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Effects of Coagulants on the Chemical Composition and Product Quality of Churpi

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Abstract

Churpi is an indigenous product of Nepal, Eastern India and Bhutan and is a dried hard coagulated casein product, often called hard cheese and used as a nutritious masticatory food item. It is a light yellowish to dark, cubical or cylindrical block, faintly sweet but distinctly smoky with a hard and compact body. The milk was standardized to fat: solid not-fat (SNF) ratio of 1: 8.7 and heated to 70° C. Then it wascoagulated with 1, 2 and 3 percent each of lactic and tartaric acid. The whey was drained immediately after coagulation, by filtering through a muslin cloth. The curd was cooked for 20 minutes, wrapped in muslin cloth, pressed overnight and was dried over fireplace for a week and then at room temperature for about 40 days. The moisture content was decreased as the concentration of coagulants in bothe cases was increased Churpt prepared by using 23 percet each of lactic and tartaric acid had the highest fat retention, and protein retention was highest when prepared by using I percent lactic acid followed by 3 percent and 2 percent lacric acid, and it was highest by using 2 percent tartaric acid followed by I percent and 3 percent. The lactose did not vary much. The total solid loss in whey was increased as concentration of coagulants increased. From the sensory analysis results the product prepared by coagulating milk with 2 percent each of lactic and tartaric acid can be taken as acceptable product.

Keywords: Churpi, Coagulants effect, Composition, Product, Quality.

Introduction

Churpi is a dried hard coagulated casin product often called hard cheese and used as a nutritious masticatory food item. It is an indigenous milk product of Darjeeling hills, Sikkim and Bhutan and generally consumed by the people of these areas (Karki 1986, Tamang *et al.* 1988). Churpi is a popular chhana-based traditional milk prooduct of several parts of the Indian subcontinet (Karki 1986, Tamang *et al.* 1988, Pal *et al.* 1993). It is prepared by acid coagulation of curd. The Tibetan inhabitants commonly use this fermented cow milk product. In Bhutan, The preparation of churpi is controlled by the "Dukpa community" but in Sikkim, Nepal and Darjeeling it is prepared by the villagers, irrespective of caste and creed. The product used as a nutritious masticatory, is light yellowish to dark brown, cubical or cylindrical block, faintly sweet, but distinctly smoky with a hard andd compact body (Pal *et al.* 1996).

Fat churpi is prepared from partially defatted milk of cow in Darjeeling, dzno (a cross breed of male Yak and indigenous cow) in Sikkim, and Yak in Bhutan. The curd formation, tratment and drying process also contributes to the final characteristics of churpi. Sherkum and churpi is as traditional product very popular in the eastern Himalayan regions. It's prepared from the butter whey after the extraction of nauni ghee from dahi. When whey is boiled milk protein will be precipitated out. This is called "sherkum" used to expel the moisture content of 12-14%. This product is called churpi or "durukha."

In some places, traditionally, milk is coagulated with previous batch of whey, and the green curd is cooked in an open pan. The cooked coagulum is heavily pressed overnight and dried for 40-60 days by hanging the pieces over the fire-place. However, in Darjeeling the green curd is not cooked but wrapped in a hessian cloth, stitched and dried in kitchen(Pal *et al.* 1993). Consequently, the quality of churpi varies from place to place (Pal 1994). It keeps well for about six months.

Methodology

Milk and skim milk powder were collected from Dairy Develpment corporation, Milk Supply Scheme, Biratnagar. The different successive opera-

Table 1. Effect of different coagulants on the quality, yield and total solids (TS) recovery in churpi

Coagulants	Coagulants (%) w/v	pH	Titrable acidity (%)	Amt. of coagulant (ml/100ml milk)	Yield (%)	T.S. recovery in churpi (%)	T.S. in whey (%)
Lactic acid	1	2.40	1.90	18.50	4.375	31.70	6.625
	2	2.27	2.52	11.88	4.475	25.25	7.250
	3	1.35	3.90	6.90	3.550	20.61	7.700
Tartaric acid	1	2.50	1.50	24.125	4.250	30.56	6.735
	2	2.20	2.25	11.35	4.725	29.89	6.800
	3	1.50	3.24	7.125	4550	26.28	7.150

tions such as stadardization (fat: SNF ratio of 1: 8.7), preheating, and filtration were carried out. The milk was tested for fat and SNF to standardize it. For the adjustment of SNF to 8.7, skimmed milk powder was added to the milk. Then it was filtered through a muslin cloth. The standadized and filterated milk was heated to 70° C and coagulated immediately at that temperature with lactic acid and tartaric acid, each of 1, 2 and 3%. The temperature of coagulant during coagulation was around 30+2°C. Coagulation was carried out until clear whey was obtained (pH 5.3 - 5.35). then whey was drained. The coagulum now known as green curd was cooked in an open pan over water-bathe for 20 minutes. The hot cooked curd was wrapped in a muslin cloth and pressed in a wooden box (hoop) at 9 kg/cm^2 pressure for 6 hours.

