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COMPARATIVE STUDIES OF CHEMICAL QUALITIES OF SINGORI (A TYPE OF SWEET) OF KUMAON REAGION

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ABSTRACT

The study was initiated to compare market and laboratory made singori with objective of providing scientifically proven best quality of said sweet. The results obtained with regard to chemical quality of singori collected from the markets indicates that either the samples were quite old or have been prepared under unhygienic conditions due to breakdown of lactose, protein and fat resulting in higher values of titratable acidity, soluble nitrogen content and FFA content and lower values for pH.

Introduction

Singori is a khoa based sweet of Uttarakhand originated in Almora. Singori has white color, sweet caramel flavor, slightly granular in texture and is rolled in malu leaves. It is prepared from khoa made by desiccation of cow or buffalo milk, addition of sugar, tartaric acid for granulation and flavouring. Singori occupies an important place among indigenous milk products of Kumaon. However, no research has been done on standard composition and quality of this sweet of particular hill region; therefore an attempt herein was made for the chemical evaluation of singori to determine the quality.

Material Methods

To compare the chemical properties, samples were collected from Almora, Haldwani, Rudrapur and Pantnadar. Simultaneously two controls were also prepared in the laboratory. The total solids, moisture content, fat, protein, lactose, ash, sucrose, calcium, phosphorous, iron,

copper, magnesium, zinc, Ph, acidity, tyrosine, soluble nitrogen and free fatty acids were estimated (AOAC, 1984).

Results and discussion

The samples of singori were examined for various attributes of chemical quality. Singori acquired from various places had varying chemical composition as illustrated in table 1. The maximum total solids content was observed in singori obtained from Pantnagar and Control 1 (87.08±1.529), and minimum was found in control 2 (77.55±1.092) samples which was significantly lower ($p \leq 0.05$) than other places. The samples obtained from Pantnagar (12.91±1.529) and Rudrapur (15.79±1.900) markets had comparatively less moisture content and appeared relatively dried and hard. Such difference might be attributed to the fact probably samples obtained from Pantnagar and Rudrapur were quite old as compared to control 2 (20.34±2.057) that is significantly higher ($p \leq 0.05$) as the sale of singori was less in these cities and the product was normally manufactured only once a week that too at a few shops. Storage of singori for a long time probably resulted in loss of moisture and increase of total solids similar to the findings of Boghra (1998). The fat content was statistically insignificant ($p \leq 0.05$) higher (20.89±1.58%) in samples collected from Pantnagar market and statistically insignificant ($p \leq 0.05$) lower in samples from Almora samples (18.43±0.41%). Control 2 samples also had statistically insignificant ($p \leq 0.05$) higher value of fat (21.50±0.811%). Similarly, the protein content was statistically insignificant ($p \leq 0.05$) higher in samples from Pantnagar and control (15.19±1.73) and (15.23±2.328 %) and statistically insignificant ($p \leq 0.05$) lower was (12.10±0.33%) in samples from Almora market. The fat and protein depends on type of available milk in the market samples could be due to use of inferior quality milk in accordance with Sarkar *et al.* (2002).

The data presented in table 2 revealed that the lactose and ash in controls (18.50±0.06% and 2.48±0.06% respectively) were significantly higher ($p \leq 0.05$) than market samples, but sucrose was significantly ($p \leq 0.05$) lower (25.52±0.22) agreeing to Kulkarni *el al.*, (2001).

It is explicit from data in table 3 that the calcium was significantly ($p \leq 0.05$) higher in sample of controls (552.28±0.22 and 550.25±0.22 respectively), phosphorus and iron was significantly ($p \leq 0.05$) higher in sample of Rudrapur (485.0±5.69 and 7.90±6.24 respectively), copper content was significantly ($p \leq 0.05$) higher in sample of control 2 (0.044±0.004),

manganese was significantly ($p \leq 0.05$) higher in sample of Pantnagar (0.044±0.021) and zinc was significantly ($p \leq 0.05$) higher in sample of Almora (0.089±0.003). These value differ due to presence of various minerals in different quantities in soil of different places that intern come into fodder so reflected in milk and milk products Sikiric *et al.*, (2003)

The observations laid down in table 4 revealed that the pH, acidity, soluble nitrogen and free fatty acids were significantly ($p \leq 0.05$) lowest (4.44±0.051, 0.44±0.006, 0.434±0.017 and0.248±0.087 respectively) in samples from Almora due to aging that caused degradation and significantly ($p \leq 0.05$) increases the value of tyrosine in the sample of same place as also reported by Suresh and Jha (1994) and Sindhu *et al.* (2000) in kalakand and khoa respectively.

