

A Brief Description on the Benefits and Risks of Raw Milk Consumption

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ABSTRACT: *There is still a lot of discussion in the public about the potential advantages of raw milk intake, which is becoming more popular. Regulatory, or public health, agencies such as the Food and Drug Administration and the Centers for Disease Control and Prevention, on the other hand, are concerned about the danger of acquiring milk-borne diseases if raw milk is contaminated with human germs. This article explains why milk was pasteurized more than a century ago, how it helped to decrease the frequency of diseases related with raw milk intake, and the presence of bacteria in raw milk. Even when obtained from clinically healthy animals or milk that seemed to be of high quality, up to a third of all raw milk samples had pathogens in certain tests. This study examines some of the widely held claims about raw milk's health advantages. The claims that raw milk intake improves nutrition, prevents lactose intolerance, or provides "good" bacteria have no scientific foundation and are myths. There is some epidemiological evidence suggesting children growing up in an agricultural environment have a lower incidence of allergies and asthma; however, a number of environmental variables may be at play, and raw milk intake is not directly linked to any "protective" impact.*

KEYWORDS: *Allergy, Benefits, Pasteurized Milk, Pathogens, Risks.*

1. INTRODUCTION

In 1908, Chicago became the first city in the United States to pass legislation mandating the pasteurization of cow's milk (except for cows that were certified tuberculosis-free). However, due to political bickering and a dispute about 'pure milk' (raw milk) Vs 'purified milk,' it took another 8 years for it to be completely accepted in Chicago (pasteurized milk). Around that period, public health authorities were concerned about the spread of bovine TB to people via cow's milk. By 1900, it was believed that up to 10% of all TB cases in humans were caused by infection via milk intake, and a tuberculosis pandemic swept across Illinois in 1910, infecting over 300,000 cattle. 1 Because of its capacity to process huge amounts of milk in a cost-effective manner, certification of herds as tuberculosis-free became extremely difficult to manage/administer, and pasteurization became more popular. TB was one of the main human health problems in the early twentieth century; for example, it is estimated that approximately 65000 people died of tuberculosis caused by bovine sources in England and Wales between 1912 and 1937.

The Standard Milk Ordinance was established by the US Public Health Service in 1924 for optional adoption by state and local agencies; it is now known as the Grade "A" Pasteurized Milk Ordinance (PMO). Pasteurization is described as "the process of heating every particle of milk or milk product to any one of the prescribed pasteurization time/temperature combinations in properly built and operated equipment." These time-temperature combinations are intended to kill all human viruses, and the most frequent pasteurization procedure involves quickly heating milk to 72 degrees Celsius and keeping it there for at least 15 seconds. In some countries, milk is subjected to higher (ultra) heat treatments (e.g., 138°C for 2-4 seconds); if the product is packaged normally, this milk is referred to as ultra pasteurized; if the process is done aseptically, the milk can be stored at room temperature, and this product is referred to as ultra-high temperature (UHT)[1]–[7].

*Risk:**Human Pathogens are present:*

Pathogens like *Campylobacter jejuni* and *Listeria monocytogenes* have been found in raw milk in surveys from across the world, with prevalence levels as high as 13% for germs like *Campylobacter jejuni* and *Listeria monocytogenes*. In other investigations, almost a third of all milk samples tested positive for at least one infection. As a result, we must presume that raw milk contains germs. Several variables affect the frequency of viruses in milk, including farm size, number of animals on the farm, cleanliness, farm management methods, milking facilities, season, and others. Even when obtained from clinically healthy animals, raw milk may be contaminated with microorganisms. Pathogens may be found in milk that seems to be of high quality (low total bacteria count). Pathogens can contaminate raw milk through at least four different mechanisms: direct passage from the cow's blood into milk (systemic infection), mastitis (udder infection), fecal contamination (external contamination of milk from the environment during or after milking), or contamination from human skin. Dairy farms serve as a major reservoir for a variety of food borne diseases. The relative significance of numerous sources of contamination varies by pathogen and is determined by agricultural methods. 6 Because pathogens are not visible to the human eye and counting their quantities may take several days, determining the safety of raw milk before it is eaten can be very difficult. On days when raw milk is not tested, there is no assurance that pathogens are not present in the milk supply (eg. because of possible contamination during a single milking occasion). It's difficult to ensure the safety of raw milk by testing it on a regular basis due of the following:

- Difficulties in collecting enough samples because milk contamination may be intermittent, and bacterial loads can fluctuate from day to day (i.e. sampling and testing every day provides more confidence to a claim of safety).
- Bacteria/spores are often linked with the fat phase of milk and are not equally dispersed throughout it.
- If the effective dosage is low, the number of organisms (pathogens) present may be too low to be identified by the test technique, but the quantities may be sufficient to cause disease.
- There may have been extremely low starting quantities of a pathogen, which were below the test method's limits at the time of sampling, but if milk was kept incorrectly, the pathogen may develop.
- Testing for each and every kind of human infection is impossible.

