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Impact of dairy plant environment yeasts on khoa

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Abstract

The environmental contamination in and around a dairy plant directly influences the microbial quality of milk products during processing, handling and storage. The air and khoa samples from three organized dairy plants were collected at different production points namely vat section, package section and storage section in Khoa unit and analysed for the incidence of yeasts and their impact on khoa. *Saccharomyces* species was the predominant yeast (42.11% and 40%) followed by *Candida sp.* (31.58% and 34.55%) found in both air and khoa samples. The other yeasts encountered were *Rhodotorula sp.* and *Torulopsis sp.* in both air and khoa samples.

Keywords: Airborne yeast, Dairy plant, Khoa unit, Vat section, Package section, Storage section

1. Introduction

The total Livestock population in India is 535.78 million. Among them, cattle is 192.49 million, buffaloes 109.85 million, sheep 74.26 million and Goat is 148.88 million as per 20th Livestock Census, 2019 ^[1]. India is the largest milk producing country with an annual production of more than 188 million tonnes which is about 17 percent of total milk production in the world. The share of Buffalo milk is 49%, cow milk 47% and goat milk constitutes 4%. It is estimated that nearly 7% of the total milk production is being utilized for making khoa due to its large scale consumption ^[2]. Khoa is an indigenous, heat coagulated, partially dehydrated whole milk product obtained by heating, evaporation and desiccation at atmospheric pressure. It is the base for a wider range of traditional sweets including gulabjamun, burfi, peda, kalakand, rabri, kulfi and their variants. It has considerable economic and dietary importance to the Indian population. The total Indian sweet market is around 520 billion in terms of annual sales. ^[3, 4]

Owing to its nutritive value and moisture content, khoa serves as a favourable medium for the growth of microorganisms on account of the unsatisfactory practices followed in its production, handling and storage results in poor shelf life ^[5]. Among the spoilage organism yeasts are encountered frequently as contaminants in khoa. It is prepared under varied conditions and gets frequently contaminated by the yeasts. The contamination of khoa by yeast causes rapid spoilage of khoa ^[6]. The presence of yeast in khoa is objectionable as they produce discolouration defects and lipolytic changes causing off flavour development in the finished product ^[7]. Hence, this study is envisaged to identify the contamination of yeast in air and khoa samples in dairy plant since khoa forms an important sweet meat base for preparation of various milk sweets which are an integral part of Indian food heritage.

2. Materials and Methods**2.1 Collection of air samples**

108 samples of air, 36 from each of the three organized khoa manufacturing dairy plants located in Tamil Nadu were collected using Andersen two stage air sampler ^[8, 9]. Among 36 air samples, 12 samples were collected from each of the three sections in Khoa manufacturing unit viz., Vat section, Package section and Storage section.

2.2 Collection of khoa samples

Similarly 108 samples of khoa, 36 from each of the three organized dairies were collected aseptically. Among 36 air samples, 12 samples were collected from each of the three sections in Khoa manufacturing unit viz., Vat section, Package section and Storage section.

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2.3 Analysis of yeasts in air and khoa samples

The samples of air and khoa were analysed for yeast according to Andersen and BIS [8, 10] respectively. Examination of yeast isolates for their morphological and biochemical characteristics were carried out as per Lodder [11] and the identification was made following the keys given by Barnett *et al.* [12].

3. Results and Discussion

Milk and milk products have high nutritive value but they are less perennial because different types of microorganisms are often present it due to unhygienic condition. The unsanitary conditions followed by the milk sweet makers in preparation, processing, packaging and storage of sweetmeats are often so poor that the products on reaching the consumers have an unbelievable microbial load, which may includes the different

strains of pathogens that causes the serious health hazards [13]. A total of 316 samples (108 air and 108 khoa samples) 36 each from three organized dairies and that to from three different sections of khoa plants *viz.*, Vat section, Package section and Storage section were collected aseptically and analyzed for yeast contamination. The numbers of isolates taken for characterization of yeasts from air and khoa samples were 57 and 55 respectively.

The incidences of yeasts contamination were reported in Table- 1. Among the 57 isolates of air samples 24 were *Saccharomyces sp.* (42.11%), 18 were *Candida sp.* (31.58%), 9 were *Rhodotorula sp.* (15.79%) and 6 were *Torulopsis sp.* (10.52%). Similarly, as indicated in Table-1 out of 55 isolates of khoa samples 22 were *Saccharomyces sp.* (40.00%), 19 were *Candida sp.* (34.55%), 9 were *Rhodotorula sp.* (16.36%) and 5 were *Torulopsis sp.* (9.09%).

