

Standardization and Nutritional Evaluation of Health Bar

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ABSTRACT

Overweight and obese children under age of five increasing among well to do families due to more consumption of fast food and are at high risk to develop diabetes and cardiovascular diseases. Bakery products are ready to eat food and could easily be modified. Cookies with balanced nutrients are fed to children as mid-day meal in some western countries. Thus study was planned with a view to develop standardized process for health bar (HB) using various ingredients. For that, process and formula was standardized using nine point hedonic scale followed by composite scoring test. Comparison of nutrient and cost was also carried out. A formula could be standardized using twenty one raw ingredients. Fat, saturated fat, MUFA, PUFA, Trans fat, cholesterol, carbohydrate, calorie and sodium content decreased while protein, ash and iron content increased in HB as compared to control bar (CB). Thus the HB might be more beneficial in hypercholesterolemia, stroke, heart attack and also helpful in bone calcification, hemoglobin formation as compared to commercial products. Cost price of the HB is higher than control bar. The HB could be sold out easily at a very high premium among higher income group people. That would help to improve nutritional status particularly of their children. Thus it can conclude that, a health benefited product could be developed.

Keywords : Health bar, Cookies, Bakery products, Children

INTRODUCTION

Globally, in 2010 the number of overweight children under the age of five is estimated to be over 42 million. Close to 35 million of these are living in developing countries like India. The main cause is increasing use of fast food due to westernization. The situation is more likely among children of well to do families. Overweight and obese children are likely to stay obese into adulthood and more likely to develop noncommunicable diseases like diabetes and cardiovascular diseases at a younger age. These diseases are largely preventable through balance diet and replacing the junk food (WHO 2011).

Bakery products are ready to eat food and could easily be modified (Kamaliya and Rema, 2003). Inclusion of many sources of food ingredients produce product with more balance nutrients. Various workers tried to incorporate different raw materials to make it healthier (Rao 1993, Marques et al. 2000, Smith et al. 1982). Different types of cookies are popular among all cross section of population particularly among children. Cookies with balanced nutrients

are fed to children as mid-day meal in some western countries.

Keeping this point in mind this study was planned with a view to develop standardized process for HB using various ingredients so as to contained more or less all the nutrient. That would serve three purposes i.e. provide healthy food to the community, add variety to bakery product, could be replaced the calorie dense cookies particularly among the children of well to do families.

OBJECTIVES

- (i) To investigate the possibility of developing nutritionally balanced cookies, i.e. health bar, using various food ingredients.
- (ii) To standardize the process parameters of health bar based on sensory and physical properties.
- (iii) To analyse the nutritional composition of the developed product.

METHODOLOGY

The good quality raw materials were purchased from standard shops of the local market of (India). That was checked for quality and cleaned using sensory organs, kept in air tight containers and used as and when needed. Control bar was prepared using commercial formula as recorded by Kamaliya and Kamaliya (2001). Process standardization with variation in mixing different ingredients, baking time and temperature, thickness and size for the experimental bar was carried out. Followed by formula standardization. That was carried out through sensory evaluation using nine-point hedonic scale for preliminary selection. The final standardization of HB was carried out using a composite scoring test. The formula used was prepared on the basis of the formula prescribed by Central Food Technological Research Institute (CFTRI).

Health bar was prepared in three replications using different levels of major raw ingredients and the comments received from the judges i.e. oat flour (OF), barley flour (BF), wheat flour (WF), ratio of OF and BF (main ingredients), raisins and honey (for sweetness), butter and oil (to improve oily taste), cinnamon (to minimize specific strong taste). The level of raw ingredient selected in such a way that the level found accepted during preliminary trials remains some were in middle.

A sensory evaluation was carried out on the next day by a judging panel constituted with five panelists from among the faculties of the School of Baking, Polytechnic in Food Science and Home Economics, College of Food Processing Technology as well as Dairy science. The evaluation carried out in day light illumination in a separate cabin provided for that purpose. The scores recorded by the judges in the score card provided to them. The panelists evaluated volume, crust colour and surface character, crumb colour, crumb texture, taste and aroma, mouth feel and overall acceptability. The developed product which scored the highest was considered as the 'experimental product' and was used for nutritional analysis.

Control Bar and selected HB were analysed for various nutrients using standard techniques into three replications. The economic analysis was carried out as per the procedure followed in the School of Baking. The production cost of bar was calculated by adding 50% of basic cost as overhead charges. All the data were tested for significance using the SPSS programme for ANOVA (Steel and Torry,

1960).

RESULTS AND DISCUSSION

The final process for HB preparation was standardized. The OF, WF and date were crushed into mixer. Barley flour, apricot, dry apple and raisins crushed separately. Almonds, cashew nuts, walnuts and watermelon seeds were broken down to small pieces. All three parts added into bowl. To that coconut powder, gingelly seeds and flax seeds were added. Finally cinnamon powder, salt, sodium bicarbonate and ammonium bicarbonate were added. Then liquid ingredients i.e. oil and butter were added and mixed into smooth dough. The dough was transferred into greased baking tray, pressed or rolled out into 10 mm thickness. Cut into rectangular shape like bar having 100 mm length and 25 mm width. Baked at 130°C temperature for 25 minutes. Allowed to cool slightly and transferred on cooling rack. The cooled bar packed in aluminum foil and stored at ambient room temperature till evaluated.

