NUTRIENT CONTENT OF MARKET AND LABORATORY KHOA SAMPLES

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Khoa/Khava/Mava refers to the partially dehydrated whole milk product prepared by the continuous heating of milk. Nutrient composition of khoa is important because it goes into the preparation of several indigenous sweet-meats. In the present study the nutrient composition of market khoa samples were analysed. These were compared with the nutrient composition of laboratory khoa samples prepared from pure cow milk or buffalo milk.

MATERIALS AND METHODS

Market samples -A total of 6 market samples of khcsa were purchased (1 sample from the local area i.e. Vallabh Vidyanagar, 2 samples from the neighbouring Anancl city, 1 sample from Barocla city and 2 samples from Ahmedabad city). These were analysed for the nutrient content.

Laboratory samples-Laboratory samples of khoa were prepared from pure cow milk as well as from pure buffalo milk. Preparation of khoa in the laboratory essentially included boiling of SOOgms of whole milk in a stainless steel vessel on a gas stove with constant stirring (approx. 45 minutes) until a solid mass was formed. The samples were cooled and used freshly for analysis.

Nutrient composition -The 6 market samples and 2 laboratory samples (one -from cow milk and the other from buffalo milk) of khoa were analysed for their proximate composition, mineral and vitamin content. Moisture was analysed by the standard AQAC (1984)[1] method while total solids was calculated as 100 minus moisture content. Carbohydrate estimation was carried out by the anthrone method (Plummer 1990)[2], fat content was determined by the standard AOAC (1984) method while protein estimation was carried out by the micro Kjeldahl method (Oser 1976)[3]. Ash content was determined by the standard AOAC method (1984)[1]. Calcium was determined by the titrimetric method of Clark and Col lip (1928) while phosphorus was estimated by the colorimeteric method of Fiske and Subbaroa (1925)[5]. Thiamine was estimated by the thiochrome method (AAVC 1951) while riboflavin was estimated by the fluorometric method (AAVC 1951)[6].

RESULTS AND DISCUSSION-The cost and major milk constituents of market and laboratory khoa samples are expressed in Table No.i. The cost of market and laboratory samples of khoa were nearly similar except for the Vidyanagar khoa sample which showed higher cost (Rs.70/kg). The other market samples showed the same price as that of cow milk khoa i.e. Rs.60/kg. For the laboratory sources of khoa, the yield was 200gm/litre from cow milk and 250gm/litre from buffalo milk and on this basis the laboratory khoa was priced. Market samples. Boghra and Mathur (1990) reported a higher calcium content (654.00mg%) in market khoa samples. A greater variation and a highly significant difference ($P<0.0005$) was observed between the two laboratory samples, cow milk khoa showing higher calcium content. Compared to cow milk khoa all the market samples showed significantly lower ($P<0.0005$) calcium content while compared to buffalo milk khoa they showed no significant difference. Adhikari et al (1994) reported similar. calcium content (680.00 mg%) for buffalo milk khoa as that observed in the present study. The trend is clearly seen from Fig.4 which expresses the mean percentage difference in the calcxum content of market samples compared to laboratory samples. Phosphorus content of the market samples varied from 383.61 to 550.02mg%. in the market samples. Highest value was in sample I i.e. 550.02mg%. while the lowest was in sample III i.e. 383.61mg%. These two samples showed a highly significant difference ($P<0.0005$) between each other. Other market samples did not show much variation. Between the two laboratory samples there was a wide variation and significant. difference ($P<0.0005$) in phosphorus content. This is also expressed in Fig.5. The average calcium 5 phosphorus ratio in the market samples was 1.28:1, buffalo milk khoa showed a ratio of 1.41:1 while cow milk khoa which contained nearly similar amounts of both calcium and phosphorus content showed a ratio of 1.10:1.

