Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(5): 1198-1202
Received: 19-07-2018
Accepted: 21-08-2018

Omveer Singh
M. Sc. (Dairy Technology) Scholar, Warner College of Dairy Technology, SHUATS, Allahabad, Uttar Pradesh, India

Puneet Arora
Assistant Professor, Warner College of Dairy Technology, SHUATS, Allahabad, Uttar Pradesh, India

Parimita
Assistant Professor, Warner College of Dairy Technology, SHUATS, Allahabad, Uttar Pradesh, India

Shimar Mishra
Ph. D. (Dairy Technology) Scholar, Warner College of Dairy Technology, SHUATS, Allahabad, Uttar Pradesh, India

Binod Kumar Bharti
Ph. D. (Dairy Chemistry) Scholar, Warner College of Dairy Technology, SHUATS, Allahabad, Uttar Pradesh, India

Prafull Kumar
Ph. D. (Dairy Technology) Scholar, Warner College of Dairy Technology, SHUATS, Allahabad, Uttar Pradesh, India

Correspondence
Omveer Singh
M. Sc. (Dairy Technology) Scholar, Warner College of Dairy Technology, SHUATS, Allahabad, Uttar Pradesh, India

Studies on physico-chemical and microbiological analysis for preparation of paneer by using buffalo milk and mint

Omveer Singh, Puneet Arora, Parimita, Shimar Mishra, Binod Kumar Bharti and Prafull Kumar

Abstract
Paneer is a kind of soft variety of cheese obtained from heat-acid coagulation of milk. Buffalo milk is better suited for making paneer as compared to cow milk because it produces soft, weak and fragile product and that is considered unsuitable for cooking purposes. In the present study is an attempt to formulate higher nutritional value of paneer with added health benefit by addition of buffalo milk and mint. The buffalo milk has many advantages regarding nutritional qualities and chemical composition as characterized by higher fat, total solids, proteins, caseins, lactose and ash contents than that of cow milk and mint has been used as a medicine. In the present investigation treatment T_0, T_1, T_2, T_3 and T_4 were formulated in which mint paneer was prepared by using buffalo milk: mint was in the ratio of (100:00, 98:2, 96:4, 94:6 and 92:8) respectively. It was found that among all treatments T_2 scored higher in sensory evaluation and was considered as optimized product of mint paneer. The statistically analyzed the mean value of physico-chemical analysis of fat, protein, carbohydrate, ash, Total Solid (TS) and acidity percent of T_2 treatment was found to be 21.78, 16.42, 19.51, 2.57, 60.28 and 0.26 respectively.

Keywords: Paneer, buffalo milk, mint, health

Introduction

Paneer

Paneer is one of the most important indigenous milk products prepared by a combined action of acid coagulation and heat treatment of milk. Paneer is a kind of soft variety of cheese obtained from heat-acid coagulation of milk. It is also believed that paneer was first developed by Nomads (Khan and Pal, 2011) [10] of south west Asia and later it was spread all over the Asia. Paneer enjoys the status of a national culinary dish in India (Aneja *et al*., 2002) [2]. Buffalo milk is better suited for making paneer as compared to cow milk because it produces soft, weak and fragile product and that is considered unsuitable for cooking purposes. Buffalo milk is more suitable for paneer manufacture (Bhattacharya *et al*., 1971; Sachdeva *et al*., 1985) [4, 14]. This is because of the fact that paneer should have firm and spongy body and close texture. Another reason is that bigger size of fat globules and casein micelles, higher concentration of solid fat, casein, calcium, phosphorus and solvation properties of casein micelles in buffalo milk compared to cow milk makes the former better suitability to paneer making (Sindhu, 1996) [16]. Quality of paneer prepared by various manufacture, which depends upon type of milk, fat percentage, type of coagulant, heat treatment of milk, moisture content and yield of paneer etc. To obtain good quality of paneer, the milk must be fresh and high microbiological standard. Good quality of paneer has a typical acidic flavour with slightly sweet taste, firm and cohesive body and closely smooth texture. Paneer resembles unripened cheese prepared from whole milk and skimmed milk **(**Bhattacharya *et al.* 1971) [4]. According to Food Safety and Standards Authority of India (FSSAI, 2011) [7], paneer can be defined as the product obtained from cow or buffalo milk or a combination thereof by precipitation with sour milk, lactic acid or citric acid. It shall not contain more than 70% moisture and the milk fat content shall not be less than 50% of the dry matter. Paneer has a fairly high level of fat (22–25%), protein (16–18%) and also contains low level of lactose (2.0–2.7%) (Kanawjia and Singh 1996). Paneer is highly nutritious dairy products and it remains about 90 per cent fat and protein, 50 per cent minerals and 10 per cent lactose of the original milk **(**David, 2012**).** Paneer is a rich source of protein and available at a comparatively lower cost and also forms an important source for vegetarians. Over and above its high protein content and digestibility, the biological value of protein in Paneer is in the range of 80 to 86 (Khan and Pal, 2011) [10].

