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Study on Detection of Adulteration Components in Packed Milk

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Milk is a basic source of human diets, which contain essential materials such as carbohydrates, protein, lipids, minerals, vitamins and essential amino acids. In order to keep milk temporarily fresh, some unethical activities are usually adapted to prevent the financial losses due to the spoilage of milk during its transportation and sale. The aim of study is to identifying the adulterants presents in the samples and compare them with the standard products. The method used for the detection of neutralizers in milk is rosalic acid and for the detection of formalin there was used Hehner's Test in this study. The study had done on seven type of packed milk (Milk Pack Nestle, Milk Pack Plus, Qudrat, Tarang, Taza, Every Day And Khatiz). Finally the result showed, neutralizer which are using for the neutralizing of acidity in milk were negative in mentioned samples, but formalin which is used for the extending of milk shelf life was positive in Milk Pack Nestle and Taza Packed Milk samples. From total 42 samples, we detected adulteration of formalin in 12 (28-30%) samples. We are advising to Society for the rejections of Milk Pack Nestle and Taza Packed Milk as use, and related administrations' must control the above packed milk imports.

Key words: chemical contamination, neutralizer, antioxidant, packed milk, quality, additives

Introduction

Milk is a white liquid produced by the mammary glands of mammals. It is the primary source of nutrition for infant mammals before they are able to digest other types of food. Milk in its natural form has high food value. It supplies nutrients like proteins, fat, carbohydrates, vitamins and minerals in moderate amounts in an easily digestible form. Due to its nutritive value, milk is significant to young and old people (Singuluri and Sukumara, 2014). The composition of milk varies considerably with the breed of cow, stage of lactation, feed, season of the year, and many other factors. However, some relationships between constituents are very stable and can be used to indicate whether any tampering with the milk composition has occurred (Afzal et al, 2012). Milk is a perishable commodity and is likely to be spoiled during summer season when weather becomes very hot (Tipu et al, 2007). Unfortunately, due to unorganized and non-regulated marketing systems, the quality of milk is hardly maintained at consumer level (Javaid et al, 2009). In order to keep milk temporarily fresh, some unethical activities are usually adapted to prevent the financial losses due to the spoilage of milk during its transportation and sale[1]. For instance, the addition of water to increase volume of milk, thickening agents like starch, flour, skimmed milk powder, whey powder or other ingredients to counter the dilution and extend the solids content of the milk[2]. The adulteration of milk is banned due to the ill effects. Carbonate in milk produce gastrointestinal problems including gastric ulcer, diarrhea, colon ulcer and electrolytes disturbance. The hydrogen peroxide disturbs the antioxidants in the body disturbing the natural immunity hence increasing aging. Chloride in the milk disturbs the acid base balance in the body and blood pH. Ammonia in milk develops regression, loss of acquired speech and sensory disturbances (Ayub et al, 2007) despite food legislation, adulteration remains uncontrolled, furthermore legal steps laid down in the PFA Act are extremely difficult to maintain due to inadequate

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and untrained man power and laboratory facilities (Monika et al, 2008). Several studies have reported a wide variety of adulterants being added to milk for sale to consumers, meaning that it is of substantially poorer quality with a lower nutritional value and toxic substances present (Fischer et al, 2011).

Adulteration of milk is one of the most serious issues that the dairy sector of Afghanistan is facing today, which not only causes major economic losses for the processing industry, but also a major health risk for the consumers. Milk adulterated with contaminated water is a serious health hazard because of potential waterborne diseases. The chemicals which are being used as adulterants in milk may affect the health of consumers. Packed Milk from neighbor countries and Jalalabd is not only consumed in Jalalabad city but also transported for marketing to big cities like Kabul, Mazaar and Kandahar. Moreover, the handling of milk and its sale process has been practiced through intermediaries under such conditions; it is hard to maintain the purity or wholesome quality of milk. Thus present study is planned to evaluate the adulterations and composition of milk sold at Jalalabad.

The main hypothesis of our study is that neighbor countries packed milk purchased in the local market of Jalalabad city has adulterants components in its composition. The aim is to identify the adulterants present in the samples and compare with the standard products. The main parameters being detection of formaline and neutralizer in packed milk

Materials and methods

Participants of this study are shopkeepers of Jalalabad city.

General considerations

We had collected 42 samples from seven kinds of packed milk, which are purchasing in Jalalabad city. From every kind we had tacked twenty samples and then we had detected the below adulteration materials. The studying samples were Pakistani Milk Pack Nestle, Milk Pack Plus, Tarang, Halib, Every Day and Afghani Khatiz.

Detection of Neutralizers in Milk

Neutralizers (NaOH, 0.1% for Na2CO3 and 0.2% for NaHCO3) are added to milk to neutralize the developed acidity in milk. Rosalic acid method can be used for the detection of presence of these neutralizers in milk.

Method 1 (Rosalic acid Method)

Reagents

First making of Rosalic acid solution (0.1%, w/v): We took 100 mg of rosalic acid powder and dissolved it in 30 ml of ethyl alcohol to make the volume with distilled water for obtaining final volume of 100 ml.

Procedure

10 ml of milk were added equal volume of 95% alcohol in a test tube. Then added a few drops of 0.1% alcoholic solution (w/v) rosalic acid. Milk showed only a brownish color whereas alkali is presents a rose red color appears.

Test for Presence of Formalin in Milk

Method 1: Hehner's Test

Reagent used is concentrated sulphuric acid.

Procedure

We took (2 ml) milk sample in a test tube and slowly added 2 ml of 90% H2SO4 containing traces of ferric chloride from the side of the test tube. Formation of purple ring at the junction indicated formaldehyde presence in milk. The violet coloration did not appear the presence of formaldehyde.

