

RESEARCH NOTE

Development of Novel Chocolate Energy Bar by using Nuts

Mayur Chandegara*¹, Bandana Chatterjee² and Neha Sewani³

¹Research & Development, Flourish Purefoods Pvt. Ltd., Ahmedabad-380009, India

²Research & Development, Flourish Purefoods Pvt. Ltd., Ahmedabad-380009, India

³Nutritionist, Flourish Purefoods Pvt. Ltd., Ahmedabad-380009, India

*Corresponding author: mayur.chandegara18@gmail.com

Paper No.: 211

Received: 13-12-2017

Revised: 08-02-2018

Accepted: 16-05-2018

Abstract

The aim of this research was to develop a novel chocolate “energy” bar supplying sufficient energy to the body. The ingredients like Dates (*Phoenix dactylifera*), Oats (*Avena Sativa*), Raisin, Rice Crispies, Nuts (Almonds, Cashew Nut), Honey (multiflora), chocolate (dark), seeds (sunflower and watermelon) were used to make this energy bar. Based on sensory analysis the developed chocolate “energy” bar containing 30% oats, 15% honey, 14% chocolate, 10% nuts, 10% seeds, 8% dates, 8% rice crispies and 5% raisin is highly recommended. The novel chocolate “energy” bar was highly acceptable with desirable sensory quality by all consumers as compared to commercial energy bar.

Keywords: Energy Bar, Dates, Honey, Chocolate, Sensory analysis

Energy bar, a convenient and healthy ready-to-eat food which supplies balance nutrients (protein, fat, minerals, vitamins, calories, and carbohydrates) and to reduce hunger is very common for health conscious people (King, 2006; Ryland *et al.* 2010; Wyatt, 2011). They are dietary supplements often consumed by athletes and other physically active people to maintain their calorific needs (Norajit *et al.* 2011). Today, customers show a burning desire for health foods, which are hygienic, portable, convenient and well proportioned. Energy bars were 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 bars (Wyatt, 2011; Euromonitor International, 2015). Increasing scenario of microwave dinners, take-out meals, home delivery for groceries and internet shopping, all clearly show the importance of convenience in determining food choices (Jaeger, 2004). Cereal bars were introduced in the last decade as a wholesome alternative of comfit when consumers show more interest in health and diets (Bower, 2000). Maughan (1991a) reported that during exercise the body may lose between 1 and 2 L of fluid per hour which equivalent to 40-80 mEq/L sodium loss and 80-160 mEq/L total electrolytes loss (Maughan, 1991b). Therefore, athletes or physically active human beings should take enough amount of carbohydrates before exercise, ‘top-up’ body’s limited supply during workouts, and consume adequate amounts immediately after activity so as to replenish endogenous stores (Ali *et al.* 2011). However, people consuming pure water immediately after their exercise may not be adequate to prevent progressive hypohydration. This is because the amount of fluid consumed by them does not match the electrolytes (sodium) losses through sweat (Greenleaf, 1992). Therefore, sports drink is normally consumed by athletes to supply carbohydrate and electrolytes to

compensate fluid and nutrient loss before, during and post exercise (Murray, 2001). Nutritional quality particularly protein, fat, crude fibre, iron, total calories and omega-3 content increased with increasing flaxseed (5–20%) in energy bar (Mridula, 2013).

Date fruit is also a good source of important phytochemicals, including carotenoids, phenolics, and flavonoids (AOAC, 1990). Flaxseed is a good source of high quality protein, soluble fibres and phenolic compounds (Mohammad, 2011). Because energy bars have various advantages, companies like Patanjali Energy Bar, Ritebite, Yoga bar, Rine bar-on the go snack, Cliff bar etc. started to produce them using numerous healthy ingredients and flavors.

Sensory evaluation is a scientific discipline used to determine, analyze, and interpret the reactions of the consumers to the characteristics of foods and other materials perceived by the senses of sight, smell, touch, taste and hearing (Stone *et al.* 2012). Sensory quality evaluation is crucial for marketing purposes; the results give in-depth insight on the preference and overall acceptance towards product (Kemp *et al.* 2011; Parn *et al.* 2015).

With the background discussed above, the main objective to conduct this research was to develop a convenient chocolate “energy” bar containing dates, oats, raisin, rice crispies, nuts, honey, chocolate, seeds etc. This product is expected to be very healthy and nutritious. In addition to that the developed energy bar is hundred percent commercially viable.

