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Studies on physico-chemical quality parameters of skim milk yoghurt fortified with pomegranate juice

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Abstract
Yoghurt is a fermented dairy product having several health benefits, so is healthier for consumption. Yoghurt is beneficial to our digestive system, especially stomach and colon; it enhances the immune response which will in turn increase resistance to immune related diseases. Yoghurt can be developed with fruit juice which can be part of a healthy diet which increases the aesthetic value of the new product as a functional food. Pomegranate juice is used as a healthful beverage since it is a natural rich source of polyphenol, flavonoid and other antioxidant.

Keywords: yoghurt, skim milk, pomegranate juice

Introduction
Yoghurt can be defined as a cultured product obtained by using Streptococcus thermo phillus and Lactobacillus delbrueckii ssp. bulgaricus. The product should contain 0.8% lactic acid, while yeast and mold counts should not exceed 100 per gram and coliform count should not be more than 10 per gram. Yoghurt represents a very significant dairy product around the world. The per capita consumption of fermented milks including yoghurt in most countries in the world has increased dramatically over the past three decades mainly due to the nutritional value and health aspects associated with these products (Tamine, 2004) [4]. Yoghurt is fermented milk, is believed to possess special nutritional attributes even though complete supporting scientific evidence has been lacking. Its consumption seemed to be associated with population having greater longevity. Recent studies have provided evidence for beneficial role of yoghurt in human digestion and physiology. Yogurt's nutritional profile has a similar composition to the milk from which it is made but will vary somewhat if fruit, cereal or other components are added. Yogurt is an excellent source of protein, calcium, phosphorus, Vitamin B2, Vitamin B1 and Vitamin B12, and a valuable source of folate, niacin, magnesium and zinc. The protein it provides is of high biological value, and the vitamins and minerals found in milk and dairy foods including yogurt are bioavailable. Eating dairy products, such as yogurt, helps to improve the overall quality of the diet and increases the chances of achieving nutritional recommendations (Mckinley2005).

Yogurts are classified in various ways according to fat ratio, production technique, aroma, and the procedures after incubation and also sold in the market. For example, creamy yogurt (full fat), homogenized yogurt (fat and different construction technique), light yogurt (non-fat), fruit yogurt, filtration (bags) yogurt and so on. Yogurt, produced in various regions of Turkey is a very traditional type and variety of procedures and methods (eg, filtration, winter, Silivri, silifke, salt, cream, etc.). Among these, preferred is the most produced yogurt torba or süzme type. Other bag or strained type products are manufactured in different countries such as laban zeer (in Egypt), Besa (in Bulgaria), skyr (in Iceland), labneh anbaris or yogurt cheese (in the Middle East) and chakka and shrikhand (Nergiz and Seçkin, 1998; Tamime and Robinson, 2007).

Average Composition of Skim Milk Yoghurt

Table 1

Characteristics	% constituents
Moisture	90.6%
Fat	0.3%
Protein	3.6%
Ash	0.7%
Lactose	4.8%

Source: Miscellaneous

Pomegranate (*Punica granatum* L.) is one of the favorite fruits of tropical and subtropical regions. Fruit juice is valued for its medicinal properties for treating leprosy patients, dysentery and diarrhea (Singh *et al*., 1967). Pomegranate (*Punica granatum* L.) is one of the important commercial fruits in many countries and it is very well adapted to the Mediterranean climate. Pomegranate production occurs during August and September. Therefore, many processes such as cold storage, concentration, or drying are used to conserve pomegranates or their juice. Fruits and related juices contain high amounts of water (75–90%), which makes them susceptible to enzymatic and microbial deterioration reactions due to the high enzymatic and microbial activities in water.

