Study on Chemical and Microbiological quality of Bogra Dahi in Bangladesh

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SUMMARY

The present experiment was conducted to assess the chemical and microbiological quality of dahi prepared at three selected areas (Bogra Sadar, Sherpur and Gabtoli) of Bogra district. Dahi samples were collected from the manufacturers of the individual dahi makers for analysis. From different dahi samples, significant difference was found in chemical status (percentage of acidity, fat, protein, total solids, ash and pH value) and microbiological status (Total viable count). No significant difference was found in case of Coliform count and Mould count. Mean acidity and pH value for Bogra Sadar, Sherpur and Gabtoli were 0.82 ± 0.04, 4.88 ± 0.20, 0.74 ± 0.06, 5.01 ± 0.48 and 0.93 ± 0.03, 4.25 ± 0.06 respectively. Fat (%) and total solids (%) were highest in Sherpur dahi (10.85 ± 0.83 and 40.73 ± 2.77 respectively). Average value of protein (%) and ash (%) of Bogra Sadar, Sherpur and Gabtoli were 4.58 ± 0.34, 0.809 ± 0.049; 5.13 ± 0.17, 0.980 ± 0.06 and 4.00 ± 0.36, 0.784 ± 0.06 respectively. Highest total viable count (log value) was recorded in Sherpur dahi (5.996 ± 0.05). Coliform and mould were present in all the samples but no yeast was found. From most of the nutritional parameters, it can be found that dahi samples prepared in Sherpur scored the highest. According to all nutritional points of view, it can be showed that dahi made at Bogra Sadar and Gabtoli was also good in quality.

Key Words   *Dahi, Chemical status, Microbiological status*

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INTRODUCTION

Milk is very nutritious and perhaps an indispensable 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: dahi or yoghurt is one of them. Of the milk production in India and Pakistan, about 7% and 4% is converted to dahi for consumption respectively (Chakraborty 1998). About 4% of the total milk produced in Bangladesh is used for the preparation of dahi (Mustafa 1997). Dahi, especially sweet dahi, is one of the most popular milk products of Bangladesh. The nutritive value of milk and products depends upon their cleanliness, purity and wholesomeness. Although, fermented milk products are safer foods i.e. disease producing organisms cannot survive there in high acidity, still if contamination occurs then in most cases yeasts and moulds and sometimes Coliform organisms can grow somewhat, if this is having proper nutrition. That is why; a desirable standard for the manufacture of dahi should be established according to the average consumers of Bangladesh. Very limited works have been done on the quality of Bogra dahi made from conventional milk in Bangladesh. Hence, an attempt was made to judge the quality of dahi prepared from different sources of milk.

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MATERIALS and METHODS

The study for getting the quality of traditional Bogra dahi was conducted based on the samples collected from Bogra Sadar, Sherpur and Gabtoli Upazilla for a period of 4 months from September to December, 2010. The samples analyses were conducted in the laboratory of Bangladesh Milk Producers' Co-operative Union Ltd. The collected dahi samples were carried to the laboratory in a specially made cool box imported from Germany where the samples can be kept in its original state for 18 hours.

Chemical analyses

Acidity percentage and Protein percentage was determined by using the procedure of Aggarwala & Sharma (1961), Fat percentage was determined by Gerber method, Total solids and Ash content of the Dahi samples were determined according to AOAC (2003), pH was determined by pH meter-215.

Microbiological Test

Microbiological parameters (Total viable count, Coliform count, Yeast and Mould Count) were determined according to the method described by APHA (1907). Dehydrated Tryptone Glucose Yeast Extract (TGYE) Agar, Eosin Methylene Blue (EMB) agar and Potato Dextrose Agar (PDA) were used to enumerate the Total viable count, colifom bacteria and yeast and mould count of dahi samples respectively.

Statistical Analysis

Data obtained from the collected sample were analyzed statistically using STATA® version 9.2 (STATA corp., Texas, USA). Data management was done by MS Excel® programme.

RESULTS AND DISCUSSION

Chemical parameters

The result of chemical tests (percentage of acidity, fat, protein, total solids, ash and pH value) of dahi samples from study areas are presented on Table-1.