MATERIALS AND METHODS

Premium quality raw materials like Dates (*Phoenix dactylifera*), Oats (*Avena Sativa*), Raisin, Rice Crispies, Nuts (Almonds, Cashew Nut), Honey (multiflora), chocolate (dark), seeds (sunflower and watermelon) etc. were procured from local market, Ahmedabad, Gujarat, India. Table 1 shows the proportion of various ingredients in treatments T-1, T-2 and T-3.

The dry ingredients like nuts were coarsely grounded and roasted at 125 °C for 10 minutes. The mixture was transferred in mould and allowed to cool at

room temperature. Dates and raisin were weighed and chopped to 2-3 mm size. Chopped raisin and dates were slowly added to dry blend and mixed thoroughly. Date syrup and honey were weighed and added slowly and mixed in such a way that no dry ingredient left uncoated.

Table 1: Formulation of Novel Chocolate Energy Bar

Ingredients	Treatments		
	T-1 (%)	T-2 (%)	T-3 (%)
Oats	34	30	26
Honey	15	15	15
Chocolate	10	14	18
Nuts	10	10	10
Seeds	10	10	10
Dates	8	8	8
Rice crispies	8	8	8
Raisin	5	5	5
Total	100	100	100

Chocolate was added to the blend and whole mixture was mixed thoroughly. The mixture was transferred in mould; pressed to make a sheet of 2 cm thick using rolling pin and it was roasted again at 130 °C for 10 minutes. Thick sheet of bar was then allowed to cool at room temperature. Finally, the bar was demoulded and cut in dimension of 10 cm × 3 cm × 2 cm. Each individual bar was wrapped properly in butter paper; packed in Low Density Poly-ethylene (LDPE) pouches (thickness 75 microns) and stored. Fig. 1 shows the detailed manufacturing process flowchart of chocolate energy bar.

Sensory characteristics of energy bar samples were evaluated for different sensory attributes by a group of twenty one panelists. Sensory attributes like appearance, taste, smell, texture, crunchiness, chewiness, mouthfeel, after taste and overall acceptability Stone *et al.* (2012) for all samples were assessed using nine pointer hedonic scale. Hedonic scale was in the following sequence: like extremely—9, like very much—8, like moderately—7, like slightly—6, neither like nor dislike—5, dislike slightly—4, dislike moderately—3, dislike very much—2, dislike extremely—1 (BIS, 1971).