Nutritional value of paneer is so high and it is also recommended for patients of diabetes, coronary heart disease, dental caries and pregnant women (Chopra and Mamtani, 1995) [5].

Buffalo milk

Buffalo milk is rich in calcium, and is a good source of minerals like magnesium, potassium, and phosphorus. It contains less cholesterol, more fat and more calories. Buffalo milk is higher in fat but lower in cholesterol making it a good option for people with high cholesterol levels. There are many risks associated with high cholesterol especially an increased risk of heart disease. Buffalo milk in general contain higher level of fat, solid not fat, protein, lactose and ash as compared with cow milk. It also contains higher quantity of calcium and magnesium but lower amount citrate, phosphate and soluble from of calcium, magnesium and citrates (Sindhu, 1998) [17]. The buffalo milk has many advantages regarding nutritional qualities and chemical composition and characterized by higher fat, total solids, proteins, caseins, lactose and ash contents than that of cow milk. In fact several factors like species, breed, feeding system, stage of lactation and season of the year are influenced on chemical composition and nutritional qualities (Ahmed *et al*, 2013) [1]. Buffalo milk was concluded to be a rich source of macro-nutrients as well as calorific values and suggested to be utilized as nutritional soft drink and/or as better base for dairy products (Salman *et al*., 2014) [15]

Mint

A member of mint family is (*Lamiaceaea*), Menthapiperita, is a herbaceous rhizomatous perennial plant. Mint is popularly known as pudina. Mint is a popular herb and that can be used fresh or dried in many dishes and infusions. Mint contains α-pinene, β-pinene, cineole, jasmone, ledol, limonene, neomenthol, piperitone, pulegone, and viridiflorol (Anonymous, 1999; Rastogi *et al*., 1991) [3, 13]. Mint has one of the highest antioxidant capacities of any food. The mint leaves are carminative and are used to treat digestive disorders like dyspepsia, bacillary dysentery, gastritis, and enteritis. It is also used as a cholagogue, vermifuge, to enhance lactation, and as a sedative. It has antifungal and antibacterial activity. Peppermint oil has a significant antimicrobial, antitumor, antiviral, immunomodulating and chemo preventive potential (Mekay and Blumberg, 2006) [11]. Peppermint has high menthol content and is used in tea and for flavoring ice cream, confectionery, chewing gum and tooth paste. Mint oil is used in toothpaste, candy, gum, and beauty products. Mint oil modulates the calcium channel-dependent processes in intestinal, neuronal, and cardiac preparations (Hawthorn *et al*., 1988) [8].

Materials and Methods

Experimental site

The experiment **"**Studies of physico-chemical and microbiological analysis for preparation of Paneer by using Buffalo Milk and Mint**"** was carried out in research lab, Warner College of Dairy Technology, Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad-211007, U.P. (India).

