Development of Fruit Bar Using Composite Fruit Peel Powder

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Abstract

The main objective of the present investigation was to prepare the composite fruit peel powder using dragon fruit albedo powder and pineapple fruit peel powder and to prepare fruit bars using this composite fruit peel powder of different compositions. The recipe for fruit bar was formulated and studied by keeping all the other ingredients same (sugar syrup (40%), almonds (10%), cashew (10%), dried dates (6%), peanut butter (3.5%) and salt (0.5%) except the varying percentage of rice flakes (5% & 20%) & composite fruit peel powder (25% & 10%). The fruit bars prepared with this composition were evaluated for sensory attributes and the nutritional analysis of most acceptable fruit bar was done. It was observed that the fruit bar sample having 7% dragon fruit albedo powder, 3% pineapple fruit peel powder & 20% rice flakes was most accepted by panel. Nutritional analysis reported that there was significant increase in protein, fibre and ash content of developed fruit peel bar by 9.51%, 22.4% and 34.64% respectively.

***Keywords*:** Fruit bar, dragon fruit, pineapple fruit, peel powder, nutritional attributes.

Introduction

Dragon fruit *(Hylocereus polyrhizus*) or Pitaya is emerging in health promotion product in addition to its known application in food having nutritional and decorative effects. Dragon fruit is gaining much attention recently because of its micronutrient enrichment regulated by the phenolics that possess antioxidant and antiproliferative activities in addition to its attractive colour. The fruit is considered as a functional food and therefore accounted as a food product with high economic value. Dragon fruit peel (albedo) is a potential source of red-purple colour for food and cosmetic decorations. Its ecological origin is meeting an economical perspective and the consumers' preference for green products as well. In addition, the moderate antioxidant activity based on phenolics indicates multifunction of this fruit waste application. Furthermore, dragon fruit peel is applicable as an alternative source of natural chlorogenic acid, quercetin, and gallic acid for other health-care application. Developing dragon fruit albedo powder is not only healthy for human body, but also is friendly for the society and environment. Dragon fruit albedo powder is estimated to be cost effective, as it is sourced from the only disposable part (peel) of the fruit (Nazli *et al*., 2013, Nattaya and Mayuree, 2013).

Pineapple is one of the commercially important fruit crops in India. The pineapple peel is hard and irregular but can be used for various culinary purposes as teas, juices and even candy preparation. It is rich in Vitamin A, C, B complex, calcium, iron, potassium and fibers containing significant amount of insoluble fibers. Peel, stem, crown and core of pineapple are considered waste by the fruit pulp industry and stand out for their high sugar content particularly by having pectin which is an insoluble fibre, besides high contents of crude fiber and proteins. This amount of discarded waste is a source of potential nutrients for diet supplementation, due to its nutritional character and low cost. Since the peel of a pineapple accounts for 34.7% of the whole fruit mass, there is a great interest in utilizing this biomass as a source of dietary fiber, instead of feeding it to livestock. The waste of pineapple peel can also be a potential source for vinegar production, alcohol and animal feed. Considering these factors, the use of pineapple peel powder to make a fruit bar may be a viable alternative as a raw material from its nutritional, functional and economic standpoint (Karina *et al*., 2016).

Fruit bar is a concentrated product that has superior nutritive and energy value. Fruit bars can be a wholesome nutritious food for all age groups, including elderly people. It can be an exceptional instant food that can deliver the required dietary fibre and other bioactive compounds, required to meet the daily requirements in humans. Fruit bars are considered as healthy type of food because they are rich in fibre. However, they are poor in fat. Fruit bars are made of processed fruit components that can be incorporated with different ingredients (Michelle *et al.,* 2011). These ingredients must be suitably combined to assure a mutual complementation or supplementation as far as flavour, texture and physical characteristics are

concerned, particularly the point of balance of water activity. Besides, preparation of nutritionally rich fruit bar by using fruit peel powders can be relatively much easier and convenient as compared to other fruit based products. Also the use of albedo powder & pineapple peel powder to make a fruit bar may be a value addition to these fruit peel waste. In view of this, the present study was undertaken with the objective **t**o prepare fruit bar using different compositions of dragon fruit albedo powder and pineapple fruit peel powder and to study its nutritional quality.