Composition of pomegranate juice

Table 2

Parameters	%
Moisture (gm)	78
Protein (gm)	2
Fat (gm)	0
Mineral (gm)	1
Crude fiber (gm)	5
Carbohydrate (gm)	14
Energy (cal)	65
Calcium (mg)	0.1
Phosphorous (mg)	70
Iron (mg)	2

Source: Nutritive value of Indian foods

Pomegranate Health Benefits

Consumers across the world are becoming more interested in foods with health promoting functions as they gain more awareness of the links between food and health. Epidemiological studies have revealed that consumption of fruits and vegetables with high phenolic content correlates with reduced cardio- and cerebra vascular diseases and cancer mortality (Hertog *et al*., 1997). Phenolic compounds produce their beneficial effects by scavenging free radicals. Recently, there has been an increasing interest in determining dietary sources of antioxidant phenolics, and red fruits and their juices such as grape and different berry juices have received attention due to their high antioxidant activity. Pomegranate juice (PJ) has become more popular because of the attribution of important biological actions. Numerous studies over the past decade have shown that PJ contains higher levels of antioxidants compared to other fruit juices and beverages Seeram *et al*. (2008)

Materials and Methods

The experimental work was carried out in the research laboratory of department of Dairy, Technology, Warner college of Dairy Technology, Sam Higginbottom university of Agriculture, Technology and Sciences Allahabad Skim Milk - it was collected from local market of Allahabad, Pomegranate Juice was collected from local market of Allahabad. (Tropicana pomegranate juice)

Yoghurt culture

Traditional mixed yoghurt culture i.e. *Streptococcus salivarius sp. Thermo philus*and *Lactobacillus delbrueckii ssp. bulgaricus* NCDC263 were obtained from National Collection Of Dairy Culture, Dairy Microbiology Division at NDRI (National Dairy Research Institute Karnal Haryana, India).yoghurt was prepared by the different level skim milk yoghurt fortified with pomegranate juice Numbers of treatment were 4 which were replicated 5times.

Treatment Combination

1. Yoghurt from skim milk
2. Skim milk yoghurt fortified with pomegranate juice (95:5)
3. Skim milk yoghurt fortified with pomegranate juice (90:10)
4. Skim milk yoghurt fortified with pomegranate juice (85:15)

Chemical analysis of skim milk yoghurt fortified with pomegranate juice.

Fat content

Fat percentage of skim milk yoghurt fortified with pomegranate juice. Was determined by gerber method as per adopting the proceder as per ISI (1981 b).

Protein content

Protein content of skim milk yoghurt fortified with pomegranate juice. Was deatermined by Kjeldahl method described in By AOAC, 1995.

Total solid content

Total solids content of sample was done gravimetrically as per the procedure for milk laid down in IS-1475. Part –I.

Moisture content

The moisture content of the yoghurt was determined as per ISI (1981b).

Percentage of acidity

Titrable acidity of pomegranate juice mixed yoghurt samples (expressed as lactic acid) was determined as per the procedure laid down in IS: 1479.

Determination of pH

PH was determined using digital pH meter

Results and Discussion

Average of data obtained on physico-chemical analysis in five replication in control and experimental Yoghurt

Table 3

Parameters	Treatments (Mean) value				
	T_0 T_1		T_2	T_3	C.D. Value
Moisture	81.74	82.19	82.64	82.99	0.594
Totals solids	18.26	17.81	17.36	16.89	0.552
Fat	0.28	0.22	0.19	0.18	0.009
Protein	3.44	3.36	3.32	3.18	0.108
Acidity	0.72	0.75	0.77	0.79	0.019

Chemical Evaluation

Table 1: Average moisture percent of control and experimental skim milk and pomegranate juice mixed Yoghurt.

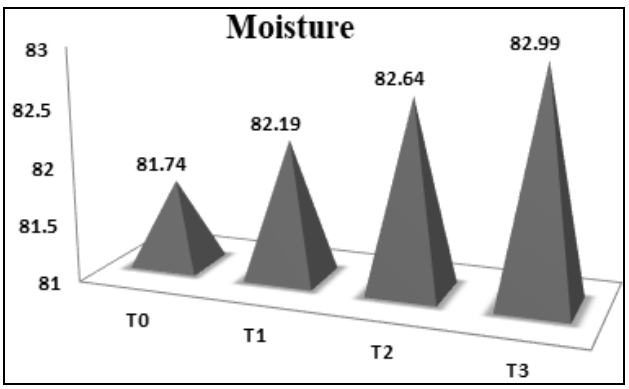

Fig 1: Average percent for Moisture in control and skim milk yoghurt fortified with pomegranate juice

