Bacteriological Quality Analysis of Milk Available in Local Market of Janakpurdham, Nepal

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ABSTRACT

Objectives: To determine the microbial quality of milk available in the market of Janakpurdham, Nepal.

Methods: Total 20 samples of milk were collected from the market and processed for MBRT test as per standard protocol. Reduction time test for each sample of the milk was recorded in a specified format and analysed statistically.

Results: Out of 20 samples, 2 (10%) samples were found of excellent quality, 3 (15%) were of good quality, 6 (30%) were of fair quality and 9 (45%) were of poor quality. Unprocessed milk was found to be highly contaminated in comparison to the processed milk.

Conclusion: Unprocessed milk was found to be highly contaminated and not fit for the human consumption.

Key words: Milk, MBRT, microbial quality

INTRODUCTION

Milk may be defined in various ways. Chemically speaking, milk is a complex fluid in which more than 100 separate chemical compounds have been found. Its major components are water, fat, lactose, casein, whey proteins, and minerals (or ash) in amounts varying with the milk of various species of animals (JP et al. 1994). However, for any given species, the range of values for the constituents of milk is fairly constant. From a physiological standpoint, milk is the secretion of the normally functioning mammary gland of the females of all mammals, which is produced for some time following parturition for the nourishment of the young of the species during the initial period of growth. In terms of physical chemistry, milk is an opaque, whitish fluid of multi disperse phases. The true solution contains lactose, vitamins, acids, enzymes, and some inorganic salts. The colloidal phase contains casein, calcium phosphate, and globular proteins. Fat exists in the form of an oil-in-water type of emulsion, with fat globules varying from 0.1 to 22 µm in diameter (Wong et al. 1988).

As a food ingredient or consumed by itself, milk provides an excellent nutritional profile in the human diet. Nutrition experts consider milk an exceptionally complete food because it contains significant levels of required nutrients such as protein, fat, carbohydrates, minerals, and several vitamins. Low-fat and no fat milks are increasingly popular in fat-reduced and fat-free food formulations (FAO 1993). Worldwide, milk of the cow is by far of more commercial importance than milk of any other mammal. In the United States, the term "milk" legally refers to cow's milk. Milk from other species is labelled to indicate the type: sheep's milk, goat's milk, etc. Milk is the whole, clean lacteal secretion of one or more healthy cows properly fed and kept, excluding that obtained within 15 days before calving and three to five days after. Colostrum,

the milk secreted immediately after giving birth, is not considered milk from a legal standpoint. The U.S. Public Health Service's definition of Grade A milk is "the lacteal secretion practically free from colostrum, obtained by complete milking of one or more healthy cows, which contains not less than 8.25% milk solids-not-fat (MSNF) and not less than 3.25% milk fat (Singh et al. 1997; Harper et al. 1996).

Milk is a good medium for the growth of microorganisms. These active growing microorganisms reduce the oxidation reduction potential of the milk medium due to the exhausted oxygen by the microorganism. Normally the milk is contaminated with organisms such as *Staphylococcus aureus, Streptococcus pyogenes, Pseudomonas* etc. Contaminated milk is one of the important sources for transmission of diseases from animals to humans. The main reason for this contamination is the improper handling of milk. Normally milk is contaminated during the milking process by the microorganisms present in the exterior surface of the animals, pipelines such as udder and adjacent areas. Unsterilized dairy utensils such as milking machines, milk cans are also a good source of contamination by the microorganisms (Walstra and Jenness 1993). The formation of methylene blue reductase is thus becoming a popular tool for determining the quality of the milk. The principle of methylene blue reduction test depends on the fact that the colour imparted to the milk by adding a dye such as methylene blue will disappear more or less quickly which depends on the quality of the milk sample to be examined. Methylene blue is a redox indicator that loses its colour under the absence of oxygen and is thought to be reduced. The depletion of oxygen in the milk is due to the production of reducing substance in the milk due to the enhanced rate of bacterial metabolism. The dye reduction time refers to the microbial load in the milk and the total metabolic reaction of the microorganism (Aurand and Woods 1984).

