

## Prospects of Jackfruit Blend Yoghurt Whey

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**Abstract:** Protein hydrolysates contribute to the multitude of functions of fermented milk and addition of various kinds of fruits, their essences, cereals, coffee, etc. to milk during fermentation and after fermentation is known for enhancing properties of yoghurt. Bioyoghurt with jackfruit was prepared and whey obtained was studied for its protein turnover, organoleptic acceptability and antibacterial property and was compared with similarly prepared plain yoghurt. The study revealed that ripe jackfruit pulp blended yoghurt showed better protein digestibility, taste acceptance and produced more anti bacterial than plain yoghurt-a novel combination of yoghurt with fruits.

**Key words:** Lactic fermentation • anti bacterial property • jackfruit blend bioyoghurt • whey

### INTRODUCTION

Fermented milk and its products have been used by man to impart increased health benefits such as warding off diseases, cancer, for being hypocholesteremic, in controlling high-blood pressure, bone formation activities etc. [1-4]. Researchers have been engaged in trying out different varieties of bioyoghurt for past couple of decades for better nutritional and organoleptic qualities. But not much effort has been made to look into prospects of these bioyoghurts as important anti microbial agents.

Jackfruit is a plentiful, seasonal, 'non-cared' tree crop of Kerala as well as many parts of India. A great majority of it goes into waste since its lesser acceptability as vegetable and inconvenience to manage in a single-family kitchen.

The purpose of this study was to evaluate and compare the effects of jackfruit blend bioyoghurt to plain yoghurt, quality and its applicability as antibacterial agent.

### MATERIALS AND METHODS

**Production of fermented milk:** 10% (w/v) of skim milk powder, Himedia, India was used for preparing milk for fermentation. Lyophilised Dahi culture mix was acquired from Microbiology Division, National Dairy Research Institute, Karnal, Harayana-India. A stock culture was obtained by rehydrating it in 100 ml skimmed milk for 24 h at room temperature. Plain yoghurt was

prepared by adding starter culture 2% (v/v). For preparing fruit blend yoghurt, ripe Jackfruit pulp was first prepared by crushing and sieving it through muslin bag. This was added at 10% (w/v) to the milk and then incubated at room temperature for 14 h. At the end of 14 h the fermented products were centrifuged at 3000 rpm for 20 min and clear filtrates were taken for further analyses. Using the filtrates (whey) the following were analysed: pH, Total Soluble Proteins (TSP), Total Free Amino Acids (TFAA), proteolytic activity, organoleptic acceptability and antibacterial property.

**Chemical analyses:** pH measurement was carried out by pH meter (Systronics). Total Soluble Proteins (TSP) were determined according to Lowry's method [5]. Total free amino acids were determined by the technique of Moore and Stein [6]. 10 ml of whey were mixed with 40 ml of 15% (w/v) TCA to precipitate protein. After 30 mins, the insoluble proteins were removed by filtration. Then the clear filtrates were extracted with diethyl ether to remove trichloro acetic acid and were adjusted to pH 2.5 with HCl. An aliquot was taken for determining free amino acid. Proteolytic activity was measured according to the method of M.E. Hull [7]. Organoleptic evaluation of whey was done by the students of School of Biosciences, Mahatma Gandhi University, Kerala, India, by scoring as mentioned by Singh and Kaul [8]. The overall acceptability of yoghurt was measured by the 9-point hedonic scale (9 = liked extremely, 8 = liked very much, 7 = liked moderately, 6 = liked slightly, 5 = neither liked nor

Table 1: Effect of fermentation on proteolytic activity of yoghurt whey with and without addition of jackfruit

Blend	pH	TSP (mg 100/ml)	TFAA (mg 100/ml)	Tyrosine (mg ml <sup>-1</sup> )
Plain yoghurt whey	5.79 (0.21)	141 (9)	27 (3)	0.14 (0.01)
Jackfruit blend yoghurt Whey	4.79 (0.01)	123 (7)	43 (4)	0.23 (0.08)

Average of six replications (±SD), TSP: Total Soluble Protein, TFAA: Total Free Amino Acids

disliked, 4 = disliked moderately, 3 = disliked slightly, 2 disliked very much, 1 = disliked extremely). Antibacterial property of jackfruit blend and plain yoghurt whey were tested according to Kirby-Bauer method [9]. Extraction of anti bacterials from whey were done by adding equal volume of acetone-methanol mixture and then concentrating on a rotary vacuum evaporator at 40°C. Anti bacterial activity were checked against pathogenic strains of *Staphylococcus albus*, *Staphylococcus aureus*, *Staphylococcus citreus*, *Shigella sonnie*, *Salmonella typhi*, *Salmonella paratyphi*, *Serratia marcencens*, *Citrobacter freundii*, *Klebsiella pneumoniae*, *Escherichia coli* and *Pseudomonas aeruginosa*.

