Development of Fruit Juice Yogurt by Utilization of Jackfruit Juice: A Preliminary Study on Sensory Evaluation, Chemical Composition and Microbial Analysis

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Abstract— **The study was designed to produce fruit juice yogurt by the addition of jackfruit juice which is nutritious as well as the delicious food. It also provides some nutrients which are beneficial for our health. An investigation was carried out to develop the acceptable prepared yogurt using different level (5%, 10% and 15%) of jackfruit juice. The different chemical, microbiological and sensory quality characteristics were analyzed. The statistical analysis showed that panelist acceptability was decreased with the increase of fruit juice level. In comparing all sensory characteristics 10% jackfruit fruit juice yogurt sample was not significantly (P>0.05), different from 5% jackfruit juice yogurt sample and 5% fruit juice yogurt sample was not significantly different (p>0.05) from plain(0% jackfruit juice) yogurt. 15% jackfruit juice yogurt sample was significantly different from plain yogurt. In comparing chemical analysis total solid and acidity were increased with jackfruit juice incorporation as jackfruit juice contain higher total solid (23.38%) and acidity (0.59%). While protein and fat content were decreased of prepared yogurt samples with the addition of jackfruit juice as juice contain low protein (1.75%) and fat (0.76%). The microbiological quality was also acceptable. Experiment showed that various types microbial (TVC, TFC) counts were reduced due to high acidity of jackfruit juice. The findings of the research may give a suggestion to prepare yogurt successfully by adding different proportion of jackfruit juice with milk and among them 15% jackfruit juice yogurt showed slightly better taste owing to high acid content.**

Keywords*— *yogurt, jack fruit juice, milk, organoleptic test, microbial test

I. INTRODUCTION

Yogurt as a dairy food can be consumed in form of snack, thirst quenching beverages and as a desert. It is semi solid custard like product. It is the product obtained from pasteurized or boiled milk by souring, natural or otherwise, by a harmless lactic acid or other bacterial culture. Yogurt may contain additional cane sugar. Sugar was added at the rate of 8 to 10% during preparation. It should have same percentage of fat and solids-not-fat as the milk which is prepared [1].

Milk is very nutritious and obligatory food for human being. But in this era of industrialization, food habit of common people is changing. They are preferable as it is healthy, delicious foods to fresh raw foods. Hence, milk is converted to various milk products, like yogurt, fermented milk, cheese, butter, yogurt, milk ice-cream etc. of which yogurt is locally available dairy product in Indian sub-continent.

Like milk, yogurt is also very nutritious as it is a good source of iodine, calcium, phosphorus, zinc, riboflavin, vitamin B5 and vitamin B12. It is also nutritionally rich in protein, molybdenum and pantothenic acid [2]. The food rating system adopted as the government standard for food labeling that are found in the U.S food and drug administration allow yogurt to be rated as one of the world's healthiest food.

It has been demonstrated that acid milk is somewhat easily digestible than normal milk. For some individuals, yogurt has a definite therapeutic value, especially, who usually suffer from stomach and intestinal disorders. The use based on the assumption that the acid fermenting bacteria and lactose of milk are able to create conditions in the intestinal tract which are unfavorable for the growth of putrefactive, bacteria and thereby prevents the formation of gas and a condition known as autointoxication. Consumption of fermented milk products is associated with several types of health benefits partly because of their content of lactic acid bacteria. Several experimental observations have indicated a potential effect of lactic acid bacteria against the development of colon tumors. A wide range of other health benefits include, improved lactose digestion, prevent diarrhea, immune system modulation & serum cholesterol reduction. Although, fermented milk products are safer foods i.e. disease producing organisms can't survive there in high acidity, still it may be contaminated with molds and coliforms [3].

In Bangladesh, yogurt is one of the most popular fermented milk products made in mud pots usually from cow milk, sometime from buffalo milk. The bacteria used are *Lactobacillus bulgaricus*, *Lactobacillus plantarum* and *Streptococcus thermophilus* and/or *Streptococcus lactis*. Lower temperature (37^0-42^0C) and long incubation period (8-15h) is required for yogurt preparation. In this subcontinent, the production of different types of yogurt from milk is about 7% in India, 4-5% in Pakistan and Bangladesh [4].