Thiamine content ranged from 0.157 to 0.195mg%. in the market samples, but all the market samples showed lower thaimine content compared to both the

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laboratory samples. Significant difference (P<0.01) was observed between the two laboratory samples, cow milk khoa showing higher thaimine content than buffalo milk khoa. The trend is clearly expressed in Fig.6 which expresses the mean percentage difference of thiamine content in market samples compared to laboratory khoa samples. Riboflavin content varied from 0.200 to 0.463mg%. in market samples. Market samples showed moderate variation between each other but the laboratory samples showed wider variation between each other. The market samples showed only half the riboflavin content as that of cow milk khoa. Samples I and VI showed higher riboflavin content than buffalo milk khoa while all other samples showed lower riboflavin content. This trend is clearly expressed in Fig.7. Riboflavin content depends on the feed given to the cow as well as the exposure of milk samples to sunlight during transport, processing, etc. The nutrient composition of khoa in general depends on many factors. These may be, the quality and the initial composition of milk, the temperature applied during preparation, the freshness of the sample, feed given to the animal, breed and health of the animal, etc. The nutrient composition also depends on the degree of concentration of milk solids and losses or gain during handling and processing (Sukumar De 1994)[12].

CONCLUSION-In the present study, the nutrient, composition of the various market samples studied did not differ much from each other. Market. samples of khoa seemed to show closer nutrient levels to the khoa prepared from buffalo milk rather than to the khoa prepared from cow milk. The lower fat but similar protein content in market khoa samples compared to buffalo milk khoa indicated that fat was being skimmed off from buffalo milk before preparation of khoa, in the market samples.

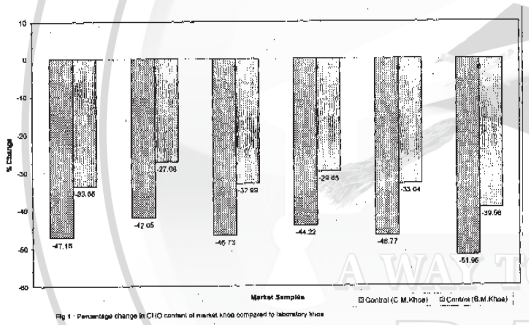
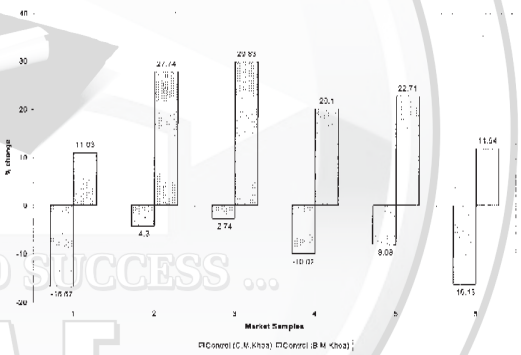


Fig.1 : Percentage change in CHO content of market khoa compared to laboratory khoa



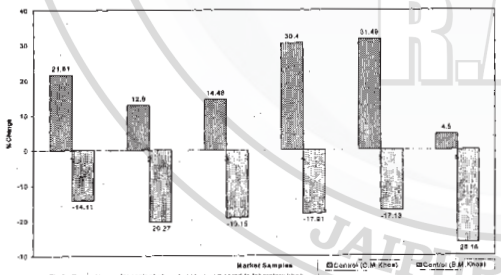


Fig.2 : Percentage in fat content of market khoa compared to laboratory khoa

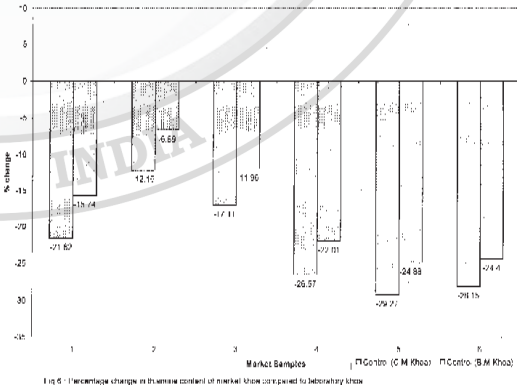


Fig.6 : Percentage change in thiamine content of market khoa compared to laboratory khoa