Table 1: Distributions of Yeasts in Air and Khoa Samples

S. No.	Yeast identified	Number of isolates	Percentage	Sample sources		
				Vat section	Package section	Storage section
I						
In Air Samples						
2.	<i>Candida sp.</i>	18	31.58	10	6	2
1.	<i>Saccharomyces sp.</i>	24	42.11	13	7	4
3.	<i>Rhodotorula sp.</i>	9	15.79	5	3	1
4.	<i>Torulopsis sp.</i>	6	10.52	4	1	1
	Total	57	100.00	32	17	8
II						
In Khoa Samples						
1.	<i>Saccharomyces sp.</i>	22	40.00	4	6	12
2.	<i>Candida sp.</i>	19	34.55	2	6	11
3.	<i>Rhodotorula sp.</i>	9	16.36	1	3	5
4.	<i>Torulopsis sp.</i>	5	9.09	1	2	2
	Total	55	100.00	8	17	30

It was found that *Saccharomyces sp.* was predominantly present in both air (42.11%) and khoa (40.0%) samples. Further, *Saccharomyces sp.* was also found to be present in higher numbers in all the three sections, namely vat section, package section and storage section of the khoa plants both in air and khoa samples. The distribution of other yeasts were *Candida Sp.* (34.55%), *Rhodotorula sp.* (16.36%) and *Torulopsis sp.* (9.09%) in khoa and *Candida sp.* (31.58%), *Rhodotorula sp.*(15.79%) and *Torulopsis sp.* (10.52%) in air samples.

The finding that *Saccharomyces sp.* was the predominant yeast in air samples (42.11%) correlates with Baroiller and Schmidt [14]. This finding may be attributed to the prevailing tropical climate and high humidity, milk spills, poor ventilation systems and outside dust.

Similarly the finding that *Saccharomyces sp.* was predominant in khoa samples (40.00%) and this is in accordance with Yadav *et al.* [15]. This result may be due to faulty handling practices, air movement and improperly cleaned equipments.

4. Conclusion

Owing to the prevailing tropical climate and high humidity in India, yeasts were encountered frequently in dairy products as contaminants and caused spoilage of dairy products. As khoa is prepared largely under unorganized sector and unsatisfactory practices followed during the making of khoa *viz.*, the dirty hands of worker, poor quality of milk, unhygienic conditions of manufacture unit, inferior quality of material used and water supplied for washing the utensils could be the source of the yeast contamination of milk products. The present study suggested the need for more strict

preventive and control measures to avoid pre and post process contamination of khoa as it forms the base material for a variety of traditional sweets.

5. Acknowledgement

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6. References

- 20th Livestock Census. Department of Animal Husbandry and Dairying. Ministry of Fisheries, Animal Husbandry and Dairying. Government of India. Krishi Bhawan New Delhi, India, 2019.
- Aneja RP. Indian Dairying: Competition is the key. In "Dairy India". 7th ed., Dairy India Yearbook publishers, New Delhi, 2017, 3-170.
- Pal D. New innovations in the processing of traditional Indian dairy products. *Indian Dairyman*. 2008; 60(3):127-131.
- Kumar M, Prakash O, Kasana KS, Dabur RS. "Technological advancement in khoa making," *Indian Dairyman*. 2010; 62(1):64-70.
- Sharma GR, Saraswat DS, Sharma SD. Studies on bacterial quality of khoa. *Indian Journal of Dairy Science*. 1972; 25:30-34.
- Davies WL. In "Indian Indigenous milk products". 2nd ed. Tacker, Spink & Co. Pvt. Ltd., Calcutta, 1940.
- Abhay Kumar, Rajorhia GS, Srinivasan MR. Effect of modern packaging materials on the keeping quality of khoa. *Journal of Food Science and Technology*. 1975;

- 12:172-177.
8. Andersen, AA. New sampler for the collection, sizing and enumeration of viable airborne particles. *Journal of Bacteriology*. 1958; 76:471-484.
 9. Kang YJ, Frank JF. Evaluation of air samplers for recovery of biological aerosols in Dairy processing plants. *Journal of Food Protection*. 1989; 52:655-659.
 10. BIS IS 3507. Methods of sampling and test for butter. Bureau of Indian Standards, Manak Bhavan, New Delhi, 1996.
 11. Lodder J. In "The yeasts – A taxonomic Study". North Holland publishing Co., Amsterdam, 1970.
 12. Barnett JA, Payne RW and Yarrow D. *Yeasts: Characteristics and Identification*. Cambridge University Press, London, 1986.
 13. Dwarkanath CT, Srikanta S. Study on the microbiological quality of traditional indian sweetmeat products. *Journal of Food Science and Technology*. 1977; 14:201-204.
 14. Baroiller C, Schmidt JJ. Study on the origin of yeasts from camembert cheese. Cited in *Dairy Sci. Abstract*. 1990; 52:7484.
 15. Yadav JS, Sunita G, Batish VK. In "A comprehensive Dairy Microbiology", 1st ed., Metropolitan Book Co, Pvt. Ltd., New Delhi, 1993.