Weekly Science Research Journal
ISSN 2321-7871

Impact Factor : 2.4210 (UIF) [Yr.2014]
Volume - 3 | Issue - 17 | 5th Nov - 2015

CONSUMER AWARENESS OF CONSUMPTION OF RAW MILK: A REVIEW OF RISK AND HEALTH HAZARDS

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ABSTRACT:

Milk and dairy products are most vital and important components of daily intake diet, but if consumed raw then they can present a health hazard due to possible contamination with pathogenic bacteria. Enhanced nutritional qualities, taste and health benefits have all have been advocated as reasons for increased interest in raw milk consumption. The bacteria in the raw milk can originate even from clinically healthy animals from which milk is derived or from environmental contamination occurring during collection and storage of milk. There are several documented milk born disease outbreak occurred in recent past and were traced back to consumption of raw unpasteurized milk. The paper analyze and review that one of best way to prevent raw milk associated food borne illness is consumer awareness about refraining from consuming raw milk and other dairy products.

Key Words :- *Raw milk, pathogens, nutrition, heat treatment, consumer awareness.*

INTRODUCTION :

Milk is one of the most important food products with livestock origin and is extremely nutritious. It is an aqueous colloidal suspension of proteins, fats and carbohydrates that contains numerous vitamins and minerals, which serves as source of energy. Milk is considered complete food on earth in all segments of the population in all stages of life (Haug et al., 2007). Raw milk is milk (secreted by mammals and used as food by human beings) that has not been subjected to any processing intended to alter the quality or composition characteristics of the milk. Over centuries consumption of raw milk and raw milk products in childhood has a "protective" effect for some allergic conditions like asthma, hay fever, eczema, which is modulation of the immune system early in life (Keene, 1999; Kilpelainen et.al. 2000; Perkin et.al., 2006; Perkin, 2007; Riedler 2000; Riedler, 2001; Remes et.al.,2003; Potter et.al., 1984). Barnes et.al (2001) studies shows significant association with animal contact showed independent protective effects from raw milk consumption on atopy for

children less than 5 years. Bieli et.al. (2007) explore the genetic mechanism that might explain the protective effect of raw milk consumption and asthma in children and found change in a specific gene (CD14). The other side of drinking raw milk according to the literature relates to food safety hazards and pathogens isolated from raw milk or linked to disease outbreaks / illnesses.

One of triumph of 19th century had been pasteurization of milk (Figure 2) as it led to significant reductions in morbidity and mortality before such programs, heat treatment was the only and key to preventing these infections, especially among infants and children. Today, some of the most devastating infections linked to raw milk consumption such as bovine tuberculosis and brucellosis have been virtually eliminated from livestock heads in developed countries through animal health programs (Gutierrez Garcia, 2006; Etter et.al, 2006). Bacterial contamination of raw milk can originate from different sources: air, milking equipment, feed, soil, faeces and grass (Coorevits et al., 2008). There three major routes of contamination of raw milk include (Keene, 1999):

i.Mastitis or shedding from the udder
ii.Manure, dirt, other vectors in the diary environment
iii.Human carriers

These contaminates in raw milk can be analyzed by various methods explained in the figure no. 1.

