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Effect of different pre-treatments on osmotic dehydration of jackfruit pulp

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Abstract
Osmotic dehydration is an effective way to preserve jackfruit pulp, as it can reduce the water content of the pulp without significantly altering the flavor. Jackfruit pulp was osmotically dehydrated at 50 °C in water bath with sugar solutions of concentration 40°B. Before osmotic dehydration jackfruit samples were also pretreated *viz.* blanching, KMS (0.25%), KMS (0.25%) + Citric acid (0.25%) and NaCl (0.5%). After dipping the pretreated jackfruit pulp in to osmotic solution for up to 180 minutes it was observed that various parameters like solid gain, mass reduction and water loss was found higher in blanched samples as compared to other.

Keywords: Jackfruit, osmotic dehydration, solid gain, mass reduction, water loss

Introduction
Jackfruit is a tropical fruit native to India, and is increasingly being used as a vegan-friendly replacement for meat. It is the largest tree borne fruit in the world, reaching up to 50 kg in weight and 60-90 cm in length. A mature jackfruit tree can produce about 100 to 200 fruits in a year. The jackfruit is a multiple fruit, composed of hundreds to thousands of individual flowers, and the fleshy petals are eaten (Julia, 2016; Silver, 2016) [2, 3]. Jackfruit consists of three important parts namely, bulb, seed and rind. Bhatia *et al.,* (1955) [4] reported that the bulbs constitute 29%, seeds 12% and rind 59% of ripe fruit. Jacob and Narasimhan (1998) [5] reported that jackfruit consists of 32% of the edible portion (pulp), 18% seed and about 50% rind (bio-waste) on weight basis. Food products from jackfruit are varied e.g. fresh jackfruit meat, jackfruit dried slice, jackfruit puree, and jackfruit essence. Ripe jackfruit is very nutritious, rich in pectin and minerals like phosphorous, iron, potassium, and calcium. Ripe jackfruits are full of carbohydrates, ascorbic acid and carotene. Unripe bulbs are used in the preparation of chips, papad, etc. The jackfruit seed contains moisture content 61.8% (w.b.), protein (11.85%), fibre (3.19%) and carbohydrate (26.20%). The calorific value is 382.79 kcal/100g. It contains ash and fat content (dry matter basis) is 0.15% and 1.006%, respectively (Gupta *et al.,* 2011) [6].
Like other tropical fruits, jackfruit has a short shelf life of 3-5 days after harvest at ambient conditions. Osmotic dehydration is a useful postharvest technology for preserving fruits and vegetables, and is especially beneficial for the preservation of jackfruit pulp.

Materials and Methods
Preparation of the samples
Ripe jackfruits were procured from local market; seed and pulp were separated and used for the present investigation. NaCl, KMS and Citric acid were used for pre-treatment purpose and samples were denoted as follow-
T_1: Control (untreated)
T_2: Blanched
T_3: NaCl (0.5%)
T_4: KMS (Potassium Metabisulphite) 0.5%
T_5: KMS 0.25% + Citric acid 0.25

Preparation of osmotic solution

Sugar was utilized as osmotic agents. To weigh sugar, an electronic balance was employed and the solute content was dissolved using a stirrer. The studies were conducted using concentrations of sugar (40°B) at temperatures of 50 °C based on preliminary tests and literature reviews. A hand Refractometer (model HRN-18) was used to measure concentrations.

Osmotic dehydration of jackfruit pulp

Initially 200 g weight of the jackfruit pulp was immersed in to the osmotic solution (40°B) at 50 °C and after 30, 60 and 180 min. weight of the pulp was noted on the analytical weighting balance having least count of 0.002 g.

Determination of water loss (WL %) and solid gain (SG %): The weight loss of the jackfruit pulp during the dehydration process was occurred due to loss in moisture content, volatile matter.