Jackfruit *(Artocarpus heterophyllus)* is the second most important fruit in Bangladesh after banana with about 17% of total fruit production of the country. In many districts like Tangail, Mymensingh, Dhaka, and adjoining areas, many jackfruit trees grow in the wild near and in forest edges. Jackfruit juice is rich in carbohydrates and is a good substrate for fermentation. It contains various types of nutrients such as fat, dietary fiber, protein, calcium, vitamin-A, vitamin-C, thiamin, riboflavin, niacin, vitamin B6, folate etc [5]. Bangladesh is a secondary center of diversity for jackfruit; this implies that it was domesticated elsewhere and subsequently introduced to Bangladesh, where the crop was then diversified [6]. In Bangladesh this fruit is consumed as fresh. So, on season lots of fruits spoil and remain unutilized. It is time to find diversified application and value added product for jackfruit.

Fortified yogurt refers to the yogurt which is made with any sorts of fruits juice. Like strawberry, mango, orange, grape etc. During such kind of yogurt generally prepared from mixed culture of *Streptococcus lactis*, *Streptococcus diacetilactis* and *Streptococcus cremoris*, however highly aromatic sweet results using *Lactobacillus planetarium* in place of *Streptococcus citrofilus.* By adding such juice prepared yogurt becomes good quality and good taste along with better specific used fruit flavor [7]. It can also increase the demand of produced yogurt. Not only taste but also it can increase the diversity of the uses of fruit juice like jackfruit juice into the produced yogurt. So, now a day's such kind of yogurt among them jackfruit juice may be popular all over the world in case of prepared fruit juice yogurt. Color, flavor and taste of prepared yogurt depend on raw material used as well as manufacturing process. Good quality yogurt should be smooth, glossy surface, no crack or holes on the surface, no whey syneresis, no off flavor. The utilization of different fruit juice in yogurt has been investing worked by a number of researchers in the world. But in Bangladesh a little work has been done on it. For that reason the present research was done to improve the quality of fruit yogurt incorporating different level of locally available jackfruit juice.

The specific objectives were (i) to analyze the different chemical quality parameters of the raw materials (milk and jackfruit juice) of produced yogurt (ii) to prepare fortified yogurt by using different level of jackfruit juice (iii) to analyze the different chemical quality parameters of the plain yogurt and jackfruit juice yogurt (iv) to count the microbiological growth of the plain yogurt and jack fruit juice yogurt and (v) to assess the organoleptic quality of the plain yogurt and jackfruit juice yogurt.

II. MATERIALS AND METHODS

Sulfuric acid (Merck KGaA), Petroleum ether (APS Finechem), Sodium hydroxide (Merck), Petroleum benzene (Merck), Ethyl alcohol (Merck), Diethyl ether (Merck), Potassium sulphate (Merck) and Copper sulphate (K2So4 and CuSo4.5H2O) (Riedel-de Haen), Anhydrous sodium carbonate (Merck), Methyl red indicator (Merck), various culture media include- Nutrient Agar (Merck), Eosin Methylene Blue (EMB) agar from Merck , Potato Dextrose Agar (PDA) from Merck Kgaa were used in our study which were at analytical grade. Milk, jackfruit juice, sugar etc. were collected from local market and the equipments were used for this experiment were crucible, desiccator, weighing balance (WTB200), filter paper (Double Rings 102, Oven (JSON-050), Soxhlet apparatus (LASSCO), Kjeldahl apparatus (KDN-08B and KDN-06C), oven (TOSHIN RGT-MW 28L2), Muffle furnace (JSMF-45T), refrigerator, bowl, cooler, boiler heater, thermometer, small size earthen pots etc.

