

Research Article

Isolation of *Candida* Species from Market Milk Samples

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Abstract: Milk is extremely liable to microbiological contamination. Yeasts like *Candida* can resist pasteurization thereby posing a threat to human health. Current research comprises collection of 80 market milk samples from three districts of Assam and examination for the presence of *Candida* spp. Identification was done by culture and biochemical methods. The results showed an alarming picture as *Candida* spp was isolated from all the samples and the various spp identified were *C. krusei* (77.50 %), *C. albicans* (13.75 %), *C. tropicalis* (6.25 %) and *C. glabrata* (2.50 %).

Keywords: *Candida* spp; *Candida* differential agar; Milk; Mastitis; Public health

INTRODUCTION

The high nutritive nature of milk makes it highly susceptible to microbial contamination. Due to the number and type of microorganisms, undesirable alterations occur in the milk's appearance, taste and smell, or in its derivatives. Since certain microorganisms may jeopardize the consumer's health [1], the milk's microbiological quality may be seen from two different aspects: Industrial quality and risks to public health [1]. One such organism is *Candida* which has the ability to survive pasteurization; as such it assumes public health significance and has been indicated in causation of thrush in humans [2]. In general yeasts are opportunistic pathogens which colonize the cows' udder. The use and abuse of antibacterial drugs, treatment with contaminated antibiotic solutions, as well as syringes, or other materials brought in contact with the mammary gland may favor yeast colonization of cow's udders [3-5]. Mycotic mastitis has been reportedly caused by various fungal species, such as *Aspergillus fumigatus*, *Aspergillus terreus*, *Candida* spp., *Cephalosporium* spp., *Coccidioides* spp., *Cryptococcus neoformans*, *Geotrichum candidum*, *Histoplasma* spp., *Mucor* spp., *Rhizopus* spp., *Torulopsis* spp., and *Trichosporon* spp. *Candida* species have been regarded in subclinical and clinical mastitis, the most reported species being *Candida albicans*, *Candida krusei*, *Candida rugosa*, and *Candida guilliermondii* [5-7].

The present study was undertaken to detect the presence of *Candida* in raw milk samples available for sale in Guwahati, Kamrup and neighbouring districts.

MATERIALS AND METHODS

Pooled milk available in the market for human consumption in three districts of Assam including Kamrup, Barpeta and Sonitpur were sampled (Table 1). Different selling points of medium and small traders and vendors of greater Guwahati area under Kamrup district and other two districts were identified for this purpose. The milk samples were collected in sterile screw cap containers. Samples were refrigerated (4°C) during transportation to the laboratory. About 50 ml of the milk sample was centrifuged at 3000 rpm for 15 min aseptically and 1-2 loopful of the sediment was inoculated onto Sabouraud's dextrose agar (SDA) plates with antibiotics and incubated at 37 °C until fully developed colonies were visible (Fig. 1). Yeast identification was performed taking into consideration morphological characteristics by Gram's staining, sugar fermentation test and growth characteristics on Hichrome *Candida* differential agar (HiMedia).

RESULTS AND DISCUSSION

Candida spp could be isolated from all the milk samples. On the basis of carbohydrate fermentation tests and growth on chromogenic media (Fig. 2), the different species were determined. The results are presented in Table 2. The species identified were *C. krusei* (77.50 %), *C. albicans* (13.75 %), *C. tropicalis* (6.25 %) and *C. glabrata* (2.50 %). The results were comparable to the work done by another worker wherein he had identified 207 *Candida* isolates, previously isolated from mastitic bovine quarter milk using API 20 C AUX system [8]. The most frequently isolated species were *Candida krusei* (34.8%), followed

by *Candida rugosa* (16.4%), *Candida kefyr* (12.6%), *Candida albicans* (10.1%), and *Candida tropicalis* (9.2%). Less common isolates were *Candida zeylanoides* (5.8%), *Candida parapsilosis* (4.3%), *Candida guilliermondii* (3.4%), *Candida famata* (1.9%), and *Candida*

glabrata (1.5%). Similarly, in another investigation carried out in mastitic bovine milk, the presence of *C. krusei* (44.5%), *C. rugosa* (24.5%), *C. albicans* (8.9%), *C. guilliermondii* (8.9%), and others (13.2%) was reported [5].

Table 1: Number of samples collected from different districts of Assam

District	Kamrup	Barpeta	Sonitpur
No. of Samples	50	20	10
No. of Isolates	50	20	10

Table 2: Species differentiation of the Candida isolates

Sl. No.	Total number of isolates	<i>Candida spp</i>	Number (Percentage)
1	80	<i>C. krusei</i>	62 (77.5)
2		<i>C. albicans</i>	11 (13.75)
3		<i>C. tropicalis</i>	5 (6.25)
4		<i>C. glabrata</i>	2 (2.5)



Fig. 1: Growth of *Candida spp* on SDA

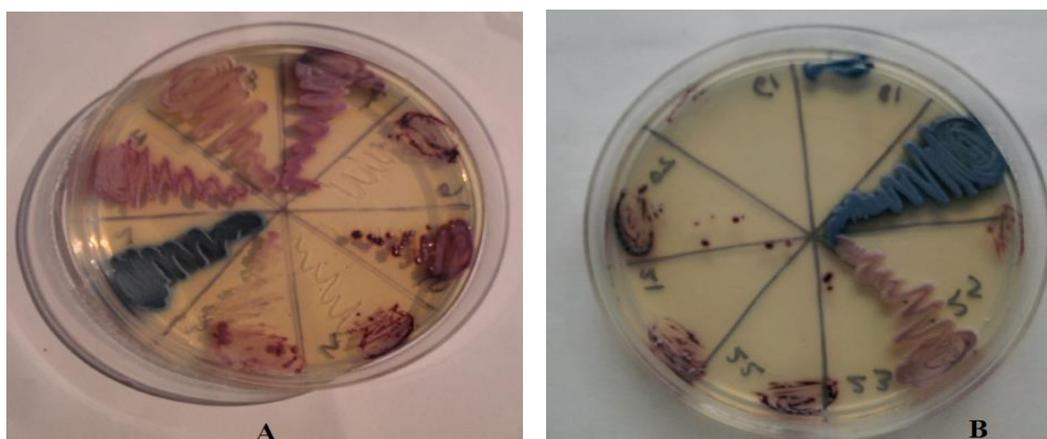


Fig. 2: Growth of *Candida spp* on Hi Chrome chromogenic medium

CONCLUSION

The results of the present study confirm the presence of *Candida spp* in the market milk. This might have resulted due to pooling of milk from different herds, some of which may harbour animals affected with mastitis- *Candida* being an important cause of mycotic mastitis. The consumption of milk contaminated with *Candida spp.*, or by fungal toxins presents a threat to human health. Adequate

management procedures, especially concerning the milking process, and hygienic methods employed at different stages of milk production, may lessen the occurrence of fungi induced mastitis and decrease its contamination during the milking process. Sanitary education to milk producers may help in improving the microbiological quality of milk.

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