ORIGINAL RESEARCH PAPER

Volume-7 | Issue-3 | March-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

DEVELOPMENT, CHARACTERIZATION AND OPTIMIZATION OF CEREAL, LEGUME AND MILLET INCORPORATED NUTRI-BAR AND ITS STORAGE STUDIES.

Home Science

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ABSTRACT

Incorporation of Different types of material such as cereal, legume and millet for the preparation of nutri-bar as main component for development of nutri-bar to reach maximum nutrition for malnourished population. Preparation such as whole wheat flour (WWF) Green Gram Flour (GGF) and Foxtail millet flour were added in different ratio for increasing of mineral content added Tulsi leaves, curry leaves and drumstick leaves and did proximate sensory analysis. The result showed that Carbohydrate (29%), Protein (18%), Fat (40%), Crude fibre (5%), Ash (4%), Moisture (4%) content was found with good sensory property. Hence nutri-bar which was prepared best suitable for sports as well as nutrition deficient populations.

KEYWORDS

Whole wheat flour, Green gram flour, Foxtail millet flour, Drumstick leaves powder (*Moringa Oleifera*), Tulsi leaves powder (*Ocimum Sanctum Linn*), Curry leaves powder (*Murraya Koenigii*), Groundnuts.

INTRODUCTION

Nutri-Composite Bar, a convenient and healthy Ready-To-Eat food which supplies balance, nutrients (Protein, fat, mineral, vitamins, calories & carbohydrate) and to abate hunger (King,2006; Ryland etal,2011; wyatt,2011) is continue to increase sales.

Nutri-composite bar initially marketed to athletes as a source of energy. However,the growing luxury groups and health-conscious consumers had increased the sales performance of snack bar (Wyatt, 2011; Euramonitor International, 2015) Due to the growing consumer demand for natural, convenient and nutritious food products ,there is a need to modify incorporate and improve the nutritive composition of Nutri-Bar for health benefits.

Millet are recommended for well being of infants, lactating mother, elderly and convalescents with high fiber and protein content, millets are preferred as dietary foods for people with diabetes and cardiovascular diseases (Mutnamilarasan et al.,2016)

Foxtail millet contains a high amount of protein (11%), and fat (4%). The protein fractions are represented by albumins an globulins (13%), prolamins (39.4%) and glutelins (9.9%). It is thus recommended as an ideal food for diabetics. It also contains significant amount of potential antioxidants like phenols, phenolic acids and carotenoids (salhetal, 2013; zhang and liu, 2015)

Curry leaves is also called as *Murraya Koenigii* and belonging to family *Rutaceae*. This leaves has been reported to have anti-oxidative, cytotoxic, antimicrobial, anti-bacterial, anti-ulcer, positive isotropic and cholesterol reducing activities.It consist of phyto constituents such as coumarin glycoside, phosphorous, calcium, iron, thiamine (Goutam MP,Purohit Rmurraya (1974)).

Drumstick leaves consis of calcium, protein, potassium, iron. It is sustainable remedy for malnutrition. Moringa is rich in phytosterols like stigmaserol, sistosterol and kampesterol which are precursors for hormones. Phytochemicals such as Tannins, Sterols, Terpenoids, Flavonoids, Saponins, Anthraquionones alkaloids and reducing sugar present along with anti-cancerous agents like Glucosinolates, Isothiocynates, Glycoside compounds and Glycerol 1-9- octadeca noate. (Lakshmipriya Gopalkrishna etc (2016))

Tulsi leaves have the antioxidant properties such as circilineol, circimartin, isothymusin, apigenin and rosameric acid. (Sunita Verma(2016))

In our nutri-bar with cereal, legume & millet we have also added curry leaves (Murraya Koenigii), tulsi leaves (Ocimum sanctum), drumstick leaves(Moringa oleifera).