Preparation of Jackfruit Juice Yogurt

The milk was first heated to 70^0C for 15 -30 minutes. After that sugar was added and heated to about 80^0C until concentrate by reducing of its original volume (one third volume of original milk) with continuous stirring for 5 minutes. Also, added clarified jackfruit juice in various proportion (0%, 5%, 10%, and 15%) prior inoculations raised the nutritive value of yogurt and gives a product of better body and consistency. The four types of produced product were designed by A (milk+0% jackfruit juice), B (milk + 5% jackfruit juice), C (milk + 10% jackfruit juice) and D (milk + 15% jackfruit juice) cooled in container containing cold water and inoculated with 1 spoon yogurt and maintained the temperature of 35 -37^0C for 16 to 18 hours approximately until desired degree of acidity and coagulation was achieved. Then cool rapidly to 5-10^0C. Finally desired yogurt was formed.

Physical (Organoleptic or Sensory) Analysis

Various methods have been used to measure food preferences. The most common method is a questionnaire of generated foods or food categories in which a hedonic scale is used to rate the degree of likings. Hedonic scale is an organoleptic quality rating scale where the judge expresses his degree of likings. A 9 point balanced scale was used. Overall tests were conducted by using nine point Hedonic scales [8]. The general form of the scale: 1. Dislike extremely, 2. Dislike very much, 3. Dislike moderately, 4. Dislike slightly, 5. Neither like nor dislike, 6. Like slightly, 7. Like moderately, 8. Like very much, 9. Like extremely. Appearance, color, flavor, texture, body and consistency, syneresis, overall acceptance (taste) tests of the samples were accomplished. This test had been used by expert and untrained panelists, but it was felt to be more effectively applicable. The 11 untrained panelists were teachers and students of Food Technology and Nutritional Science, Department of Moulana Bhasani Science and Technology University, Bangladesh. In Hedonic scaling, response, i.e. state of like and dislike are measured on a rating scale. The essential features of the Hedonic scale were its assumption of

a continuum of preferences and the direct way it defined the categories of response in terms of like and dislikes. Points given by the sensory panel based on the likings and disliking were analyzed by SPSS program (17.0) and Microsoft Excel 2007.

Chemical Composition Analysis

All the samples were subjected to chemical quality assessment. Moisture was determined by oven-drying method, Ash was determined by incineration method, Fat was determined by the modified Rose- Gottlieb Method, Protein by Kjeldahl method and Crude fiber by [9] method. pH is the measurement of H+ ion activity; it measures active acidity. pH may be determined by measuring the electrode potential between glass and reference electrodes. The pH of sample was determined with a pH meter (Hanna Instrument)

Microbiological Analysis

All the samples were conducted by various microbial parameters. Total Viable Count (TVC), Total Coliform Count (TCC), Total Fungal Count (TFC) was done according to the standard methods for the examination of dairy products [10].

Data Analysis

All the ends of data collection, data were complied, tabulated and analyzed. Statistical analysis of the data generated out of the chemical analysis of various samples was done with the help of Microsoft Excel 2007. The local units were converted in to the standard units. The qualitative data were transferred into quantitative data. Microsoft office word and Microsoft excel 2007 were used for data analysis and presentation. Various descriptive statistical measures such as percentage, mean, standard deviation (SD) etc. were used for categorization and describing the variable. Different tables, graphs, charts etc. were used for the presentation of findings. Moreover, all data found from the experiment were statistically analyzed using one way and two way Analysis of Variance (ANOVA) at a 0.05 significance level. Duncan's Multiple Range Test (DMRT) was used to compare treatment means, if a significance difference was detected at a 0.05 level of significance.

III. RESULTS AND DISCUSSION

Chemical Qualities of Milk & Jackfruit Juice Sample

Table 1 shows the chemical composition of milk & Jack fruit juice sample. Moisture, total solids, protein, fat, ash, acidity, pH content and specific gravity of the selected samples were analyzed for their chemical qualities.

The moisture content of milk was 89.20%; average specific gravity of milk sample was 1.03, average total solid, protein, fat and ash content of milk samples were 10.80, 2.2, 4.16, 0.47 percent respectively.