Procurement and collection of ingredient

a) Buffalo milk: Buffalo milk was purchase from Aggies Dairy, SHUATS, Allahabad.
b) Mint: Mint was purchase from local market of Allahabad.
c) Citric acid: Citric acid was procured from Dairy Technology Lab, Warner College of Dairy Technology, SHUATS, Allahabad.

Treatment Combination

T0-Control prepared from buffalo milk and mint (100:00)
T_1 –Experimental sample prepared from buffalo milk and mint (98:2)
T_2 –Experimental sample prepared from buffalo milk and mint (96:4)
T_3 –Experimental sample prepared from buffalo milk and mint (94:6)
T_3 –Experimental sample prepared from buffalo milk and mint (92:8)

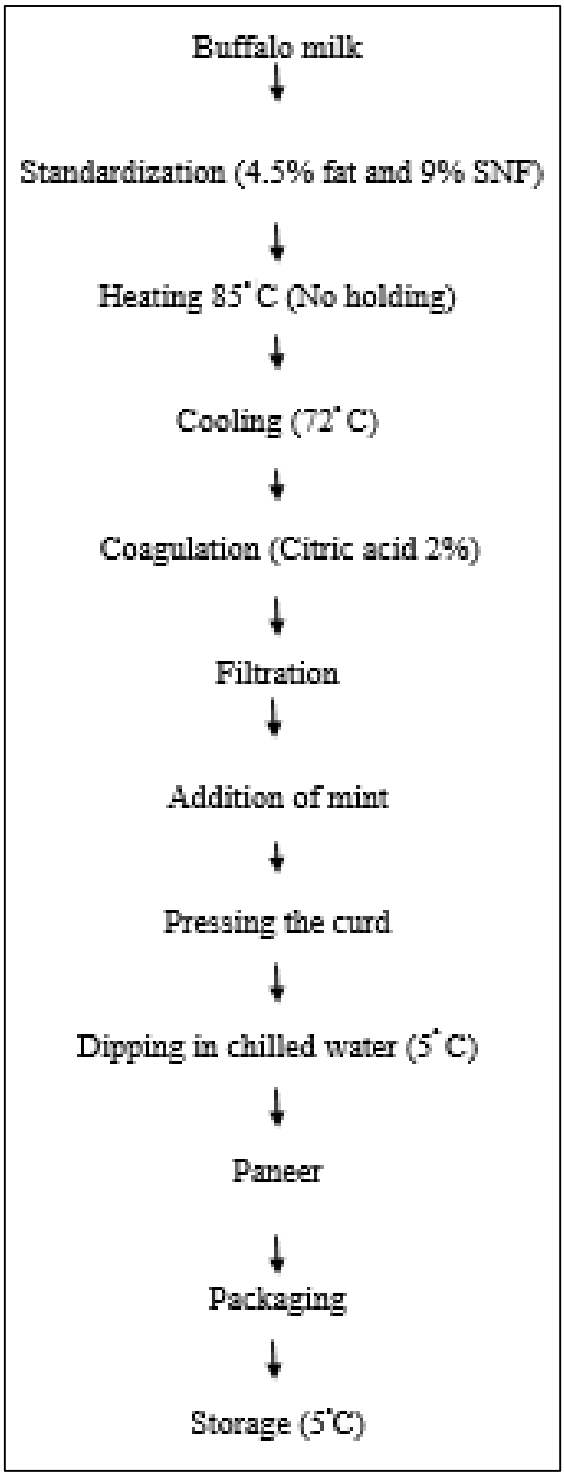

Fig 1: Flow diagram for manufacturing of Paneer by using buffalo milk and mint

Physico-Chemical analysis

Physico-Chemical analysis of Paneer by using Buffalo Milk and mint samples of different treatments were analyzed for their different analytical methods. Fat percentage was determined by Gerber method as described by James (1995). Protein percent was estimated by Kjeldahl method. Carbohydrate percent was estimated by difference method. Ash percent was estimated by AOAC 900.02A. Moisture was determined as per the procedure given in AOAC 2000. Total solids (TS) was estimated according to the method of Association of Official Analytical Chemists (AOAC, 2000). Moisture was determined as per the procedure given in AOAC (2000).

