RESEARCH PAPER | Microbiology | Volume : 4 | Issue : 4 | Apr 2014 | ISSN - 2249-555X

Microbial Quality of Milk and Milk Products Collected from Akola City of Maharashtra

KEYWORDS: Milk and Milk Products, Staphylococcus aureus, Escherichia coli, Salmonella typhi and Shigella spp and Public Health.

Javed Khan	M. Musaddiq	Budhlani G. N
P. G. Department of Microbiology Shri Shivaji College of Arts, Commerce and Science, Akola.	P. G. Department of Microbiology Shri Shivaji College of Arts, Commerce and Science, Akola.	P. G. Department of Microbiology Shri Shivaji College of Arts, Commerce and Science, Akola.

ABSTRACT *The study was undertaken to investigate the microbiological quality of Milk and Milk product from Akola city. Among the 100 samples including (Raw Milk 25, Packaged Milk 25, Curd 20 , Khoa 20, Paneer10) used for the study, bacteriological identification revealed a definite dominance of Staphylococcus aureus, Escherichia coli, Salmonella typhi and Shigella spp were isolated on selective agar. The Staphylococcus aureus was found to most dominant organism was present in 95% in Milk and Milk products similarly Escherichia coli was found in 75% in Milk and Milk products . Salmonella typhi was present in 25% while Shigella spp bacteria present in 10% in all samples. The study will show the Microbiological Quality of Milk and Milk product and unhygienic practices and brief idea about standard of Packed Milk available in Market of Akola.*

Introduction:-

Milk and Milk products constitute important nutritional components for all age groups; it is the only source of first class proteins especially for vegetarians and also essential food material for the young ones. It supplies most essential elements like Calcium and Phosphorus along with numerous other essential major and minor substances. Due to its complex biochemical composition and high water content, Milk and Milk products act as an excellent culture medium for growth and multiplication of varieties of microorganisms particularly under unhygienic production and storage at ambient temperature. (Karthikeyan & Dhanalakshmi., 2010).

Among the Indian Milk and Milk products like Curd, Khoa, Paneer and Milk based products are important, which provide a good means of conserving and preserving surplus Milk solids. Khoa is of greater importance to the confectionaries. India's annual milk production is over 78 million tons; nearly 50 per cent of total Milk produced in India is utilized for the manufacture of variety of traditional milk products. (Khan A Q., 2006).

Approximately 50 percent of milk produced is consumed as fresh or boiled; remaining is utilized for manufacturing of indigenous varieties of Milk products such as Khoa, Paneer, Curd, Ice-cream, Etc. (Anjum et al., 1989).

The manufacture of these products is based on traditional method without any regard to the quality of raw material used and/ or the hygienic quality of the products. Under such conditions, many microorganisms can find access to the milk products. The unhygienic conditions at the production units lead to contamination of products with different types of microorganisms leading to a low shelf life of the base products. Most of these products are sold in the market without proper packaging and unduly exposing them to atmospheric contamination. (Soomro et al., 2002).

Considering the above facts, the detection and enumeration of microorganisms in Milk and Milk products is an integral part of any good quality assurance program and reflect the effectiveness of sanitation practices, processing and distribution schemes of local, private manufactures and organized dairies. Hence, the present study was taken to assess the Microbial quality of Milk and Milk products Akola (Maharashtra).

Materials and Methods:-

The study was conducted at the Department of Microbiology, Shri Shivaji College of Arts, Commerce and Science, Akola. (Maharshtra). During the period from October 2012 to May 2013.

➢ **Collection of samples:-**

100 Samples of Milk and Milk product like Raw Milk (25), Packaged Milk (25), Curd (20) , Khoa (20), Paneer (10) were collected from the market Milk and Milk product samples were directly transported to the laboratory in ice box. They were stored in refrigerator and analyzed within 24 hours.

➢ **Microbiological analysis**

A portion (1 g or 1 ml) from each sample was taken aseptically and diluted in 9 ml sterile distilled water .The diluted sample was streak inoculated on sterile Nutrient Agar and incubated at 37 °C for 24 hours. After incubation period all the colonies undertaking for Gram Staining as per the results of Gram Staining respected colonies were inoculated on Sterile Selective media such Mannitol Salt agar (M. S. A) For Staphylococcus aureus, Eosin Methylene Blue (E. M. B) for Escherichia coli, Xylose lysine deoxycholate agar (X. L. D) for Salmonella typhi and for Shigella spp Salmonella-Shigella agar (S. S agar) was used.

