensive foods rich in protein, calcium, iron, fiber etc. The blanching treatment was effective in retarding in antinutrient content of pearl millet seeds (Rekha *et al.*, 1999).

Substitution with *bajra* flour is a cost-effective way to increase protein, fibre, iron and other nutrient. Traditional preparation when modified like cupcakes with *bajra* flour could serve a means of enhancing nutritive value. Therefore, the present study was undertaken to know the effect of addition of *bajra* flour on sensory and nutritive value of cupcakes.

METHODOLOGY

Procurement of pearl millet

Pearl millet was procured from Sector-15 Market, Chandigarh.

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Processing of pearl millet

The clean and healthy grain of pearl millet was used for preparation of flour. They were roasted in a pan and then ground with the help of electric grinder. Then the ground content was sieved through a mesh sieve to obtain flour. The powdered sample was stored in air tight container until further use for experiments

Biochemical analysis of pearl millet

Moisture, crude protein, fat, ash, crude fibre, iron and calcium were determined by the method of (AOAC 1980). Phytic acid was determined by the method of (Haug and Lantzch 1983). Polyphenols was determined by the method of (Singh and Jambunathan 1981).

Standardization and development of cupcakes

A standard recipe is one in which the amount and proportion of the ingredients and method will consistently produce a high quality product. The ingredients are carefully balanced for the number of servings a recipe has to yield. Formulation was prepared by blending refined flour and *bajra* flour in different proportions. Table 1 depicted different combinations of flour of refined flour and *bajra* flour.

Table 1 Proportion of cupcakes

Sr.No.	Ingredients	Type A	Type B	Type C	Type D	Type E
1.	Refined flour	100	75	50	25	-
2.	*Bajra* flour	-	25	50	75	100

Sensory evaluation of cupcakes

The developed value added cupcakes was standardised using sensory evaluation technique with the help of 5 panel members using 9-point hedonic scale. The developed value added cupcakes along with standard sample was served to the panel members for sensory evaluation. Most acceptable level of *bajra* flour in cupcakes was further analysed for its nutrient content.

Nutritional evaluation of cupcakes

Nutritive values of all the recipes were calculated using Nutritive Value of Indian food by (Gopalan *et al.*, 2014).

Estimation of proximate composition and mineral content of standard and most acceptable cupcakes

The standard and most acceptable food products out of the ratios were evaluated to assess proximate and mineral composition as per the parameters mentioned earlier.

Statistical analysis

All the obtained data of chemical analysis and sensory evaluation were statistically analyzed using Mean, Standard error, Friedman-Test according to the standard method.

OBSERVATIONS AND ASSESSMENT

Estimation of proximate composition, mineral content and anti-nutritional factors of pearl millet

The analysis showed the composition of *bajra* (Table 2) as moisture 12.6 ± 0.2 %, protein 9.9 ± 2.8 g, fibre 2 ± 2.6 g, fat 4.2 ± 0.5 g, carbohydrate 69 g, ash 2.39 ± 0.2 % **,** calcium 39.3 ± 1.3 mg, iron 6.7 ± 0.4 mg, phytic acid 647.8 ± 0.1 mg and polyphenols 606 ± 0.2 mg per 100 gram.

Table 2 Proximate composition, mineral content and anti-nutritional factors of pearl millet

Proximate Composition	Mean (per 100 gram)
Moisture (%)	12.6 ± 0.2
Protein (g)	9.9 ± 2.8
Crude fibre (g)	2.0 ± 2.6
Fat (g)	4.2 ± 0.5
Ash (%)	2.3 ± 0.2
Carbohydrate (g)	69
Mineral Content	
Calcium (mg)	39.3 ± 1.3
Iron (mg)	6.7 ± 0.4
Anti-nutritional Factors	
Phytic acid (mg)	647.8 ± 0.1
Polyphenols (mg)	606 ± 0.2

Development of cupcakes

Five types of cupcakes were developed from flour of the pearl millet in different proportions.