The scores of T_0 (100% skim milk) ranged from 81.05-82.00, T_1 (5% juice + 95% skim milk) ranged from 81.70-82.60, T_2 (10% juice + 90% skim milk) ranged from 81.96-82.95 and T_3 (10% juice + 85% skim milk) ranged from 82.40-83.45 respectively

The highest average score Moisture percent was 82.99 in T_3 followed by T_2 82.64, T_1 82.19 and lowest average score was obtained in T_0 (81.74)

The results showed that treatment T_3 was best in Moisture percent because T_3 having suitable combination 15% juice +85% skim milk and 8% sugar.

The difference in score for Moisture of yoghurt was significant.

Table.2 Average Total solids percent of control and experimental skim milk and pomegranate juice mixed Yoghurt.

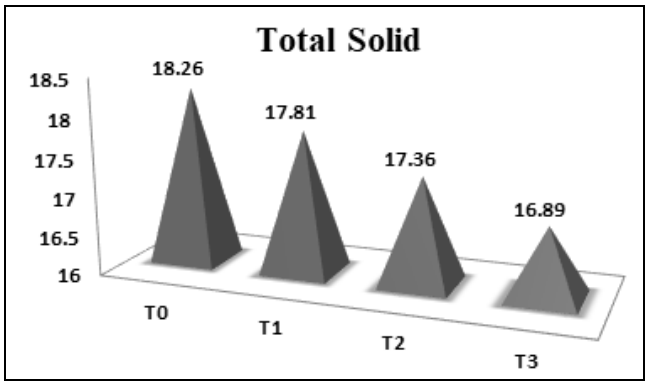

Fig 2: Average percent for Total solid in control and skim milk yoghurt fortified with pomegranate juice

The scores of T_0 (100% skim milk) ranged from 18.00-18.95, T_1 (5% juice + 95% skim milk) ranged from 17.40-18.30, T_2 (10% juice + 90% skim milk) ranged from 17.05-18.04 and T_3 (10% juice + 85% skim milk) ranged from 16.55-17.20 respectively

The highest average score Total solid percent was 18.26 in T_0 followed by T_1 17.81, T_2 17.36 and lowest average score was obtained in T_3 (16.89)

The results showed that treatment T_3 was best in Total solid percent because T_3 having suitable combination 15% juice +85% skim milk and 8% sugar.

The difference in score for Total solid of yoghurt was significant.

Table 3: Average Fat Percentage of control and experimental skim milk and pomegranate juice mixed Yoghurt.

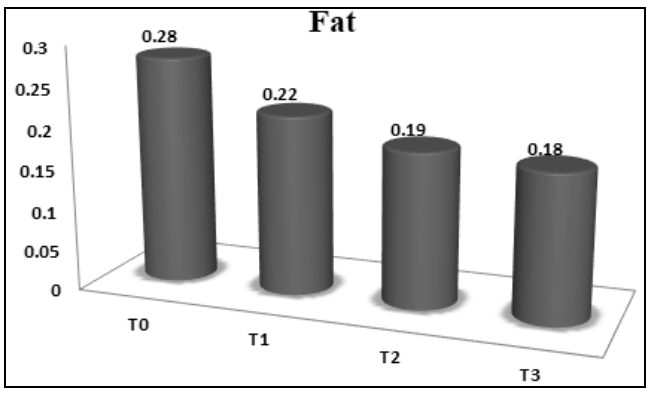

Fig 3: Average percent for Fat in control and skim milk yoghurt fortified with pomegranate juice

The scores of T_0 (100% skim milk) ranged from 0.27-0.29, T_1 (5% juice + 95% skim milk) ranged from 0.21-0.23, T_2 (10% juice + 90% skim milk) ranged from 0.17-0.20 and T_3 (10% juice + 85% skim milk) ranged from 0.17-0.19 respectively

The highest average score Fat percent was 0.28 in T_3 followed by T_2 0.22, T_1 0.19 and lowest average score was obtained in T_0 (0.18)

The results showed that treatment T_3 was best in Fat percent because T_3 having suitable combination 15% juice +85% skim milk and 8% sugar.

