Research Article

ADULTERATION IN LOCAL AND IMPORTED LIQUID MILK OF KABUL CITY, AFGHANISTAN

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ARTICLE INFO	ABSTRACT
	Adulterants in milk are chemical substances added in milk for different purposes like better taste, correction of SNF level, increasing density, regulation of viscosity and decreasing freezing point of milks which are added water. The purpose of this research is to evaluate and find adulterants in liquid milk samples available in Kabul city. Prestigious and valid methods from FSSAI (Food Safety and Standard Authority of India) are used in this research. Milk samples are collected from different districts of the city according to the list of Afghanistan's ministry of business and industries. The imported liquid milk were from Iran (10 kinds), Pakistan (14 kinds), Uzbekistan (1 kind),and 3 produced milk kinds from Kabul city. There were 3 adulterations found in Pakistan milk samples,4 adulterations in Iranian milk samples, 2 adulterations in Uzbek milk samples and 1 adulteration in Afghan milk samples. Methods used for detection of adulterations was FSSAI for milk analysis and according to this method Starch, Formalin, Hydrogen peroxide, Sulfates, Nitrates, Sodium chloride, Cellulose and Anionic detergent were tested in all milk samples. Among those of 28 milk samples, ammonium sulfate (89.28%) was found in majority of samples followed by formalin (64.28%), sodium chloride (3.57%), starch (3.57%) and anionic detergent (7.14%).

INTRODUCTION

Milk adulteration is a social problem. It exists both in backward and advanced countries(1). As a result of the increased demand, in addition to the growth in competition in the dairy market and the increasing complexity of the supply chain, some unscrupulous producers are attempting in milk fraud. This malpractice has become a common problem in the developing countries, which lack strict vigilance by food safety authorities. Milk is often subjected to fraud (by means of adulteration) for financial gain, but it can also be adulterated due to ill-informed attempts to improve hygiene conditions (2). Several adulterants are added to fresh cattle milk for various purposes: milk powder and starch are added to improve its viscosity; water is added to enhance its volume; to increase its shelf life, ice and certain chemicals like hydrogen peroxide, carbonates, bicarbonates, and antibiotics are supplemented. Detergents are added to milk to compensate for the reduction in the foaming nature of fresh milk, caused by the addition of water to it. In a similar manner, urea is used for whitening the milk. Boric acid and formalin are added to milk during processing as a milk preservative in order to prevent the growth of micro-organism in it (3). Water is the most common adulterant used, if the water is contaminated, for example, with chemicals or pathogens, this poses a serious health risk for consumers. Likewise addition of water to milk affects the physical as well as chemical quality of milk by altering the proportion of different constituents (15) and decreases its nutritional value; for infants and children this may be a serious concern as they are at a critical stage of growth and development and are dependent on milk products for supplies of vital nutrients and so may be at risk of malnutrition. Indicators of undernourishment are manifested as child-stunting, underweight, wasting, and nutrition-related child mortality (2). Ingestion of formalin can lead immediate deleterious effects on almost all systems of the body including gastrointestinal hemorrhage, cardiovascular collapse, convulsions, sever metabolic acidosis and acute respiratory distress syndrome (4). Urea adulterated milk is very harmful to the girls as it has tens up the process of puberty (5). Addition of unwanted chemical agents in fresh milk for different purposes is carried out usually by illiterate and unskilled persons who has no awareness of their toxic effect on human health (3). Milk supply to Kabul city takes place through different marketing channels i.e. direct sellers, packaged imported foreign milk, milk vendors from the surrounding areas, dairy shops and dairy farms, and is based on unorganized marketing system. Thus, without research and rummage we cannot know about milk's quality.

MATERIALS AND METHODS

This was a cross sectional based research accomplished over a period of 7 months on 140 (28 kinds) imported and produced

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liquid milk samples from Kabul city Afghanistan. Performance method was FSSAI for milk analysis and duration time of research was form 2016/08/27 to 2017/05/15. All milk kinds were packaged except two kinds that were produced in Kabul city. Samples without package were packed in stoppered disinfected bottles and brought to the laboratory to prevent chemical and microbial contamination.

