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To study the chemical properties of litchi fortified *Dahi*

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Abstract

Milk and milk products are important food for vegetarians as these are the only source of animal protein to them. The study was conducted to evaluate the changes in physico-chemical characteristics of *Dahi* due to the fortification of Litchi juice. During chemical analysis of the product several parameters was analysed, some of them shows increasing trend due to addition of litchi juice like acidity, moisture, total solid and some of parameters show inverse relationship like fat, protein, ash and pH i.e. their value decreases as we increase the amount of Litchi juice. From this study, we can say that addition of Litchi juice in *Dahi* not only increases its functional value but also affects its chemical properties significantly.

Keywords: fortification, parameters, functional, vegetarians, chemical

Introduction

An estimated 50-55 per cent of milk produced in India is converted into a variety of traditional milk products using processes such as coagulation, desiccation and fermentation (Aneja *et al.*, 2002) ^[1]. Historically the fermentation of milk can be traced back to around 10,000 B.C. It is likely that fermentation initially arose spontaneously from indigenous micro flora in milk. Fortunately, the bacteria were *Lactococci* and *Lactobacilli* which typically suppress spoilage and pathogenic organisms effectively. Fermented milk products also known as cultured dairy products are dairy foods that have been fermented with lactic acid bacteria such as *Lactobacilli*, *Lactococcus* and *Leuconostoc*. Fermentation process not only increases the shelf life of the product but also adds to taste and improves the digestibility of milk. Fermented milk represents an excellent source of nutrients such as calcium, protein, phosphorus and riboflavin. During fermentation of milk, lactic acid and other organic acids are produced and these increase the absorption of iron. If it is consumed at meal times, the acids are likely to have positive effect on the absorption of iron from other foods (Joshi and pandey, 1999) ^[8]. *Dahi* is generally consumed in its original form as an accompaniment to the meal or it may be converted into raita. *Dahi* may be consumed as such or as sweet or savoury drink as a dessert containing sugar, spices, fruits, nuts, etc. an extensive all India survey project on *Dahi* revealed that there are, broadly speaking, two types of *Dahi* revealed that there are, broadly speaking, two types of *Dahi* prevalent in the country for direct consumption, viz., a sweet/mildly acidic variety with a pleasant flavor, and a sour variety with a sharp, acidic flavor (Aneja *et al.*, 2002) ^[1].

Litchi, like citrus fruits, is an excellent source of vitamin C; 100 g fresh fruits provide 71.5 mg or 119% of daily-recommended value. Studies suggest that consumption of fruits rich in vitamin C helps body develop resistance against infectious agents and scavenge harmful, pro-inflammatory free radicals. Vitamin C is also essential to the production of collagen, a well-functioning immune system and healthy teeth and bones. It is an antioxidant, helping rid the body of free radicals that contribute to disease and aging. Litchi also contains a very good amount of minerals like calcium, phosphorus, zinc, selenium, potassium and copper. Potassium is an important component of cell and body fluids help control heart rate and blood pressure; thus offers protection against stroke and coronary heart diseases. In 1 cup of fresh litchi, or 28.34g of dried, you get about 300 mg of potassium, more than in a small orange. Potassium is an essential mineral that helps regulate heart rhythms. It is also an electrolyte which helps muscle contraction and fluid balance. Copper is required in the production of red blood cells. Litchi is also a source of magnesium and phosphorus, to support strong bones. Fresh litchi is also a source of vitamins B, specifically riboflavin, niacin, vitamin B-6 and folate. These vitamins are important to red blood cell health and metabolic processes.

Litchi consists of unsaturated fatty acids that aid in the absorbing beta carotene and various other fat soluble vitamins. It aids in preventing blood clots, serious damage to the cells and also minimizes strokes to 50% in heart attack patients. The litchi is said to relieve coughing. It has beneficial effect on gastralgia, tumors and enlargements of the glands. Litchi contains 66% glucose, 5% sucrose, total sugar content is more than 70%, ranks first in a variety of fruit, has effect on supply energy, add nutrition. As the researches show, litchi has effect on brain tissue, obviously improve agrypnia, amnesia, tired. The flesh of lychee helps overcome stomach upsets and stomach ulcers. Litchi tonifying spleen, can calm the adverse-rising energy, it is the dietary supplements for intractable hiccups and diarrhea.

