

Physicochemical Evaluation of Flaxseed-Date Bar

Maimuna Sultana Mohd. Ateequddin*, M. P. Ingle**

(*Department of Agricultural Engineering, Maharashtra Institute Technology, Aurangabad,-431010 (MS) India)

(**Department of Agricultural Engineering, Maharashtra Institute Technology, Aurangabad,-431010 (MS) India)

ABSTRACT

The objective of this study was to develop a flaxseed-date-bar fortified high level of dietary fibre by using functional ingredients. Formulations were developed containing 0, 5, 10, 15 and 20 grams of flaxseed flour. Flaxseed- date bar were evaluated for their, Physic-chemical properties. In the physical evaluation of bar it was found that flaxseed flour increase the hardness from 1076.82g to 1403.12g. The results revealed that the bar containing nuts and oilseeds shows maximum protein content (10.09 percent), dietary fibre content (9.89 percent), and ash content(2.90 percent) was found in flaxseed-date bar. The gross energy of the flaxseed-date bar was in the range of 353.75 kcal to 377.08 kcal .The maximum gross energy was recorded by following sample A₄ were as the minimum was obtained by A₀. The result revealed that flaxseed-dates along with nuts can be useful to prepare flaxseed-date bars of good sensory and nutritional value which provide substantial amount of carbohydrates, proteins, fats and dietary fibre.

Key words: Flaxseed, dates, bar, physical, chemical properties.

I. INTRODUCTION

Consumers demand and desire the health foods, which are portable, convenient and proportioned as well. Often, many options aren't available that are minimally processed, rich in nutrients and tastes good [1]. The food bars are snacks of good sensory and nutritional characteristics due to their high carbohydrates, proteins, lipids, and minerals contents [2].

Flaxseed is being used extensively for the development of functional foods. The components of flaxseed, identified to exhibit the health benefits are fibre, lignans and linolenic acid (Omega-3 fatty acid). Moreover, flaxseed is a good source of high quality protein, soluble fibres and phenolic compounds [3]. The flaxseed protein has been found to be effective in lowering plasma cholesterol and triacylglycerides. Flaxseed fibre, both soluble and insoluble is considered to reduce the blood glucose and cholesterol levels [1]. Flax seed contains polyunsaturated fatty acids in high rates, saturated fatty acid in low rates, fibre in low rates with plenty of potassium, and small amounts of magnesium, iron, copper, zinc and various vitamins [4]. Recently, flaxseed has shown potential for CVD prevention due to its composition of ALA, soluble fibres, and lignans. These components are believed to protect the cardiovascular system by reducing serum cholesterol, platelet aggregation and inflammatory markers [5].

Date fruits are still considered by many people in this part of the world as a staple food. Date palm is a good source of energy, vitamins, and a group of elements like phosphorus, iron, potassium and a significant amount of calcium [6]. Dates are very healthful and nutritious fruit which are rich in

carbohydrates (70-80%) and the array of other nutrients. Carbohydrates in dates are mostly in the form of fructose and glucose and are easily absorbed by the body [7]. Moreover, date fruits contain fat (0.20-0.50%), protein (2.30- 5.60%), dietary fibre (6.40-11.50%), minerals (0.10-916 mg/100 g dry weight), and vitamins (C, B₁, B₂, B₃, and A) with very little or no starch [8]. Date fruit is also a good source of important phytochemicals, including carotenoids, phenolics, and flavonoids. Date fruit can not only provide antioxidant, antimutagenic, and immunomodulatory benefits to health but also has diverse medicinal values, including antihyperlipidemic, anticancer, gastroprotective, hepatoprotective, and nephroprotective properties [9].

II. MATERIALS AND METHODS

2.1 Procurement of Raw Material

Dates and flaxseed, other ingredients used in the preparation of bar included, Nuts (almonds and cashew nuts), sesame seeds, vegetable hydrogenated fat, aluminium foil, and Low Density Polyethylene etc, were procured from local market of Aurangabad.

2.2 Pre-treatment of raw materials

Dates were pitted. Pitted dates are cutted into 6-8 pieces and steamed for three minutes by placing them on live steam to make them free from microbes and softening purpose. Almonds and cashew nuts are crushed to form grits and roasted for minute. Roasted flax seed is ground to form powder.

2.3 Preparation of Flaxseed-Date Bars

Dates and flaxseed were blended in five different proportions (table1) with uniform mixing.

Other ingredients (almonds, cashew nuts, sesame seeds, hydrogenated fat) were added to the blend and mixed thoroughly. After mixing, the blend was converted into sheet of 1.5 cm thickness on stainless steel table with rolling pin. Flaxseed-date bars (1.5x7cm) were cut with the help of stainless steel cutting blades which were adjusted to 1.5cm width

and 7cm in length. The thickness of bars was adjusted by moving up and down stainless steel strips frame. Each bar of 25g was packed individually in aluminium foil (primary) and (secondary) packaging was done in Low Density Polyethylene and stored at ambient temperature.

