

PREPARATION OF VALUE-ADDED CUPCAKES BY USING OF BLACK WHEAT FLOUR, FINGER MILLET FLOUR AND ASHWAGANDHA POWDER TO COMBAT MALNUTRITION

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Abstract– Cupcake are enjoyed by all age people and hence they can act as a very good source for providing nutrients. Black wheat is high in iron and fiber. Ashwagandha powder is used to treat various disease. The present study was carried out with the objectives to prepare healthy and nutritious cupcake remaining the beneficial proportion of black wheat flour, finger millet flour, ashwagandha powder to assess the acceptability of developed product and to find the nutritive value. Refined flour, black wheat flour, finger millet flour and ashwagandha powder were mixed in the ratio of 30:46:20:4 (T1), 20:50:25:5 (T2), 9:55:25:6 (T3) and 100% refined flour (control). Sensory analysis indicated that value added cupcake (T2) were liked very much by the panelists. The nutritional composition of the best product T2 increased with the incorporation of black wheat, finger millet, ashwagandha powder, refined flour in Cupcake the Moisture and Ash content was found to be 4.28 percent and 1.5/100g, Protein content is 14.89g, Fat-9.24g, Fibre- 2.7g and Carbohydrate- 70.69 g, Iron- 8.45 mg, Calcium- 74mg, Antioxidant- 49.37percent and Energy 420.08 (kcal). The cost of the Cupcake T0 (16.6 Rs.), T1 (22.72 Rs.), T2 (23.84 Rs.) and T3(25.02Rs.). Cupcake should be recommended for all age groups as it helps to boost immunity, maintain blood sugar level, high blood pressure. Therefore, it can be concluded that black wheat flour in combination with finger millet flour and ashwagandha powder can be successfully incorporated for the development of nutritious bakery product.

INTRODUCTION

Malnutrition is the major problem in all age group of people specially among children. It occurs due to inadequate intake of proteins, vitamins, energy and micro-nutrients, which impairs the quality of life resulting from under weight, poor health. Studies have suggested that there is a need to focus on the youngest children in nutrition programs to prevent long-term effects (Victoria *et al.*, 2008). For the fulfillment of necessary nutrient and to tackle the malnutrition and micronutrient supplementation among the all age group those are suffering from micronutrient deficiency and malnutrition related poor outcomes thus the product which were formalized to fulfil the objectives of the study must contained the ingredient like black wheat which is significantly provide essential proteins that are often lacking in vegetarians, elderly, and people in acute stress due to illness and disease. Black wheat

and black wheat products also contain many of the vitamins, minerals and nutrients that obese people need often, these individuals are eating sub-optimal diets. Improvement in the nutritional value of common wheat grains (amber) in color can address the major challenge, i.e. malnutrition.

Normal wheat with supplemental anthocyanin (a phenolic compound) content results in colored wheat (purple, blue and black) which has been developed by National Agri-food Biotechnology

Institute (NABI), Mohali, Punjab after seven years of research. It has got permission for human consumption by Food safety and standards authority of India (FSSAI) in June 2018 vides F.No.04/Std/PA/FSSAI/2018. Two types of biortified wheat namely blue and purple wheat were bred together to form black wheat. A new Black-grained wheat developed from a previously existing blue and purple line in China had high protein, total essential amino acids and total amino acids and