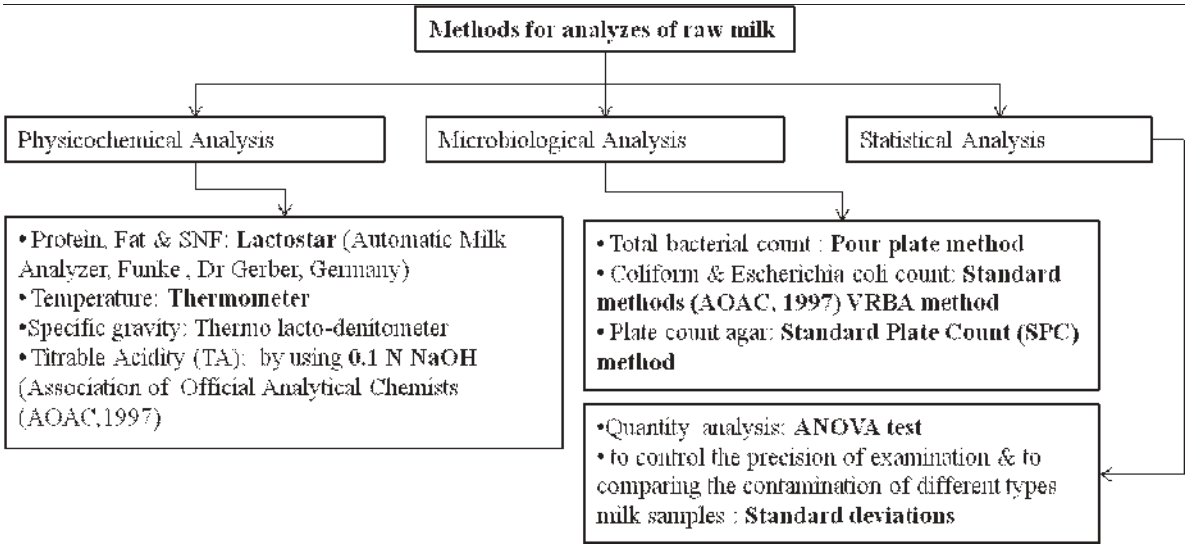

Figure1: Various methods of analysis of raw milk.

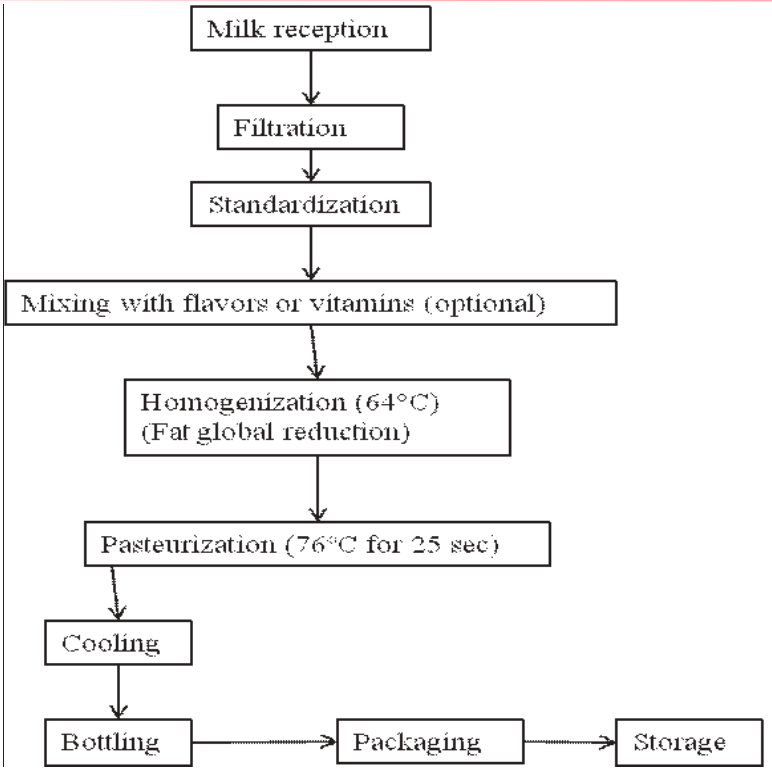

Figure 2: Basic flow chart of process of pasteurization of milk.

2. HEALTH HAZARDS FROM RAW MILK

Drinking of raw milk can lead to getting sick like diarrhea, stomach cramping and vomiting often for days, even healthy adults. It may also lead to kidney failure, paralysis, chronic disorders, and even death. A wide variety of germs that are sometimes found in raw milk including bacteria like Brucella, Campylobacter, Listeria, mycobacterium bovis (a cause of tuberculosis), Salmonella, Shiga toxin – producing Escherichia [e.g. E.coliO157], Shigella, Yersinia), parasites (e.g., Giardia), and viruses (e.g., norovirus).