➢ **Identification of pathogens**

- Cultural characteristics, Gram nature and color of colonies were noted.
- Biochemical examination colonies from each petriplate were picked, subcultured, incubated at 37 °C and then identified by the various biochemical tests.
- Biochemical tests were performed to confirm, Staphylococcus aureus, Escherichia coli Salmonella typhi using, Catalase test, Indole test, Methyl red test, Voges Prousker test, Nitrate Reduction test, Unease production, Citrate utilization test and Glucose, Lactose, Mannitol sugar fermentation test.

Result and Discussion:-

Pathogenic bacteria in Milk have been a major factor for public health concern since the early days of the dairy industry. Many diseases are transmissible via Milk products. Traditionally raw or unpasteurized Milk has been a major vehicle for transmission of pathogens. The Health of dairy herd and milking conditions basically determine the milk quality. Another source of contamination by microorganisms

Volume : 4 | Issue : 4 | Apr 2014 | ISSN - 2249-555X

is unclean teats. The use of unclean milking and transport equipments also contributed to the poor hygienic quality (Parekh & Subhash, 2008). In this study a total 100 Milk and Milk products samples were taken from Market of Akola. The results of bacterial enumeration of Milk and Milk produts which collected from local vendors, private manufacturers and organized dairies are shown in as follows.

Morphological Study of Bacteria isolated from Milk and Milk products.

Gram and cultural characteristics of Staphylococcus aureus, Escherichia coli, Salmonella typhi and Shigella spp were studied and results are given in Table no- 1. Biochemical test for identification of Staphylococcus aureus, Escherichia coli, Salmonella typhi and Shigella spp were performed and results are given in Table no- 2. Milk and Milk product like Raw Milk (25), Packaged Milk (25), Curd (20), Khoa (20), Paneer (10), different pathogenic bacteria were isolated shows in table no-3.

Table no- 1:- Morphological & Cultural characteristics of Pathogenic bacteria isolated from Milk and Milk products.

Sr. No	Isolated pathogens	Gram staining and morphology	Culture characteristics on selective media
1.	S. aureus	Gram + ve cocci	Mannitol Salt Agar (Golden yellow color colonies)
2.	E. coli	Gram – ve coccobacilli	Eosin Methlene blue Agar (Green Metallic Sheen colonies)
3.	S. typhi	Gram –ve rod shaped	Xylose lysine deoxycholate agar (Black Centre color colonies)
4.	Shigella spp	Gram –ve rod	Salmonella-Shigella agar (colorless colonies)

Table no- 2:- Biochemical characteristics of Pathogenic bacteria isolated from Milk and Milk products.

Sr. No	Biochemical test	S. aureus	E. coli	S. typhi	Shigella spp
1.	Catalase	+	+	_	_
2.	Urease	_	_	_	_
3.	Oxidase	_	_	_	_
4.	Coagulase	+	_	_	_
5.	Citrate utilization	–	–	+	–
6.	Nitrate reduction	+	–	–	
7.	Indole production	–	+	–	+
8.	Methyl red	+	+	+	+
9.	Voges prousker	+	–	–	–
10.	Glucose	+	+	+	+
11.	Lactose	+	+	_	_
12.	Mannitol	+	+	+	+
13.	Sucrose	+	+	_	_
14.	Maltose	+	_	+	+

Table no-3:- Distribution of various Milk and Milk products samples on the basis of bacterial pathogen.

Sr. No	Types of Sample	No. of Samples	Isolated bacteria from Milk and Milk Products			
			S. aureus	E. coli	S. typhi	Shigella spp
1.	Raw Milk	25	20	15	10	03
2.	Packed Milk	25	10	10	02	Nil
3.	Curd	20	15	20	08	05
4.	Khoa	20	18	15	10	08
5.	Paneer	10	05	08	05	05

The presence of bacteria like Staphylococcus aureus, Escherichia coli, Salmonella typhi and Shigella Spp in milk suggested contamination from various sources such as animal teats, udder, etc. unclean hands of worker, environmental dust and microbes, unclean utensils in dairy, and others.(Zagare et al., 2012).