Methods

The materials required for preparation of fruit bar namely dragon & pineapple fruit peels, almonds, cashew, dried dates, peanut butter, sugar, rice flakes and salt etc., had been purchased from the local market. The preparation of dragon fruit albedo powder and pineapple fruit peel powder was carried out as shown in Fig.1.

Fruit bars were prepared by making different compositions of rice flakes, albedo powder and pineapple peel powder as per Table 1 and Fig. 2 by keeping all the other ingredients same that is sugar syrup (40%), almonds (10%), cashew (10%), dried dates (6%), peanut butter (3.5%) and salt (0.5%).

Table 1. Compositions of fruit peel powders

Sample	Rice Flakes	Albedo Powder	Pineapple Peel Powder	Total (%)
Control	30	00	00	30
S1	20	05	05	30
S2	20	06	04	30
S3	20	07	03	30
S4	5	12.5	12.5	30
S5	5	15	10	30
S6	5	10	15	30

Sensory analysis of all these samples prepared with these treatment combinations was made on the basis of nine point headonic scale and the most sensory accepted sample was found. The nutritional analysis (moisture content, carbohydrate content, protein content, fat content, ash content and energy content) of this most sensory accepted sample and control sample was made by standard AOAC (2000)

method and its statistical analysis was carried out with the help of t-Test for paired two samples and correlation.