Materials and Methods

Chemical tests

After the organoleptic evaluations all Litchi Fortified *Dahi* samples were chemically analysed in the laboratory for composition. The following parameters were determined:

- Acidity content
- pH
- Moisture content
- Fat content (%)
- Protein (%)
- Total solids content (%)
- Ash content (%)

Flowchart of litchi fortified *Dahi*

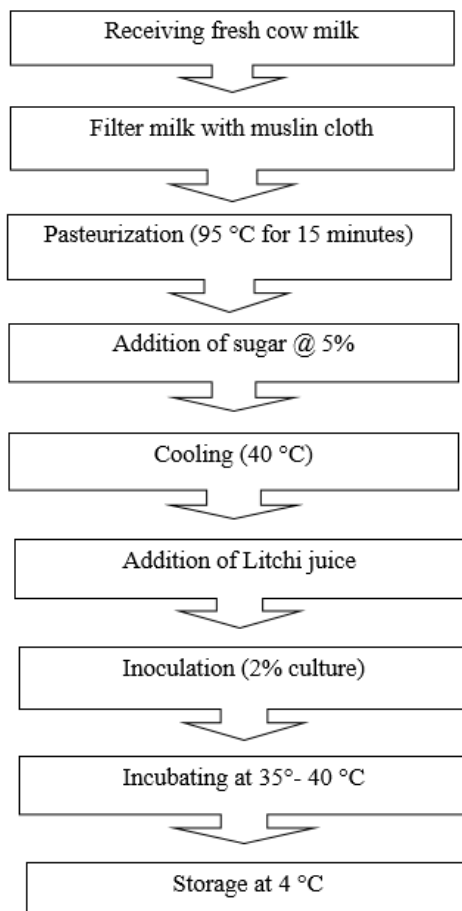


Table 1: Shows the various combination of preparation of litchi fortified *Dahi*

Treatment	Cow Milk (MI)	Litchi Juice (MI)	Sugar
T ₀ (0%)	200	0	0
T ₁ (10%)	200	20	5%
T ₂ (15%)	200	30	5%
T ₃ (20%)	200	40	5%

(0% to 20%- Amount of litchi juice on the basis of milk)

Results and Discussion

Litchi fortified *Dahi* was prepared by taking different levels of litchi juice @ (0%, 10%, 15%, 20%) in different treatments (T₀, T₁, T₂, T₃) respectively, and sugar level in this *Dahi* was kept constant at 5% of cow milk. Culture of *Lactobacillus lactis spp.* 2% was used. Different treatment was taken to make litchi fortified *Dahi* with four replications. Experimental findings are based on Chemical evaluation.

Fat: The average fat percent varies from 1.62 to 3.93, where maximum value was observed in the case of T₀ and minimum in case of T₃. Statistical analysis showed that there was significantly difference within the fat content of different treatment of *Dahi*. Generally, fruit contain low level of fat. Therefore, the addition of fruit juice might have decrease the fat percentage of *Dahi*.

Table 2: Fat Content in litchi fortified *Dahi*

Treatment	R ₁	R ₂	R ₃	R ₄	Total	MEAN
T ₀	3.9	4.0	4.0	3.8	15.7	3.93
T ₁	3.5	3.4	3.5	3.4	13.8	3.45
T ₂	2.5	2.2	2.0	2.2	8.9	2.22
T ₃	1.5	1.7	1.8	1.5	6.5	1.62
Total	11.4	11.3	11.3	10.9		

Table 3: Analysis of variance of fat content of litchi fortified *Dahi*

For comparing	SE(d)	CV%	SE.m.±	CD
Product	0.072887	3.673145	0.051339	0.164882

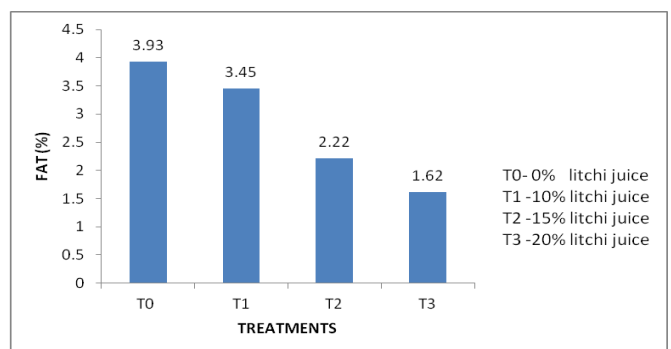


Table 4: Graphical presentation of fat content in litchi fortified *Dahi*.