Acidity percentage

The average percentage of acidity of dahi samples prepared from Bogra Sadar, Sherpur and Gabtoli milk were 0.82 ± 0.04, 0.74 ± 0.06 and 0.93 ± 0.03 respectively. Highly significant differences (P<0.001) were found among those mean values. Mean acidity of Bogra Sadar and Gabtoli dahi agrees with the findings of Ray and Srinivasan (1972), Ghosh and Rajorhia (1987), Sarkar et al. (1996) who found the mean acidity percentage 0.84-1.16, 0.73-0.9 and 0.36-1.22 respectively. The mean percentage of Sherpur that was buffalo milk dahi acidity percentage agreed with the findings of Cardoso et al. (1991) who reported acidity percentage for buffalo milk was 0.8. Wide variation in the titratable acidity could be attributed due to different types of milk, different buffering action of protein, citrates, lactose etc., concentration of fat, milk solids not fat and sugar in milk.

Fat Percentage

The percentage of mean fat content of Bogra Sadar, Sherpur and Gabtoli milk dahi were 5.82 ± 0.35, 10.85 ± 0.86 and 5.16 ± 0.65 respectively. Statistical analyses showed that fat content of different dahi samples differ highly significantly (P<0.001). Akin et al. (1995) reported from an experiment that yoghurt contained 3.9% fat. El-Samragy and Samragy (1998) reported that fresh yoghurt

contained 4.3% fat. Park (1994) evaluated eight varieties of commercial milk yoghurt having the mean value of 2.25 ± 0.13 fat percentages. In the present experiment, the fat percentages of all dahi groups were higher than any researcher's report. This indicates the better quality of Bogra dahi.

Total Solids Percentage

Highly significant differences (P<0.001) were found among those mean values. Average total solids content was the highest (40.73%) in Sherpur and that was the lowest in Gabtoli (27.89%). Sample average grand mean for TS content was 32.87% with a standard deviation (SD) of ± 6.15 from the current study which agrees with the findings of Ghosh and Rajorhia (1987). EL-Samragy and Samragy (1988) reported that milk yoghurt had contained 14.16% TS which is lower than our study's value. Generally variation in TS content of dahi could be attributed due to different types of milk, addition of sugar in different concentration or extent of concentration of milk during heat treatment.

Protein Percentage

Statistical analyses showed that there were significant difference (P<0.01) within the protein content of different groups of dahi. Samples' average grand mean for protein content was 4.57 with a standard deviation (SD) of ± 0.55. In case of Bogra Sadar milk dahi, the result agree with the findings of Chakraborty (1998) and Ali (1998) who found that milk dahi contained 4.22% and 4.44% protein respectively. In case of group Sherpur dahi, the result agreed with the findings of Chakraborty (1998) who found protein 5.1% in buffalo milk dahi. In case of group Gabtoli milk dahi, the result agrees with the findings og EL-Samragy and Samragy (1988) and Park (1994) who found 3.80 and 3.99 fat% in yoghurt respectively. Dahi was with a higher protein content might be due to higher degree of milk concentration by heat prior to manufacturing in Bogra.

Ash Percentage

The mean percentage of ash of group Bogra Sadar, Sherpur and Gabtoli dahi samples were 0.809 ± 0.04, 0.98 ± 0.06 and 0.784 ± 0.06 respectively. Significant differences (P<0.01) were found among those mean values. In case of Bogra Sadar dahi the result agreed with the findings of Rahman (1998) who reported that dahi ash content was 0.825 ± 0.06. In case of group Gabtoli dahi the result agree with the findings of EL-Samaragny and Samaragny (1988) and Park (1994) who found 0.78 and 0.818 ± 0.01 percent respectively. Sherpur milk contained higher milk TS % as it was the sample of buffalo milk. That is why the ash content of the Sherpur dahi was higher than other two groups of dahi.

pH Value

From the Table 1, it is observed that mean value for Bogra Sadar, Sherpur and Gabtoli dahi were 4.88 ± 0.20, 5.01 ± 0.48 and 4.25 ± 0.06 respectively. Statistical analyses showed that there were significance difference (P<0.05) within the value of different dahi samples. In our experiment the result agreed with the findings of Rahman (1998) and Ali (1998) who found that average value of dahi were 4.47 ± 0.45 and 4.79 ± 0.011 respectively.

Microbiological parameters

The result of microbiological tests (Total viable count, Coliform count, Yeast and Mould count) of dahi samples from study areas are presented on Table 2.