Sensory evaluation of cupcakes

Results of sensory evaluation of cupcakes prepared with *bajra* flour presented in (Table 3 and Fig. 1) revealed that the overall acceptability of cupcakes ranged from 7.0-8.7. This indicated that the recipes were found under the category of 'liked moderately and liked very much. Standard cupcakes (Type A) exhibit highest scores for all sensory attributes i.e. 8.6 ± 0.24 (appearance), 8.6 ± 0.24 (color), 8.8 ± 0.2 (texture), 8.8 ± 0.2 (flavour), 8.8 ± 0.19 (taste) and 8.7 ± 0.04 (overall acceptability) as compared to cupcakes prepared with *bajra* flour. However incorporation of *bajra* flour in cupcakes upto 100 per cent level maintains like slightly on the basis of 9 point hedonic scale. Statistical data revealed that there was significant difference in taste and overall acceptability at ($p\leq0.01$). However no significant differences were observed in appearance, color, texture and flavour.

Singh (2003) also developed sponge cake with blanched and malted pearl millet flour which was moderately liked by the panelists.

Table 3 Mean scores of sensory evaluation of cupcakes

Types of Cupcakes	Appearance	Colour	Texture	Flavour	Taste	Overall acceptability
Type A (Rf::100)	8.6 ± 0.24	8.6 ± 0.24	8.8 ± 0.2	8.8 ± 0.2	8.8 ± 0.19	8.7 ± 0.04
Type B (Rf:P::75:25)	8.2 ± 0.19	8.2 ± 0.19	8.6 ± 0.39	8.6 ± 0.24	8.6 ± 0.24	8.4 ± 0.09
Type C (Rf:P::50:50)	8.0 ± 0.31	7.6 ± 0.51	7.8 ± 0.58	7.8 ± 0.58	8.2 ± 0.37	7.8 ± 0.089
Type D (Rf:P::25:75)	7.4 ± 0.6	7.0 ± 0.7	7.6 ± 0.51	7.6 ± 0.51	7.6 ± 0.51	7.4 ± 0.1
Type E (P::100)	7.2 ± 0.48	7.2 ± 0.48	7.2 ± 0.48	7.4 ± 0.6	6.2 ± 0.31	7.0 ± 0.224
Friedman Test	8.800	5.873	7.241	8.753	13.268	19.184
p-value	.066	.209	.124	.068	.010**	.001**

Rf: Refined flour
** Significant at 1 %
P: Pearl millet

Cakes prepared by incorporating foxtail millet and pearl millet at a variation of 10 per cent, 20 per cent and 30 per cent, out of which variation 20 per cent and 30 per cent were very good in appearance, texture, taste, colour and flavour. Cakes made from pearl millet were highly acceptable than foxtail millet (Shadang and Jaganathan 2014).
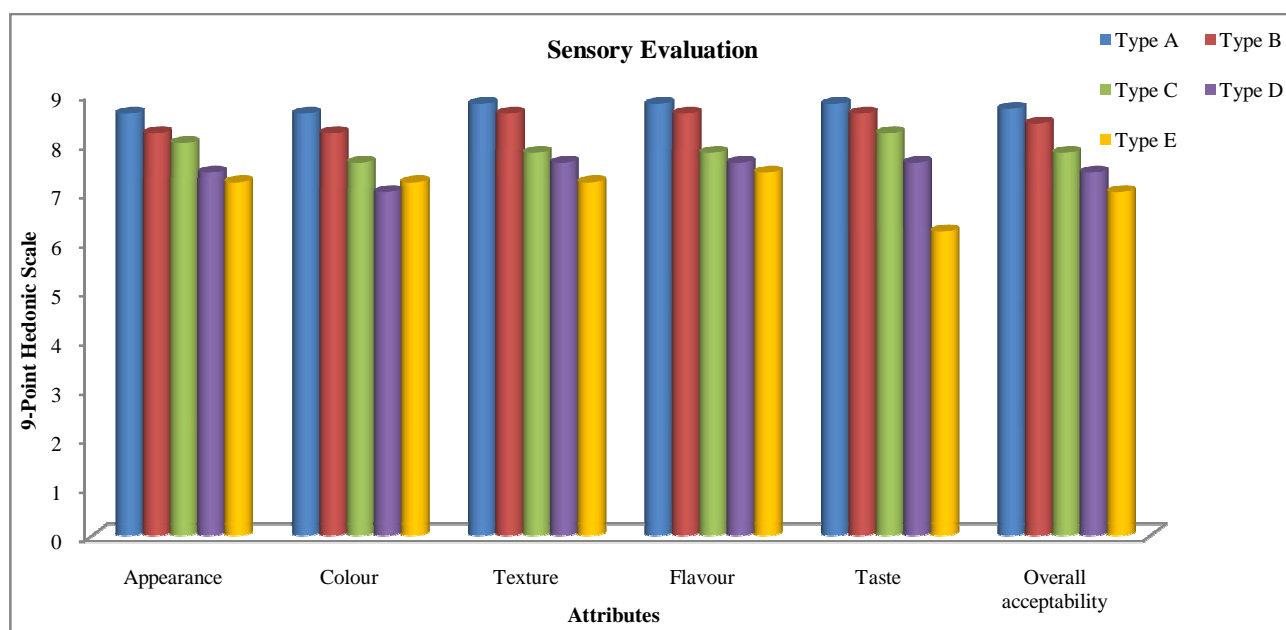
Fig 1 Mean scores of sensory evaluation of cupcakes