The difference in score for Fat of yoghurt was significant.

Table 4: Average Protein percent of control and experimental skim milk and pomegranate juice mixed Yoghurt.

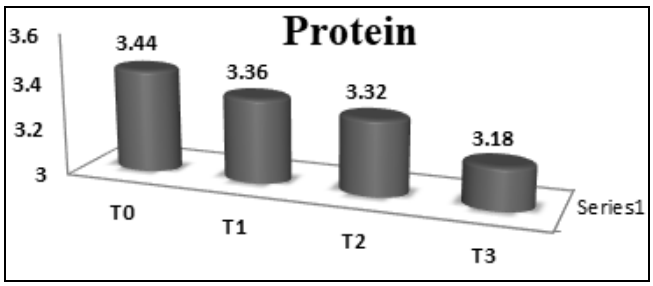

Fig 4: Average percent for Protein in control and skim milk yoghurt fortified with pomegranate juice

The scores of T_0 (100% skim milk) ranged from 3.30-3.50, T_1 (5% juice + 95% skim milk) ranged from 3.30-3.40, T_2 (10% juice + 90% skim milk) ranged from 3.20-3.40 and T_3 (10% juice + 85% skim milk) ranged from 3.10-3.30 respectively. The highest average score Protein percent was 3.44 in T_0 followed by T_1 3.36, T_2 3.32 and lowest average score was obtained in T_3 (3.18)

The results showed that treatment T_3 was best in Protein percent because T_3 having suitable combination 15% juice +85% skim milk and 8% sugar.

The difference in score for Protein of yoghurt was significant.

Table 5 Average percent of Acidity control and experimental skim milk and pomegranate juice mixed Yoghurt.

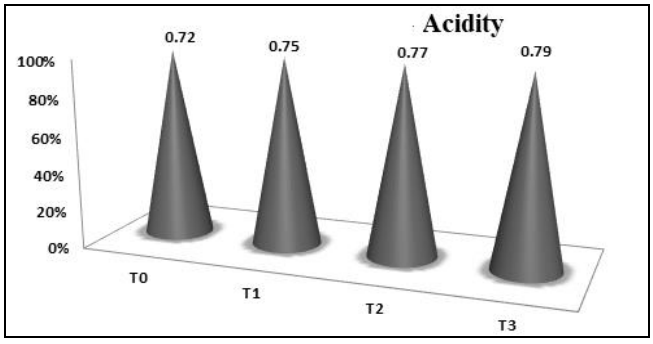

Fig 5: Average percent for Acidity in control and skim milk yoghurt fortified with pomegranate juice

The scores of T_0 (100% skim milk) ranged from 0.71-0.73, T_1 (5% juice + 95% skim milk) ranged from 0.73-0.76, T_2 (10% juice + 90% skim milk) ranged from 0.74-0.79 and T_3 (10% juice + 85% skim milk) ranged from 0.76-0.82. Respectively.

The highest average score Acidity percent was 0.79 in T_3 followed by T_2 0.77, T_1 0.75and lowest average score was obtained in T_0 (0.72)

The results showed that treatment T_3 was best in Acidity percent because T_3 having suitable combination 15% juice +85% skim milk and 8% sugar.

The difference in score for Acidity of yoghurt was significant.

Conclusion

From the experimental result obtained during the present investigation, it may be concluded that the yoghurt can be successfully prepared by using skim milk which was standardized to (0.3% fat and 8.7% SNF) 15% pomegranate juice & 8% sugar. Yoghurt fortified with 15% pomegranate juice. On the basic of chemical analysis (treatment T_3) was found to be best Optimized product of Yoghurt (T_3) had more moisture, acidity and (treatment T_1)had more protein, fat &total solids, as compared to the control (T_0)product.