Microbiological analysis

The microbiological analysis i.e. coliform and yeast and mould test of the mint paneer samples of different treatments was done by using standard procedure laid down in I.S. 1947 PART III.

Statistical analysis

Data was analysed using Analysis of Variance (ANOVA) & Critical difference (C.D) in WASP software and excel software. The significance was separated at (p<0.05).

Results and Discussion

The present study was undertaken for development of paneer by using Buffalo Milk and mint consumed in India. The data collected on the different aspects were analyzed statistically using the method of analysis of variance and critical difference technique. The significant and non-significant differences observed have been analyzed critically within and between the different treatment combinations of mint paneer.

The results obtained from the analysis are presented in this chapter under the following headings:

1. Physico-Chemical characteristics of paneer by using buffalo milk and mint
2. Microbiological characteristics of paneer by using buffalo milk and mint

Table 1: The different parameters of control and experimental paneer by using Buffalo Milk and mint

Parameter	Treatment				
	T_0	T_1	T_2	T_3	T_4
1. Physico-Chemical analysis					
Fat%	22.49	22.24	21.78	21.33	20.87
Protein%	17.08	16.75	16.42	16.09	15.75
Carbohydrate%	19.89	19.70	19.51	19.33	19.14
Ash%	2.59	2.58	2.57	2.54	2.53
Total solids%	62.25	61.27	60.28	59.34	58.29
Acidity (LA)%	0.20	0.22	0.26	0.28	0.29
2. Microbiological analysis					
Yeast & Mould	4.40	3.80	3.60	3.40	2.60
Coliform	Nil	Nil	Nil	Nil	Nil

Chemical characteristics of control and experimental paneer by using Buffalo Milk and mint

Fat percent in control and experimental paneer by using Buffalo Milk and mint

The data regarding fat percent in control and experimental paneer by using buffalo milk and mint sample of different treatments are presented in table 1. It was statistically analyzed that mean value of T_0, T_1, T_2, T_3 and T_4 was found to be 22.69, 22.24, 21.78, 21.33 and 20.87 respectively. Fat percent of paneer by using buffalo milk and mint and control milk, highest mean fat percent was recorded in T_0 (22.69) followed by T_1 (22.24), T_2 (21.78), and T_3 (21.33), T_4 (20.87). It was observed that mean treatment values was decreased from T_0 to T_4 experimental samples so the fat of different treatment decreased significantly (P<0.05).

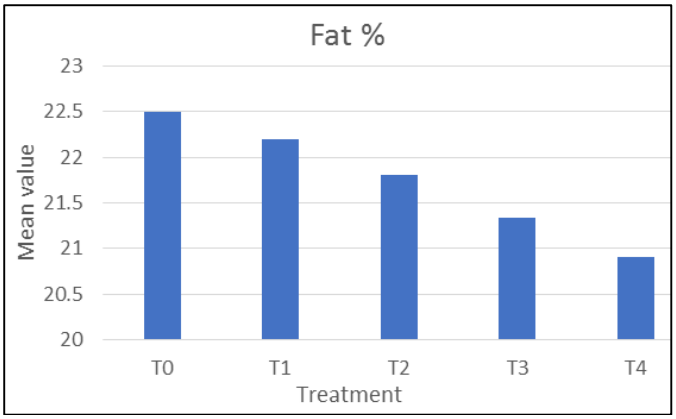

Fig 2: Average percentage of Fat for paneer by using buffalo milk and mint

Protein percent in control and experimental paneer by using Buffalo Milk and mint

The data regarding protein percent in control and experimental paneer by using Buffalo Milk and mint sample of different treatments are presented in table 1. It was statistically analyzed that mean value of T_0, T_1, T_2, T_3 and T_4 was found to 17.08, 16.75, 16.42, 16.08 and 15.75 respectively. Protein percent of paneer by using buffalo milk and mint and control milk, highest mean protein percent was recorded in T_0 (17.08) followed by T_1 (16.75), T_2 (16.42), T_3 (16.09) and T_4 (15.75). It was observed that mean treatment values was decreased from T_0 to T_4 experimental samples so the protein of different treatment decreased significantly (P<0.05).