Nutritive contribution of cupcakes

Table 4 Nutritive values of cupcakes

Types of Cupcakes	Energy (kcal) #	Protein (g) #	Carbohydrate (g) #	Fat (g) #	Fiber (g) #	Calcium (mg) #	Iron (mg) #
Type A (Rf::100)	1170	24.35	123.6	64.2	0.3	89	4.8
Type B (Rf:P::75:25)	1173.2	24.45	121.9	65.1	0.5	93.7	6.1
Type C (Rf:P::50:50)	1176.4	24.55	120.2	66.1	0.7	98.4	7.4
Type D (Rf:P::25:75)	1179.6	24.7	118.2	67.1	0.9	103	8.7
Type E (P::100)	1183	24.9	117.2	68.3	1.2	108	10.1

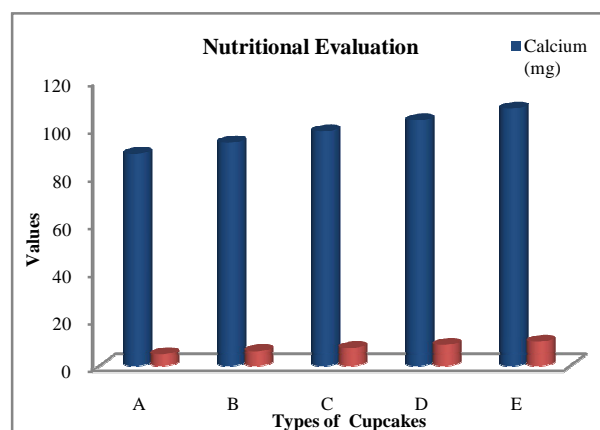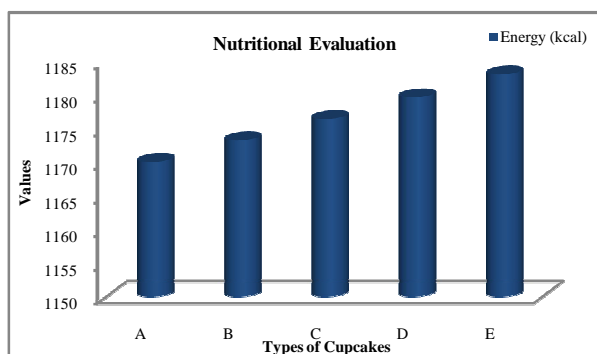Rf: Refined flour kcal: kilocalories
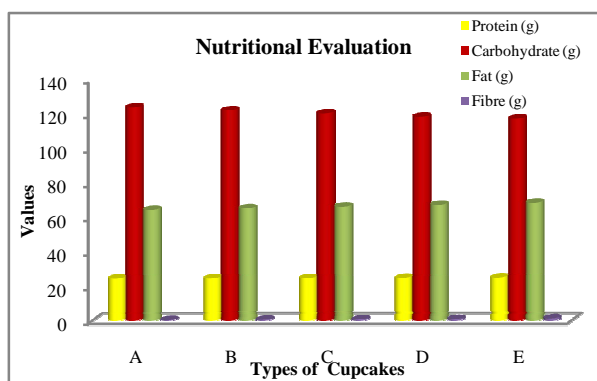P: Pearl millet g: gram
Gopalan *et al* (2014) mg: milligram