Langer et. al. (2012) reviewed dairy product outbreaks from 1993 to 2006 in all 50 states of United States of America, in which it is compared the amount of milk produced, during the study period (about 2.7 trillion pounds). The Centers for Disease Control and Prevention (CDC, 2012) estimated that raw milk and milk products (cheese and yoghurt) if consumed was found to be 150 times higher in disease outbreaks. According to the CDC reports (2010; 2012), there have been 24000 food borne reported dairy associated outbreaks of human disease in last decade in United States. Out of these 173 per year outbreaks are from unpasteurized products, resulting in 1571 cases, 202 hospitalizations, and 2 deaths. The outbreak caused by unpasteurized milk and milk products was 150 times greater than the outbreaks linked to pasteurized milk. The study also revealed that the state where the sale of raw milk is legal has more than twice the rate of out breaks as states where it was illegal.

The regulation of the commercial distribution or selling through vendors of packaged raw milk varies across the world (Table 1). In some of the countries selling of raw milk is completely banned and many countries it had partial banned but do not restrict the purchase of raw milk brought directly from farm. In the countries of European Union regulations, regulations about raw milk and milk products are legal and considered safe for human consumption while in rural Asia where milk consumption is very popular, the laws prohibiting raw milk are rarely enforced or are nonexistent.

Table 1: Legal status of consumption of raw milk around the world

	Continents	Countries	Legal Status
1.	Africa		No clear cut policy on selling of raw/unpasteurized milk.
		South Africa	Affinity with EU law. Lots of regulatory gaps (Regulations relating to milk and dairy products (R.1555 del 21/11/1997))
		Ethiopia	No clear cut policy
		Nigeria	No clear cut policy
2.	Asia		In rural Asian country, distributed unpasteurized. Laws prohibiting law milk nonexistent or rarely enforced.
3.	Europe		Legal
		France	Legal
		Germany	Packaging required ,stringent quality restrictions, Label " Raw Milk-boil before usage" ,Legally sold
		United Kingdom	Illegal in Scotland. Legal: in England, Wales, North Ireland.
		Austria	Legal with automatic vending machines
		Bulgaria	Legal with automatic vending machines
		Croatia	Legal with automatic vending machines
		Czech Republic	Legal with automatic vending machines
		Poland	Legal with automatic vending machines
		Romania	Legal with automatic vending machines
		Slovakia	Legal with automatic vending machines
		Slovenia	Legal with automatic vending machines
4.	North America		
		Canada	Prohibited under Food and Drug Regulations since 1991.
		United States	Partially ban in some states
5.	Oceania		
		Australia	Prohibited in all states
		New Zealand	Legal (buying from farm gate and up to 5liters for personal use)

3. CONSUMER AWARENESS AND RAW MILK CONSUMPTION

Consumer awareness depends upon the level of public education and participation in ensuring food safety on the basis of the age old practices that have been handed over generation to generation (Falkenstein , 2009). The industrial efforts to educate consumers on food safety are limited to label information on appropriate use of their products. The study conducted by Bahman et. al. (2012) shows that traditional method of boiling raw milk also affects the vitamins – thiamine, vitamin B6 and folic acid within the B-complex and vitamin C (Table 2). Meanwhile, there is risk that milk could be contaminated by environmental factors such as soil or animal faces, animal diseases or bacteria on an animal's skin.