Table 1 Recipe for formulation of Bar

Ingredients	F o r m u l a t i o n				
(g) ¹	A 0	A 1	A 2	A 3	A 4
D a t e s	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
Flaxseed flour	0	5	1 0	1 5	2 0
A l m o n d s	7 . 5	7 . 5	7 . 5	7 . 5	7 . 5
C a s h e w n u t s	7 . 5	7 . 5	7 . 5	7 . 5	7 . 5
S e s a m e s e e d s	5	5	5	5	5
Hydrogenated Fat	5	5	5	5	5

2.4 Physical Analysis of Bar

2.4.1 Texture analysis of bar

Texture of bars was determined according to [7], with certain modifications by using a texture analyzer (Mod. CT3 Stable Microsystems, Surrey, UK) with a 10 kg load cell. Textural determinations were made by using three point bend rig probe for bend test. The bars were bended to determine structural characteristics present inside or on the surface.

Samples for bend test were placed centrally on heavy duty plate form under three point bend rig probe. Both the load cell and probe were calibrated before test. Hardness measurement of bars by bending involved plotting force (g) versus time (sec). The maximum force (g) was used as an index of hardness for the bend test as shown in (table 2).

Table 2 CT3 settings for comparison of hardness of bars by bend test with 3 points bend rig.

P a r a m e t e r s	V a l u e
P r e - t e s t s p e e d	2 . 0 m m / s
T e s t s p e e d	1 . 0 m m / s
P o s t - t e s t s p e e d	1 0 . 0 m m / s
D i s t a n c e	5 . 0 m m
T r i g g e r t y p e	A u t o

2.5 Proximate Composition of Bars

The chemical analysis of fortified bars i.e moisture content, fat content, protein content, ash, crude fibre content, and carbohydrate was carried out by A.O.A.C [10] method.

2.6 Gross energy value

The gross energy of the flaxseed-date-bars was calculated using standard factors for energy in the form of kcal/g as 4, 9 and 3.75 kcal/g for protein, lipid and carbohydrate, respectively. The energy contents were summed up to give total or gross energy [10].

Texture parameters i.e. hardness (the force required to disintegrate sample when placed on 3 point bend rig) were studied. The data (Table 3) showed that addition of flaxseed flour had significant effect on texture of bars. Similar trend was observed by [11] that as the level of apricot paste increases the level of hardness also increases and ranged from 742.12g to 436.47g. Maximum value of hardness was observed in flaxseed flour bar such as A₄ (1403.12g) and minimum in A₀ (1076.82g).

Table 3 Texture Analysis of Bar

Treatment	Hardness (g)
A ₀	1 0 7 6 . 8 2
A ₁	1 1 2 5 . 7 6
A ₂	1 2 1 2 . 4 4
A ₃	1 3 3 0 . 7 2
A ₄	1 4 0 3 . 1 2

III. RESULT AND DISCUSSION

3.1 Physical Analysis of Bar

3.1.1 Texture Analysis of Bar Texture is another most important property which determines the overall quality and consumer acceptability of a food product.

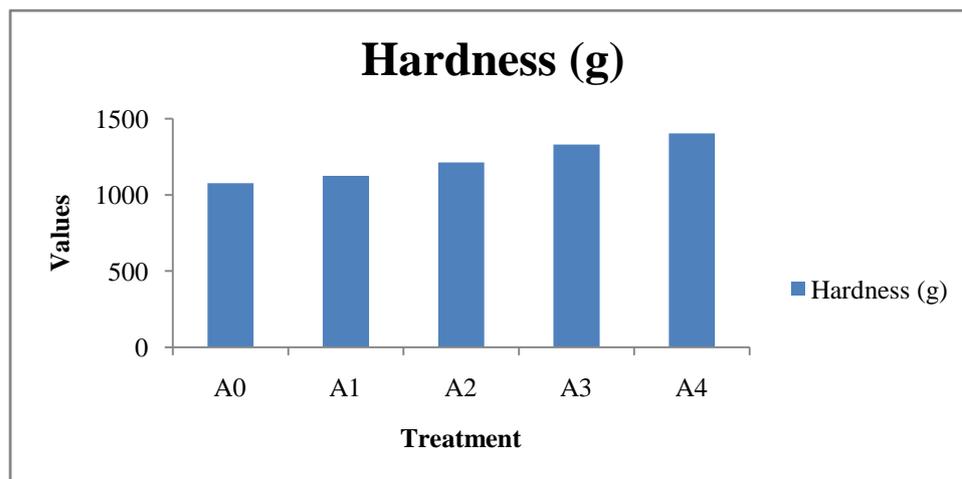


Fig. 1 Texture Analysis of Bar

A₀ - 0% flaxseed flour, A₁ -5% flaxseed flour , A₂ - 10% flaxseed flour, A₃ - 15% flaxseed flour, and A₄ - 20 % flaxseed flour.