Table-1: Chemical Qualities of Milk & Jackfruit Juice Sample

Constituents	Milk	Jackfruit juice
Moisture (%)	89.20±0.16	76.62±0.05
Total solid (%)	10.80±0.16	23.38±0.05
Protein (%)	2.27±0.01	1.75±0.01
Fat (%)	4.16±0.06	0.76± 0.01
Fiber (%)	Not done	1.71±0.01
Ash (%)	0.47±0.005	0.89±0.12
Acidity (%)	0.18±0.01	0.59±0.01
pH	6.55±0.34	5.05±0.05
Specific gravity	1.03±0.005	Not done

Average three replication ± SD

All the above mentioned parameters of milk samples were also within normal range. Acidity (0.18%) and pH value of milk samples were also within normal range (6.55). Similar result was found by [11] and [12]. Analysis of jackfruit juice also shows that average moisture, total solids, protein, fat, fiber and ash content of the samples were 76.62, 23.38, 1.75, 0.76, 1.71 and 0.89 percent respectively. It also was observed by [13].

Chemical Quality Assessments of Different Types of Prepared Yogurt

Chemical composition of different types of prepared yogurt is given in Table 2. Moisture, total solids, protein, fat, ash, acidity and pH content of the selected samples were analyzed for their chemical qualities.

Table-2: Comparison of Chemical Composition of Different Types of Prepared Yogurt

Constituents	A	B	C	D
Moisture (%)	66.58±0.62	65.61±0.42	64.87±0.23	63.26±0.21
Total solid (%)	33.41±0.62	34.28±0.35	35.24±0.22	36.73±0.21
Protein (%)	4.55±0.02	4.46±0.03	4.34±0.05	4.23±0.08
Fat (%)	7.33±0.02	6.72±0.03	6.71±0.02	6.64±0.03
Ash (%)	0.905±0.009	0.88±0.06	0.87±0.01	0.86±0.02
Acidity (%)	0.97±0.01	0.98±0.008	1.01±0.03	1.16±0.07
pH	4.52±0.02	4.48±0.02	4.45±0.03	4.39±0.008

Average three replications ± SD. A (milk+ 0% jackfruit juice), B (milk+ 5% jackfruit juice), C (milk+10% jackfruit juice), D (milk+15% jackfruit juice).

The comparison of data in respect of chemical quality of yogurt samples is presented in Table-2. It was observed that among the samples, A (0% or plain yogurt) contained higher moisture content (66.58%) and yogurt with D (15% jackfruit

juice) had lowest moisture content (63.26%). Moisture content of prepared yogurt reduces with the addition of jackfruit juice content as jackfruit juice composed of more total solid. It was observed that D sample of yogurt had highest total solid (36.73%) than other types of produced yogurt due to addition of jackfruit juice. While sample A had lowest total solid (33.41%) as it had no jackfruit juice. On the other hand, protein, fat and ash content of yogurt samples decreased owing to the addition of jackfruit juice with milk. Jackfruit juice had lower amount of protein, fat and ash. As jackfruit juice contained more total solids than milk and for this reason addition of jackfruit juice increased the total solids content of yogurt samples. For this reason, addition of jackfruit juice decreased the protein, fat and ash content of yogurt.

The average acidity content of yogurt A, B, C and D samples were 0.97, 0.98, 1.01 and 1.16 % respectively. Statistical analysis showed that the difference between the acidity of different types of prepared yogurt samples did not differ significantly. Addition of jackfruit juice increased the amount of acidity slightly. This was owing to quick fermentation nature of jackfruit juice.

Microbiological Quality Assessments of Different Types of Prepared Yogurt

In this study 3 different tests TVC, TCC, TFC were conducted to compare the microbiological quality of different types of prepared jackfruit juice yogurt samples.

Total Viable Count (TVC)

TVC of a yogurt sample gave an indication of the total number of viable cells (microorganisms) present in the prepared yogurt. Total viable count of different types of prepared jackfruit juice yogurt samples A, B, C and D were 2.52×10^7, 1.85×10^7, $1.75\times10^7$and 1.52×10^7 cfu/ml respectively are presented in the Table-3. TVC was higher in A type of yogurt compare than other (B, C, D) samples of yogurt owing to addition of jackfruit juice as it can increase the amount of acidity so plain (A type yogurt as free from jackfruit juice). So, all sorts of yogurt prepared from jackfruit juice were considered as safe for human consumption.