The distribution of pathogenic bacteria from Milk and Milk products shown in table no 3. As per the result it was noted that Out of 25 samples of Raw Milk 20 samples were found to be heavy contaminated with Staphylococcus aureus > Escherichia coli> Salmonella typhi>. Also Packed Milk (Processed Milk) out of 20 samples only 10 samples was found to contaminated and Shigella Spp was not found in packed Milk but other pathogenic bacteria like Staphylococcus aureus, Escherichia coli, Salmonella typhi were frequently minimum in packed Milk. Similarly in Milk Products like Curd, khoa and Paneer among these products in total 20 Curd samples 15 samples found to positive for the growth of All above mentioned pathogenic bacteria while in Khoa a total 20 samples were taken and Heavy growth of pathogenic bacteria was resulted.

Out of 10 samples of Paneer 8 sample shows the growth of pathogenic bacteria. In this study it was found that Milk product especially Khoa is unsafe for Human consumption also Packed Milk is not properly pasteurized and in case of Raw Milk the hygiene condition not followed properly.

According to Zagare et al., 2012, it was reported that Salmonella typhi and E.coli was found dominantly in all samples and S. aureus was not found in all types of Packed and raw Milk but as per the study of Soomro et al., 2002 it was found that in Tandojam Pakistan 65% samples including Milk and Milk products was contaminated with Escherichia coli. Ekici et al., (2003) it was reported that Staphylococcus aureus was present in 55% samples, Escherichia coli was present in 35% samples, Salmonella typhi was present in 25% and Shigella Spp was present in10% samples of Milk and Milk Products.

From the study of Muhamed Mubarack et al., 2010, it was found that the dominant microbial flora associated with Raw Milk samples in and around Coimbatore Dt. were in the order of Staphylococcus aureus > Escherichia coli > Salmonella sp. among the isolated pathogens. The presence of those bacteria in milk suggested contamination from various sources, such as animal, human, environment, utensils and others. investigation of the Srujana et al.,2011 was investigate that dominant microbial flora associated with Milk and Milk products was. The findings of all these investigation similar with our study results.

Therefore, it is recommended that training and guidance should be given to farms owners and their workers responsible for milking. Meanwhile, information on health hazards associated with contaminated raw milk should be extended to the public, so that consumption of untreated/ improperly. Treated raw milk could be avoided.

REFERENCE

➢ Anjum MS, Lodhi K and Raza AA (1989): "Pakistan's Dairy Industry: Issues and Policy Alternatives". Special Report Series No. 14. Pak Econom. Analysis Network Project Islamabad. | ➢ G. Srujana, A.Rajender Reddy, V. Krishna Reddy and S. Ram Reddy (2011): "Microbial quality of Raw and Pasteurized Milk samples Collected from different places of Warangal district, (A. P) India". International journal of pharma and bio sciences, ISSN No-9075-6299. | ➢ K. Ekici, H. Bozkurt and O. Isleyici (2004): "Isolation of Some Pathogens from Raw Milk of Different Milch Animals'. Pakistan Journal of Nutrition 3 (3): 161-162. | ➢ Khan A Q (2006): "Milk and milk products: An entrepreneurial approach". All India Dairy Business Directory. pp. 115-117. | ➢ N Karthikeyan and B Dhanalakshmi (2010): "Hygienic Quality of Indian Sweet Milk Products from Different Sources". Bangladesh J Microbial, Volume 27, Number 2, December 2010, pp 32-37. | ➢ Parekh TS and Subhash R (2008): "Molecular and bacteriological examination of milk from different milch animals with special references to Coliforms". Curr. Res. Bacteriol. 1(2), 56-63. | ➢ Soomro A.H, M.A. Arain, M. Khaskheli and B. Bhutto (2002): "Isolation of Escherichia Coli from Raw Milk and Milk Products in Relation to Public Health Sold under Market Conditions at Tandojam'. Pakistan Journal of Nutrition 1(3): 151-152. | ➢ Zagare M.S, Deshmukh A.M and Patil S.S (2012): "Analysis of Dairy Pack Food for Presence of Bacterial Pathogens". International Journal of Science ISSN: 2277-5536 (Print); 2277-5641 (Online) DAV Volume-1, Issue-1. |