Fig 2 Nutritive values of cupcakes

Estimation of proximate composition and mineral content of standard and most acceptable bajra food products

Table 5 Proximate composition and mineral content of cupcakes

Proximate Composition	Type A	Type B
Protein (g)	20.2±0.4	21.4±0.1
Carbohydrate (g)	37.7	36.7
Fat (g)	30.2±0.2	32.4±0.4
Fibre (g)	1.1±0.5	1.2±0.3
Moisture (%)	9.4±0.5	6.6±0.3
Ash (%)	1.4±0.3	1.7±0.5
Mineral Content		
Calcium (mg)	46.2±0.2	52±0.7
Iron (mg)	4.2±0.5	5.8±0.2

%: percent, g: gram, mg: milligram
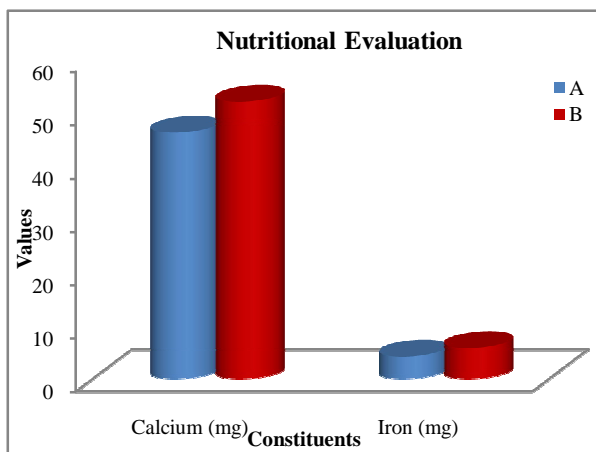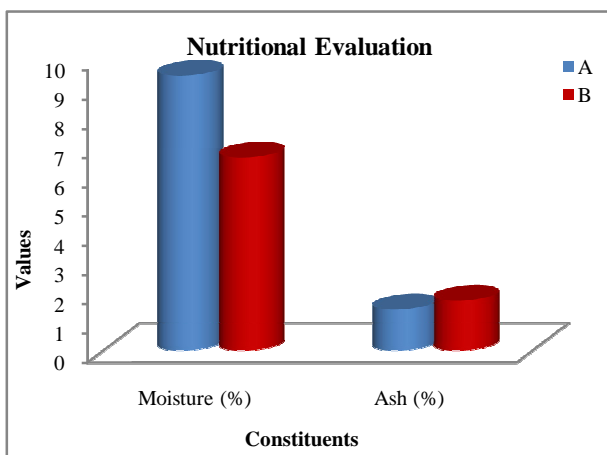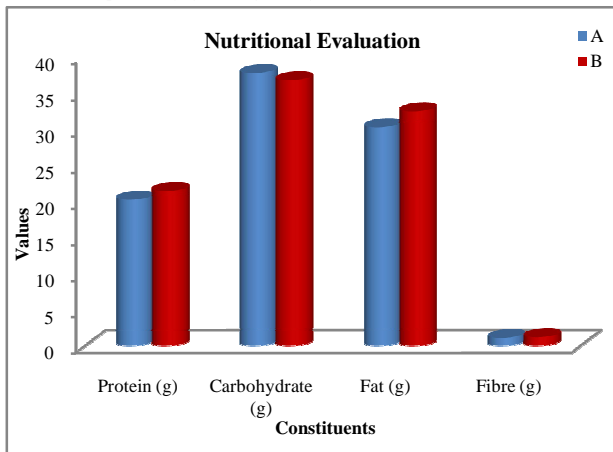
Fig 3 Proximate composition and mineral content of cupcakes

CONCLUSION

This study has demonstrated that addition of increasing levels (100 %) of *bajra* flour in the cupcakes affected the quality of sensory attributes. Cupcakes with 100 % *bajra* flour contains the highest amount of energy, protein, fat, fibre and iron. The findings of the present study may help in developing commercial processing technology for effective utilization of *bajra* flour especially for preparation of cupcakes. So it can be inferred from the present study that the cupcakes developed by using *bajra* flour were nutritious and acceptable. Therefore, results suggest that there is a great scope for use and marketing of value added cupcakes using *bajra* and it can be concluded that *bajra* can be utilized for achieving food and nutritional security for nation.

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