Results

Milk used for human consumption can be adulterated with inferior, cheaper materials or hazardous chemicals, including pond water, formalin, and neutralizers. I resulted that, packed milk imported from neighbor countries especially from Pakistan has low quality and 28-30% of milk samples were positive for formalin. In this research, we did not see positive sample for neutralizers. The completed result showed in below Table 1.

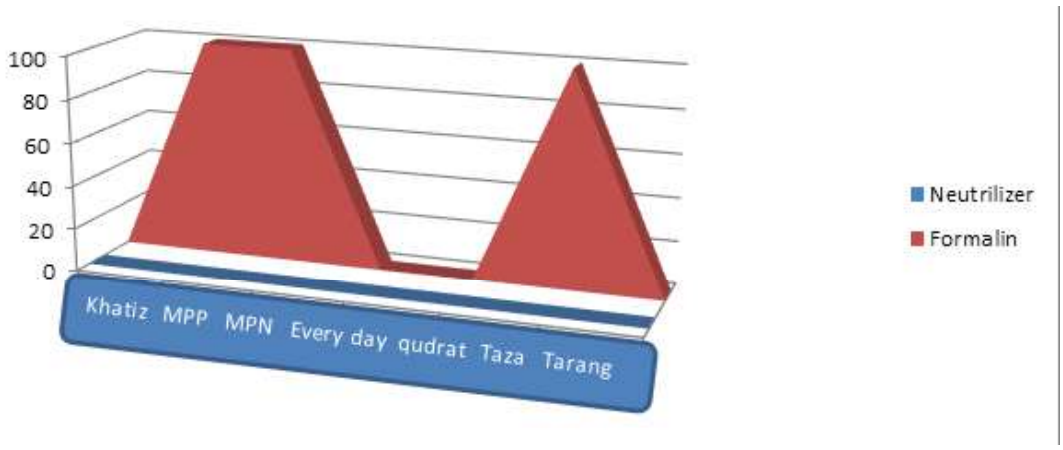
Discussion

Adulterants in milk mainly include addition of vegetable protein, milk from different species, addition of whey and watering which are known as economically motivated adulteration (Brototi et al, 2017). Some chemicals such as, bicarbonates, even the most lethal chemical formalin, are used to increase the storage period of milk (Ramya et al, 2015). A study carried out by Ramyaet and his colleagues in 2015

Table 1
Formalin and neutrilizers in packed milk

	Detection of formalin and neutralizers in packed milk					
	Samples	**Number of samples**	**Neutralizers**	**Percentages of the positive samples**	**Formalin**	**Percentages of the positive samples**
1	Khatiz	6	Negative	0%	Negative	0%
2	Milk Pack plus	6	Negative	0%	Positve	100%
3	Milk pack Nestle	6	Negative	0%	Positve	100%
4	Everyday	6	Negative	0%	Negative	0%
5	Qudrat	6	Negative	0%	Negative	0%
6	Taza	6	Negative	0%	Positve	100%
7	Tarang	6	Negative	0%	0%	0%

Figure 1
The above fig shows presence of Neutralizers and formalin in packed milk



found neutralizers and water in their studied packed milk samples (Ramya et al, 2015). The similar result showed by Singuluri and their colleagues (Singuluri et al, 2014). Therefore a researched completed in 2014, also diagnosed neutralizers and formalin in packed milk positive (Swetha et al, 2014). However, this study did not find positive sample for neutralizers. A study carried out by Sinha for formalin detection in packed milk found formalin in 2,2-3,3% milk samples[3]. The same result was given by a study by Ghulam shabir and his colleagues for formalin and water detection (Bahram et al, 2014); 15-20% positive samples for formalin and 25-28% for water samples were detected. Although a study result obtained by Singuluri and Sukumaran, detected 32% milk samples for formalin and 30% for water (Singuluri et al, 2014). But only 12 out of 42 milk samples (28-32%) positive for formalin and approximately 25% for water detection which is similar with Singuluri and Sukumaran's results and higher than other mentioned researchers' data.

Conclusion

Milk is the Essential source of nutrition for Humans diet and has high food value. It has nutrients like proteins, fat, carbohydrates, vitamins and minerals. According to the extension of shelf life of milk, some materials like neutralizers and formalin used by various companies are dangerous for human health. In our result we have seen 28-30% samples positive for formalin and neutralizers were negative in all samples. In this regards we want the Governments to control borders for the imports of packed milk and give permission to those packed milks which is free from adulterations.

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Исследование по обнаружению фальсифицированных компонентов в пакетированном молоке

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Молоко – основной источник питания для человека, содержащее такие вещества, как углеводы, белок, липиды, минералы, витамины и незаменимые аминокислоты. Для предотвращения финансовых потерь во время транспортировки и реализации, производители иногда используют фальсифицированные компоненты, чтобы молоко дольше оставалось свежим. Цель исследования – выявить примеси, присутствующие в образцах, и сравнить их со стандартами продукта. В исследовании, которое мы провели с семью образцами пакетированного молока (Milk Pack Nestle, Milk Pack Plus, Qudrat, Tarang, Taza, Every Day и Khatiz), нейтрализатор не обнаружен, но обнаружен формалин, который используется для продления срока годности молока, в пакетированных образцах Milk Pack Nestle и Taza Packed Milk. Из 42 проб фальсификацию с формалином обнаружили в 12. Процент от общего количества образцов примесей составляет 28-30%, и мы рекомендуем отказаться от использования молока в Milk Pack Nestle и Taza Packed Milk и контролировать его импорт.

Ключевые слова: химическое загрязнение, нейтрализатор, антиоксидант, фасованное молоко, качество, добавки

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