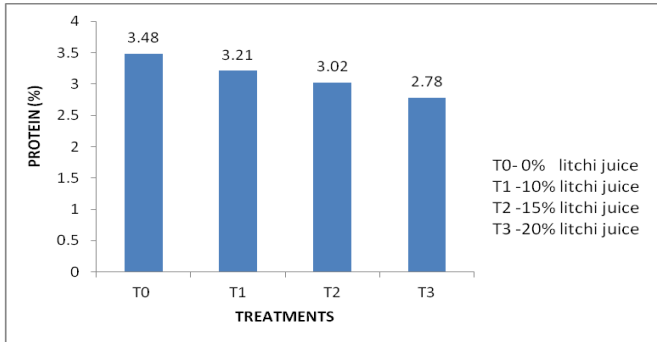
Protein: The average value of protein ranges from 2.78 to 3.48. Statistical analysis showed that there was significant difference within the protein content of different treatment of *Dahi* samples. The protein content was higher in T₀ (3.48 %) and lower in T₃ (2.78 %). The protein content decreased due to addition of fruit juice which contains lower protein than milk.

Table 5: Protein content in litchi fortified *Dahi*.

Treatment	R ₁	R ₂	R ₃	R ₄	Total	MEAN
T ₀	3.50	3.48	3.44	3.50	13.92	3.48
T ₁	3.19	3.19	3.22	3.25	12.85	3.21
T ₂	3.06	2.99	3.04	2.99	12.08	3.02
T ₃	2.76	2.81	2.77	2.80	11.14	2.78
Total	12.51	12.47	12.47	12.54		

Table 6: Analysis of variance of protein in litchi fortified *Dahi*

For comparing	SE(d)	CV%	SE.m.±	CD
Product	0.022981	1.040208	0.01625	0.051987



Graphical presentation of protein content in litchi fortified *Dahi*.

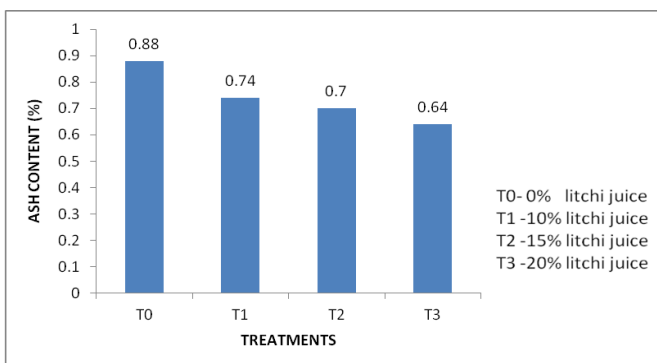
Ash: The average ash percent of different treatment varies from 0.64 to 0.88, Where maximum value attained by treatment T₀ and minimum by T₃. Statistical analysis showed that there was significantly difference within the ash content of different treatment of *Dahi*.

Table 7: Ash Content in litchi fortified *Dahi*

Treatment	R ₁	R ₂	R ₃	R ₄	TOTAL	MEAN
T ₀	0.89	0.87	0.90	0.87	3.53	0.88
T ₁	0.75	0.73	0.76	0.72	2.96	0.74
T ₂	0.71	0.72	0.69	0.69	2.81	0.70
T ₃	0.64	0.66	0.64	0.65	2.59	0.64
Total	2.99	2.98	2.99	2.93		

Table 8: Analysis of variance of Ash in litchi fortified *Dahi*

For comparing	SE(d)	CV%	SE.m.±	CD
Product	0.010688	2.044334	0.007558	0.024178



Graphical presentation of ash content in litchi fortified *Dahi*.

