Acta Scientific Microbiology (ISSN: 2581-3226)

Volume 7 Issue 3 March 2024

Research Article

Quantitative/Qualitative Analysis of Fermented Milk Products of Cold Desert Region

Gitanjali B Sathe* and Surajit Mandal

Department of Microbiology, ICAR-National Dairy Research Institute, Karnal, India

***Corresponding Author:** Gitanjali B Sathe, Department of Microbiology, ICAR-National Dairy Research Institute, Karnal, India.

DOI: 10.31080/ASMI.2024.07.1364

Received: February 08, 2024

Published: February 29, 2024

Abstract

This study aimed to evaluate some physicochemical and microbiological characteristics of fermented food samples collected from cold desert region of Himachal Pradesh (India). The pH of fermented milk samples ranged 3.49 to 4.8 and titratable acidity ranged from 0.45 to 2.02% LA. Whereas lactic count ranged between 5.9 to 10.5 log CFU/mL; samples were highly contaminated with yeast and mould count ranged from 10 to $3.2x10^6$ CFU/mL and some samples were contaminated with high number of coliform count ranged from <10 to $2.4x10^4$ CFU/mL.

Keywords: Lactic Acid Bacteria; Fermented Milk; Microbial Analysis

Introduction

India is huge country where diverse varieties of traditional products are available; the variation is depending on the method of preparation and tradition. The diversity in climatic conditions which results in consumption of different foods. In cold desert (Chamba, Lahaul and Spiti districts of Himachal pradesh) of India different types of fermented products are prepared and consumed. They are prepared by fermenting milk, cereals and vegetables. Fermented milk products includes Lobo (Cottage cheese), Churpa/Churphe (dried cottage cheese), Dahi, Lassi, Kadhi and Nudu [1,2]. There are different microfloras present in fermented foods of cold desert region but there is less data available on analysis of fermented products. Earlier studies were conducted and explored microbiologically and documented on isolation and identification of lactic acid bacteria (LAB) from different fermented foods of this region [3]. Traditional Fermented products are prepared at house hold level under natural conditions with undefined micro-flora by back-slopping. So, the quality of products is not uniform and it may causes hazards to the consumers. The aim of the present study was to evaluate some microbiological and physical-chemical characteristics of fermented milk of cold desert region.

Material and Methods

Collection of samples

A total 31 traditionally prepared fermented milk (i.e. Dahi and Lassi) samples and one goat milk sample were collected from cold desert region (Lahaul and Spiti district, Chamba district, Himachal Pradesh) of India. Samples were collected in sterile sample bottles and they were stored in thermos box with ice packs to maintain low temperature and shipped to laboratory at 5-7°C using ice pack. Samples were stored at refrigeration temperature up to analysis.

Analysis of samples

Determination of pH and titratable acidity

Ten gram sample was homogenously mixed with 10 ml of distilled water and pH of the solution was measured with a calibrated pH meter. Titratable acidity (% lactic acid) was determined by titrating against 0.1 N NaOH solution in presence of phenolphthalein indicator [4].

$$\text{Acidity (\% LA)} = \frac{9 \times \text{Vol. of NaOH consumed (ml)} \times \text{Normality of NaOH}}{\text{Wt. of curd sample taken for titration (g)}}$$

Microbiological analysis

The collected samples were prepared for microbiological analysis. Each sample was diluted by mixing 11 gm homogenous sample in 99 ml sterile normal saline solution with help of sterile pestle and mortar to get 10^{-1} dilution. Subsequently, up to 10^{-7} dilutions were prepared using 9 ml normal saline tubes. The following microbiological parameters were analyzed.

Microbiological parameters	Dilution	Media	Incubation
Total lactococci count, 30°C	10^{-5}, 10^{-6}, 10^{-7}	M17 agar	30°C for 48 h
Total lactococci count, 37°C	10^{-5}, 10^{-6}, 10^{-7}	M17 agar	37°C for 48 h
Total lactobacilli count, 30°C	10^{-5}, 10^{-6}, 10^{-7}	MRS agar	30°C for 48 h
Total lactobacilli count, 37°C	10^{-5}, 10^{-6}, 10^{-7}	MRS agar	37°C for 48 h
Coliforms count	10^{-1}, 10^{-2}, 10^{-3}	Violet Red Bile Agar	37°C for 24 h
Yeast and molds count	10^{-1}, 10^{-2}, 10^{-3}	Potato Dextrose Agar	25-30°C for 3-5 days

Table 1: Microbiological analysis of samples.