Data Collection

Specially designed Proforma was prepared to collect data which includes all characteristics of milk samples/kinds like name, name of company, expiry and manufacture date, composition and food info. 5 samples were collected from each of milk kind to conduct analysis. The software used for data analyzing is Graph Pad prism 5.01.

RESULTS

The results of this research shows that almost all milk samples were adulterated i.e. from 140 milk samples 137 included adulterants as shown in (table 1).

Presence or absence of adulteration

Out of 140 milk samples major portion i.e., 137 (97.85%) samples were adulterated and 3 (2.14%) were pure milk.

Table 1 No. and percentage of total and contaminated samples

No. and (%) of total samples	140 (100%)
No. and (%)of contaminated samples	137 (97.85%)
No. of pure samples	3 (2.14%)

Country wise distribution of milk samples

Out of 140 samples 70 (50%) were from Pakistan, 50 (35.7%) from Iran, 15 (10.7%) from Afghanistan and 5 (3.57%) from Uzbekistan.

Table 2 No. of samples from each country

Countries name	No. of samples
Pakistan	70 (50%)
Iran	50 (35.7%)
Afghanistan	15 (10.7%)
Uzbekistan	5 (3.57%)

Number of Adulterations in each country's milk samples

Four adulterants were found in total Iran milk samples, three adulterants were in Pakistan milk samples, two adulterants were in Uzbekistan samples and one was found in Afghanistan milk sample.

Table 3 No. of adulterants present in total samples of each country

Countries name	Adulterants
Iran	4
Pakistan	3
Uzbekistan	2
Afghanistan	1

Number and percentage of samples containing adulterants (in total 140 samples)

Out of 140 sample of milk 125 (89.28%) contains sulfates, 90 (64.28%) contain formalin, 10 (7.14%) contain anionic detergent, 5 (3.5%) contain starch and 5 (3.5%) contain sodium chloride.

Table 4 Number and percentage of samples contaminated with adulterants (in total 140 samples)

No. of total samples		Sulfates	Formalin	Anionic detergent	Starch	Sodium chloride	Hydrogen peroxide	Nitrates	Cellulose
140(100%)	percentage	89.28	64.28	7.14	3.5	3.5	0	0	0
	number	125	90	10	5	5	0	0	0

Here is the data calculated in the total samples of each country, exactly shown in figures below:
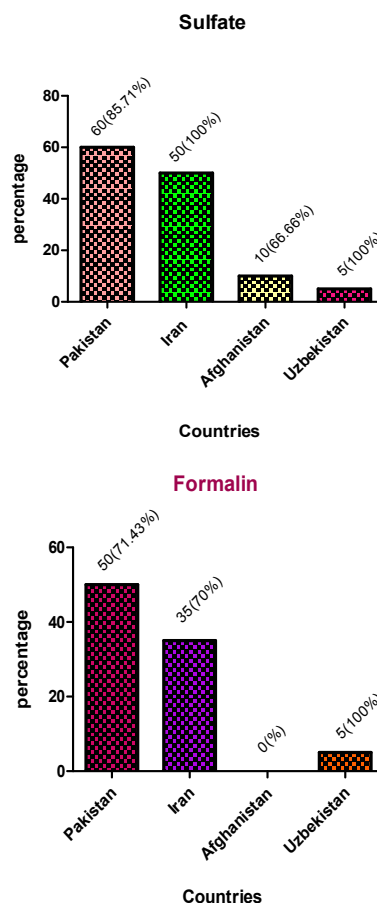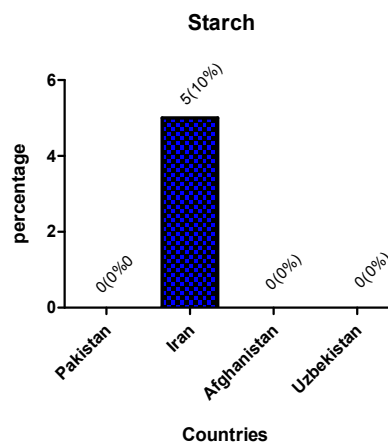