Raw milk has often been recognized as the cause of food related disease outbreaks. The data concerning human illness outbreaks linked to dairy products in the United States from 1993 to 2006 has been examined. There were 121 dairy product outbreaks with known pasteurization status; 73 (60 percent) of these included raw milk products, resulting in 1571 recorded cases, 202 hospitalizations, and two fatalities. In the 21 states that allow the sale of raw milk, there were a total of 55 (75%) outbreaks. There were fewer outbreaks and illnesses in states that prohibited the selling of raw milk. The average number of outbreaks linked with non-pasteurized milk was 4-fold greater over this 6-year period (average 13.5 outbreaks/year) than during the last assessment of outbreaks between 1993-2006, according to a revised report spanning the period from 2007 to 2012. 10 Even in areas where raw milk sales are prohibited, outbreaks caused by raw milk intake have been documented; for example, in Wisconsin, there were six outbreaks between 1998 and 2009, resulting in 261 recorded cases and 27 hospitalizations[8]–[10].

However, the number of diseases examined as part of well-documented outbreaks is likely just a fraction (tip of the iceberg) of the total number of illnesses linked to raw milk intake. In Minnesota, for example, 3.7 percent of patients with sporadic, domestically acquired enteric illnesses reported raw milk intake throughout their exposure period, according to routine surveillance data from 2001 to 2010. Children were disproportionately impacted, with 76 percent of children under the age of five receiving raw milk from their own or a family member's farm. During the research period, the number of sporadic laboratory-confirmed illnesses among Minnesota residents who reported raw milk intake was 25 times higher than the number of raw milk-associated outbreak cases. Furthermore, they calculated that up to 20500 Minnesotans, or 17% of raw milk users, were sick with enteric infections after consuming raw milk throughout the research period.

Health Benefits Recommended:

A variety of claims have been made regarding the health advantages that might theoretically be obtained from the intake of raw milk. According to recent scientific assessments conducted by different international organizations, there is no credible scientific evidence to support any of these claimed health advantages.

Nutritional:

The nutritious content of milk does not alter much after pasteurization. Fermentation has little effect on protein quality; modest denaturation of whey proteins (7%) has been observed as a result of pasteurization, however protein denaturation has no effect on nutritional quality. Pasteurization has little effect on mineral concentrations since minerals are very heat stable. Pasteurization may result in modest vitamin C, folate (vitamin B₉), vitamin B₁₂, vitamin B₆, and thiamine losses (vitamin B₁). Only vitamin B₁₂ is a good source of these vitamins; milk contains low amounts of most of the vitamins mentioned above, which may exhibit small losses due to pasteurization. Pasteurization has no effect on the concentrations of heat-stable riboflavin (B₂) or fat-soluble vitamins like vitamin A and E. Other variables affecting vitamin losses in milk include the kind of packing material, light exposure, and storage time/temperature. Feed (such as pasture grazing) may have a significant impact on milk composition, and proponents of raw milk often mistake feed-related changes in milk composition with pasteurization-related changes in milk composition. Other milk processing methods, such as ultra-pasteurization and ultra-high temperature, have a minimal effect on milk nutritional quality.

Allergy:

Food allergy is an aberrant immune response triggered by sensitization to a specific food (usually a protein). In patients, cow's milk proteins may cause an immunoglobulin E-mediated response known as cow's milk protein allergy (CMA). Within the first year of life, most young babies overcome this allergy. Young babies may be more vulnerable to CMA because of their poorer digestive systems (lower pepsin/enzyme activity, higher stomach pH), which exposes them to greater allergic reactions from "intact" proteins or longer peptide sequences. Raw milk, unhomogenized and pasteurized milk, as well as homogenized and pasteurized milk, was not tolerated by CMA patients. It's also worth noting that epidemiological evidence suggests that consuming pasteurized milk isn't linked to an increased risk of developing respiratory allergies or atopic dermatitis.

Lactose Intolerance (Raw Milk Enzymes):

Lactose is found in all kinds of milk (including human and breast milk), and when we eat it, the lactase enzyme (A-galactosidase) hydrolyzes it into glucose and galactose, which the body absorbs. Many people lose their capacity to digest lactose as they get older, and this

may lead to lactose intolerance, which causes digestive symptoms like bloating, diarrhea, and gas when they consume or drink milk or milk products. Raw milk is said to help with lactose intolerance, among other things. In a recent randomized controlled trial, raw milk failed to decrease lactose malabsorption or lactose intolerance symptoms in individuals with lactose malabsorption when compared to pasteurized milk. There is no reason to believe that raw milk may help with lactose intolerance since it lacks the A-galactosidase enzyme. Individuals with lactose intolerance tolerate yogurts better because they contain large quantities of bacteria that produce the A-galactosidase enzyme.

Although certain proteases and lipases are found in small amounts in raw milk, no physiological function for these enzymes in human digestion has been shown. Because both the native milk proteinase (plasmin) and lipase (lipoprotein lipase) are generally heat stable, there would be minimal difference in activity between raw and pasteurized milk. In any case, raw milk enzymes are likely to be degraded/hydrolyzed in the digestive tract of humans (due to the stomach acid, pepsin, etc).