Osmotic dehydrated samples were blotted with tissue paper and later weighed for determination of WL and SG as shown by the following equation (Aktas *et al*., 2007).

$$\text{Water Loss (WL)} = \frac{\text{Wwo} - \text{Ww}}{\text{Wo}} \times 100$$

$$\text{Solid Gain (SG)} = \frac{\text{Ws} - \text{Wso}}{\text{Wo}} \times 100$$

$$\text{Mass Reduction (MR)} = \text{WL} - \text{SG}$$

Where,

W_{wo} is the initial water mass,

W_w is the mass of water at time t,

W_S is the solid mass at time t,

W_{so} is the initial solid mass

Results and Discussion

Moisture content % (wb)

The data showing the effect of osmosis on moisture content of jackfruit pulp before pretreatment is given in Table 1, which shows that in the beginning (at 0 min.) moisture content for samples was 78.45% (wb), which further decreased during the osmosis process of 180 min. and after 180 min. moisture content was decreased to 61.40%.

Table 1: Effect of solution concentration (40°B) and temperature (50 °C) on moisture content (%, wb.) of jackfruit pulp

	Time (min.)						
	0	**30**	**60**	**90**	**120**	**150**	**180**
Moisture content (w.b. %)	78.45	72.333	67.983	65.005	63.277	62.21	61.405

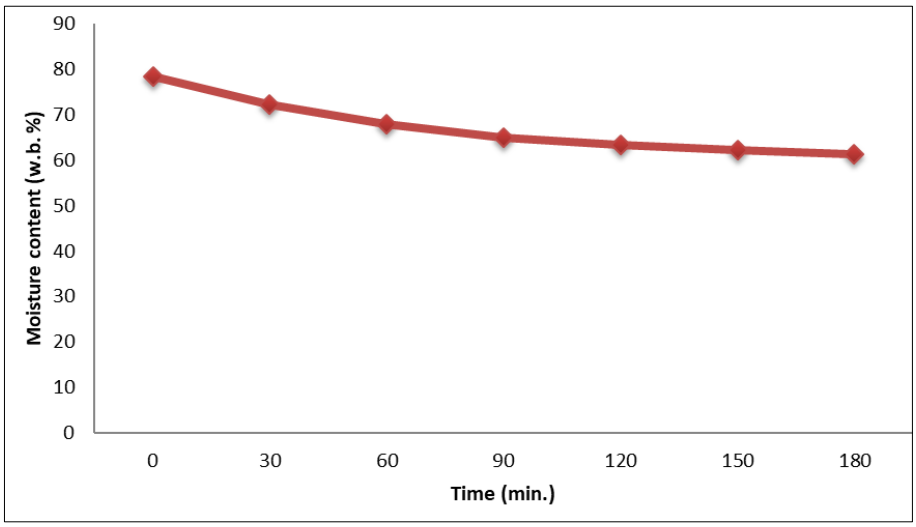

Fig 1: Effect of solution concentration (40°B) and temperature (50 °C) on moisture content (%, wb.) of jackfruit pulp

Effect on Solid gain (%), Water loss (%) and Mass reduction (%)

Osmotic dehydration of jackfruit pulp was done in 40 °Brix at 50 °C. The effect of sugar concentration and time on water loss, solid gain, and mass reduction at constant temperature of 50 °C during osmotic dehydration for different Treatments is given under following heads.

Effect on Solid gain

The data showing the effect of pretreatments on solid gain of jackfruit pulp is given in Table 2. The solid gain after 180 min for T_1 sample ranges from 4.42% to 10.46%. Similarly for T_2, T_3, T_4 and T_5 sample ranges from 5.17% to 10.96%, 3.90% to 10.12%, 3.68% to 10.30%, and 3.68% to 9.65%, respectively. Similar trends were reported by Chaudhary *et al.*, (2018) [1].

Table 2: Effect of solution concentration (40°B) and temperature (50 °C) on solid gain of jackfruit pulp

Treatments	**Time (min.)**						
	0	**30**	**60**	**90**	**120**	**150**	**180**
T_1	0	4.424	7.116	8.74	9.601	10.103	10.466
T_2	0	5.174	7.553	9.241	10.218	10.607	10.963
T_3	0	3.91	6.475	7.801	8.821	9.587	10.127
T_4	0	3.686	6.586	8.636	9.791	10.21	10.308
T_5	0	3.687	6.146	7.459	8.401	9.107	9.651