Table-1. Comparison of average chemical composition of Bogra Sadar, Sherpur and Gabtoli dahi

Parameters (%)	Milk collected from			LSD value	Level of significance
	Bogra Sadar ($\bar{X}$ ± SD)	Sherpur ($\bar{X}$ ± SD)	Gabtoli ($\bar{X}$ ± SD)		
Acidity	0.82 ± 0.04	0.74 ± 0.06	0.93 ± 0.03	0.101	***
Fat	5.82 ± 0.035	10.85 ± 0.86	5.16 ± 0.65	1.502	***
Protein	4.58 ± 0.34	5.13 ± 0.17	4.0 ± 0.36	0.7008	**
Total Solids	29.99 ± 1.64	40.73 ± 2.77	27.89 ± 1.27	4.595	***
Ash	0.809 ± 0.40	0.980 ± 0.06	0.784 ± 0.06	0.1259	**
Value	4.88 ± 0.20	5.01 ± 0.48	4.25 ± 0.06	0.7007	*

$\bar{X}$:Mean; SD: Standard Deviation; ***:Significant at 0.1% level; **: Significant at 1% level; *: Significant at 5 % level;

Table 2. Comparison of average microbiological status of Bogra Sadar, Sherpur and Gabtoli dahi

Parameters (log value)	Milk collected from			LSD value	Level of significance
	Bogra Sadar ($\bar{X}$ ± SD)	Sherpur ($\bar{X}$ ± SD)	Gabtoli ($\bar{X}$ ± SD)		
Total viable count	5.878 ± 0.03	5.996 ± 0.05	5.859 ± 0.05	0.1028	**
Coliform count	1.75 ± 1.20	2.70 ± 0.21	1.00 ± 1.15	_	NS
Mould count	1.445 ± 1.07	1.889 ± 0.59	2.064 ± 0.44	_	NS

NS: Not significant

Total Viable Count

The average total bacteria per ml of dahi samples made from Bogra Sadar, Sherpur and Gabtoli dahi were 5.878 ± 0.03, 5.996 ± 0.05 and 5.859 ± 0.05 (log value) respectively. Statistical analyses showed that significant differences ($P<0.05$) were existed among the different dahi samples. Average highest total viable count was recorded for dahi samples of Sherpur dahi (5.996 ± 0.05) where that was the lowest for Gabtoli dahi samples (5.859 ± 0.05). Sample average grand mean for total viable count was 5.911 per ml with a standard deviation (SD) of ± 0.07. The present investigation partially supported by the result of Adeyl (1998), who found that total viable bacteria contained per ml of laboratory made dahi samples were within the range of 6.2 to 6.3. (Log value). The variations in Total viable count in different Dahi samples might be due to the use of undefined wild starter culture in improper ratio and amount.

Coliform count

No statistically significant differences were found in respect of coliform count per ml of different dahi samples. Sample average grand mean for coliform count was 1.818 with a standard deviation (SD) of ± 1.14. Overall result of this parameter agreed with that of the result of Islam (1999) who found that coliform count per ml of Laboratory made dahi was 440.660 ± 114.020 (log value- 2.64 ± 2.05). The presence of coliform organisms in dahi samples indicates the contamination of dahi during their production and handling which may pose public health problems.

Yeast and Mould count

Average highest mould count per ml (2.064 ± 0.44) was found in Gabtoli dahi and lowest in Bogra Sadar dahi (1.445 ± 1.07). No significant differences were found among the different dahi samples. Samples average grand mean for mould count was 1.799 with a standard deviation (SD) of ± 0.73. Adeyl (1998) and Islam (1999) found wider

variation in mould count per ml than that of present investigation.

No yeast were grown in our experiment which shows greater quality of Bogra dahi samples. Dastum (1956); Henricks and Deconick (1965) reported that yoghurt did not grow any yeast.

CONCLUSION

The present experiment was conducted to evaluate the chemical and microbiological quality of dahi. Judging from the results of all parameters (chemical and microbiological) it could be advocated that dahi made in Sherpur dahi was the best from others two. A comprehensive research work is still required to determine the versatile qualities of traditional dahi market of Bogra district to have uniformity and superiority in its organoleptical, chemical and microbiological quality.

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