MATERIALS AND METHODS

The samples of milk were collected from different areas of Janakpur market. Sample collections were lasted from May to June, 2017. Sampling was performed according to standard protocol for the examination of milk. All milk samples were collected from 3 different sources comprising of 5 cows milk, 6 buffalo milk and 9 DDC milk. Total 20 samples of milk were collected aseptically and processed for MBRT test as per standard protocol. Reduction time test for each sample of the milk was recorded in a specified format and analysed statistically.

RESULTS

A total of 20 samples were examined physically and then proceed for the MBRT test. Out of 20 samples, 2 (10%) samples were found excellent quality, 3 (15%) were of good quality, 6 (30%) were of fair quality and 9 (45%) were of poor quality. Among these 20 samples, 6 samples were of processed milk, 5 samples were of unprocessed/raw milk and 9 samples were of Diary Development Corporation milk.

**Table 1: MBRT table of processed milk**

Samples	Reduction time (hrs)	Quality
Cow milk	3.5	Good
Cow milk	6.0	Excellent
Buffalo milk	4.0	Good
Cow milk	2.5	Fair
Buffalo milk	0.5	Poor
Buffalo milk	1.5	Fair

Table 2: MBRT table of unprocessed milk

Sample	Reduction time (Hrs)	Quality
Cow milk	2.0	Fair
Buffalo milk	0.75	Poor
Buffalo milk	1.5	Fair
Buffalo milk	0.5	Poor
Cow milk	½ hrs	Poor

Table 3: MBRT of DDC milk

Sample	Reduction Time (hrs)	Quality
DDC milk	3.5	Good
DDC milk	8.0	Excellent
DDC milk	1.5	Fair
DDC milk	2 .0	Fair
DDC milk	2.5	Fair
DDC milk	1.5	Fair
DDC milk	2.5	Fair
DDC milk	2	Fair
DDC milk	2	Fair
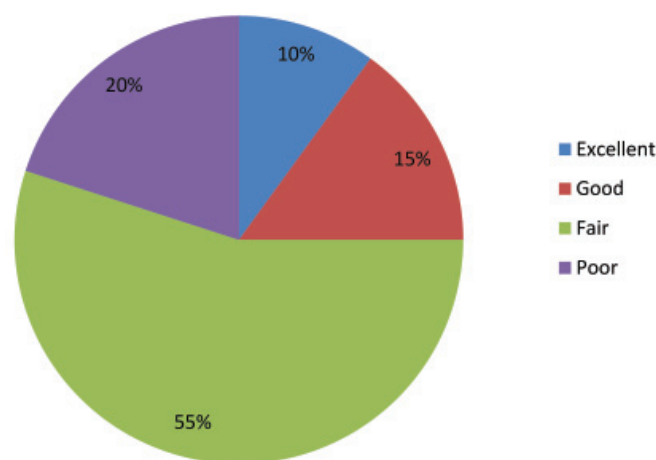
Figure 1: Percentage of quality of milk available in different areas of Janakpur market

DISCUSSION

Milk is the important source of protein. It help us to develop the brain sharpens our memory, make us powerful. Though nowadays people, for their selfish motive of earning money they mix harmful chemicals in the milk just to increase its qualitquantity. Thus milk quality is lowered and human immune system is also lowered and are suffering from many diseases (NDC 1993). The methylene blue reduction test is based on the fact that the color imparted to milk by the addition of a dye such as methylene blue will disappear more or less quickly. The removal of the oxygen from milk and the formation of reducing substances during bacterial metabolism cause the color to disappear. Oxygen is consumed by the bacteria the greater the number of bacteria in milk, the quicker will the oxygen be consumed, & in turn the sooner will the color disappear. Thus the time of reduction is taken as a measure of the number of organism in milk (Aurand and Woods 1984).

In this study, 20 milk samples from different local areas of janakpur tested. Out of 20 samples 2(10%) were of excellent, 3 (15%) were good, 6 (30%) were fair and 9 (45%) were of poor quality. Among these 20 samples, 6 samples were of processed milk, 5 samples were of unprocessed/raw milk and 9 samples were of DDC milk.

CONCLUSION

The quality of milk was found very poor in raw milk. The quality of DDC milk i.e. pasteurized was good and it is suitable for human consumption. Milk samples which were not processed found contaminated. Thus to prevent from the milk borne diseases pasteurized milk should be consumed.

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