Acidity: The average values of acidity in percentage were found as 0.65, 0.72, 0.75, and 0.81 for T₀, T₁, T₂ and T₃ respectively. Statistical analysis showed that the difference of acidity percentage among of different treatment were significant in litchi fortified *Dahi*. This might be due to the addition of fruit juice which might have increases the rate of

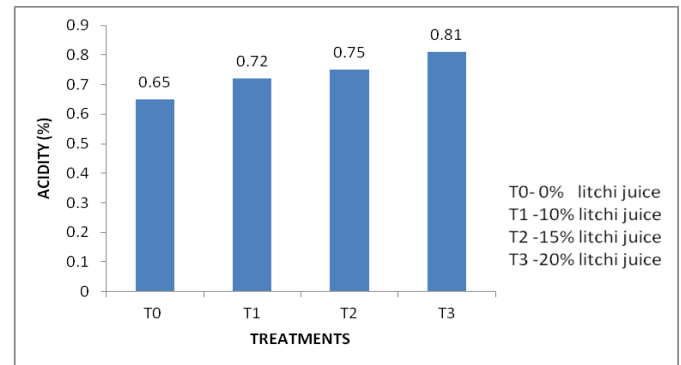
fermentation of milk. This was the main reason of increased acidity in fruit *Dahi*.

Table 9: Acidity in litchi fortified *Dahi*

Treatment	R ₁	R ₂	R ₃	R ₄	TOTAL	MEAN
T ₀	0.66	0.65	0.66	0.66	2.63	0.65
T ₁	0.73	0.71	0.74	0.73	2.91	0.72
T ₂	0.75	0.76	0.74	0.75	3.00	0.75
T ₃	0.80	0.82	0.82	0.81	3.25	0.81
TOTAL	2.94	2.94	2.96	2.95		

Table 10: Analysis of variance of acidity in litchi fortified *Dahi*

For comparing	SE(d)	CV%	SE.m.±	CD
Product	0.007289	1.398848	0.005154	0.016488



Graphical presentation of acidity in litchi fortified *Dahi*.

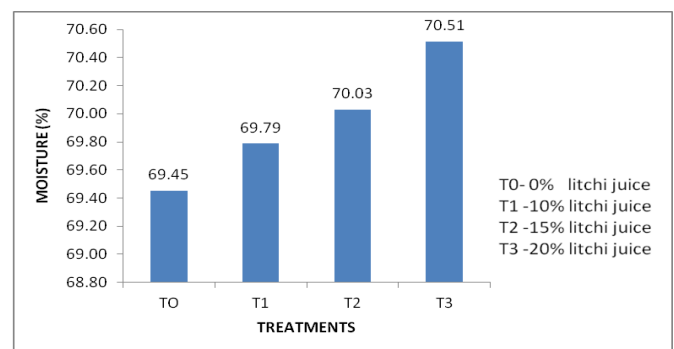
Moisture: The average values of moisture percent of different treatments of *Dahi* samples varies from 69.45 to 70.51, respectively. Statistical analysis showed that significant difference was found in different *Dahi* samples. The highest moisture content was in T₃ (70.51) and lowest in T₀ (69.45).

Table 11: Moisture content in litchi fortified *Dahi*

Treatment	R ₁	R ₂	R ₃	R ₄	Total	Mean
T ₀	69.45	69.44	69.45	69.46	277.8	69.45
T ₁	69.78	69.80	69.77	69.80	279.15	69.79
T ₂	70.04	70.02	70.02	70.03	280.11	70.03
T ₃	70.50	70.55	70.50	70.50	282.05	70.51
TOTAL	279.77	279.81	279.74	279.79		

Table 12: Analysis of variance of moisture in litchi fortified *Dahi*

For comparing	SE(d)	CV%	SE.m.±	CD
Product	0.011441	0.023133	0.00809	0.025882



Graphical presentation of total moisture content in litchi fortified *Dahi*.