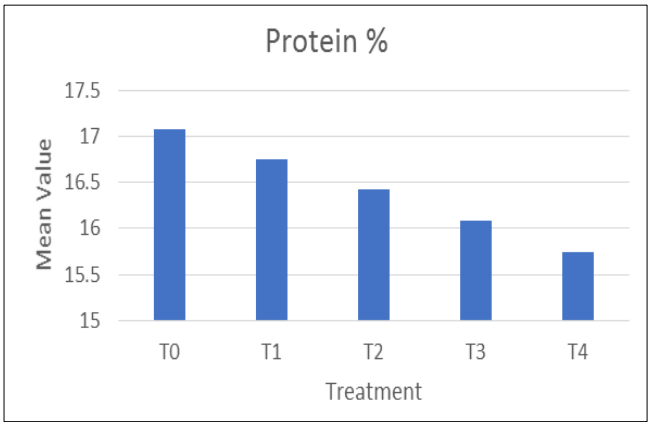

Fig 3: Average percentage of Protein for paneer by using buffalo milk and mint

Carbohydrate percent in control and experimental paneer by using buffalo milk and mint

The mean value of carbohydrate for T_0, T_1, T_2, T_3 and T_4 was found to be 19.89,19. 70, 19.51, 19.33 and 19.14 respectively. The carbohydrate percent of paneer by using buffalo milk and mint and control milk, highest mean protein percent was recorded in T0 (19.89) followed by T1 (19.70), T2 (19.51), and T3 (19.33) T4 (19.14). It was observed that mean treatment values was decreased from T_0 to T_4 experimental samples so the carbohydrate of different treatment decreased significantly (P<0.05).

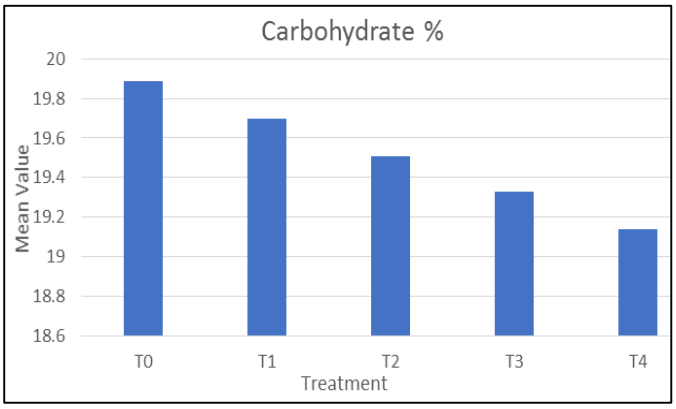

Fig 4: Average percentage of Carbohydrate for paneer by using buffalo milk and mint

Ash percent in control and experimental paneer by using buffalo milk and mint

It was statistically analyzed that mean value of ash content of T_0, T_1, T_2, T_3 and T_4 was found to 2.59, 2.58, 2.57, 2.54 and 2.53 respectively. Ash percent of paneer by using buffalo milk and mint and control milk, highest mean ash percent was recorded in T0 (2.59) followed by T1 (2.58), T2 (2.57), and T3 (2.54) T4 (2.53). It was observed that Ash content of the mint paneer decreased from 2.59 to 2.53. This may be due to lower ash content in buffalo milk and mint was observed. Pariskar *et al.*, (2015) observed the same result for preparation of kheer prepared from soy milk blended with buffalo milk.