Figure 1, 2 determining sulfate and formalin in samples of different countries
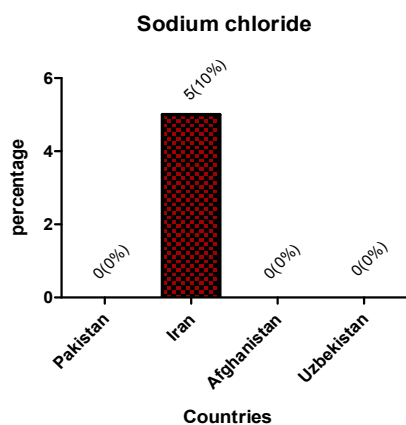
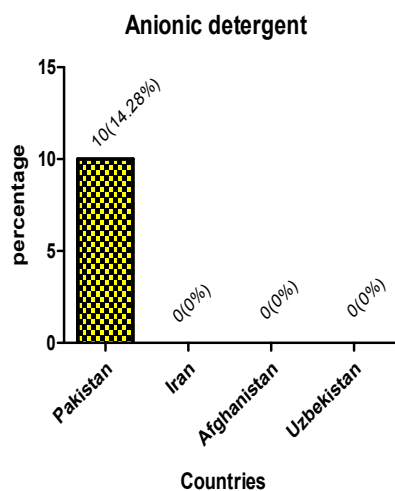**Figure 3, 4** determining starch and sodium chloride in milk samples

Figure 5 determining anionic detergent in different milk samples

DISCUSSION

Detection of Sulfates

Sulfates are added to the water diluted milk to decompensate SNF level. In this study 125 (89.28%) milk samples were added sulfates. The higher percentage of starch (96%) was reported by Jivraj Makadiya and Astha Pandey in 2015 (6).

Detection of Starch

Starch was added to increase the thickness of milk after addition of water. This research result marked that only 5 (10%) milk samples were contaminated with starch. However, the higher percent age of starch (27% and 35.5%) in milk samples were recorded by Ghulam Shabbier Bahram *et al.* 2014 and Ahmad 2009 (7) (8). Tanzina Azad 2016 mentioned that higher amount of starch may cause diarrhea due to the effects of undigested starch in colon. Its accumulation in the body may prove very fatal for the diabetic patients (9).

Detection of Salt (Sodium chloride)

Sodium chloride was added in milk to mask the higher water content. In the present research Sodium chloride was found in 3.5% milk samples among total140milk samples examined, which was in contrast to the results of Ghulam Shabbier Bahram *et al.*(2014), Shrishti Nirwal *et al.* (2013), He manth Singuluri and Sukumaran (2014) who reported 19%, 51% and 82% positivity respectively (7) (10) (11). It has been reported that epidemiological, clinical, and animal studies show chronic excess sodium ingestion acting upon a substrate of genetic susceptibility, is an important etiologic fact or in essential hypertension and the expression of its sequelae. Positive correlations also have been obtained between dietary salt and the incidence of stroke and gastric cancer (12).

Detection of detergents

Detergents are added to emulsify and dissolve the oil in water giving the frothy solution, the characteristic white color of milk (13). As per the present research 7.14% milk samples were shown positive for detergents. Results obtained from this research are in contrast with the results of Hemanth Singuluri and Sukumaran (2014) (44%), Ghulam Shabbier Bahram *et al.*2014 (41%) (7) (11). The Indian Council of Medical Research or ICMR (1993) in one of its reports, states detergents cause food poisoning and gastro intestinal complications.

Detection of formalin

Formalin and hydrogen peroxide are used as chemical preservatives for milk. These are usually used to increase the shelf life of milk during summer season when environmental temperature is very high. This unethical activity is usually adopted by the milk traders to prevent the financial losses due to the spoilage of milk during its transportation and sale in various parts of the world (14). In this research, 75% of the samples were positive for formalin, which was lower than that of results obtained by Ghulam Shabbier Bahram *et al.*(2014) (20%) and Hemanth Singuluri and Sukumaran (2014) (32%) (7) (11). The addition of formalin as adulterant in milk causes vomiting, diarrhea, and abdominal pain. It also leads to decrease in body temperature, shallow respiration, weak irregular pulse and unconscious (5). It also causes blindness by damaging optic nerve and it is carcinogenic in nature (14).