Table 2: Effect of boiling on the nutritional quality (vitamins) of Standardized milk

	Parameters	Control	Boiled milk	Percent decrease
	Fat-soluble vitamins			
	Vitamin A (retinol palmitate) (mg/kg)	2.95	2.33	21
	Vitamin D3 (cholecalciferol) (mg/kg)	0.057	ND(MDL=0.05)	
	Vitamin E (mg/kg)	ND (MDL = 1)		
	Vitamin K (mg/kg)			
	Water-soluble vitamins			
	Vitamin B1 (thiamine) (µg/100g)	342	342	0
	Vitamin B2 (riboflavin) (µg/100g)	1824	1888	-3.51
	Vitamin B3 (niacin) (µg/100g)	780	680	13
	Vitamin B5 (pantothenic acid) (µg/100g)	2731	2653	3
	Vitamin B6 (pyridoxine) (µg/100g)	329	329	0
	Vitamin B7 (biotin) (µg/100g)	25	25	0
	Vitamin B12 (cyanocobalamine) (µg/100g)	3.4	2.7	2.1
	Folic acid (µg/100g)	32	32	0
	Vitamin C (µg/100g)	ND (MDL = 100)		

ND: Not detected; MDL: Method detection limit
Source: (Bahman S et. al. 2012)

4. REGULATIONS ABOUT RAW MILK

Regulation regarding the commercial selling of packaged raw milk varies across the world. In some of the countries selling of raw milk is completely banned while had partial bans that do not restrict the purchase of milk bought directly from farmer. European Union and U.S. standard for milk and milk products requires that checks originate from level of primary production, and it lays down the conditions of maintaining the standards, types of feed to be given, and the monitoring of these regulations. But Indian conditions and situation are different, a diary farm may have just one or two draught animals, and milk from a number of such holdings is commonly pooled before it is processes. The animal health requirements stipulated by the European Union. Since 1987 in U.S. Food and Drug Administration (FDA) mandated pasteurization of all milk and milk products for human consumption and banning all shipments of raw milk in interstate commerce with the exception of cheese made from raw milk. The code of Federal Regulations (21 CFR Sec. 1240.61) strictly mandates pasteurization for all milk and milk products in final package from intended for direct human consumption (21CFR1240.61).
In India, milk and milk products are dietary staples, the 2010 Dietary guidelines for India recommend to include dairy products on their diet. According to Law of Prevention of Food Adulteration, 1976, it has mandatory to not to sale untreated milk to the consumers. Dairy products fall under the jurisdiction of the Food Safety and Standards Regulations (FSSR), which replaced the Milk and Milk Products Order, 1992 on August 5, 2011 (FSSAI,2012). The FSSR applies equally to domestic and imported food, and requires that food business operators (including food processors, manufactures, exporters, or importers) hold a license to carry out any food business without a license from Food Safety and Standards Authority of India (FSSAI). According to new guidelines, it is mandatory to mention all information regarding pasteurized, sterilized, date of packing, fat percentage, Solid Not Fat (SNF) and other treatment done on contained milk.

Table 3: Current Policies and Bodies for milk and milk products

1.	Prevention of Food Adulteration (PFA) Act
2.	Bureau of Indian Standards
3.	Agricultural Produce (Grading and Marking) Act 1937 (amended in 1986): 'AGMARK'
4.	Export (Quality Control and Inspection) Act (1963)
5.	Food and Safety Standards Act 2006
6.	Food Safety and Standards Authority of India (FSSAI)
7.	Secretariat for Industrial Approvals (SIA)

5. CONCLUSION

Experts also found that raw milk led to much more severe illness and hospitalization than pasteurized milk. Reports outbreaks represent the tip of the iceberg. Because not all people who get foodborne illness seek healthcare, get their illness diagnosed, or get reported to public health officials, the actual number of illnesses associated with raw milk likely is much higher. The state Co-operatives and Corporate sector which are actively involved in the organized manner for the production of raw milk and processing of milk have to play a viral role of monitoring the production of animal feed. The public sector can play a very important role through awareness programs, education to dairy farmers and milk processors about the health hazards of raw milk and milk products. Further, there should be limits on the sale of raw milk, selling on open or in grocery stores and other retail outlets. Warning labels regarding the health consequences of raw milk and produces to carry insurance sufficient to cover damages sustained by individuals who become ill from food borne illness as result of consuming their raw milk products. Thus, action therefore needs to be initiated to devise mechanism, especially Asian countries, such as through media, for proper, adequate and continual education of consumer on raw milk consumption.

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