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ANALYSIS OF MILK QUALITY, ADULTERATION AND MASTISIS IN FOUR DIFFERENT MILK SAMPLES

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ABSTRACT

The present study is aimed to analyze the milk quality, adulteration and mastitis infection in milk Samples available in market. Four different milk samples were analyzed for physical appearance, quality, adulterants and mastitis infection. 90% milk samples were white in color and 10 % were yellowish white. pH ranged between 6.5 – 6.9. Analysis of milk quality showed that Arokya milk appears to be better than the other three milk samples. Out of 4 milk samples analyzed for adulteration, adulterants found were glucose (80%), skim milk powder (58%), salt (51%) and urea (35%) while found negative for formalin, salicylic acid, boric acid, starch, soap and ammonium sulphate. All the samples were free from mastitis infection. The adulterants decrease the nutritive value of milk and may also cause serious human health related problems.

Keywords: Raw milk samples, Milk quality, Adulteration, Mastitis.

1. INTRODUCTION

Milk is the fluid normally secreted by female mammals for the nourishment of their young ones. It is a part of daily diet for the expectant mothers as well as growing children. Milk provides a near perfect diet for most young animals and in most cases forms the sole source of diets for most mammals in their first few weeks or months of life. Milk is one of the complete foods which there seems to be no adequate substitute. Milk has good quality protein and is a unique substance in that it is consumed as fluid milk with minimal processing and also it is the raw material used to manufacture a wide variety of products. Milk may be modified by condensing, drying, flavouring, fortifying, demineralization and other treatments Milk being a major constituent of human diet, can serve as a good medium for the growth of many microorganisms especially bacterial pathogens, therefore its quality control is considered essential to the health and welfare of a community. As reported by Foster, the threat posed by diseases spread through contaminated milk is well known and the epidemiological impact of such diseases is considerable. The presence of these pathogenic microorganisms in milk has emerged as a major public health concern especially for those individuals who still drink raw milk. The aim of this work therefore is to determine the microbiological quality of raw milk from different locations in Abia state and also to compare the microbial quality of the milk from a controlled environment (Michael Okpara University of Agriculture, Umudike) to others from commercial source .

2. MATERIALS AND METHODS:

2.1. Collection of the samples

Four different milk samples were collected from market and to be transported easily without any delay. The milk samples are Aavin, Raw milk, Arokya millk, Komatha milk samples were collected in autoclaved sterilized containers, All the possible precautions were taken to avoid external contamination at the time of collection of samples and during processing.

2.2. Analysis of milk samples

The raw milk samples were analyzed for physical appearance, quality, presence of adulterants and Mastitis infection. Color and pH of all samples were checked and milk quality was analysed by Methylene Blue Reduction test (MBRT), Alcohol test, Phosphatase test and Clot on boiling (COB) test. The adulteration tests were done using the HiMedia Adulteration Testing Kit protocol. Tests included were Urea test, Salt test, Soap test, Skim milk powder test, Glucose test, Formalin test, Salicylic Acid test, Boric Acid test, Starch test and Ammonium Sulphate test. The mastitis tests were White Side test, Chloride test, Catalase test, Strip Cup test.

2.3. Methylene blue reduction time (MBRT) test

The MBRT test was performed according to American Public Health Association (APHA, 1960). 1 ml of methylene blue solution (1 : 25,000) was added to sterilized and labelled test tubes, each containing 10 ml of raw milk sample. The tubes were sealed with rubber stopper and carefully inverted three to four times to mix up the dye with the milk sample.

All the tubes were incubated in a water bath at 37°C and examined at intervals of 30 min to 1 h for 8 h. The time taken for the methylene blue dye to decolorize was recorded between last inversion and complete de-colourization when four-fifths of the colour had disappeared (Duangpan and Suriyaphan, 2009).

3. RESULTS AND DISCUSSION

The color of milk observed was white in appearance (90%) to yellow (10%). The pH of milk samples ranged from 6.5 to 6.9. The adulterants analysed were glucose (80%), skim milk powder (58%),salt (51%) and urea (35%) while found negative for formalin, salicylic acid, boric acid, starch, soap and ammonium sulphate . All the samples showed negative result for mastitis infection. Milk is one of the most complete foods available in nature for human consumption. Milk contains all nutrients in balanced proportions to meet the demand of humans. Good quality milk is required for quality dairy products. The adulterated raw milk with adulterants is taken as defective and cannot be processed. Recently Chakravorty and Chakravarty (2011) showed that milk distributed in different localities of Varanasi city is highly adulterated and impure.

