Research Paper

DETECTION OF ADULTERANTS IN RETAIL MILK SAMPLES PROCURED IN PRODDATUR TOWN, YSR KADAPA (DT), ANDHRA PRADESH

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The recent emerging and burning issue of milk is its adulteration. Adulteration is practiced either to substitute the cheaper ingredients or to impress the buyer to think the product is more valuable or of better quality. Keeping in view of this issue a small work was planned to detect the adulteration in milk. A total of 50 samples were collected from retail outlets, nearby chilling centres and different localities in and around Proddatur of YSR Kadapa District, Andhra pradesh, India and tested for the determination of and extent of adulteration. Qualitative analyses were carried out on 50 milk samples with the help of a standard milk adulteration kit manufactured by HiMedia Laboratories, Mumbai, India. The results indicates that out of 50 samples 54% and 40% of the samples were adulterated with Sodium chloride and Sugar respectively. The presence of Urea and Hydrogen peroxide was nearly same (24% and 26% respectively). To little extent the milk was also adulterated with Formalin (12%), Glucose/ Dextrose and Detergents (10%), Starch (8%), Neutralizers (6%) and Skim milk powder (2%). All percentage values are indicative of presence of these adulterants. The findings of this study prooved that the milk procured did not confirm to the legal standards and it was adulterated with toxic chemicals which are injurious to health in a long run. People should be educated about the toxic effects of different adulterants on their health.

Keywords: Adulteration, Milk adulteration, Raw milk samples, Retail milk samples

INTRODUCTION

Milk in its natural form is a unique food for the nourishment of human being from long back as it supplies nutrients like proteins, fat, carbohydrates, vitamins and minerals in moderate amounts in an easily digestible form than any other single food (Neumann et al., 2002). It has all the substances needed by humans in its easiest

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assimilable form. Due to its nutritive value milk is recommended to young and old people (Kandapal et al., 2012). However the quality of milk is deteriorated due to its adulteration in different marketing channels. Adulteration of milk is usually done by adding inferior cheaper materials/elements like pondwater, cane sugar and powdered milk (Prasad, 1999) and there were reports of adulteration in dairy products also in many parts of India (Sharma, 1996; and Choudhary, 1997). Milk adulteration is either by dilution of milk by water or by making synthetic milk. Synthetic milk is produced by blending urea, cooking oil, detergent, caustic soda, sugar, salt and skimmed milk powder in order to make more profit (Bansal and Bansal, 1997). It does not contain natural milk and hence it is devoid of essential nutrients. Further natural milk is adulterated by diluting with water and addition of substances such as urea, fat, sugar, neutralizers, salt, hydrogen peroxide etc to maintain desired viscosity and specific gravity of milk (Varley, 1969).

Water is an adulterant in milk which is always added to increase the volume of milk which in turn decrease the nutritive value of milk, if contaminated posses a health risk especially to infants and children. Detergents are added to emulsify and dissolve the oil in water giving the frothy solution (foamy appearance), and for the characteristic white color of milk (Centre for Science and Environment, 2006). Urea/sugar are added to mask the decreased SNF, to provide whiteness to milk and to improve the milk taste. The presence of urea in milk overburdens the kidneys as they have to filter out more urea content from the body (Hemanth et al., 2000; and Kandapal et al., 2012). Starch is also used as an adulterant and if high amounts of starch are added to milk, this can cause diarrhea due to the effects of indigestible starch in colon. Its accumulation in the body may prove very fatal for diabetic patients (Singuluri et al., 2014). Caustic soda is added to the blended milk to neutralize the acidity, thereby preventing it from turning sour during transport (Kandapal et al., 2012). Hydrogen peroxide is added to milk to prolong its freshness, but peroxides damages the gastrointestinal cells which can lead to gastritis and inflammation of the intestine (Singuluri et al., 2014). Such artificial milk is harmful for all, but is more dangerous for pregnant women, fetus and persons who are already having heart and kidney problems. The cost of preparing synthetic milk is less than Rs. 3 per litre and is sold to consumers at a price ranging between Rs. 10 and Rs. 15 per litre after blending with natural milk.

From the public health point of view, the Government of India promulgated the Prevention of Food Adulteration Act (PFA act) in 1954. The act came into force for the first time in 1955. It prohibits the manufacture, sale and distribution of not only adulterated foods but also foods contaminated with toxicants. Despite food legislation, adulteration remains uncontrolled, further more legal steps laid down in the PFA act are extremely difficult to maintain due to inadequate and untrained man power and laboratory facilities (Monika and Gupta, 2008). Keeping in view of all the above facts, a study was planned to find out the quality of raw milk available in local markets of Proddatur and the surrounding areas of Proddatur, YSR Kadapa District.

MATERIALS AND METHODS
The present study was conducted in the Department of Veterinary Public Health and Epidemiology, College of veterinary Science,
Proddatur, YSR Kadapa District. Fifty samples of raw milk were collected from the vendors in the town and were collected into clean dry sterilized glass bottles. A standard milk adulteration kit manufactured by HiMedia Laboratories, Mumbai, India was used to screen the samples. The milk samples were tested for the following adulterants Formalin, Urea, Starch, Neutralisers, Detergents, Sodium Chloride, Skim milk powder, Sugar, Glucose/Dextrose, Hydrogen Peroxide and acidity was also tested.