3.2 Proximate Composition of Bars

Mean value for proximate composition of Flax-Date Bar

Treatment	A ₀	A ₁	A ₂	A ₃	A ₄
Moisture	14.61	12.35	11.67	10.77	10.54
Fat	12.48	13.52	14.64	15.64	16.58
Protein	6.32	6.76	7.22	9.63	10.09
Crude Fibre	7.00	7.69	8.45	9.42	9.89
Ash	1.95	2.08	2.19	2.69	2.90
Carbohydrate	57.64	57.6	55.83	51.85	50.00
Calories (kcal)	353.75	364.72	370.00	373.71	377.08

Table 4 Proximate Composition of Bars

The data regarding moisture contents differed significantly among different treatments (Table 4). Maximum mean value was observed in A₀ (14.61%) and minimum in A₄ (10.54%). It is evident from the results that there was a gradual decrease in moisture content with increasing concentration of flaxseed flour. These results correlate with findings of [7], who observed a decrease in moisture content (18.14 to 17.62 %) in date based fibre enriched fruit bars.

The data on crude protein and crude fat showed significant changes in the treatments. Flaxseed is rich in fat content i.e polyunsaturated fat and nuts and sesame are rich source of protein and their addition resulted in increase in protein and fat contents. Similarly, there was slightly increase in ash content as dates are rich source of minerals content of bars. Maximum values for crude fibre (9.89/100g) and ash (2.90/100g) were observed in bars containing 20g flaxseed flour (A₄) against minimum in A₀ (7.0g/100g and 1.95g/100g) on dry weight basis. Carbohydrate content of bar was significantly affected due to addition of flaxseed flour in different proportion in different treatments. Carbohydrate was

in the range of 57.64 percent in A₀ and 50.00 percent in A₄. Nitrogen free extract was non-significantly affected due to addition of dried apricot in different bars.

IV. CONCLUSION

The study demonstrated that date and flaxseed flour can be used formulate flaxseed-date bars improves protein, fibre content and polyunsaturated fatty acid reduces the risk of cardiovascular diseases and promotes health benefits of bars. Thus, from the present investigation it is clear that flaxseed flour could be successfully value added. Hence, it can be concluded that the flaxseed flour is a potential oil seed among the oilseeds with superior nutrient content, could be a worthy addition to one's daily diet. Flaxseed-dates bars can be implement on commercial scale.

References

- [1] D. Mridula, K.K Singh, P. Barnwal, Development of omega -3 rich energy bar with flaxseed, *J Food Sci Technology*, 50(5), 2013, 950-957.
- [2] B Dave Ooamah, Flaxseed as a functional food source, *J Sci Food Agric* 81, 2001, 889-894.
- [3] Mohammad SharrifMoghaddasi, Linseed and Usages in Humanlife, *Advances in EnvironmentalBiology*, 5(6), 2011, 1380-1392.
- [4] Bloedon, L.T, Szapary P. O, Flaxseed and cardiovascular risk, *Nutrition Reviews*, 62(1), 2004, 18-27.
- [5] F. Shahdadi, H. O. Mirzaei, A. Daraei Garmakhany, Study of phenolic compound and antioxidant activity of date fruit as a function of ripening stages and drying process, *J Food Sci Technol*, 2013.
- [6] B. Shaheen, M. Nadeem, T. Kauser, G. Mueen-ud-Din and S. Mahmood, Preparation and Nutritional Evaluation of Date Based Fiber Enriched Fruit Bars, *Pakistan Journal of Nutrition* 12(12), 2013, 1061-1065.
- [7] Walid Al-Shahib, Richard J. Marshall, The fruit of the date palm: Its possible use as the best food for the future, *International Journal of Food Sciences and Nutrition*, Volume 54, Number 4 2003, July 247 -259.
- [8] Rania M. A. Mohamed, Aisha S. M. Fageer, Mohamed M. Eltayeb, Isam A. Mohamed Ahmed, Chemical composition, antioxidant capacity, and mineral extractability of Sudanese date palm (*Phoenix dactylifera* L.) fruits, *Food Science & Nutrition*; 2(5), 2014 478-489.
- [9] A. O. A. C. Official Method of Analysis 15thEdition, Association of Official Analytical Chemists Washington, D. U.S.A (1990).
- [10] S. M. Zahra, M. Nadeem, S. Hussain, T.M. Qureshi Ahmed Din, F. Rashid, Development and Evaluation of Nutri-bars for Internally Displaced People in Humanitarian Emergencies, *J. Agric. Res.*, 52(2) 2014.