antioxidant than those in white wheat variety (Li *et al.*, 2003). The black wheat variety has been name 'Nabi MG' which is rich in zinc and iron content compared to normal wheat, thus indicating double bio-fortified lines which is expected to have significant effect on human health. Black wheat is a gluten free cereal which is rich in vitamin B, protein, dietary fibre and other nutrients like phosphorus, potassium, calcium, magnesium, manganese, selenium and copper (Sharma *et al.*, 2018). Black wheat have high protein content and antioxidant activity (AOA), owing to the presence of phenolic acid and vitamin C. Black wheat is a boon for people suffering from stress, as researches revealed its effectiveness to tackle stress if added in our daily diet. Presence of unsaturated fatty acid in black wheat prevent the chances of increased occurrence of diabetes and cardiovascular (hypertension, stroke, peripheral vascular disease and Coronary artery disease), cardiac diseases (Kumari and Tzudir, 2021). Millets are important crops in semiarid and tropical regions of the world due to their resistance to pests and diseases, short growing season and productivity under hardy and drought conditions when major cereals cannot be relied upon to provide sustainable yields. Furthermore, millets, as they do not contain gluten and hence are advisable for celiac patients (Chandrasekara and Shahidi, 2010). Ragi or finger millet (*Eleusine coracana* L.) is one of the common millets in several regions of India. (Sakamma *et al.*, 2018) concluded that around 4.5 million tons of finger millet are produced worldwide every year. India produces 1.2 million tons annually. Regular consumption of finger millet is known to reduce the risk of diabetes mellitus and gastrointestinal tract disorders and these properties were attributed to its high polyphenols and dietary fiber contents. Finger millets is rich in protein, iron, calcium, phosphorus, fiber and vitamin content. The fiber and calcium content is higher than all cereals and iodine content is said to be highest among all the food grains. Administration of *Withania somnifera* was found to increase the total number of white blood cells and bone marrow cells, as well as to increase the titre of circulating antibodies and antibody-producing cells and to stimulate the production of immune cells and the phagocytosis of macrophages.

MATERIALS AND METHODS

The study entitled was "Utilization of white wheat

flour, Black wheat flour, Finger millet flour, Ashwagandha powder for the development of Cupcakes" conducted in the Nutrition Research Laboratory, Department of Food Nutrition and Public Health, Ethelind College of Home Science, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj-211 007, U.P. India. The raw materials for the development of food products like black wheat, white wheat, finger millet, ashwagandha were purchased from the local markets of Prayagraj.

Development of the value added products

Value added food product were prepared with incorporation of Black wheat flour, finger millet flour, ashwagandha powder and white wheat flour. For each product, the basic recipe (control T0) had three variations like T1, T2, T3 respectively, where the amount of one or more ingredients was varied.

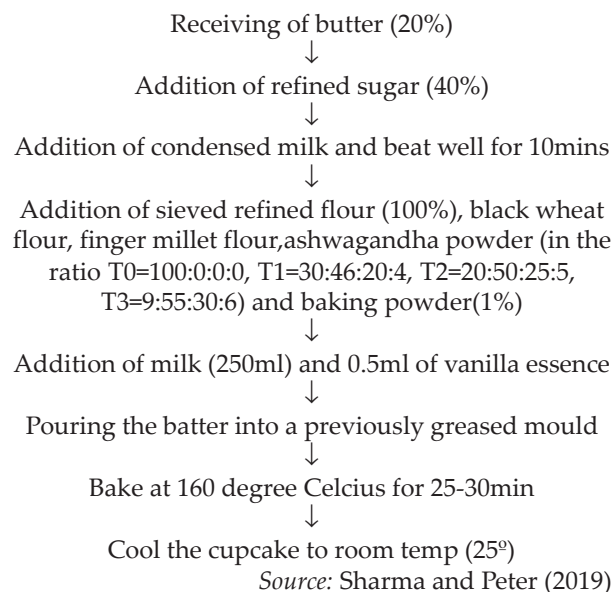
Treatment combination

Cupcakes were prepared by using refined flour, black wheat flour, finger millet flour and ashwagandha powder in ratio of 100:0:0:0 (control), 30:46:20:4 (T1), 20:50:25:5 (T2) and 9:55:30:6 (T3).

Preparation of Cupcake

Cupcake prepared by using different ratios of nutritive value.

Sensory evaluation: Sensory evaluation of the food products for their acceptability was done by a panel of 5 judges. The score card based on the 9 point Hedonic Scale was used for sensory evaluation on



the basis of evaluation of attributes like Colour and Appearance, Body and Texture, Taste and Flavour, overall Acceptability (Srilakshami, 2007).