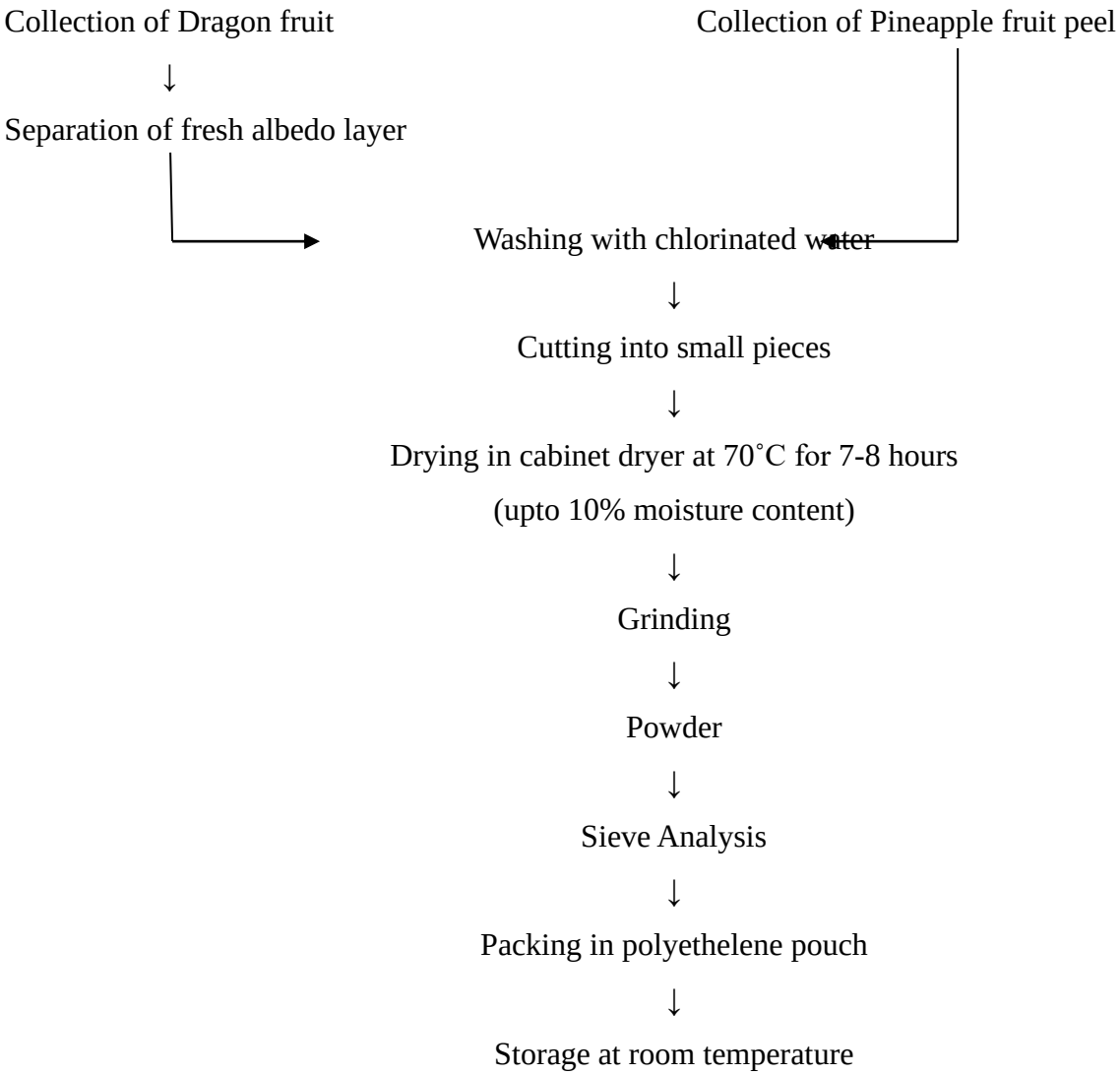


Fig. 1 Flow chart of preparation of fruit powder

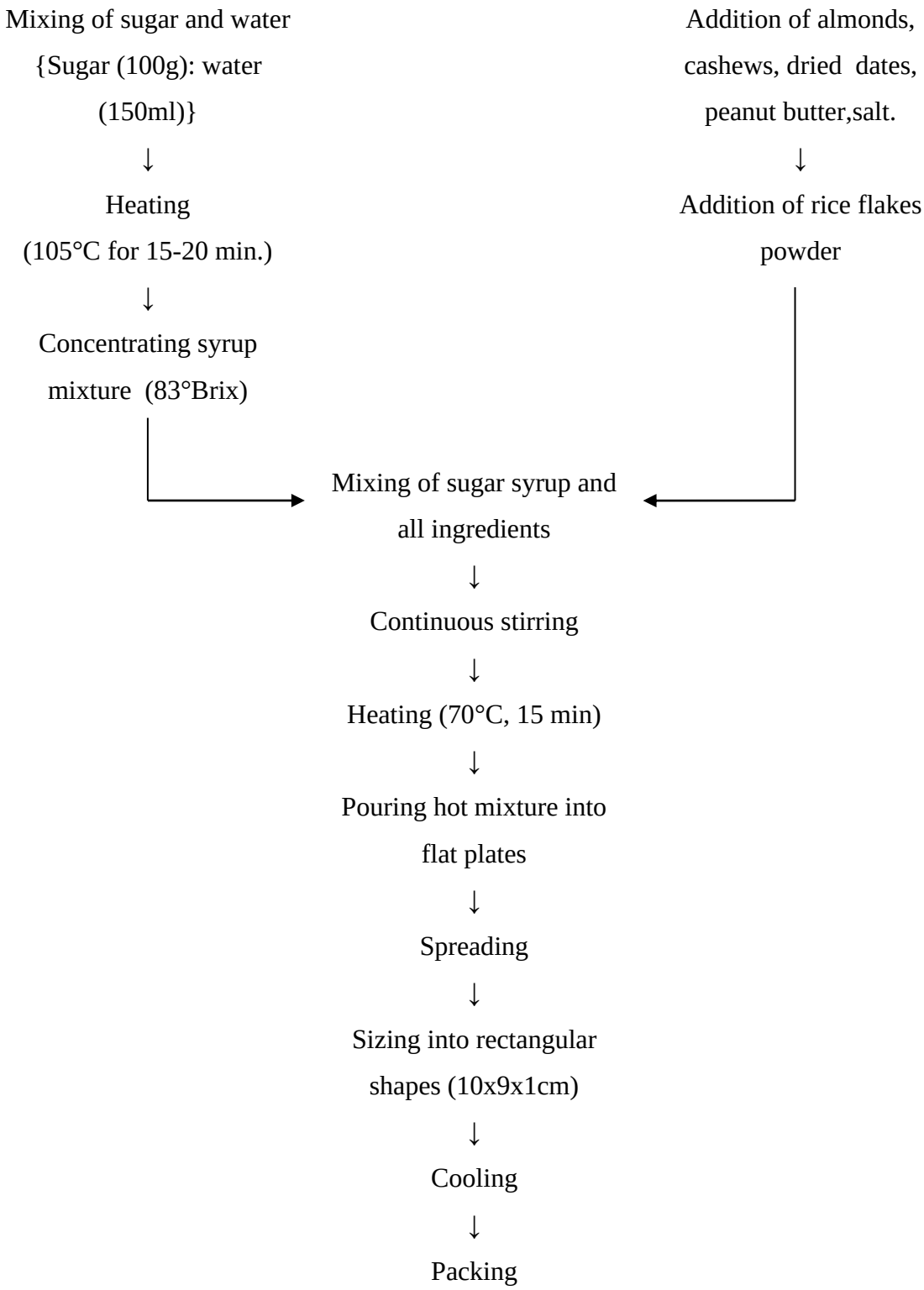
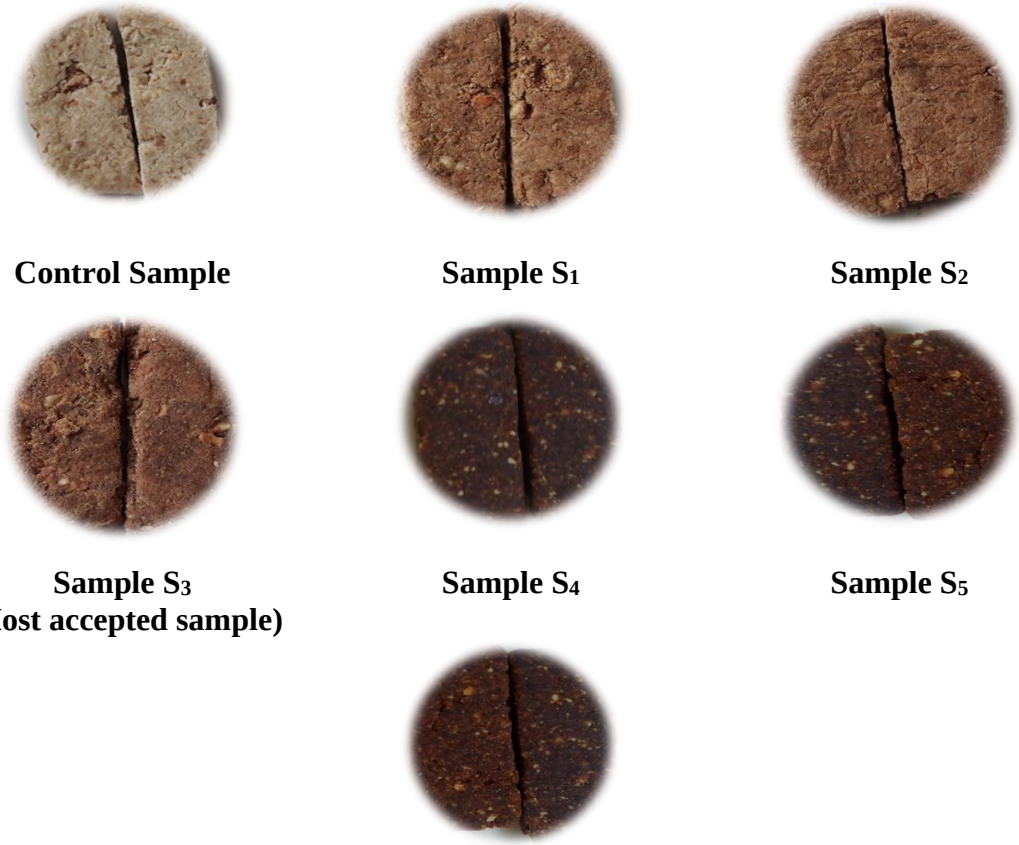


Fig. 2 Flow chart of preparation of fruit bar

Results

Moisture content of dragon fruit albedo was found to be 94.89 % (db) and moisture content of pineapple peel was found to be 96.46 % (db). It was observed that 10 kg of dragon fruits were required to get 2.5 kg of albedo and 250 gm of powder. Average particle diameter of dragon fruit albedo powder was observed as 0.389 mm. Also it was observed that 2.5 kg of pineapple peels were required to get 250 gm of powder. Average particle diameter of Pineapple peel powder was observed as 0.543 mm. The results obtained for the fruit bars prepared according to the treatments shown in Table 1 are shown in Fig.3.