The mass was cut into long strips of about 12x2x2cm^3. The cut pieces were dried over the fire-place for a week. The smoke of the fire gives the product a slight smoky smell. The product was further dried at room temperature (30° - 35°C) for 40-45 days. The six samples of churpi were subjected to the sensory evaluation of 15 panelists. The parameters for evaluation were flavor, body and texture; color and apperance; gumminess and chewiness, and overall acceptability. The scoring data obtained from different panelists were statistically analyzed. The chemical analysis of the product was made by the standard methods given. Acidity of the churpi was made by the method described by Dairy Development Corporation (1989). Fat content in churpi was estimated by the procedure given by Ranganna 1994. The protein content in churpi was estimated by the Kjeldhl method and the conversion factor used is 6.38 (Ranganna 1994). The ash content and moisture content in churpi were determined by Lane and Enyon method (Pearson 1976).

Results and Discussion

Chemical composition of standardized milk for cjurpi making should be as follows : moisture 90.3%, fat 1.0%, SNF 8.7%, acidity 0.14-0.15% and pH 6.4-6.6 (Pal *et al.* 1996). Churpi prepared from skim milk showed flat flavor due to the negligible amount of fat content because the agreeable flavor of rich milk and other dairy products is largely due to milk fat (Eckles *et al.* 1973).

Milk having acidity within the range of 0.14-0.16% was only accepted for churpi preparation, a increase in acidity above this was due to result of bacterial action on lactose in milk.

The mean pH and titrable acidity of different concentrations of coagulants used, ranged from 1.35-2.50 and 1.50-3.90 percent, respectively (Table 1). The amount of coagulants required decreased with increasing concentraion. The moisture content of churpi prepared by using lactic acid 1% was higher than that of the sample prepared by using other two concentrations. Similar results were obtained by using tartaric acid (Table 1).

The yields of churpi prepared by using 2% lactic and tartaric acid were significantly higher than the yields of the samples prepared by using other two concentrations of the coagulants. They yield obtained from tartaric acid was higher than that of lactic acid of the same concentrations.

Total solid loss in whey increased with increase with increase in concentration of coagulant. Sachdev and Singh (1987) reported that loss of total solid in whey was 5.8%, 6.4% and 6.8%, when coagulated with 1, 2 and 3% citric acid, respectively. Total solid

Table 2. Chemical composition of churpi in percent dry basis

Coagulant concentration (%)	Moisture	Acidity	Protein	Lactose	Fact	Ash
Lactic acid						
1	14.0	0.40	70.36	3.05	6.72	5.17
2	13.5	0.45	68.72	3.10	7.14	6.75
3	13.9	0.47	69.87	3.00	6.90	6.18
Tartatic acid						
1	12.90	0.85	69.70	2.90	8.07	5.16
2	12.30	0.50	70.36	3.10	8.16	5.05
3	11.90	0.52	68.54	3.20	7.58	5.15

loss in whey is also afected by the pH of coagulation. As the pH (5.30-5.35) of coagulation was kept same for all cases, the effect may only be due ro concentration difference of coagulants. The total solid recovery decreases as concentration of coagulant increases (Table 1). Total solid loss in whey and total solid recovery in churpi are inversely related (Pal *et al.* 1995).

The churpi obtained by coagulating with tartaric acid of concentration 1 and 2% had higher amount of fat, 8.07 and 8.16%, respectively, whereas churpi from other concentrations had lower percentage, and minimum fat (6.72%) was obtained from 1% lactic acid (Table 2).

The protein content also varies with the concentrations of coagulants. The values obtained from 1% lactic acid (Table 2). The protein content also varies with the concentrations of coagulants. The values obtained from 1% lactic and 2% tartaric acid were same (70.36%), whereas from 2% citric acid it was less, i.e., 68.5% (Table 2).

The acidity in churpi from 1% tartaric acid was 0.85% which is very high (Table 2). The higher the acidity, the greater the sourness in the product, which is not desirable (Eckles, 1973). According to sensory evaluation, no significant difference was observed in the samples from lactic acid in respect to flavor, body and texture, and gumminess and chewiness, whereas significant difference was observed in the samples for clolor, appearance and overall acceptability. On carrying out least square deviation (LSD) for above two parameters it was found that there was significant difference between samples obtained from 1 and 2% 2 and 3%. lactic acid for color and appearance, and no significant difference between samples from 1 and 3%. For overall acceptability, there was significant difference between 2 and 3 % but insignificant differences were observed between 1 and 3 % and 1 and 2%.

It was found that there was no significant difference beteen samples prepared by using 1,2and3 % tartaric acid. Samples from 1 % tartaric acid were judgedto be merely darkerin colour which may be due to use of darker smoke, and to be brittle which may be due to less heat treattment / extensive hydrolysis of protein as supported evidence in milk and milk products (Wadsworth and Bassettle 1985)

A low score for body and texture of churpi prepared from tertaric acid (1%) could also be attributed to less heat treatment,since heating increases protien -protien interactions which in turn increase the consistency and aggregation of particles (Saio *et al.* 1968), leading to higher compactness.

Conclusion

Churpi, a nutritious protien -rich product can be prepared from locally available raw material by simple method. The chemical composition of product prepared by using different concentrations of coagu-

lant,did not vary much. The product yield (%) obtained from 2% each of lactic and tartaric acid was higher than from other concentrations i.e.,4.475 and 4.725%, respectively.With both coagulants, as concentration was increased the total solid lost in whey was also increased. The churpi prepared by using 2% each of lactic and tartaric acid can be taken as acceptable product.

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