RESULTS AND DISCUSSION

A total of 50 milk samples were tested in duplicates. All tests were carried out at room temperature and the results are summarized into 3 categories. Group I indicates the presence of Carbohydrates, Group II indicates the presence of salts and Group III was classified as other compounds where peroxides/detergents were used.

The results of Group I adulterants is shown in Table 1. As evident from the table the milk samples are adulterated to a little extent with starch (8%), glucose (10%) and to a negligible extent by Skim milk powder (2%). Similar type of results were reported by Singuluri et al. (2014) and Chanda et al. (2012) with respect to starch, sucrose but 8% of skim milk powder adulteration was reported by Singuluri et al. (2014) whereas it is only 14% by Chanda et al. (2012). In the present study the extent of adulteration with sucrose is 40%, which was similar to the results of Chanda et al. (2012), whereas less than 40% adulteration with sucrose was reported by Singuluri et al. (2014). This reveals that sucrose is added either to increase the weight or relative mass of natural milk. Presence of sucrose may indicate that it was used to mimic the natural sweetness of milk (Faraz et al., 2013). Therefore it could be assumed that sugar was added to the diluted raw milk to improve its taste. This result is in agreement with the findings of Lateef et al. (2009) who found that middle men used to adulterate milk to maximize their profit by adding cheap substances to increase the value of total solids upto a level which is acceptable by the consumers.

Extent of Group II adulterants is summarized in Table 2. As evident from the table all the samples tested were positive for acidity/alkalinity. The same result was reported by Singuluri et al. (2014). In the present study the extent of adulteration with salt and urea were 54% and 24% respectively, which were in contrast to the results reported by Kandapal et al. (2012). These results are nearer to the results reported by Singuluri et al. (2014) (Salt-82%, urea-60%). The present

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<th>Table 1: Group I Adulterants (n = 50)</th>
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<td>Adulterant</td>
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<td>No. of positive samples</td>
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<td>Percentage of positive samples</td>
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<th>Table 2: Group II Adulterants (n = 50)</th>
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<td>No. of positive samples</td>
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study revealed that milk was adulterated with neutralizers to an extent of 6%, which are almost similar to the results reported by Kandapal et al. (2012) (negligible amounts) and nearer to the results reported by Singuluri et al. (2014) (26%) and Chanda et al. (2012) (20%). These chemicals are used as cheap preservatives which will increase the shelflife of fresh milk. Neutralisers such as carbonates and bicarbonates of various alkalies are generally used to mask the pH and acidity values of badly preserved milk passing it off as fresh milk (Faraz et al., 2013). Sodium chloride is particularly used to interfere with lactometer reading and urea is added to provide whiteness, to increase the consistency of milk and for leveling the contents of SNF as that of natural milk. Presence of urea in milk overburdens the kidneys as they have to do more work to throw out urea contents from the body. This may lead to renal failure in some cases, besides urea is also harmful for the heart and liver. The most probable reason for the presence of urea in all the samples of milk maybe due to the fact that fodder being consumed by cattle would be containing fertilizer/herbicide/pesticide residues which are being indiscriminately used nowadays for increasing the yield of crops and urea is one of the active ingredients of most of the fertilizers/herbicides/pesticides. Thus urea gradually finds its way in the milk secretion of the animals consuming this fodder (Kandapal et al., 2012).

Results of Group III adulterants are summarized in Table 3. In this group 12% and 10% of the samples were positive for the presence of formalin and detergents respectively in contrast to the results of Kandapal et al. (2012) (100%) with respect to the presence of detergent and almost similar results were reported by Chanda et al. (2012) (10%) but Singuluri et al. (2014) reported the presence of 32% of formalin and 44% of detergents in milk samples. In the present study the presence of Hydrogen peroxide was reported upto 26% which is similar to the findings of Singuluri et al. (2014) but in contrast to the findings of Debnath et al. (2008), Das et al. (2010), Chanda et al. (2012) and Kandapal et al. (2012) who have reported the complete absence of hydrogen peroxide in the milk samples. Peroxide and formalin are generally used to preserve and to increase the shelf life of milk, on the other hand the presence of detergents may be due to low maintainance of milk tanks while preparation or it can be used to mask fat value of milk. The ICMR (1993) in one of its reports, states detergents cause food poisoning and gastrointestinal complications.

### CONCLUSION

In light of the above discussion, it may be concluded that salt (54%) and sugar (40%) are the common adulterants in all the samples of raw milk. It came to know from this study that a large number of milk samples were adulterated and they did not confirm to the legal standards prescribed by the Food Safety Standards Authority of India (FSSAI). The extent of adulteration varied significantly with least percentage for skim milk powder (2%) and highest for sodium chloride (54%). This indicates that most of the milk vendors are practicing the adulteration of milk with available adulterants to get more money. In a developing

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<th>Adulterant</th>
<th>Formalin</th>
<th>Hydrogen Peroxide</th>
<th>Detergents</th>
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<tr>
<td>No. of positive samples</td>
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<td>13</td>
<td>5</td>
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<tr>
<td>Percentage of positive samples</td>
<td>12</td>
<td>26</td>
<td>10</td>
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![Table 3: Group III Adulterants (n = 50)](http://www.ijasvm.com/currentissue.php)

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country like India, milk and milk products play an important role in the nutrition of newborn kids, youngsters and adults. The presence of adulterants in the milk may cause adverse effects on the health of human beings. As most of the public are unaware of the ill effects of adulterants and preservatives on their health, awareness should be brought among the people about the milk adulteration to protect their health and to get good quality milk for which they are paying the amount.

REFERENCES