Chemical analysis:- Proximate composition viz. moisture, ash, crude protein, crude fat, crude fiber, was analyzed by standard methods (AOAC,2007). The moisture content of raw and processed leaves was determined by drying the samples in a Hot air oven at 105 °C. Total Ash content was estimated using a muffle furnace. Protein was calculated by Lowry's Method. Crude fat was extracted with petroleum ether, using a continuous extractor (Soxhlet Method) and for fibre, acid-alkali washing was given (Extraction Method). The available carbohydrates were calculated by adding the value of moisture, crude protein, crude fat, fibre, and ash which was then subtracted from 100 (Calculation Method). Gross energy was computed with the help of the formula [Gross Energy (Crude protein × 4) + (Crude fat × 9) + (Carbohydrate × 4)]. Calcium was determined by Titration Method and iron was determined by the colorimetric method. Antioxidant Activity of the developed food products was done by the DPPH (2,2- diphenyl-1-picrylhydrazyl) Method.

Determination of cost

Cost of the prepared products were calculated taking into account the cost of individual raw

ingredients used in the preparation of the food products at the prevailing market price.

Statistical analysis

Analysis of variance technique (ANOVA), and Critical difference were used to analyze the data.

RESULTS AND DISCUSSION

Organoleptic evaluation of prepared product 'Cupcake'

Products were prepared by the incorporation of wheat flour, black wheat flour, finger millet flour and ashwagandha powder. The basic recipe of Cupcake with the incorporation black wheat flour, finger millet flour and ashwagandha powder as a control. Cupcake with the three treatments of each product i.e., T1 refined flour, black wheat flour, finger millet flour and ashwagandha powder (in ratio of 26:46:20:4), T2 (refined flour, black wheat flour, finger millet flour and ashwagandha powder (in ratio of 20:50:25:5), refined flour, black wheat flour, finger millet flour and ashwagandha powder (in ratio 9:55:30:6)). The organoleptic evaluation of products with regard to attributes of colour, body and texture, flavor, taste and overall acceptability were done using a nine point hedonic scale. The most acceptable treatment was T2 for colour and

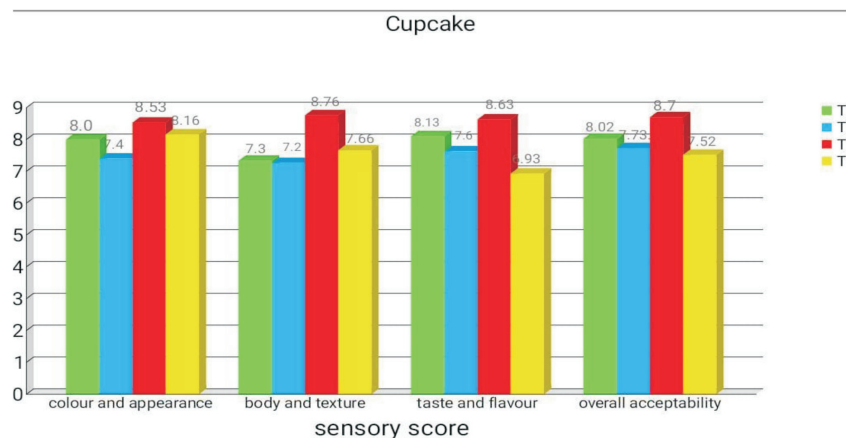


Fig. Average sensory score for different attributes of "Cupcake"

Table 1. Preparation of cupcake by using of black wheat flour, finger millet flour and ashwagandha powder

Treatment	Refined flour	Black wheat flour	Ragi flour	Ashwagandha powder
T ₀	100g	-	-	-
T ₁	30	46	20	4
T ₂	20	50	25	5
T ₃	9	55	30	6

Table 2. The average nutritional composition of control and the best treatment samples of Cupcake