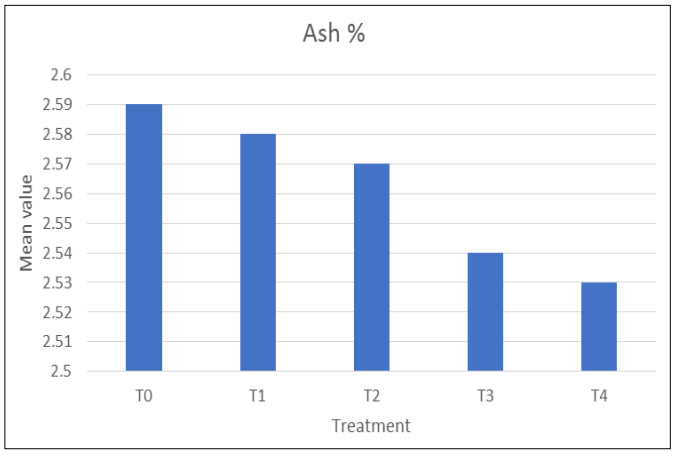

Fig 5: Average percentage of Ash for paneer by using buffalo milk and mint

Total solids percent in control and experimental paneer by using buffalo milk and mint

The data shown in table 1, the mean value for Total solid of T_0, T_1, T_2, T_3 and T_4 was found to 62.25, 61.27, 60.28, 59.34 and 58.29 respectively. The Total Solid percent of paneer by using buffalo milk and mint and control milk, highest mean protein percent was recorded in T_0 (62.25) followed by T_1 (61.27), T_2 (60.28), and T_3 (59.34) T_4 (58.29). It was observed that mean treatment values was constantly decreased from T_0 to T_4 experimental samples so the carbohydrate of different treatment decreased significantly (P<0.05)

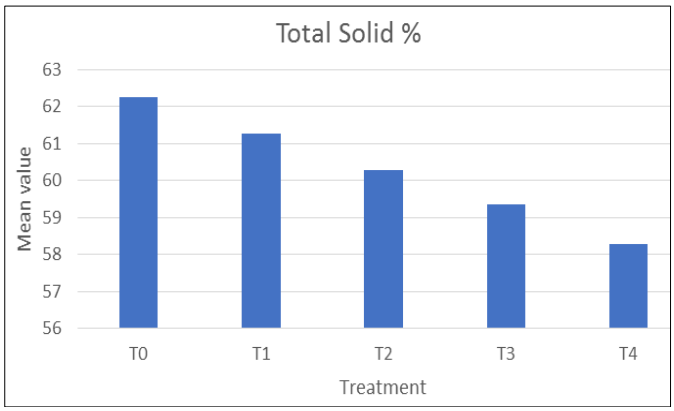

Fig 6: Average percentage of Total Solid for paneer by using buffalo milk and mint

Acidity (Lactic Acid) percent in control and experimental paneer by using buffalo milk and mint

The data regarding acidity percent in control and experimental paneer by using buffalo milk and mint sample of different treatments are presented in table 1. It was analyzed that mean value for acidity of T_0, T_1, T_2, T_3 and T_4 was found to 0.20, 0.22, 0.26, 0.28 and 0.29 respectively. Acidity percent of paneer by using buffalo milk and mint and control milk, highest mean acidity percent was recorded in T_4 (0.29) followed by T_3 (0.28), T_2 (0.26), and T_1 (0.22), T_0 (0.20).

