MICROBIOLOGICAL ANALYSIS OF UNPROCESSED AND PROCESSED MILK WITH ITS PUBLIC HEALTH SIGNIFICANCE: A CASE STUDY OF BULDANA DISTRICT (M.S.).

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Abstract: Milk is an important food of diet of vast population on earth, due to its high nutritional value for human beings. Milk can originate even from clinically healthy animals from which milk is derived or from environmental contamination occurring during collection, processing, transportation and storage of milk. So we focus on microbial analysis of processed and raw milks which are sold in Buldana district from various rural milk venders and milk dairies. The milk samples were collected that is, raw milk and pasteurized milk during the months of June-November, 2011. Individual milk samples were analyzed by standard plate count, presence of total coliform and faecal coliform. Bacteria were present with presence of yeast and mould in both processed and raw milk. Our results indicate that the majority of unprocessed milk was of poor microbiological quality with presence of total coliform and faecal coliform. While in the processed milk was low contamination with presence of total coliform and faecal coliform. So, the consumption of un-boiled and unprocessed raw milk is also health hazard due to contamination with pathogenic bacteria such as *E. coli, S. aureus* and *S. typhi*. The attempt was made to inform public health risk assessments that evaluate the microbiological safety of pasteurized and raw milk. The study indicates that addition of water to milk is most common adulterant which not only reduces the nutritional value of milk but contaminated water may also health risks to the consumers.

Keywords: Microbiological Quality, Public Health Risk, *E. coli, S. aureus* and *S. typhi*

INTRODUCTION

Milk may be defined as the whole, fresh, clean lacteal secretion obtained by the complete milking of one or more healthy milky animals, excluding that obtained within 15 days before or 5 days after calving or such periods as may be necessary to render the milk practically colostrums free, and containing the minimum prescribed percentage of milk fat and milk-solids not fat. Milk is an important food of diet of vast population on earth, due to its high nutritional value for human beings. Milk is a highly nutritious food that is ideally suited for growth of pathogenic and spoilage organisms when suitable temperature exists. The microbial load of milk is a major factor in determining its quality. It indicates the hygienic level exercised during milking, that is, cleanliness of the milking utensils, condition of storage, manner of transport as well as the cleanliness of the udder of the individual animal[1]. If milk is produced un-hygienically and handled carelessly, it gets contaminated very easily leading to its early spoilage[2].

Bacterial contamination of raw milk can originate from different sources: air, milking equipment, feed, soil, faeces and grass[3]. Routine pasteurization has been highly effective in ensuring the safety of dairy products. Microbiological examination of milk is essential to find the degree of contamination with the

dictions and enumeration of indicator organisms. These microorganisms are indicators of both the manner of handling milk from milking till consumption and the quality of the milk. The coliform group of bacteria is defined as the indicator (faecal coliform) of suitability of milk for drinking[4]. Milk produced under hygienic conditions from healthy animals should not contain more than 5×10^5 bacterial/ml[5]. Yeasts themselves are not commonly the cause of defect in dairy products unless they ferment lactose. In this case, they can grow rapidly and produce a characteristic yeasty or fruity flavor and obvious gas[6].

The attempt was made to analysis of processed and unprocessed milk for bacterial contaminations from various rural milk venders and milk dairies. Heavy bacterial load and coliform present in the milk indicates the hygienic level and quality of milk. So, there is an urgent need to follow the control measures to improve microbial quality of milk.

MATERIALS AND METHODS

The available milks were examined which are sold in Buldana district in the form of processed and unprocessed milk from various rural milk venders and milk dairies. The milk samples were collected that, raw-milk (50) and pasteurized milk (50) during the months

of August - October, 2011. All samples were collected in sterile packed steel container and transported to the laboratory. Individual milk samples were analyzed by standard plate counts, presence of total coliform and faecal coliform[7]. Microbiological analysis included enumeration and identification of potential pathogens according to standard procedures for the number of heterotrophic bacteria i.e. *E. coli, S. aureus* and *S. typhi*[7,8]. All plates were incubated under aerobic conditions at 36±1°C for 24 - 48 hrs. The calculated number of colonies was expressed as colony forming units (cfu)/100 ml.