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Table 1: Total solids and moisture content of singori

S. N.	Places	T.S. (Mean±SEM) %	Moisture (Mean±SEM)%	Fat (Mean±Sem) %	Protein (Mean±Sem)%
1	Pantnagar	87.08±1.529	12.91±1.529	20.89±1.580	15.19±1.73
2	Rludrapur	84.21±1.900	15.79±1.900	18.57±0.344	12.83±0.399
3	Haldwani	83.97±1.574	16.02±1.574	18.54±0.215	12.13±0.428
4	Almora	83.72±1.225	16.27±1.225	18.43±0.410	12.10±0.332
5	Control-1	80.61±0.420	17.20±1.558	19.87±0.309	14.23±0.328
6	Control-2	77.55±1.092*	20.34±2.057*	21.50±0.811	15.23±2.328
Overall		**82.86±758**	**16.42±0.740**	**18.85±297**	**13.45±0.251**

*Significant at 5% level (p≤ 0.05)

T**able 2: Lactose, ash and sucrose content of singori**

S.N.	Places	Lactose (Mean±Sem) %	Ash (Mean±Sem) %	Sucrose (Mean±SEM %)
1	Pantnagar	15.42±0.45	2.45±0.611	33.91±0.89
2	Rudrapur	16.31±0.74	2.48±0.003	34.01±0.65
3	Haldwani	18.43±0.45	2.17±0.06	32.70±0.59
4	Almora	16.49.±0.54	2.13±0.04	34.57±0.49
5	Control-1	18.50±0.06*	2.49±0.02*	25.52±0.2*
6	Control-2	18.50±0.06*	2.48±0.02*	25.52±0.22*
	Overall	**17.288±0.29**	**2.37±0.04**	**31.04±0.76**

*Significant at 5% level (p≤ 0.05)

Table 3: Calcium, phosphorus, iron, copper, manganese and zinc content of singori

Sl No.	Places	Calcium* (Mean±SEM) mg.%	Phosphorus (Mean±SEM) mg.%	Iron (Mean±SM) mg.%	Coper (Mean±SEM) mg.%	Mn (Mean±SEM) mg.%	Zn (Mean±SEM) mg.%
1	Pantnagar	511.4±5.65	474.2±6.26	7.50.4±0.22	0.032±0.002	0.044±0.021*	0.079±0.004
2	Rudrapur	511.4±6.19	485.0±5.69*	7.90±6.24*	0.023±0.001	0.019±0.001	0.089±0.001
3	Haldwani	532.0±9.75	494.6±7.33	5.70±9.07	0.032±0.005	0.011±0.001	0.085±0.002
4	Almora	506.6±5.31	478.2±3.93	7.89±0.03	0.026±0.001	0.014±0.001	0.089±0.003*
5	Control-1	552.28±0.22*	453.0±13.88	7.13±0.0.07	0.034±0.006	0.017±0.002	0.085±0.004
6	Control-2	550.25±0.22*	477.4±11.82	7.13±5.07	0.044±0.004*	0.030±0.003	0.271±0.180
Overall		**310.40±0.76**	**477.0±4.05**	**7.21±0.15**	**0.032±0.002**	**0.022±0.004**	**0.116±0.030**

*Significant at 5% level ($p \leq 0.05$)

Table 4: pH, acidity, tyrosine, soluble nitrogen and free fatty acids content of singori

S.N.	Places	pH (Mean±SEM)	Acidity (Mean±SEM) %	Tyrosine (Mean±SEM)%	Soluble N (Mean±SEM) %	FFA (Mean±SEM)%
1	Pantnagar	5.40.±0.050	0.53.4±0.007	163.2±3.33	0.564±0.005	0.178±0.007
2	Rudrapur	5.38±0.066	0.57±6.007	161.8±1.77	0.682±0.009	0.240±0.011
3	Haldwani	5.28±0.037	0.54±9.010	155.4±1.17	0.556±0.024	0.230±0.017
4	Almora	4.44±0.051*	0.44±0.006*	169.4±2.64*	0.434±0.017*	0.248±0.087*
5	Control-1	5.44±10.163	0.45±0.0.024	159.0±1.18	0.566±0.004	0.112±0.005
6	Control-2	5.44±10;163	0.45±0.022	147.5±4.76	0.502±0.018	0.178±0.1007
Overall		**5.40.0±0.040**	**0.50±0.010**	**167.1±1.67**	**0.514±0.026**	**0.198±0.016**

*Significant at 5% level ($p \leq 0.05$)