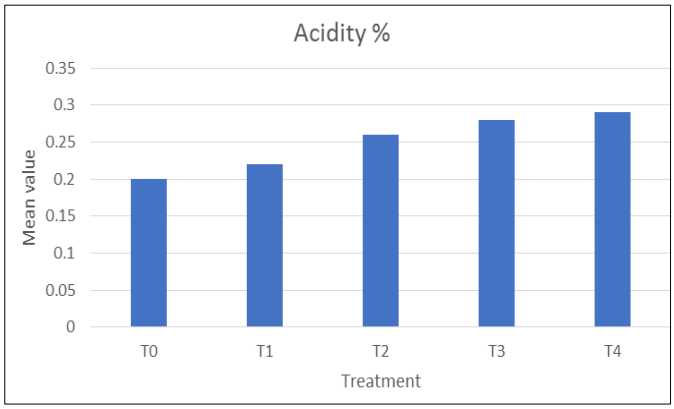

Fig 7: Average percentage of Acidity for paneer by using buffalo milk and mint

Microbiological characteristics of control and experimental paneer by using buffalo milk and mint

Yeast and mould count in control and experimental paneer by using buffalo milk and mint

The data shown in table 1, the mean value of T_0, T_1, T_2, T_3 and T_4 was found to be 4.40, 3.80, 3.60, 3.40 and 2.60 respectively. The Yeast and mould count of paneer by using buffalo milk and mint and control milk, highest mean yeast and mould percent was recorded in T_0 (4.40) followed by T_1 (3.80), T_2 (3.60), and T_3 (3.40) T_4 (2.60). It was observed that mean treatment values was constantly decreased from T_0 to T_4 experimental samples so the yeast and mould of different treatment decreased significantly (P<0.05)

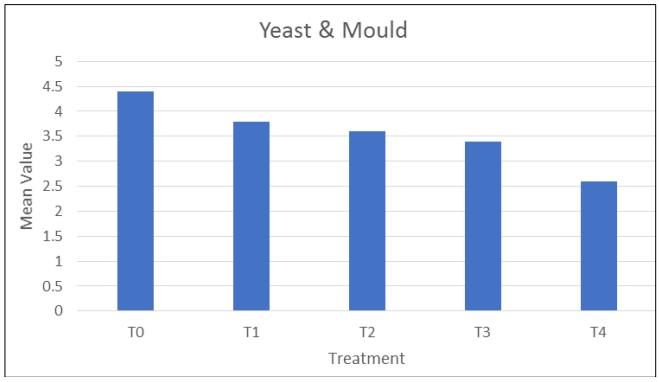

Fig 8: Average percentage of Yeast and Mould for paneer by using buffalo milk and mint

Coliform count in control and experimental paneer by using buffalo milk and mint

The data regarding coliform count in control and experimental paneer by using buffalo milk and mint sample of different treatments are presented in table 1. The mean value for coliform of all treatment was found to be nil.

Summary and Conclusion

The highest mean fat percentage was recorded in the sample of T_0 (22.69) and lowest was recorded in T_4 (20.87). All treatment was significant which may be ascribed to addition of different level of mint in treatments. The highest Protein percentage was recorded in the sample in T_0 (17.08) and lowest was recorded in T_4 (15.75). All treatment was significant which may be ascribed to addition of different level of mint in treatments. The highest mean Carbohydrates percentage was recorded in the sample in T_0 (19.89) and lowest was recorded in T_4 (19.14). It is therefore concluded that there was all treatment was significant which may be ascribed to addition of different level of mint in treatments. The highest Ash percentage was recorded in the sample of T_0 (2.59) and lowest was recorded in T_4 (2.53). All treatment was significant which may be ascribed to addition of different level of mint in treatments. The highest Total solids percentage was recorded in the sample of T_0 (62.25) and lowest was recorded in T_4 (58.29). It is therefore concluded that there was all treatment was significant which may be ascribed to addition of different level of mint in treatments. The highest mean acidity percentage was recorded in the sample of T_4 (0.29) and lowest was recorded in T_0 (0.20). It is therefore concluded that there was all treatment was significant which may be ascribed to addition of different level of mint in treatments. The highest mean yeast & mould count was recorded in T_0 (4.40) and lowest was recorded in T_4 (2.60). All treatment was significant which may be ascribed to addition of different level of mint in treatments. None of the samples of Control and experimental preparation of paneer by using buffalo milk and mint samples showed the presence of the coli forms which indicates that proper hygienic conditions were maintained during the preparation and storage of the product. Overall results of the present study indicate that the mint was added satisfactory into the preparation of buffalo milk paneer.