Result and Discussion

Physicochemical and microbiological analysis of fermented milk samples

Total 32 Samples were collected from Lahaul and Spiti District and Bharmaur of Chamba District) of Himachal Pradesh state of India (Table 2). These collected samples were analysed for some physicochemical and microbiological characteristics.

Samples were collected in sterile sample bottles and stored in ice pack till the analysis of samples. There were 23 Dahi samples,

S. no.	Code	Sample	Raw materials	Source
	K1	Dahi	Cow milk (local)	Kaza, Spiti Valley
	K2	Dahi	Cow milk (Jersey)	Kaza, Spiti Valley
	K3	Dahi	Cow milk	Kaza, Spiti Valley
	K4	Dahi	Cow milk (cross breed)	Kaza, Spiti Valley
	K5	Dahi	Churu milk	Kaza, Spiti Valley
	K6	Dahi	Churu milk	Kaza, Spiti Valley
	K7	Dahi	Churu milk	Kaza, Spiti Valley
	K8	Dahi	Churu milk	Kaza, Spiti Valley
	K9	Dahi	Churu milk	Kaza, Spiti Valley
	K10	Dahi	Churu milk	Kaza, Spiti Valley
	K11	Dahi	Cow milk	Kaza, Spiti Valley
	K12	Dahi	Churu milk	Kaza, Spiti Valley
	K13	Dahi	Cow milk (Desi)	Kaza, Spiti Valley
	K14	Dahi	Churu milk	Kaza, Spiti Valley
	K15	Dahi	Churu milk	Kaza, Spiti Valley
	K16	Lassi	Churu milk	Kaza, Spiti Valley
	K17	Dahi	Churu milk	Kaza, Spiti Valley
	K18	Dahi	Churu milk	Kaza, Spiti Valley
	K19	Dahi	Churu milk	Kaza, Spiti Valley
	L1	Dahi	Churu milk	Losar, Spiti Valley
	S1	Milk	Goat milk	Bharmaur, Chamba
	S2	Dahi	Cow milk	Bharmaur, Chamba
	S5	Dahi	Cow milk	Bharmaur, Chamba
	S7	Lassi	Cow milk	Bharmaur, Chamba
	S9	Dahi	Cow milk	Bharmaur, Chamba
	S10	Lassi	Cow milk	Bharmaur, Chamba
	S13	Lassi	Cow milk	Bharmaur, Chamba
	S14	Lassi	Cow milk	Bharmaur, Chamba
	S15	Lassi	Cow milk	Bharmaur, Chamba
	S16	Lassi	Cow milk	Bharmaur, Chamba
	S17	Lassi	Cow milk	Bharmaur, Chamba
	S18	Dahi	Buffalo milk	Bharmaur, Chamba

Table 2: Fermented foods samples collected from cold desert region of Himachal Pradesh.

7 Lassi samples and 1 goat milk. Fermented milk samples were directly processed for analysis of pH, titratable acidity, total lactic count, coliform count, yeast and mould count. The analyzed data of pH and titratable acidity (expressed % lactic acid); lactic count, coliform count, yeast and mould count showed in table 3. The pH of fermented milk samples ranged from 3.49 to 4.8; titratable acidity: 0.45 to 2.02% LA; lactic counts: 5.9-10.5 log CFU/mL. Besides lactic acid bacteria, samples were heavily loaded with yeasts and mould count ranged from 10 to $3.2x10^6$ CFU/mL; some samples contained high number of coliform count ranged from <10 to $2.4x10^4$ CFU/mL (Table 2). It shows that product prepared in unhygienic condition and also the starter culture used for preparation itself got contaminated as they preparing the fermented food by back slopping. It also includes the handlers, quality of water used and the utensils [5].