Table -3: Microbiological Quality Assessments of Different Types of Prepared Yogurt

Microbial parameters	**A**	**B**	**C**	**D**
TPC (cfu/ml)	2.52×10^7	1.85×10^7	1.75×10^7	1.52×10^7
TCC (cfu/ml)	Nil	Nil	Nil	Nil
TFC (cfu/ml)	1.78×10^4	1.70×10^4	1.51×10^4	1.01×10^4

Average three replications. A (milk+ 0% jackfruit juice), B (milk+ 5% jackfruit juice), C (milk+10% jackfruit juice), D (milk+15% jackfruit juice).

Total Coliform Count (TCC)

The total coliform count of different types of prepared samples gave an indication of the total number of pathogenic bacteria present in the yogurt. Coliform is a dangerous bacterium mostly available in the nature and may cause diarrhea. TCC was nil in all sorts of prepared yogurt sample. The finished products should have coliform less than 10cfu/ml as recommended by Bangladesh Standards Testing Institute (BSTI). But in this study coliform count of all sorts of prepared yogurt sample remained nil respectively which are showed on the Table 3. Thus four (A, B, C and D) samples of prepared yogurt samples also were considered as safe for consumption.

Total Fungal Count (TFC)

TFC was recorded for A, B, C and D were 1.78×10^4, 1.70×10^4, 1.51×10^4 and 1.01×10^4 cfu/ml respectively are expressed in the Table-3. As per microbial standard, fungal count of all sorts of prepared yogurt samples remained in the acceptable range $\leq3.34\times10^4$ also observed by [14]. So, prepared yogurt samples were considered as safe for consumption. The mold content of the prepared yogurt depends upon the preparation, handling and storage condition. More yeast and mould count is found in the prepared yogurt for large vendors compare to household sample [15].

Physical Quality Assessments of Different Types of Prepared Yogurt

Organoleptic tests of the prepared yogurt depend on its appearance, color, flavor, texture, consistency, syneresis and overall taste of the sample. The comparison among prepared yogurt of their organoleptic quality factors are presented on Table- 4. The general form of the organoleptic hedonic scale was used in the following rated:

The overall band score of all types of prepared yogurt was acceptable in quality but their specific characteristics was slightly differs by the test panel board.

Table-4: Comparison of Physical Qualities of Different Types of Prepared Yogurt

Constituents	**A**	**B**	**C**	**D**
Appearance	8.3^{a}	8.3^{a}	8.1^{ab}	7.5^{bc}
Color	8^{a}	8.09^{a}	7.9^{ab}	7.8^{ab}
Flavor	7.8^{a}	8.05^{ab}	8.2^{bc}	8.2^{bc}
Texture	8.2^{a}	7.9^{ab}	7.4^{bc}	7.1^{cd}
Body and Consistency	8.09^{a}	7.8^{ab}	7.7^{bc}	7^{cd}
Syneresis	7.2^{a}	7^{bc}	7.1^{ab}	7.09^{bc}
Overall Taste Acceptance	8.09^{a}	7.9^{ab}	7.5^{bc}	7.09^{cd}

Mean of 11 scores for each sensory characteristics. A (milk+ 0% jackfruit juice), B (milk+ 5% jackfruit juice), C (milk+10% jackfruit juice), D (milk+15% jackfruit juice).

Mean in row followed by the same letter are not significantly different at 95% confidence level (p> 0.05).

Appearance

The physical score and comparison for appearance of different types of prepared yogurt are given in Table 4 and Figure-1. Average appearance score of prepared yogurt samples A, B, C and D were 8.3, 8.3, 8.1 and 7.5 respectively. Highest and lowest appearance score were recorded for A and D sample of prepared yogurt respectively. Appearances of prepared yogurt may be depend on milk, jackfruit juice and processing technique. In the appearance acceptability test, hedonic scale showed that, prepared all sorts of yogurt samples were liked very much (>7) by the judge that are shown by Figure-1. According to panelists' score D sample significantly different from other samples at 5% probability level.