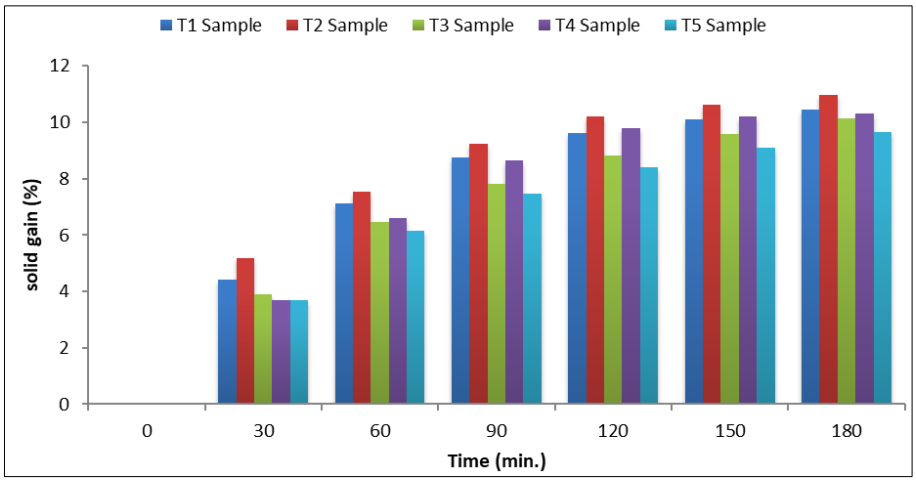

Fig 2: Effect of solution concentration (40°B) and temperature (50 °C) on solid gain of jackfruit pulp

Effect on water loss: The data showing the effect of pretreatments on water loss of jackfruit pulp is given in Table 3. The water loss after 180 min for T_1 sample ranges from 10.54% to 27.51%. Similarly for T_2, T_3, T_4 and T_5 sample ranges from 12.42% to 29.15%, 9.25% to 26.41%, 8.70% to 26.99%, and 8.70% to 24.92%, respectively.

Table 3: Effect of solution concentration (40 °B) and temperature (50 °C) on water loss (%) of jackfruit pulp

Treatments	Time (min.)						
	0	**30**	**60**	**90**	**120**	**150**	**180**
T_1	0	10.541	17.582	22.185	24.775	26.343	27.511
T_2	0	12.442	18.792	23.678	26.71	27.97	29.156
T_3	0	9.258	15.848	19.484	22.425	24.73	26.418
T_4	0	8.706	16.146	21.881	25.363	26.685	26.998
T_5	0	8.709	14.975	18.529	21.196	23.273	24.927

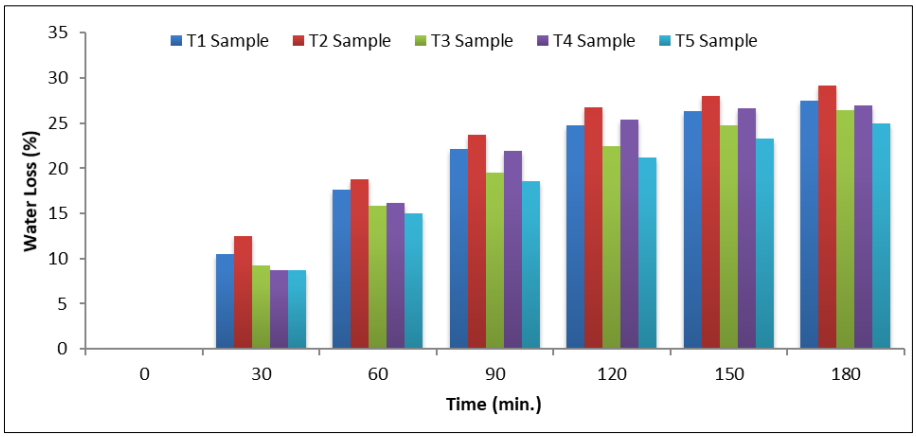

Fig 3: Effect of solution concentration (40°B) and temperature (50 °C) on water loss (%) of jackfruit pulp

Effect on Mass reduction (%): The data showing the effect of pretreatments on mass reduction (%) of jackfruit pulp is given in Table 4. The mass reduction (%) after 180 min for T_1 sample ranges from 6.11% to 17.04%. Similarly for T_2, T_3, T_4 and T_5 sample ranges from 7.26 to 18.19, 5.34 to 16.29, 5.02 to 16.69, and 5.02 to 15.27(g), respectively.