Results of sensory evaluation showed that sample S_3 having 7% dragon fruit albedo powder and 3% pineapple peel powder was most accepted by the panel, whereas the control sample ranked fourth by the panel. Fruit bars containing 25 % mixture of albedo powder and pineapple peel powder were rejected (least accepted) by the panel.



Control Sample **Sample S_1** **Sample S_2**

Sample S_3 (Most accepted sample) **Sample S_4** **Sample S_5**

Sample S_6

Fig. 3 Fruit bar

Nutritional analysis of both the prepared powders as well as most accepted fruit bar sample and sample without powders is shown in Table 2. It was observed that, there was significant increase in protein, fibre and ash content of developed fruit peel bar by 9.51%, 22.4% and 34.64% respectively. Also it was observed that there was a positive correlation indicating increment in nutritional content of fruit bar with increment in proportion of peel powder and vice versa.

Table 2 Nutritional analysis of fruit powders & fruit bars

Sr. No.	Particulars (%)	Dragon Fruit Albedo Powder	Pineapple Fruit Peel Powder	Control Sample	Most Accepted Sample
1	Moisture	6.64	6.20	8.44	13.06
2	Carbohydrate	36.04	73.30	61.21	65.02
3	Protein	4.33	5.11	4.94	5.41
4	Fat	1.25	1.18	23.88	24.18
5	Fibre	21.28	17.44	1.83	2.24
6	Ash	16.70	2.48	1.53	2.06
7	Energy (Kcal)	-	-	480	485

Mean	83.12	85.28
Variance	31076.22	31555.98
t (cal)	2.60	
P(T<=tp) one-tail	0.02	
t (table)	1.94	

Source of Variation	SS	df	MS	F	P-value	F critical
Rows	356529.1	6	59421.52	1782.79*	1.76E-09	4.28
Columns	26.30	1	26.30401	0.79	0.408545	5.99
Error	199.98	6	33.33056			
Total	356755.4	13				

* indicates significant values at 5% level

Conclusions

1. Fruit bar using 10% composite powder (7% dragon fruit albedo powder and 3% pineapple fruit peel powder) can be prepared with high sensory score.
2. Fruit bar with increased nutritional value (9.51% increase in protein content, 22.4% increase in fibre content) can be prepared with 10% composite peel powder of dragon fruit and pineapple fruit.

References

1) Farajzadeh D., & M. T. Golmakani (2011). Formulation and experimental production of energy bar and evaluating its shelf-life and qualitative properties; Iranian Journal of Military Medicine, 13(3), 181-187.
2) Karina, Aparecida, Damasceno, Carlos, Antonio, Alvarenga, Gonc, Alves,Geyzielle Dos, Santos, Pereira, Luciene, Lacerda, Costa; Paulo, Cezar, Bastianello, Campagnol, Patricia, Leal, De, Almeida & Lucas, Arantes-pereira (2016). Development of cereal bars containing pineapple peel flour (Ananas comosus l. merril); Journal of food quality, 417-424
3) Rafiu, Agbaje, Chek, Zaini, Hassan, Norlelawati, Arifin & Asma Abdul Rahman (2014). Sensory Preference and Mineral Contents of Cereal Bars Made From Glutinous Rice Flakes and Sunnah Foods; IOSR Journal of Environmental Science, Toxicology and Food Technology, 8 (12), 26-31.
4) Silvana, Mariana, Srebernich, Gisele, Mara, Silva, Gonçalves, Rita, de, Cássia, Salvucci, Celeste, Ormenese & Cristiane Rodrigues Gomes Ruffi (2016). Physico-chemical, sensory and nutritional characteristics of cereal bars with addition of acacia gum, inulin and sorbitol; Food Science Technology, Campinas, 36(3), 555- 562.