Nutrients	Control (T0)	Treatment (T2)	(T0-T2)	T. cal
Moisture (g)	4.28	3.2	1.08	22.06
Ash(g)	0.84	1.5	0.66	27.37
Protein (g)	3.04	14.89	11.85	66.06
Fat(g)	20	8.64	11.36	28.90
Energy (kcal)	483.84	420.08	63.76	7.79
Carbohydrate (g)	72.92	70.69	2.23	42.49
Calcium (mg)	22	74	52	7.60
Iron (mg)	3.93	8.45	4.52	65.70
Crude fiber (g)	0.35	2.7	2.35	51.37
Antioxidant (DPPH) %	22.72	49.37	26.65	73.96

t(tabulated) value at 5% = 4.303, Result = satisfactory



Plate 1. Cupcake prepared by incorporating Black wheat flour, Finger millet flour and Ashwagandha powder

appearance (50% incorporation level of black wheat flour, 25% incorporation level of ragi, 20% refined flour, 5% ashwagandha powder) as compare to T0, T1, T3. T2 got highest score for body and texture which contained 50% percent black wheat flour, 25% incorporation level of ragi, 20% refined flour, 5% ashwagandha powder followed by T0, T1, T3. T2 got highest score for flavor and taste which contained 50% black wheat flour, 25% incorporation level of ragi, 20% refined flour, 5% ashwagandha powder followed by T0, T1, T3. T2 got highest score for overall acceptability which contained 50% percent black wheat flour, 25% incorporation level of ragi, 20% refined flour, 5% ashwagandha powder followed by T0, T1, T3. Sharma *et al.*, (2018) reported that as the proportion of black wheat flour increases in flour blends, it results in darkening of the chapati which ultimately affected the sensory scores for colour and appearance.

Nutritional composition of Developed product 'Cupcake'

Table 2 demonstrates the differences between the control and the best treatment sample i.e., the moisture content of the developed product decreases as a result of incorporating Black wheat flour, Finger millet flour, Ashwagandha powder and

refined flour. On the other hand, the ash, protein, calcium, iron and crude fiber content increase due to the inclusion of black wheat flour, which are a good source of these nutrients. The carbohydrate content of T2 decreases due to the addition of black wheat flour, ashwagandha powder, finger millet flour, which has a lower carbohydrate content. However, the energy, iron, calcium, and antioxidant properties increase as a result of a higher level of incorporation of Black wheat flour, Finger millet flour and Ashwagandha powder. The result is supported by finding of Sharma and yamer (2022) that intend to develop nutritionally enrich crackers with ragi flour. Result show that finger millet rich crackers recorder energy (451.5kcal), carbohydrate (76.6g), protein (11.3g), fat (12g), fiber (2.5g), calcium (194.3g), Therefore, it can be concluded that cookies developed from the enrichment of garden cress seeds has acceptable sensory attributes and improved nutritional content in terms of dietary fiber, calcium and PUFA. The result is supported by the findings of (Alejandra *et al.*, 2019). It is feasible to formulate cupcakes with moringa leaf powder, increasing their antioxidant capacity and protein content. However, more studies should be carried out in order to improve their aspect, flavor and aroma since tasters penalized these attributes as the

moringa concentration increased.

Cost of the prepared product 'Cupcake'

Cost of the prepared products were calculated taking into account the cost of individual raw ingredients used in the preparation of the food products at the prevailing market price. The cost of the Cupcake T0 (16.6 Rs.), T1 (22.72 Rs.), T2 (23.84 Rs.) and T3(25.02Rs.) because ratio of ingredients is high in T3 as compare to T0, T1 and T2.

CONCLUSION

It is concluded that millet like black wheat flour could be successfully incorporated in refined flour, finger millet and ashwagandha powder to enhance the nutritive value of value added cupcake. Among the experimental treatments, the treatment incorporated with 25%, finger millet flour, 50% black wheat flour, 20% refined flour, 5% ashwagandha powder T2 was the most acceptable for all the four products namely cupcake. The incorporation levels of black wheat flour, finger millet flour, ashwagandha powder increased the cost but it is comparatively cheaper than the control even through it was marginal. Cupcake can be recommended for the overall development of the malnourished children who are suffering from severe stunting and wasting growth defects in their physical and mental growth stage.

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