MATERIALS & METHODS

Selection of Ingredients for Development of Nutri-bar

Whole wheat flour (WWF), Green gram flour(GGF), Foxtail millet , groundnut, drumstickleaves, curryleaves , tulsi leaves, jaggery, ghee, cardamomwere bought from local market Murbad, Thane India. Analysis was carried out in Department of Food Technology in College of Food Technology, Saralgaon, Murbad.

Preparation of raw material

The whole wheat grain & green gram were grind and flour made into flour. Foxtail millet was coarsely grinded in mixer and husk was separated. Then all the ingredients were roasted separately. Cardamom seed powder was prepared and the leaves were (tulsi , curry, drumstick leaves dried in drier for 4 hours and made into the powder.

The whole wheat flour, green gram flour, foxtail millet, groundnut, drumstickleaves, curryleaves , tulsi leaves, cardamom powder is mixed properly in bowl. Then ghee is added in the pan after melting the ingredients are mixed in the bowl and roasted. Add crushed jaggery into it and mix properly till the mixture become thick. After that on the plate apply the ghee and grease it and put the mixture on it and keep it for set in room temperature and cut into desired pieces with the help of moulder.

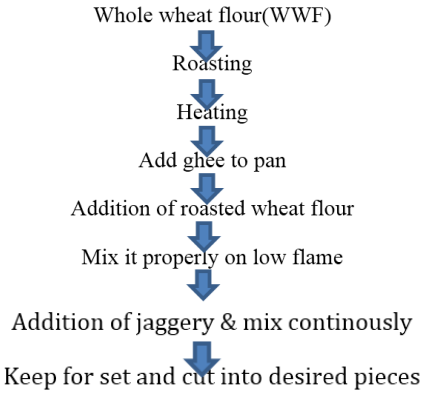
Table 1: Formula for preparation of nutri-composite bar

Ingredients	T_0(gm)	T_1(gm)	T_2(gm)	T_3(gm)	T_4(gm)
Wheat flour	100	30	20	30	20
Green Gram Flour	-	30	30	30	40
Foxtail Millet	-	20	30	30	20
Groundnut	-	20	20	10	20
Ghee	40	40	40	40	40
Jaggery	80	80	80	80	80
Cardamom Powder	5	5	5	5	5
LEAVES: Drumstick	4	4	4	4	4
Tulsi	4	4	4	4	4
Curry	2	2	2	2	2

T1- with addition of 30gm wheat flour, 30gm green gram flour 20gm foxtail millet, 20gm groundnut

T2- with addition of 20gm wheat flour, 30gm green gram flour 30gm foxtail millet, 20gm groundnut.
T3- with addition of 30gm wheat flour, 30gm green gram flour 30gm foxtail millet, 10gm groundnut.
T4- with addition of 20gm wheat flour, 40gm green gram flour 20gm foxtail millet, 20gm groundnut.