Antibacterial and Beneficial Microflora Systems:

According to certain media sources, raw milk is healthful because it contains "good bacteria." Probiotics are described as "live microorganisms that provide a health benefit on the host when given in sufficient quantities." Lactic acid bacteria are considered probiotics in certain cases. Key probiotic bacteria such as Bifidobacteria and Lactobacillus acidophilus, on the other hand, should be present in raw bovine milk at very low levels since they do not compete effectively with the more prevalent kinds of lactic acid bacteria. Instead, Bifidobacteria are abundant in the gastrointestinal tracts of both cows and humans, and their presence in raw milk has been considered as a potential indication of fecal contamination. When probiotic cultures are used in commercial goods such as yogurt, it is very desired that (a) the particular probiotic strain utilized was derived from a human source (rather than from animals such as cows), and (b) the specific strain transmits established health advantages when taken at high levels (i.e. millions of colony forming units per milliliter). No fecal contamination of raw milk by probiotic bacteria meets any of these criteria.

At the farm level, farmers may take precautions to minimize pathogen levels in their raw milk by reducing fecal/pathogen contamination and keeping storage temperatures low to prevent pathogen development. To summarize, raw milk is not intrinsically safe and poses a substantial risk of food illness when consumed. Raw milk has no intrinsic health or nutritional advantages, and media claims to the contrary have been debunked. Pasteurized milk has a good food safety record and is still a good source of many essential nutrients, particularly for children and young people.

2. DISCUSSION

Raw milk, also known as unpasteurized milk, is milk that has not been pasteurized, a procedure that involves heating liquid goods to kill germs and prolong shelf life. Raw milk proponents claim that it has many advantages, including improved taste, nutrition, and the development of a robust immune system. The medical community, on the other hand, has cautioned of the risks, which include the possibility of infection, and has found no apparent benefit. Salmonella, E. coli, Listeria, Campylobacter, and other bacteria found in raw milk may cause foodborne disease, often known as "food poisoning." Anyone who drinks raw milk or consumes raw milk products is at risk of contracting these germs. Because raw milk contains living organisms, the flavor evolves with time, ranging from sweet to less sweet to downright nasty, or "clabbered," which indicates that the curds and whey are beginning to separate. The dangers and advantages of drinking raw milk are discussed in this article.

Milk consumption is estimated at billions of liters worldwide, the majority of which is consumed as pasteurized cow's milk. In recent years there has been an increase in the consumption of raw milk due to perceived health benefits compared with heat-treated milk, including increased nutritional value and the potential presence of probiotic bacteria. However, raw milk and milk product consumption poses a significant health risk associated with ingestion of foodborne pathogens and consequent zoonotic illnesses. Contamination of raw milk generally occurs from environmental sources, or from sick animals. Good farming practices and effective post processing are generally sufficient for the eradication of milk-borne pathogens. Annually, a number of human illnesses are associated with consumption of raw milk worldwide, and the severity of these varies from mild symptoms to life threatening infections. In recent times, there have been calls for legislation preventing the sale of unpasteurized milk in many developed countries.

Raw milk consumption is controversial. The hazards linked to this product are known since a long time, but many studies show evidence of many positive aspects related to raw milk and its products. Among negative aspects, the presence of pathogenic bacteria and chemical residues and absence of proper taxing can be described, in countries in which raw milk sale to consumers is not allowed; in these specific countries, these problems are enhanced by the absence of proper inspection during production and sale. However, when raw milk is produced under restrict hygienic conditions, the beneficial aspects of this product are evident: despite the beneficial bacteria that can be preserved in this product, cultural and sensorial aspects must be considered for the production of artisanal food. Based on such evidences, it is important to address the relevance of adequate legislation regarding production and sale of raw milk, highlighting the proper and rigorous inspection and monitoring during all production steps. Finally, consumers must be aware of raw milk and its products' possible risks, without any biased information regarding this issue.

3. CONCLUSION

The intake of raw milk presents a genuine and needless health risk due to the possibility of harmful bacteria infection, as shown in this analysis. It is thus suggested that milk be heated before serving, particularly to small children, pregnant women, or anybody with a chronic illness or a weakened immune system. Raw milk supplied on farms to the general public (e.g. during a school visit) and raw milk distributors enabling the automated delivery of raw milk from a bulk reservoir to the customer are highlighted in this context. Infants should only be fed "infant formula" from a nutritional standpoint, since raw milk does not meet the nutritional requirements of this age group.

Pasteurization of milk has been linked to better public health in the past, and more current research on raw milk consumption suggests a risk of bacterial illnesses that might be prevented with heat treatment. Thermal treatment is now the most widely used and successful technique for increasing the microbiological safety of milk without significantly altering its nutritional content or other advantages associated with raw milk intake. The dangers and advantages of raw milk are discussed in this article.

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