## RESULT AND DISCUSSION

The present study reveals that pH and total soluble proteins are lower in jackfruit blend whey yoghurt while free amino acids and tyrosine value is found to be higher as compared to plain yoghurt (Table 1). This indicates that protein is broken into smaller peptides and free amino acids in jackfruit blend bioyoghurt in much faster rate in comparison to plain yoghurt. This further implies that protein digestibility is faster in jackfruit blend yoghurt. The amino acid pattern and percentage of free amino acids change from sample to sample in fermented milk products [10]. Addition of jackfruit to milk before fermentation enhanced the proteolytic pattern of lactic acid bacteria. This may be due to the increase in bacterial mass as nutrient supply is more. Also, liberation of free amino acids by booming lactic acid bacteria increases the contents of free amino acids and soluble peptides. Soluble compounds derived from casein, whey proteins and microbial cells during fermentation migrate into the whey fraction and are concentrated with whey proteins. Free amino acids and peptides of whey influence the functionality and flavour of its products. The difference is attributed to the quantity and quality of free amino acids [11]. Proteolytic enzymes produced during fermentation are responsible for increased protein digestibility.. Enhanced protein digestibility has been earlier reported in various cereal-legume blend bioyoghurts [12]. Hence consumption of products prepared out of fermented jackfruit blend bioyoghurt will

Table 2: Scorecard for yoghurt prepared from skim milk with and without jackfruit pulp

Details of scoring	Maximum points allotted	M	M J
Flavour	7	4	6
Taste	6	4	5
Consistency	4	3	3
Appearance	3	2	3
Total	20	13	17

Average of six replication. (Corrected to nearest whole number), M: Milk alone, MJ: Milk and Jackfruit, Excellent: 14-17, Very good: 10-13, Good: 8-10

Table 3: Anti bacterial property (inhibition zone in mm) of whey of plain and jackfruit blend yoghurt

Tested pathogens	M	M J
<i>Staphylococcus albus</i>	7 (1)	11 (1)
<i>Staphylococcus aureus</i>	9 (1)	14 (2)
<i>Staphylococcus citreus</i>	7 (1)	13 (1)
<i>Shigella sonnie</i>	9 (2)	14 (2)
<i>Salmonella sonnie</i>	9 (1)	12 (1)
<i>Salmonella paratyphi</i>	8 (1)	12 (1)
<i>Serratia marcencens</i>	9 (2)	13 (1)
<i>Citobacter freundii</i>	9 (2)	14 (2)
<i>Klebsiella</i>	7 (1)	11 (1)
<i>Esch erichia coli</i>	8 (1)	12 (1)
<i>Pseudoamoas aeruginosa</i>	8 (1)	13 (2)

Average of six replications (±SD), M: Milk alone, MJ: Milk and Jackfruit

definitely raise the nutritional status of vegetarians and can easily be incorporated in day-to-day diet even in low socio-economic population of tropical developing nations.. Hence the present findings could be exploited to prepare whey and other food products with jackfruit blend bioyoghurt.

Comments by the panelists of organoleptic analysis indicated that jackfruit blend yoghurt to be more desirable than plain yoghurt (Table 2). This may be further enhanced by adding suitable coloring and other flavoring agents. There are reports showing that flavored whey drinks have more nutritional and refreshing properties [13].

Results of antibacterial property have great significance (Table 3). The zone of inhibition is greater in jackfruit blend yoghurt whey for all pathogenic strains

tested when compared to plain yoghurt. Jackfruit blend yoghurt whey thus seems to produce more peptide antibacterials. It is seen to inhibit the growth of *Staphylococcus albus*, *Staphylococcus aureus*, *Staphylococcus citreus*, *Shigella sonnei*, *Salmonella typhi*, *Salmonella paratyphi*, *Serratia marcescens*, *Citrobacter freundii*, *Klebsiella pneumoniae*, *Escherichia coli* and *Pseudomonas aeruginosa*.

### CONCLUSIONS

The present results of jackfruit blend yoghurt bears significance on different counts. It has better nutritional value than plain yoghurt as the protein digestibility increased during fermentation. The chemical changes which take place during fermentation with the addition of jackfruit to milk are therefore of great interest as overall protein turnover becomes faster, influencing the nutritional status and flavour altogether. Hence this finding may help in developing fermented milk products with jackfruit. Jackfruit, though seasonal, are found plentiful in India. This seasonal bounty of nature could be utilised to manufacture value added products. It may create some employment opportunities too. Yoghurt, especially fruit yoghurt is a healthier food and those who are lactose intolerant too can consume it. But, the consumption of yoghurt (except the traditional dahi consumption) is not much in our society. It is to be encouraged especially among children habituated to ice creams and convalescents. Results of antibacterial property reveal that jackfruit blend whey can be utilized in formulation of pharmaceuticals.

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