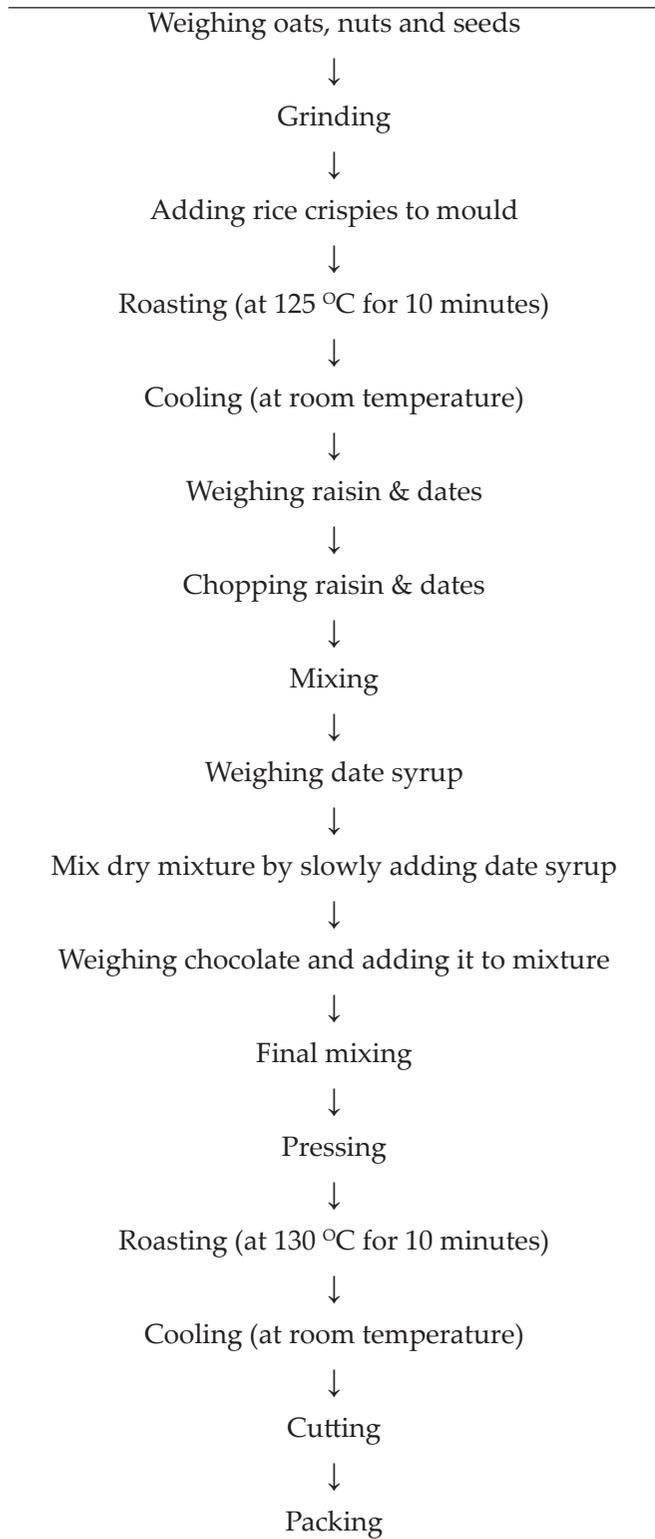


Fig. 1: Process Flow Chart of Novel Chocolate Energy Bar

RESULTS AND DISCUSSION

Sensory analysis results are reported in Table 2. Factors like appearance, taste, smell, texture, crunchiness, chewiness, mouthfeel, after taste and overall were taken under consideration by each sensory panelist based on which the ratings has been assigned by them.



Plate 1 : Novel Chocolate Energy Bar

Table 2 shows sensory analysis of treatment T-1 (34% oats, 15% honey, 10% chocolate, 10% nuts, 10% seeds, 8% dates, 8% rice crispies and 5% raisin). It states that highest average rating (7.64) was obtained in the parameter: Texture; which is because of higher oats percentage. The lowest average rating (5.98) was observed in parameter: Overall; which was due to lower chocolate proportion.

Treatment T-2 (30% oats, 15% honey, 14% chocolate, 10% nuts, 10% seeds, 8% dates, 8% rice crispies and 5 % raisin) in Table 2. It shows that highest average rating (8.52) was obtained in the parameter: Crunchiness; which is because of proper binding and solidification of rice crispies, nuts and seeds with chocolate. The lowest average rating (7.17) was observed in parameter: Mouthfeel and After Taste; which was due to softness of bar in some parts due to uneven pressing/compaction. However, this treatment received the highest average overall rating (8.02) which depicts how appealing it is to sensory panelists.

Based on treatment T-3 (26% oats, 15% honey, 18% chocolate, 10% nuts, 10% seeds, 8% dates, 8% rice crispies and 5% raisin) given in Table 2, it is concluded that highest average rating (7.33) was obtained in the

Table 2: Sensory Analysis of all the treatments

Treatments	Appearance	Taste	Smell	Texture	Crunchiness	Chewiness	Mouth feel	After taste	Overall Acceptability
T-1	6.62	6.88	6.95	7.64	6.73	6.90	7.48	6.95	5.98
T-2	7.36	8.31	7.26	7.86	8.52	7.29	7.17	7.17	8.02
T-3	6.50	7.33	6.74	6.55	6.86	6.33	6.36	6.12	6.90
T-4 (Control)	7.03	7.17	7.07	7.24	7.00	7.21	7.14	7.02	7.12

parameter: Taste; which was because of increased chocolate percentage. The lowest average rating (6.12) was observed in parameter: After Taste; which was due to seeds, dates and date syrup dominant taste along with chocolate.

Treatment T-4 (Control) is commercial energy bar obtained from local market whose sensory analysis average ratings are given in Table 2. It shows that overall acceptance including all parameters taken under consideration were quite low. Table 2 given above shows compiled sensory analysis average ratings of all treatments which showed Treatment T-2 of developed energy bar has higher acceptability as compared to Treatment T-4. This indicated that the developed energy bar might work well in competition with other existing energy bars that are produced by large industries. In addition, the developed energy bar may receive a high acceptance by those who are allergic to gluten, soy, and dairy. It also showed that the developed energy bar has a future in the energy bar market and according to some panelists, the developed energy bar will be successful in future markets.