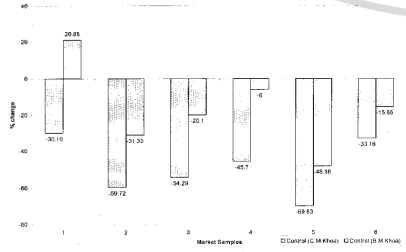


Fig.7 : Percentage change in riboflavin content of market khoa compared to laboratory khoa

Table No. 1 : Major milk constituents in market and laboratory samples of khoa.

Sample No.	Source of Sample	Cost (Rs./Kg)	Moisture	Total Solids	Cho*	Fat	Protein	Fat/Protein ratio
I	[illegible]	60	30.16 ± 0.32	69.84 ± 0.32	12.93 ± 0.72	32.24 ± 0.87	17.01 ± 0.20	1.89
II	[illegible]	60	32.24 ± 0.67	67.76 ± 0.68	14.19 ± 1.64	29.93 ± 3.22	19.57 ± 1.14	1.53
III	[illegible]	70	30.36 ± 0.42	69.64 ± 0.81	13.04 ± 0.50	30.35 ± 0.30	19.69 ± 0.64	1.53
IV	[illegible]	60	30.65 ± 0.31	69.35 ± 0.90	13.65 ± 0.86	24.57 ± 2.51	18.40 ± 0.66	1.89
V	[illegible]	60	32.52 ± 0.60	67.48 ± 1.08	13.03 ± 0.29	34.96 ± 0.38	18.93 ± 1.02	1.85
VI	[illegible]	60	36.53 ± 0.16	63.47 ± 1.10	11.76 ± 0.64	27.71 ± 1.64	17.15 ± 0.09	1.61
VII	[illegible]	60	27.89 ± 0.28	72.11 ± 0.26	1.2 ± 0.86	2 ± 0.72	2 ± 0.49	1.29
VIII	[illegible]	70	29.66 ± 1.89	70.34 ± 1.99	1 ± 0.73	3 ± 0.71	1 ± 0.59	2.49

Average of 3 trials
Mean ± S.E.M.

* Average of 6 trials

1 - Significantly different from all market samples

2 - Significantly different from buffalo milk khoa

3 - Significantly different from all market samples eccept sample No. IV.

Table No. 2 : Mineral and vitamin content of market and laboratory samples of khoa.

Sample No.	Ash	Calcium	Phosphorus	B1	B2
I	4.77 ± 0.29	631.01 ± 16.44	550.02 ± 31.56	0.174 ± 0.001	0.463 ± 0.127
II	7.04 ± 1.88	592.45 ± 45.55	502.49 ± 42.49	0.195 ± 0.039	0.267 ± 0.009
III	3.93 ± 0.36	532.89 ± 20.85	383.61 ± 17.79	0.184 ± 0.013	0.303 ± 0.042
IV	4.79 ± 0.71	560.26 ± 5.41	459.75 ± 8.45	0.163 ± 0.002	0.360 ± 0.040
V	4.10 ± 0.44	639.54 ± 20.59	480.78 ± 87.24	0.159 ± 0.001	0.443 ± 0.084
VI	1 ± 5.45 ± 0.05	2.3 879.61 ± 6.26	2.9 819.92 ± 55.56	3.4 0.222 ± 0.003	0.663 ± 0.113
VII	1 ± 5.49 ± 0.11	656.21 ± 9.62	466.93 ± 24.37	0.209 ± 0.001	0.383 ± 0.015

Average of 3 trials
Mean ± S.E.M.

* Average of 6 trials

1 - Significantly different from sample Nos. I, III and VI

2 - Significantly different from all market samples.

3 - Significantly different from buffalo milk khoa.

4 - Significantly different from all market samples eccept sample No. IV.

C.M. = Cow milk, B.M. = Buffalo milk

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