S. No.	Sample	pH	Acidity (%LA)	Lactic count (log CFU/mL)				Coliform counts (CFU/mL)	Yeast and mould counts (CFU/mL)
				M17		MRS			
				30°C	37°C	30°C	37°C		
K1	Dahi	3.88	1.35	5.95	10.07	6.81	7.79	50	$>10^5$
K2	Dahi	3.9	1.64	10.17	9.89	8.36	7.56	60	$>10^6$
K3	Dahi	3.74	1.58	8.55	10.06	7.78	8.62	20	$>10^6$
K4	Dahi	3.68	1.74	9.71	TNTC	9.78	9.95	90	$>10^6$
K5	Dahi	3.56	2.02	TNTC	7.79	6.84	7.02	60	$>10^5$
K6	Dahi	4.25	0.95	8.29	9.73	8.57	8.45	<10	$>10^6$
K7	Dahi	3.88	1.69	10.12	10.35	10.25	10.23	<10	$>10^4$
K8	Dahi	4.54	0.8	9.52	9.57	9.42	9.73	<10	$>10^5$
K9	Dahi	4.24	1.4	9.71	9.42	8.86	9.04	<10	$>10^5$
K10	Dahi	4.48	0.92	10.39	10.26	10.18	9.97	<10	$>10^5$
K11	Dahi	4.76	0.87	9.87	9.97	7.02	8.21	<10	$>10^5$
K12	Dahi	5.01	0.88	10.24	10.08	10.01	10.08	<10	$>10^5$
K13	Dahi	3.59	1.68	9.63	10.36	8.98	9.05	140	$>10^6$
K14	Dahi	4.76	0.84	8.45	8.35	8.31	8.25	$5.2x10^2$	$1.15x10^3$
K15	Dahi	4.52	1.07	10.31	TNTC	10.17	9.01	55	$5.1x10^4$
K16	Lassi	4.30	1.08	8.44	10.11	9.87	9.25	$2.4x10^4$	<10
K17	Dahi	3.49	2.21	TNTC	TNTC	7.15	7.55	70	$>10^6$
K18	Dahi	4.38	0.90	10.12	10.07	10.11	9.83	<10	$>10^5$
K19	Dahi	4.61	0.80	10.15	10.29	TNTC	10.38	$1.8x10^3$	$>10^5$
L1	Dahi	3.92	1.34	10.17	10.01	6.83	8.39	50	$>10^5$
S2	Dahi	4.23	0.63	8.08	8.02	7.82	7.73	100	$5.2x10^5$
S5	Dahi	4.60	0.84	8.41	8.47	8.24	8.62	10	$8.2x10^2$
S7	Lassi	4.12	0.82	7.63	7.22	8.11	6.96	20	$5.2x10^5$
S9	Dahi	4.29	0.45	8.35	7.52	8.22	7.15	20	$6.4x10^5$
S10	Lassi	4.26	0.56	8.72	8.63	8.31	8.26	20	$2.2x10^5$
S13	Lassi	3.82	0.78	7.78	7.08	7.76	7.12	0	$1.41x10^6$
S14	Lassi	4.5	0.77	8.67	8.92	8.56	8.85	20	$3.1x10^2$
S15	Lassi	4.07	0.76	8.33	8.01	8.23	8.09	$2.8x10^2$	$2.50x10^6$
S16	Lassi	4.41	0.68	8.42	7.81	8.61	9	$1.5x10^2$	$3.20x10^6$
S17	Lassi	4.35	0.68	8.57	7.94	8.23	8.31	$1.6x10^4$	$1x10^4$
S18	Dahi	3.76	0.82	9.23	6.91	6.48	6.78	<10	$3.7x10^5$
*All values are average values									

Table 3: Physicochemical and microbiological characteristics of fermented milk samples collected from cold desert region of H.P. (India).

Conclusion

This study shows that the quality of product was not good so it is hazardous to consumers; it may be due to handling practices and the preparation by using back slopping which having unknown microflora. It is needed to give knowledge related to the preparation of product and hygienic condition. From these products we can isolate and identify lactic acid bacteria / biodiversity which having good techno-functional property and formulate defined culture; we will get potential culture for preparation of fermented food product.

Acknowledgement

Authors are thankful to NDRI, Karnal for providing Ph.D. -ICAR-fellowship to Ms. Gitanjali B. Sathe, so as to carry out this work.

Bibliography

1. Savitri and Bhalla T C. "Traditional foods and beverages of Himachal Pradesh". *Indian Journal of Traditional Knowledge (IJTK)* 6 (2007): 17-24.

2. Nehal N. "Knowledge of traditional fermented food products harbored by the tribal folks of the Indian Himalayan belt". *International Journal of Agricultural Science and Food Technology* 4 (2013): 401-414.

3. Panda A., *et al*. "Ethnic preparation and quality assessment of Chhurpi, a home-made cheese of Ladakh, India". *Journal of Ethnic Foods* 3 (2016): 257-262.

4. Association of Official Analytical Chemists. In: Official methods of analysis of AOAC international, 16th ed. Cuniff (Ed.), Vol. II. Maryland, USA: AOAC International 5th revision (1999).

5. Uzeh RE., *et al*. "Microbiological and Nutritional Qualities of Dairy Products: Nono and Wara". *Nature and Science* 4.3 (2006): 37-40.