Table 4: Effect of solution concentration (40°B) and temperature (50 °C) on mass reduction (%) of jackfruit pulp

Treatments	Time (min.)						
	0	**30**	**60**	**90**	**120**	**150**	**180**
T_1	0	6.117	10.467	13.445	15.173	16.24	17.045
T_2	0	7.268	11.238	14.437	16.492	17.363	18.193
T_3	0	5.348	9.373	11.683	13.603	15.143	16.292
T_4	0	5.02	9.56	13.245	15.572	16.475	16.69
T_5	0	5.022	8.828	11.07	12.795	14.167	15.277

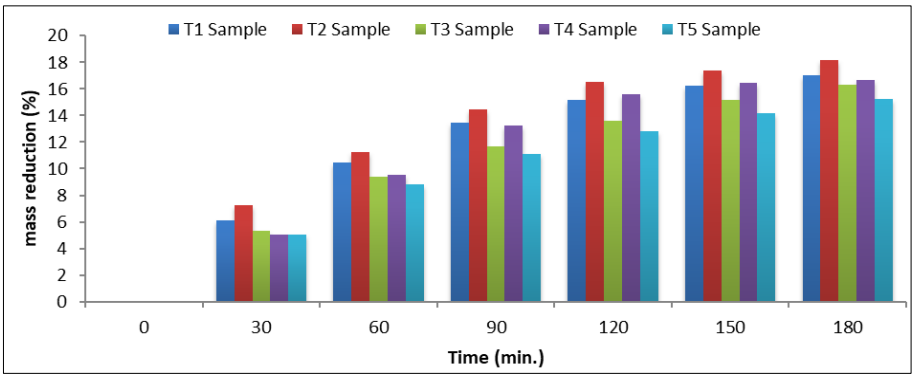

Fig 4: Effect of solution concentration (40 °B) and temperature (50 °C) on mass reduction (%) of jackfruit pulp

Conclusion

In conclusion, this study investigated the effect of different pre-treatments on the osmotic dehydration of jackfruit pulp. The results showed that pre-treatments significantly affected the quality of the osmotically dehydrated jackfruit pulp. After immersing the pretreated jackfruit pulp in an osmotic solution of sugar of 40 °B at 50 °C temperature for 180 minutes, it was discovered that different parameters such as solid gain, mass reduction, and water loss were higher in blanched samples (T_2) than others. Least values were observed for sample treated with NaCl (0.5%) i.e. T_5 sample, as compared to rest.

References

1. Chaudhary V, Kumar V, Singh GR, Singh J, Chauhan N, Kumar P. To study the osmotic dehydration characteristics of pineapple (*Ananas comosus*) slices, International Journal of Chemical Studies. 2018;6(5):1081-1083
2. Julia M. Jackfruit. Center for New Crops & Plant Products, Purdue University Department of Horticulture and Landscape Architecture, 2016. (https://hort.purdue.edu/newcrop/morton/jackfruit_ars.htm.l).
3. Silver M. Here's The Scoop on Jackfruit, A Ginormous Fruit to Feed the World, 2016. (https://www.npr.org/sections/thesalt/2014/05/01/308708000/heres-the-scoop-on-jackfruit-a-ginormous-fruit-to-feed-the-world) *NPR*.
4. Bhatia BS, Siddappa GS. Composition of nutritive value of jackfruit. Indian J agri sci. 1955;25:303-6.
5. Jacob JP, Narasimhan P. Quality of blast-frozen and cryo-frozen ripe jackfruit bulbs. J Fd. Sci. & Technl. 1998;35(1):59-61.
6. Gupta D, Mann S, Sood A, Gupta RK. Phytochemical, nutritional and antioxidant activity evaluation of seeds of jackfruit. International Journal of Pharma and Bio Sciences. 2011;2(4):336-345.