(1) Preparation of nutri-composite bar:
Flowchart 1: Preparation of T0 (Control



Flowchart 2: Preparation of T4

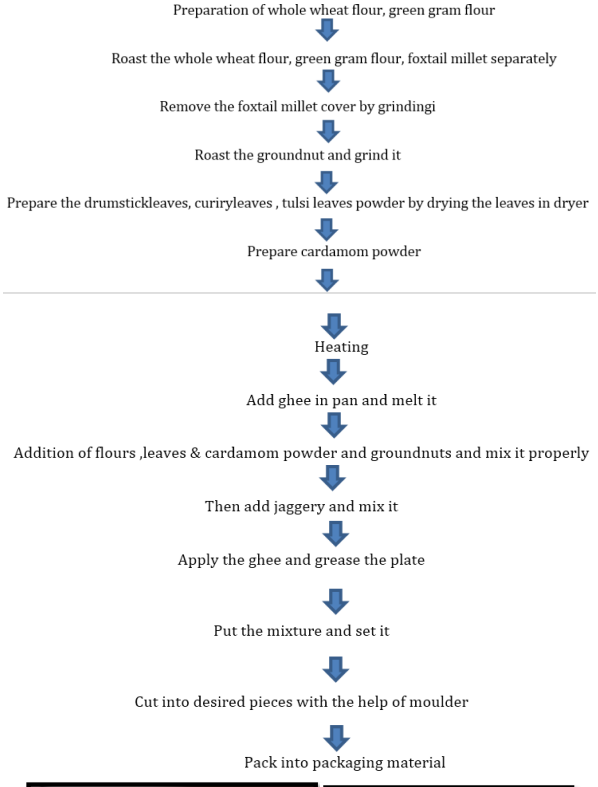


Fig 1: Prepared Nutri-Bar

Fig 2: Packaging of Nutri-Bar

Proximate analysis
The nutri-composite bar were analyzed in protein, ash, fat, crude fiber, moisture, carbohydrate, calcium (AOAC, 2002).

Sensory evaluation
The organoleptic evaluation is respect of colour, taste, flavour, texture, overall acceptability was evaluated by trained/semi-trained judges using 9 point hedonic scale (amerine et al.,1965).

RESULTS AND DISCUSSION

Proximate composition of Nutri-Bar
Nutri-bar showed best nutritional parameters moisture (4%), ash (4%), crude fiber (5%), Fat (40%), carbohydrates (29%) and calcium (15%).

Table 4: Chemical composition of nutri-composite bar

Composition	Dry weight basis (%)	
Moisture	4%	±0.70
Ash	4%	±0.70
Crude fiber	5%	±0.70
Fat	40%	±3.53
Carbohydrate	29%	±1.41
Protein	18%	±0.70
Calcium	15%	±0.70

Table 2: Score of organoleptic evaluation of nutri-composite bar

Parameters	T_0		T_1		T_2		T_3		T_4	
Colour	6.5	±0.97	7.1	±0.56	7.6	±0.51	6.2	±0.42	7.6	±0.69
Taste	6.3	±0.67	6.9	±0.56	7.8	±0.78	6.3	±0.67	8.0	±0.94
Flavour	6.6	±0.84	7.3	±0.48	7.5	±0.84	6.6	±0.84	7.9	±0.73
Texture	6.4	±0.51	6.7	±0.48	7.5	±0.84	6.4	±0.84	8.0	±0.66
Overall acceptability	6.5	±0.70	7.2	±0.54	7.6	±0.69	6.2	±0.42	8.0	±0.66

This mean value is calculated of each parameter are presented in sample. This table shows that score for samples T4 recorded highest score. This score for parameter like colour (7.6), taste(8.0), flavour(7.9), texture(8.0), overall acceptability(8.0) was found.

Table 3: Organoleptic Evaluation of Nutri-Bar Stored at Ambient Temperature (30°C)

SAMPLE	NUTRI-BAR				
STORAGE DAYS	COLOUR	TASTE	FLAVOUR	TEXTURE	OVERALL ACCEPTABILITY
0	7.6±0.69	8.0±0.94	7.9±0.66	8.0±0.73	8.0±0.66
15	8.0±0.56	7.9±0.56	7.9±0.91	7.8±0.73	7.9±0.73
30	7.3±0.67	7.2±0.42	7.0±0.67	6.7±0.47	7.1±0.73
45	6.2±0.42	6.6±0.51	6.2±0.51	6.6±0.42	6.2±0.42

Organoleptic properties at ambient temperature with different days of storage periods the results showed best overall acceptable for 0 and 15 days storage periods.

CONCLUSION

Cereal, legume millet based nutri-composite bar supplemented with specific quantity of drumstick, tulsi, curry leaves. jaggery cardamom powder is added for more beneficial. It increased in protein, CHO, and dietary fiber content. Bar produce from only wheat flour produced a poor quality of taste, flavour and colour. When nutri-bar fortified with the mix flour of green gram, foxtail millet and groundnut and other dry leaves increased the result of quality of the product, sensory and organoleptic analysis.

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