Flavor

The physical score and comparison for the flavor and smell of different types of prepared yogurt are given in Table-4 and Figure-1. Average flavor score of prepared yogurt samples A, B, C and D were 7.8, 8.05, 8.2 and 8.2 respectively. Highest and lowest Flavor and Smell score were recorded for C and D types of prepared yogurt respectively. Statistically there were significant different (p>0.05) within the flavor of different yogurt samples. It was observed that, the addition of jackfruit juice increased the flavor score.

Texture

The physical score for the texture of different types of prepared yogurt are given in Table-4 and Figure-1. Average texture score of prepared yogurt samples A, B, C and D were 8.2, 7.9, 7.4 and 7.1 respectively. Highest (8.2) and lowest (7.1) texture score were recorded for A and D types of prepared yogurt respectively. Texture of the yogurt may be depends upon the rate of development of the acidity i.e., type of organism present in the starter culture and jackfruit juice.

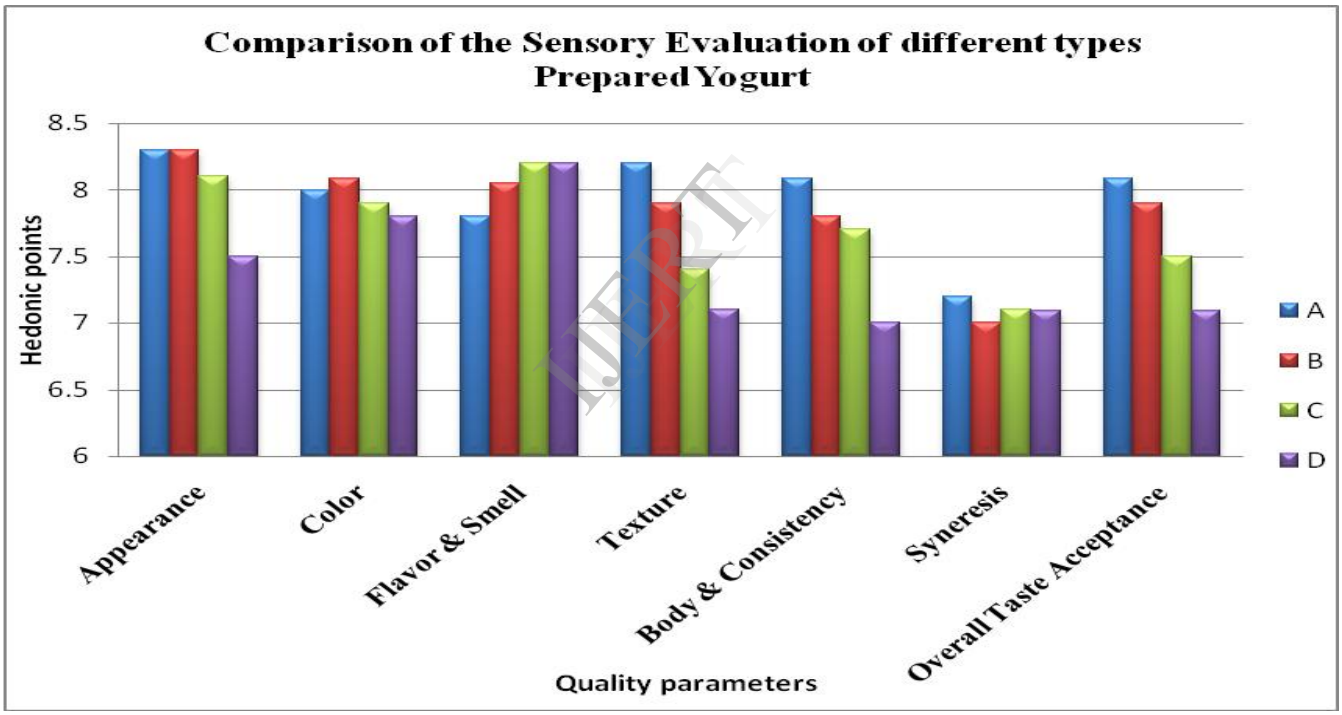

Fig. 1: Comparison of the Sensory Evaluation of Different Types of Yogurt

Color

The physical score and comparison for the color of different types of prepared yogurt are given in Table-4 and Figure-1. Average color score of prepared yogurt samples A, B, C and D were 8, 8.09, 7.9 and 7.8 respectively. Highest and lowest color score were recorded for B and D types of prepared yogurt respectively. Color of prepared yogurt depends on the color of milk or caramelized color obtained during heating of the milk or added coloring materials as well as color of the jackfruit juice [16]. Color acceptability test showed that all sorts of yogurt samples were liked very much (>7) by the Judge that are shown by Figure-1. Color of 3 samples (A, B, C) were preferable than D sample.

The wide variation in the quality parameters of prepared yogurt can be attributed to the manufacturing conditions type of organism used [17]. Other scientists also found that color and texture score of yogurt prepared from whole milk was higher than other samples [18].The average score of texture of all sorts of prepared yogurt was very much liked (>7) by the judges by hedonic scale.

Body and consistency

The physical score for the body and consistency of different types of prepared yogurt are given in table-4 and figure-1. Average body and consistency score of prepared yogurt samples A, B, C and D were 8.09, 7.8, 7.7 and 7.0

respectively. Statistically there were significant different ($p>0.05$) within body and consistency score of different yogurt samples. Variations among the sample may be due to the bacterial mixed culture and variation in the strain of bacteria in the mixed culture, jackfruit juice properties and variations in the manufacturing techniques by the different manufacturers. Hedonic scale showed that, body and consistency of all sorts of yogurt samples were very much liked by judges (>7) but body and consistency of A sample of yogurt was slightly superior to other 3 samples of yogurt.