The results obtained using different levels of raw ingredients during preliminary trials indicated that main ingredients OF, BF and WF as well as raisins and honey at 10%, while butter and oil at 5% and Cinnamon at 1% found acceptable. Thus the main ingredients OF, BF, WF, raisins and honey were incorporated at 0, 5, 10, 15 and 20 % levels, butter and oil at 0, 2.5, 5, 7.5, and 10 % and cinnamon at 0, 0.5, 1, 1.5 and 2% levels in the formula and evaluated for sensory acceptability. Later on OF and BF in the ratio (0+20%, 5+15%, 10+10%, 15+5%, 20+0%) were incorporated in the formula and evaluated for sensory characteristics.

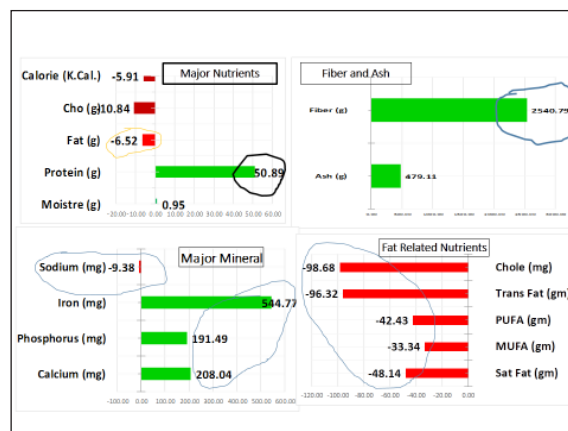
It was found that the HB prepared using different levels of any of the raw ingredient had no significant difference. The difference in sensory score among various levels of incorporation was very less. None of the experimental product produced scored below five, i.e. neither like nor dislike, for any of the characteristics. The range of ingredient incorporation in the formula was decided on the basis of primary selection carried out on nine point hedonic scale followed to preliminary trials might be the reasons for the similarity in the results. During both the techniques almost the best selection was taken place. The product scored the highest in the sensory characteristics considered as the standard formula. The final formula adopted is depicted as Table 1.

Table 1 : Standardized formula for health bar

Sr. No.	Ingredients	Per cent
1	Oats flour	10.0
2	Barley flour	10.0
3	Whole wheat flour	5.0
4	Dry apple	5.0
5	Raisins	10.0
6	Dates	10.0
7	Apricots	5.0
8	Almonds	3.0
9	Cashew nut	3.0
10	Walnuts	3.0
11	Coconut powder	3.0
12	Gingelly seeds	3.0
13	Watermelon seeds	3.0
14	Flax seeds	3.0
15	Cinnamon powder	1.0
16	Honey	12.5
17	Butter	5.0
18	Oil	5.0
19	Salt	0.1
20	Sodium bicarbonate	0.2
21	Ammonium bicarbonate	0.2
12	Gingelly seeds	3.0
13	Watermelon seeds	3.0
14	Flax seeds	3.0
15	Cinnamon powder	1.0
16	Honey	12.5
17	Butter	5.0
18	Oil	5.0
19	Salt	0.1
20	Sodium bicarbonate	0.2
21	Ammonium bicarbonate	0.2

Table 2 :Nutritional composition of control and health bar and their difference

Nutrient	Control Bar	Health Bar	% Change
Moister (g)	11.34 ± 0.26	11.45 ± 0.45	0.95
Protein (g)	5.49 ± 0.21	8.28 ± 0.42	50.89
Total Fat (g)	23.78 ± 0.65	22.23 ± 0.45	[-6.52]
Carbohy drate (g)	58.93 ± 1.15	52.54 ± 1.37	[-10.84]
Calorie (K. Cal.)	471.61 ± 16.04	443.72 ± 10.87	[-5.91]
Dietary Fiber (g)	0.14 ± 0.02	3.61 ± 0.29	2540.79
Ash (g)	0.33 ± 0.02	1.89 ± 0.07	479.11
Saturated Fat (%)	9.92 ± 0.48	5.15 ± 0.04	[-48.08]
MUFA (%)	8.81 ± 0.34	5.87 ± 0.45	[-33.37]
PUFA (%)	8.69 ± 0.64	5.01 ± 0.37	[-42.35]
Trans Fat (%)	4.22 ± 0.28	0.16 ± 0.02	[-96.21]
Cholesterol (mg)	11.33 ± 0.39	0.15 ± 0.01	[-98.68]
Calcium (mg)	38.99 ± 0.07	120.10 ± 6.27	208.04
Phosphorus (mg)	72.73 ± 1.07	211.99 ± 11.11	191.49
Iron (mg)	1.28 ± 0.07	8.25 ± 0.45	544.77
Sodium (mg)	105.85 ± 0.52	95.92 ± 2.84	[-9.38]



Graph 1 : Percent change in nutritional composition of CB and HB

The nutritional value for proximate composition, fat-associated nutrients and selected minerals obtained for both CB and selected HB were indicated in Table 2. The difference in the nutritional value as percent change were calculated and indicated in the same table.

Mean of three replication \pm SEM

Table 2 shows that, fat and associated nutrients like saturated fat, MUFA, PUFA, Trans fat, and cholesterol as well as carbohydrate, calorie and sodium content decreased in developed product and thus it might be beneficial in hypercholesterolemia, stroke, heart attack as compared to commercial products. Protein, ash and major mineral content increased thus found more useful in bone calcification, hemoglobin information as compared to commercial product. Thus it could be concluded that a health benefited product could be developed.

Cost price of the HB is higher than CB. The cost of ingredients used for the preparation of HB is quite high than used for CB. However, as per objective of the study the HB is developed targeting high society and therefore it could be sold out easily at a very high premium.

Conclusion :The good nutrients were increased while bad nutrients decreased in large quantity i.e. a health benefited product could be developed. This may be used as mid-day school meal or replaced presently consumed cookies

or biscuits particularly among children of well to do families. That might be useful to prevent them becoming obese and may save from lifestyle diseases.

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