CONCLUSION

There suits of milk adulteration tests clearly showed that the milk collected from different places in Kabul city contains different adulterants and preservatives like salt, detergents, formalin, sulfate and starch which has both economic and public health importance because this may cause serious health effects to consumers, as well as consumers are not getting the original good quality of the milk and are being deceived. Hence, the milk sold in those places can not be considered as good nutritive milk.

Consumers must be aware of this malpractice and they have to be more active against the milk adulteration. Because in developing country like Afghanistan milk and milk products are a part of day to day life, especially in children and elders. Hence, it is very necessary to educate the persons who are directly or indirectly involved in milk production, processing and marketing as well as consumers. The findings of this research also highlights that, there is an urgent need to implement the hygiene practice, effective monitoring and quality control system in Kabul city, Afghanistan by local authorities and also they should ensure that only good quality milk is sold to consumers.

References

1. Siuli Das, Bhaswati Goswami and Karabi Biswas. Milk Adulteration and Detection: A Review. Sensor Letters. 2016;14.

2. Caroline E. Handford, Katrina Campbell, Christopher T. Eliott. Impact of Milk Fraud on Food Safety and Nutrition with Special Emphasis on developing Countries. Comprehensive Reviews in Food Science and Food safety. 2016; 15(1).
3. Fahdullah Shakir, Zia-ud Din, Iftikhar Ahmad, Imran khan, Muhammad abbas, Zahoor Ahmad et al. Malpractices of Milk Aduteration with Chemicals and Its Impact on Nutritional Status of Pre-school Children in Peshawar - Pakistan. Food Science and Technology. 2017; 5(2).
4. Nawaiwaqt Group. Formalin in Milk. Islamabad. 2010;.
5. Ali Afzal M.S.Mahmood, Iftikhar Hussain, and Masood Akhtar. Adulteration and Microbiological Quality of Milk. Pak. *Journal of Nutrition*. 2011; 10(12).
6. Astha Pandeyand Makadiya Jivraj. Quality Assessment and Detection of Adulteration in Baffalo Milk Collected From different Areas of gandhinagar by Physio-Chemical Method. *International Journal of PharmTech Research*. 2015; 8(4).
7. Bahram Ghulam Shabir Khaskheli, Muhammad Soomro, Aijaz Hussain Nizamani, Zaheer Ahmed (12). Detection and Extent of Extraneous Water and Adulteration in Milk Consumed at Hyderabad, Pakistan. *Journal of Food and Nutrition Sciences*. 2014 April; 2(2).
8. Adam Hassabo Ali Ahmad. Milk Adulteration by Adding Water and Starch at Khartoum State. Pakistan Journal of Nutrition. 2009; 8(4).
9. Azad Tanzina Ahmed Shoeb. Commaon Milk Adulteration and their Detection technics. *International Journal of Food Contamination*. 2016 December; 3(22).
10. Nirwal, Shrisheti Pant, Rakesh Rai, Nishant. Analysis of Milk Quality, Adulteration and Mastitis In Milk Samples Collected From Different Regions of Dehradun. Resaerch Gate. 2013 June.
11. Singuluri MK. And Hemanth, Sukumaran. Milk Adulteration In Hyder Abad, India. A Comparative Study on The Levels of Different Adulterants Present in Milk. *Journal of Chromatoghraphy and Separation Techniques*. 2014 February; 5(212).
12. Battarbee HD, Meneely GR. The toxicity of salt. CRC Crit Rev Toxicol. 1978; 5(4).
13. D Maheswara Reddy, K.Venkatesh and C. Venkata Sesha Reddy. Adulteration of milk and its detection. *International journal of chemical studies*. 2017 June; 5(4).
14. Chinta Siva S, Sudhanthiramani Sudhanthirakodi, Bahrathy Sukumar. The study on detection of adulteration in milk samples supplied by local vendors in Tiropathi region, India. Quarterly journal. 2014; October.
15. Javaid S.B. GadahiJ.A. Khaskheli M. Bhutto M.B. Kumbher S. and Panhwar A.H.. Physical and Chemical Quality of Market Milk Sold At Tandojam, Pakistan. 2009; 29(1).

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