Syneresis

The physical score for the syneresis of different types of prepared yogurt are given in Table-4 and Figure-1. Average syneresis score of prepared yogurt samples A, B, C and D were 7.2, 7.0, 7.1and 7.09 respectively. Syneresis of the prepared yogurt depends mainly upon the rate of development of the acidity i.e., type of organism present in the starter culture and jackfruit juice quality. The wide variation in the quality parameter of yogurt can be attributed to the manufacturing conditions type of organism used [17]. Yogurt contains no stabilizer so syneresis is more pronounced but some samples of jackfruit yogurt gave little syneresis comparable to plain yogurt. It was due to presence of more total solids which was observed by Younus *et al.* [19].

Overall taste acceptance

Taste was also influenced by the quality of the raw materials used in the processing of prepared yogurt. The physical score for the overall taste of different types of prepared yogurt are given in Table-4 and Figure-1. Average overall taste score of prepared yogurt samples A, B, C and D were 8.09, 7.9, 7.5 and 7.09 respectively. Hedonic scale showed that, the A and B samples of prepared yogurt were better than C and D samples. All fruit juice yogurt were significantly different from A (plain yogurt) but other 3 samples were not significantly different from each other. However, yogurt containing up to 10% jackfruit juice were acceptable in terms of sensory evaluation. The highest level of jackfruit juice yogurt (15% jackfruit juice or D sample) was not accepted by the panelist in terms of all sensory evaluation. As D sample gave slightly bitter taste due to higher acidity. Finally, study showed that A (plain yogurt), B (5% jackfruit juice yogurt), C (10% jackfruit juice yogurt) samples were preferable and acceptable by panelist.

IV. CONCLUSION

The study was carried out a comparison among different levels (5%, 10% and 15%) of jackfruit juice yogurt to the plain yogurt (0% jackfruit juice) on the basis of organoleptic, chemical and microbiological analysis. Nine points hedonic scale of organoleptic characteristics showed 0%, 5%, 10% jackfruit juice containing yogurt had better appearance, color, flavor, and texture and overall test acceptability compare to 15% jackfruit juice yogurt. Moreover, microbiological quality parameters ensure the safety of all products and in case of TVC, TCC and TFC were in acceptable range. So, all of prepared yogurt samples were suitable for consumption.