CONCLUSION

The novel chocolate “energy” bar (T-2) with 30 % oats, 15% honey, 14% chocolate, 10% nuts, 10% seeds, 8% dates, 8% rice crispies and 5% raisin as shown in plate 1 resulted in higher acceptance by panelists and it has a great potential to be commercialized. This product is highly recommended to those who require rapid energy recovery and replenishment at pre, during and post exercise. The novel chocolate “energy” bar can be consumed as a ready-to-eat healthy appetizer, especially for breaking the fast during the fasting month.

REFERENCES

Ali A., Duizer L., Foster K., Grigor J. and Wei W. 2011. Changes in sensory perception of sports drinks when consumed pre, during and post exercise. *Physiology and Behavior*, **102**: 437–443.

A.O.A.C. 1990. Official Method of Analysis 15th Edition, Association of Official Analytical Chemists Washington, D. U.S.A.

BIS 1971. IS: 6273 Part I and Part II. 1971. Guide for sensory evaluation of foods. Indian Standard Institution, Manak Bhawan, New Delhi.

Bower J.A. and Whitten R. 2000. Sensory characteristics and consumer linking for cereal bar snack foods. *J. Sensory Stud.* **15**(3): 327–345.

Euromonitor International 2015. Snack bars in Malaysia. Retrieved on July 10, 2015 from website: <http://www.euromonitor.com/snack-bars-in-malaysia/report>.

Greenleaf, J.E. 1992. Problem: thirst, drinking behavior, and involuntary dehydration. *Medicine and Science in Sports and Exercise*, **26**: 645–656.

Jaeger, S.R. and Meiselman, H.L. 2004. Perceptions of meal convenience: the case of at home evening meals. *Appetite*, **42**: 317–325.

Kemp, S., Hollowood, T. and Hort, J. 2011. *Sensory evaluation: a practical handbook*. United Kingdom: John Wiley and Sons.

King, J. 2006. Nutrition bar update. *Nutraceuticals World*, **9**(1): 32–36.

Maughan, R.J. 1991a. Effects of CHO-electrolyte solution on prolonged exercise. In Lam, D.R. and Williams, M. H. (Eds). *Perspectives in Exercise Science and Sports Medicine. Ergogenics–Enhancement of Performance in Exercise and Sport*, p. 35–85. United States: Cooper Publishing Group.

Maughan, R.J. 1991b. Optimizing hydration for competitive sport. In Lam, D.R. and Williams, M.H. (Eds). *Optimizing Sports Performance. Perspectives in Exercise Science and Sports Medicine*, p. 139–184. United States: Cooper Publishing Group.

- Mohammad, S.M. 2011. Linseed and Usages in Humanlife. *Advances in Environmental Biology*, 5(6): 1380-1392.
- Mridula, D., Singh K.K. and Barnwal, P. 2013. Development of omega-3 rich energy bar with flaxseed, *Journal of Food Sci. Technology*, 50(5): 950-957.
- Murray, R. and Stofan, J. 2001. Formulating carbohydrate-electrolyte drinks for optimal efficacy. In Maughan, R.J. and Murray, R. (Eds). *Sports Drinks: Basic Science and Practical Aspects*, p. 197–224. Boca Raton, FL: CRC Press.
- Norajit, K., Gu B.J. and Ryu G.H. 2011. Effects of the addition of hemp powder on the physicochemical properties and energy bar qualities of extruded rice. *Food Chemistry*, 129(4): 1919-1925.
- Parn, O.J., Bhat, R., Yeoh, T.K. and Al-Hassan, A.A. 2015. Development of novel fruit bars by utilizing date paste. *Food Bioscience*, 9: 20–27.
- Ryland, D., Vaisey-Genser, M., Arntfield, S.D. and Malcolmson, L.J. 2010. Development of a nutritious acceptable snack bar using micronized flaked lentils. *Food Research International*, 43: 642–649.
- Stone, H., Bleibaum, R. and Thomas, H.A. 2012. Measurement. In Stone, H. Bleibaum, R. and Thomas, H.A. (Eds). *Sensory Evaluation Practices*, p. 101-104. United States: Academic Press.
- Wyatt, S.L. 2011. State of the snack industry. Symphony IRI Group. Retrieved on July 14, 2015 from website: <http://www.healthycornerstores.org/wpcontent/uploads/2011/11/SNAXPO-2011.pdf>