Acknowledgements

The authors are highly thankful to the Dean, Warner College of Dairy Technology, Sham Higginbottom University of Agriculture, Technology & Sciences, Allahabad (UP) for giving necessary facility and valuable guidance for research work.

References

1. Ahmed S, Anjum FM, Huma N, Sameen A, Zahoor T. Composition and physico-chemical characteristics of buffalo milk with particular emphasis on lipids, proteins, minerals, enzymes and vitamins. The J Ani and Plant Sci. 2013; 23:62-74.
2. Aneja RP, Mathur BN, Chandan RC, Baneerjee AK. Heat-acid coagulated products. In" Technology of Indian Milk Products" (Ed. P. R. Gupta). A Dairy India pub, New Delhi. 2002: 133-142.
3. Anonymous. Drugdex Drug Evaluations. Peppermint. Greenwood Village, Colorado: Thomsen Greenwood Village, Colorado, USA: Thomson Micromedex Inc. Healthcare series. 1999
4. Bhattacharya DC, Mathur ON, Srinivasan MR, Samlik O. Studies on methods of production and shelf life of paneer (Cooking type of acid coagulated cottage cheese). Journal Food Science Technology. 1971; 8(9):117-120.
5. Chopra S, Mamtani R. Soy Paneer or Paneer. Indian Dairyman. 1995; 47(8):27-29.
6. David J. Preparation of functional paneer from buffalo milk blended with coconut milk. Research Journal of Animal Husbandry and Dairy Science. 2012; 3(2):88-90.
7. FSSAI. Food Products Standards and Food Additives. Food Safety and Standards Regulations, 7th edition. International law book company publication, Delhi, India, 2011, 270.
8. Hawthorn M, Ferrante J, Luchowski E, Rutledge A, Wei XY, Triggle DJ. The actions of peppermint oil and menthol on calcium channel dependent processes in intestinal, neuronal and cardiac preparations. Aliment Pharmacol Ther, 1988, 101-18.
9. Kanawjia SK, Singh S. Sensory and textural changes in paneer during storage. Buffalo J 1996; 12:329-334.
10. Khan SU, Pal MA**.** Paneer production- A review. J Food Sci. Tech. 2011; 48(6):645-660.
11. Mekay DL, Blumberg JB. A review of the bioactivity and potential health benefits of peppermint tea (*Mentha piperita* L). Phytother. Res. 2006; 20:619-633.
12. Pariskar JR, Patil RA, Padghan RA, Londheand PV GK, Bhosale KS. Studies on chemical composition of Kheer prepared from soy milk blended with buffalo milk. Asian J Dairy & Food Res. 2015; 34(2):109-112
13. Rastogi RP, Mehrotra BN. (1991). Compendium of Indian medicinal plants. New Delhi: CDRI and PID. 1991; 3.
14. Sachdeva S, Singh S, Kanawjia SK**.** Recent developments in paneer technology. Indian Dairyman. 1985; 37:501
15. Salman muhammad, Khasheli muhammad, Israr-ul-haq, Talpur aisha rahman, Khuhr aneela perveen, Rauf mubasher *et al.* Comparative studies on nutritive quality of buffalo and cow milk. International Journal of Research in Applied, Natural and Social Sciences. 2014; 2(12):69-78
16. Sindhu JS. Suitability of buffalo milk for products manufacturing. Indian Dairyman. 1996; 48:41-47.
17. Sindhu JS**.** Chemical aspects of cow and buffalo milk in relation to quality of traditional dairy products. In Compendium: Advances in traditional dairy products. Centre for Advanced studies in Dairy Technol. NDRI Karnal, 1998, 12-16.