Total Solids: The average values of total solid (TS) in percentage of different treatment varies from 21.10 to 23.01,

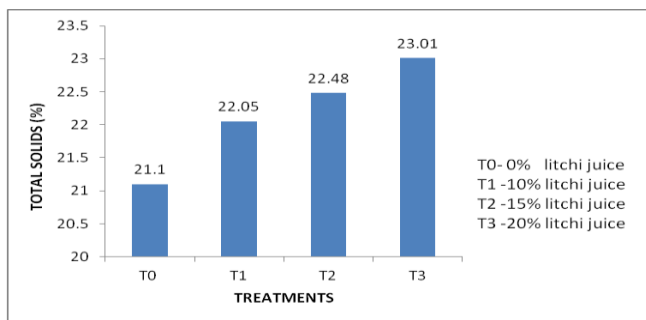
Where maximum value attained by T₃ and minimum value by T₀. Statistical analysis showed that there was a significant difference among the total solids content of different treatment of *Dahi*. Addition of litchi juice increased the total solids content compared to plain *Dahi*.

Table 13: Total solids content in litchi fortified *Dahi*

TREATMENT	R ₁	R ₂	R ₃	R ₄	TOTAL	MEAN
T ₀	21.10	21.12	21.10	21.09	85.22	21.10
T ₁	22.08	22.01	22.05	22.07	88.21	22.05
T ₂	22.50	22.48	22.50	22.47	89.95	22.48
T ₃	23.00	23.02	23.00	23.03	92.05	23.01
Total	88.68	88.63	88.65	88.66		

Table 14: Analysis of variance of total solids in litchi fortified *Dahi*

For comparing	SE(d)	CV%	SE.m.±	CD
Product	0.01559	0.099477	0.011024	0.035268



Graphical presentation of total moisture content in litchi fortified *Dahi*.

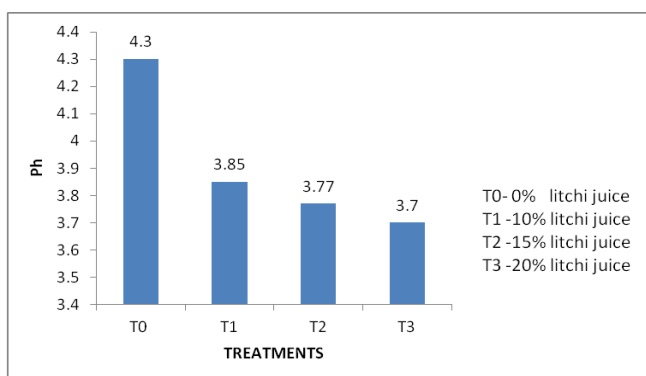
Ph: The average values of pH were 4.30 to 3.70 respectively. Where maximum value observed in T₀ and minimum value in T₃. Statistical analysis showed that there was a significant difference among the pH of different treatments of *Dahi*. Litchi juices are acidic in nature. So, additions of litchi juice the pH value of *Dahi* declines.

Table 15: pH of litchi fortified *Dahi*

TREATMENT	R ₁	R ₂	R ₃	R ₄	TOTAL	MEAN
T ₀	4.31	4.30	4.31	4.30	17.22	4.30
T ₁	3.86	3.84	3.85	3.85	15.40	3.85
T ₂	3.77	3.76	3.77	3.78	15.08	3.77
T ₃	3.70	3.71	3.71	3.70	14.82	3.70
TOTAL	15.64	15.61	15.64	15.63		

Table 16: Analysis of variance of pH in litchi fortified *Dahi*

For comparing	SE(d)	CV%	SE.m.±	CD
Product	0.005	0.180961	0.003536	0.011311



Graphical presentation of total moisture content in litchi fortified *Dahi*.

Conclusion

This experiment was conducted to increase the utilization of litchi fruit for producing *Dahi* with increased functional value, i.e litchi fortified *Dahi*. In the production of litchi fortified *Dahi* different level of litchi juice was added as 10%, 15%, and 20% and sugar at 5% level constant in each treatment. In this experiment there was four replications of each treatment and control. During Chemical analysis it was found that due to addition of litchi juice the following parameters were increased like acidity, moisture, total solids and some parameters show inverse relationship i.e. decrease in the value was observed with addition of litchi juice like fat, protein, ash and ph.

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