Regular consumption of standard qualities jackfruit juice added to yogurt will meet up our demand of nutrition and it also acts as good supplement of carbohydrate. It has high digestibility power compare to plain yogurt as well.

REFERENCES

[1] D. Sukumer, Outlines of dairy technology (9th edition). Oxford University Press, New Delhi. 2005. pp. 9, 404, 405, 407,409.

[2] L. Ensminger, "Study on the nutritional value of yogurt", Indian J. Vet. Sci., 1986, pp. 12(1): 11-14.

[3] Wollowski, I., Rechkemmer, G. and Pool-Zobel, B.L. , Protective role of probiotic and probiotic in colon cancer. *American j. clinical nutria.*, 2001.*73 (supply): 451S – 455S.*

[4] Mustafa, M., A study on the preparation of fruit Curd (Yoghurt). *M.Sc. Thesis*, 1997. *Bangladesh Agricultural University, Mymensingh, Bangladesh*

[5] Abd El-Zaher. Studies on micro propagation of jackfruit. 2-A comparative histological studies on in vitro and ex vitro plants of jackfruit. World J. Agric. Sri., 2009. 4: 255-262.

[6] Harlan, Study on the nutritional value of jackfruit. Journal of Agricultural and Food Chemistry, 1971. 58: 6645-6658.

[7] Celik and Bakirci, Study on the properties of fruit yogurt. Influence of addition of fruit on the mineral content of yogurts :nutritional assessment , food chemistry, 2003. 71;84-88

[8] Peryam, D; Pilgrim, F.J., Hedonic scale method of measuring food preference. *Food Technol.*, 1957. *11(9): 9-14.*

[9] A.O.A.C., Official methods of analysis. 10th Ed. Association of official Analytical Chemist. Washington, D.C. 1982.

[10] H. Michael Wehr and Joseph F. Frank , Standard Methods for the Examination of Dairy Products, 2004, American Public Health Association

[11] Islam M.N., Hossain ,S.M.I and Mannan, A.K.M.A ,.1984, studied on the physical parameters and chemical qualities on the market milk in Mymenshingh town,13:52

[12] Nahar,L,. Study on the preparation of yogurt from skim milk with the addition of vegetable oil and different level of not fat Dry milk (NDM). Dept. of Dairy Sci. BAU, Mymensingh, 2000.p:22.

[13] Mandokhel, M.D., Study on the physic-chemical composition of industrial yogurt and market (Hotel, sweet shop and milk vending shop) made curd. *M.Sc. Thesis.* 1996. *Submitted to Sindh Agricultural University, Tandojam.*

[14] Zaman, W., Chowdhury, N.A. and Paramanik, K. , Study on the Quality assessment of Curd (Curd), Locally available in Bangladeshi Market. *World J. Dairy & Food Sci.*, 2011. *6(1): 15-20.*

[15] Saikali, J., Picard, C.; Freitas ,M. and Holt, R.P., Fermented Milks, probiotic Cultures and Colon Cancer. *Nutrition and Cancer*, 2004. *49(1): 14-24.*

[16] Munzur, M.M., Islam, M.N;. Akhter, S and. Islam, M.R., Effect of different levels of vegetable oil for the manufacture of Curd from skim milk. *Asian-Aust. J. anim. Sci.*, 2004. *17(7): 1019-1025*

[17] Avlesen, K., Abrahmsen, R.K. and Steimstholt, K. Production of yogurt powder for acidification of frozen yogurt. *Meieriposten.*, 1979. *68 (6): 167-170.*

[18] Begum, J., Qualitative characteristics of curd prepared from non-fat dry milk fortified with vegetable oil. *M.S. Thesis*, 2004. *Department of Dairy Science, Bangladesh Agricultural University, Mymensingh*

[19] Younus, S., Masud, T. and Aziz, T. , Quality evaluation of Market Yogurt/Curd. *Pakistan J. Nutri.*, 2002. *1(5): 226-230.*