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References

1. Anonymous. Drinking yoghurt from Denmark. Dairy Industry International. 2001; 51(4):34-35.
2. AM Hassanein, Eman TA Yousef, Hoida AM El Shazly. Effect Concentrated Pomegranate on Probiotic Yoghurt. World Applied Sciences Journal. 2014; 30 (5):567-574, 2014.
3. Cam M, HisIl Y, Durmaz, G. Classification of eight pomegranate juices based on antioxidant capacity measured by four methods, Food Chemistry. 2009; 112: 721-726.
4. Deeth HC, Tamine AY. Yoghurt: Nutritive and therapeutic aspects. J. Food Prot, 1981, 44: 78.
5. Eshmail P, Madora Thakhani K, Takalani Mpho, E Mashau. Yoghurt is considered as a healthy food and incorporating carrot powder will make it even healthier, 2016.
6. FAO/WHO. In joint committee of Govt. Experts on the code or principles concerning milk and milk products report, 18th session. No.CX5/70, FAO, Rome, Italy, 1976.
7. IDF. Compositional standards for fermented milks.47: 192.in ice cream with WPC and hydrolyzed lactose. NZ J. Dairy Sci. Technol. 1969; 19:255-265.
8. Kaup SN. Bioavailability of calcium in yoghurt and its relationship to the hypochlesterolaemic properties of yoghurt. Food Sci. Technol. Abstr. 1988; 20:7173.
9. Mehanna NM, Gone S. Manufacture of yoghurt from milk fortified with whey powder. Egyptian. J. Dairy Sci 1988; 16:239.
10. Marwa M, El Said a, HF Haggag b, Hala M, Fakhr El Din a, AS Gad a, *et al.* Antioxidant activities and physical properties of stirred yoghurt fortified with pomegranate peel extracts. Annals of Agricultural Science, 2014, 59(2).
11. Mehanna NM, Gone S. Manufacture of yoghurt from milk fortified with whey powder. Egyptian. J. Dairy Sci, 1988; 16:239.
12. Tamime AY, Robinson RK. Tamime and Robinson's Yoghurt: Science and Technology, second ed. CRC Press LLC, Boca Raton, J. Agric. Food Chem. 1999; 51:601-608.
13. Tamime AY, RK Robinson. A general and acceptability of Bio-yoghurt. Proc. 7 Egyptian Treatment of Yogurt and its Manufacture; Science Conf. and Technology, Pergamon Press, Oxford. 23. Driessen, F.M. and Z. Puhan, 1988. Technology of, 1985.
14. Saint Eve A, Levy C, Martin N, Souchon I. Influence of proteins on the perception of flavored stirred yogurts. J. Dairy Sci. 89, 922–933. Shiban, M.S., Al Otaibi, M.M., Al-Zoreky, N.S., 2012. Antioxidant activity of pomegranate (*Punica granatum* L.) fruit peels. Food Nutr. Sci. 2006; 3:991-996.
15. Santosh Parimita, Kishor K, Singh H, Rai BS, Dey S. sensory acceptability of yoghurt prepared from a blend of goat and cow milk The Pharma Innovation Journal. 2017; 6(10):205-208
16. Santosh, Kishor K, Parimita, Waddi L, Majumdar S, Singh V. Studies on physicochemical parameters of yoghurt incorporated with goat milk and cow milkInternational Journal of Chemical Studies. 2018; 6(2):1716-1720.
17. Valenzkey R. Fruit is a key ingredient in yoghurt-A success story. AmericanDairy Rev. 1978; 40:53.
18. Vance grosser R. How to make and sell hard frozen yoghurt. American Dairy Rev. 1978; 40:1453.
19. Singh RP, Chidambara KN, Jayaprakasha GK. Studies on the antioxidant activity of pomegranate (Punica granatum) peel and seed extracts using in vitro models. J. Agric. Food Chem. 50, 81–86. SPSS, 1999. SPSS for Windows. Release 10.0 (27 Oct., 1999). Standard Version. Copyright SPSS Incs, 1989–1999, 2002.