In the present study, out of the four different milk samples Arokya found to be better than other milk samples based on the quality of milk. The milk samples have white or yellow color with pH ranges from 6.5-6.9. These findings agreed with the reports of Judkins and Mack (1955), who reported that normal milk has a yellowish color due to presence of fat, casein. These differences in color may be due to differences in nature of feed consumption or the breed of cow or the fat and solid contents of the milk. As per the present data, only Arokya milk sample were under better quality standards while compared to other milk samples. Milk, as it is secreted from the udder of a healthy cow is very low in bacterial numbers. Bacteria can increase in raw milk due to poor milking methods, inadequate cleaning of milk equipment, poor cooling and in some cases, as a result of mastitis (Khan *et al.,* 2008).

Table 1. Physical properties of milk.

S.No.	Nature of milk sample	Colour	Odour	Taste
1	Raw milk	Yellowish colour	Sour odour	Salty taste
2	Arokya milk	Creamy white colour	Less sour odour	Sweet taste
3	Aavin milk	Creamy white colour	Less sour odour	Sweet taste
4	Komatha milk	Creamy white colour	Less sour odour	Sweet taste

Table 2: Methylene blue reduction test.

S.No.	Class of milk samples	Time taken for Decolourisation in hours	Quality of milk
1	ClassI(Arokya milk)	Decolourisation takes more than 8 hours	Excellent
2	Class II (Aavin milk)	6 to 8 hours	Good
3	Class III (Komatha milk)	2 to 6 hours	Fair
4	Class IV (Raw milk)	Less than 2 hours	Poor

These differences in color may be due to differences in nature of feed consumption or the breed of cow or the fat and solid contents of the milk. As per the present data, only Arokya milk sample were under better quality standards while compared to other milk samples. Milk, as it is secreted from the udder of a healthy cow is very low in bacterial numbers. Bacteria can increase in raw milk due to poor milking methods, inadequate cleaning of milk equipment, poor cooling and in some cases, as a result of mastitis. Out of four milk samples tested for presence of adulterants, Glucose was highest (80 %), skim milk powder (58%) followed by salt and urea with 51% and 35% respectively. Wadekar Sanjeevani *et al.* (2011) observed that maximum milk samples adulterated with sugar were 20.00 per cent in summer, 12.00 per cent in rainy and 3.00 per cent in winter seasons. Mastitis, an infection of the udder, is one of the most common heard concerns. Mastitis in dairy cows, which is most often result of a bacterial infection (contagious or environmental), causes an increased somatic cell levels in milk. Unhealthy cow's milk has the potential to yield milk that is lower in quality. However, in the present study no positive samples were found for mastitis.

It was assumed that most of these bacteria isolates have the capacity to cause diseases like food poisoning, gastroenteritis and mastitis. However some of these microorganisms can be prevented from causing disease in humans since milk is usually pasteurized or treated before consumption. The

presence of pathogens in milk emerges as a public health concern, especially for those individuals who still drink raw milk. The presence of fungal isolates suggests that not only bacteria can be found in milk. Mucor species which has a world-wide distribution but mostly found in soil, dung etc was isolated. Mucor spp are known to cause diseases in man and animal. Mucor racemosus is often found in milk and other food products. *Candida* spp also found in milk sample causes many human and animal diseases, despite being the normal flora of the skin. This yeast has been implicated in some milk related diseases by some other researchers. Their presence in milk though in low numbers, might be a public health concern Also adequate care, treatment of the animals, and regular check up of the animals in the campus by veterinary doctors and animal scientists goes a long way to reduce infections in these animals.

According to differences in feeding and housing strategies of cows may influence the microbial quality of milk. is generally proportional to pollution degree produced by Listeriosis is a sporadic disease which is often feces associated with the consumption of contaminated milk (Aggad *et al.,* 2010). The presence of high numbers of coliforms in milk and dairy products (Aygun and Pehlivanlar, 2006). The important characteristics of Listeria production of milk, as unclean udder and teats can spp. contributing to food-borne transmission are the contribute to the presence of coliforms from a variety of ability to grow at a low temperature (Rahimi *et al.,* 2010). Sources such as manure, soil, food, personnel and even there was one contamination with L. monocytogenes in water (Bille *et al.,* 2009).

4. CONCLUSION

On the basis of data obtained in the present study, conclusion may be drawn that milk quality is not completely as per standards and adulteration in milk is still in practice and has not been checked completely. It is increasing very fast . Consumption of lower quality milk may lead to serious human health problems. To eradicate this malpractice by local dairy owners which is deep rooted in the cities more than rural areas, steps should be taken from the door steps of local consumers. The consumers must be more active against milk adulteration going on in whole country. It is important to have a quality control system that regularly check and ensure that only good quality milk is sold. The consumers and the milk sellers combined effort will help to decrease the adulteration practice. In conclusion, high microbial counts and the occurrence of pathogens are likely to affect the keeping quality and safety of raw milk as well as products derived from it. The achievement of hygiene in dairy farm directly influences the production oriented economic results and health safety perspective in human beings. It is therefore recommended that the animals be treated by experts to ensure the health of the animals. Also public health training and guidance should be given to farmers, and their workers. 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.

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