Fig. 1 Shows presence of Yeast & Mould in processed and unprocessed milk samples.
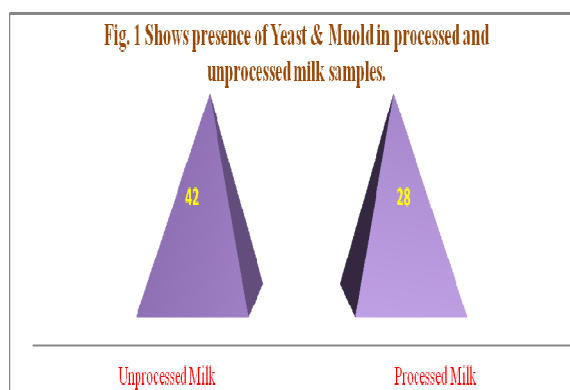
Sr. No	Source of Sample	Total Milk samples	TVC (1X 10^5) cfu/ml	Yeast & Mould	Total Coliform		Fecal Coliform		*E. coli*		*S. aureus*		*S. typhi*	
					Sample	%	Sample	%	Sample	%	Sample	%	Sample	%
1	Unprocessed Milk	50	5.75-40	42	47	94	36	72	39	78	22	44	12	24
2	Processed Milk	50	2.5-29	28	35	70	24	48	18	36	9	18	4	8

Where- TVC: Total Viable Count; cfu: colony forming unit.

RESULTS AND DISCUSSION

Milk is a highly nutritious food, ideally suited for growth of pathogenic and spoilage organisms when suitable condition exists and microbial load of milk is a major factor in determining its quality. Microbial analysis of processed and unprocessed milks, which are sold in Buldana district in the form of processed and unprocessed milk from various rural milk venders and milk dairies. The milk samples were collected that, raw-milk (50) and pasteurized milk pouch (50) during the months of August- October, 2011. The quality of milk samples are given as bellow,

Overall bacterial count of samples had present 3.5-40X10^5cfu/ml. Bacteria can originate even from clinically healthy animals from which milk is derived or from environmental contamination occurring during collection, processing, transportation and storage of milk. Heavy bacterial load and coliform present in the milk indicates the hygienic level and quality of milk. The presence of yeast and mould in both processed and unprocessed milk shown in figure.1.

Our results indicate that the majority of unprocessed milk was of poor microbiological quality with presence of (94%) total coliform and (72%) faecal coliform. While in the processed milk was presence of (70%) total coliform and (48%) faecal coliform. Yeasts were present in 95.0% of raw milk samples and moulds were found in 63.3% of raw milk samples[9]. Pathogenic bacteria are present maximum in the unprocessed sample than the processed milk sample. Most abundant presence of *E. coli* in both processed and unprocessed milk samples was found 36% and 78%

respectively shown in fig. 2. a majority of the Tanga city residents consume raw milk will increase the risk of milk-borne *E. coli* poisoning[10]. Quality milk means that is the milk which is free from pathogenic bacteria and harmful toxic substances, free from sediment and extraneous substances, of good flavor, with normal composition, adequate in keeping quality and low in bacterial counts.

Fig. 2 Shows percentage of bacteriological quality processed and unprocessed milk.
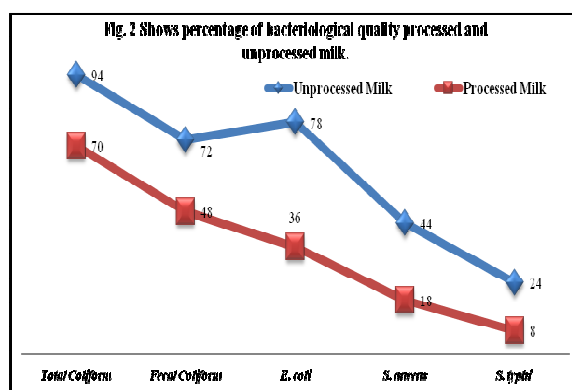
In figure.2 shown that the presence of *S. aureus* was maximal in unprocessed milk than the processed milk which was 44% and 18% respectively. While the presence of *S. typhi* in processed and unprocessed milk samples were 8% and 24% respectively. El-Ziney and Al-Turki was found that only 70% of the collected samples were contaminated by *S. aureus*[11]. Out of total coliform positive samples (45%), only four samples were positive for faecal coliforms which identified as *E. coli* and the incidence of *Salmonella typhi* was high as 8 (24%) out of 33 milk samples were found to be positive for this organism. These data will help to inform public health

risk assessments that evaluate the microbiological safety of pasteurized and raw milk. The presence of pathogenic bacteria are indicated that the poor sanitary and hygienic quality of milk which are readily available in Chikhli town from various rural vendors and dairies.

CONCLUSION

Milk is an important food of diet of most population particularly growing children's due to its high nutritional value. Microbiological analysis of processed and unprocessed milk samples were heavy bacterial load and coliform present in the milk which was indicated the hygienic level and quality of milk from various rural milk venders and milk dairies. The consumption of processed and unprocessed milk is also health hazard due to contamination with pathogenic bacteria. It can originate even from clinically healthy animals from which milk is derived or from environmental contamination occurring during collection, processing, transportation and storage of milk. It would be helped to inform public health risk assessments and evaluate the microbial safety of pasteurized and raw milk. So, there is an alarming need to follow the control measures to improve microbial quality of milk.

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