

# KNOWLEDGE ON STORAGE AND SPOILAGE OF MILK AT HOUSEHOLD LEVEL

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**Abstract:** Milk (Lac) has been produced since the early 7th millennium BC. Around 1000 BC, humans used a nutritious white liquid food secreted by the mammary glands of mammals. Milk consumption varies around the world, averaging between 10 and 212 kg per person per year (Evershed & Payne, 2014). Milk contains bioactive peptides such as casein, whey protein, milk polar lipids (MPL),  $\alpha$ -linolenic acid (ALA), conjugated linoleic acid (CLA), and palmitic acid (16:0), Lactose, and other trace elements (such as calcium, phosphorus, magnesium, and vitamin D) have important effects on human metabolism and health. Milk and dairy products are excellent sources of immune-boosting ingredients, vitamins and minerals, especially calcium and phosphorus. It contains significant amounts of A and B complexes, including thiamine, riboflavin, nicotinic acid, and vitamin B12, but is a poor source of vitamin C and E. The purpose of this study was to gain insight into milk spoilage and storage at home level. A questionnaire was distributed and data was collected. Participants consumed 34.9% of raw milk, 62.1% of packaged milk, 1.94% of powdered milk, and 0.97% of Tetra Pak milk daily. I was the majority of the participants. 91.2% of participants stored milk for 1 day, 5.82% for 3 days, and 0.97% of participants for more than 3 days. Knowledge of preservation methods, such as sterilization, was also good for the majority of participants (95.1%), with only 4.85% unaware. Therefore, most participants were aware of the deterioration of milk and how to store it, and prepared various recipes using milk before deterioration.

**Keywords:** Milk, Bio-active peptides, Spoilage, Storage, Pasteurization.

## 1. INTRODUCTION

Milk and milk products are excellent sources of immune-promoting components, vitamins, and minerals, especially Calcium and Phosphorous. Milk has significant amounts of vitamins A, and B complex such as thiamine, riboflavin, nicotinic acid, and vitamin B12 but is a poor source of vitamin C and vitamin E. Milk (Lac), which was used by humans in the early seventh millennium BC, is a nutritious, white liquid food secreted by the mammary glands of mammals. Cows' milk consumption varies around the world, with an average of 10–212 kg per person per year (Evershed & Payne, 2014) Milk contains 18 of 22 essential nutrients including a variety of bioactive peptides such as caseins, whey proteins, and fatty acids like milk polar lipids (MPL),  $\alpha$ -linolenic acid (ALA), conjugated linoleic acids (CLA), palmitic acid (16:0), lactose and other minor constituents (ie, calcium, phosphorous, magnesium, and vitamin D) which have an important impact on human metabolism and their health. Research proved that milk has a wide range of physiological benefits including anti-carcinogenic, anti-inflammatory, anti-oxidative, anti-adipogenic, anti-hypertensive, anti-hyperglycemia, and anti-osteoporosis. It is also referred to as nature's single most complete food and has an extremely high nutritional quality that helps in different body mechanisms including growth, supply of energy, reproduction, maintenance, repair, appetite, and satisfaction. The microbial contamination of milk that occurs from a variety of sources helps in facilitating dairy fermentations (e.g. Lactococcus, Lactobacillus, Streptococcus, Propionibacterium, and fungal populations), promoting health (e.g. lactobacilli and bifidobacteria). It also has harmful effects like causing spoilage (e.g. Pseudomonas, Clostridium, Bacillus, and other spore-forming or thermophilic microorganisms), or causing disease (e.g. Listeria, Salmonella, Escherichia coli, Campylobacter and mycotoxin-producing fungi). Additionally, there is concern that microbial contamination in milk contribute to the emergence of resistance, particularly in dangerous bacteria. However, a number of health risks could decrease its quality and endanger the general public's health. The presence of pathogenic microbes in food presents a serious threat to the public's health and is often brought about by careless handling, improper storage conditions, and hazardous temperatures. Milk supports the growth of bacteria because of its specific composition and near-neutral pH ranging between 6.5 and 6.8. Storage temperatures and methods have a significant influence on the number of bacteria in milk. Microorganisms that have the ability to grow at lower temperatures are

mostly psychrotrophic bacteria that multiply at or below 7°C. Bacteria spoilage occurs when psychrotrophic microbes increase in numbers and become the dominant microflora during refrigerated storage resulting in poor-quality of milk. If milk is kept in standard storage conditions, its shelf life is 7 to 14 days; however, seasonal and regional variations may also exist. The most relevant bacterial groups for determining milk quality are counts of mesophilic bacteria, psychrotrophic bacteria, lipolytic (LIP) bacteria, proteolytic (PROT) bacteria, thermotolerant bacteria [laboratory pasteurization count (LPC)] and thermotolerant-psychrotrophic bacteria (LPC-PBC).

Total bacterial count (TBC) and psychrotrophic bacterial count (PBC) are laboratory tests that allow for the quantification of mesophilic and psychrotrophic bacteria in milk, respectively. These tests are used to assess or monitor the sanitary and storage conditions during the production, collection, and handling of raw milk. Hygienic milking conditions are vital to ensure high initial microbiological quality; however, milk storage conditions (i.e., temperature) can also influence bacterial growth. Some psychrotrophic bacterial strains can be classified as LIP or PROT bacteria, which can increase during milk cold storage, producing lipases and proteases, the action of which could affect milk functionality and also result in defects in dairy products such as rancidity and bitter flavors. Bacteria of the *Pseudomonas* genus are considered one of the predominant psychrotrophic groups in raw milk with a high spoilage potential (De Jonghe et al., 2016). Thermotolerant and thermotolerant-psychrotrophic bacteria are capable of surviving thermal treatments (i.e., pasteurization), while the latter can also grow at low temperatures; consequently, they are capable of multiplying during different processing stages (Robinson, 2002; Fromm and Boor, 2004; Barbano et al., 2006).

## 2. METHODOLOGY

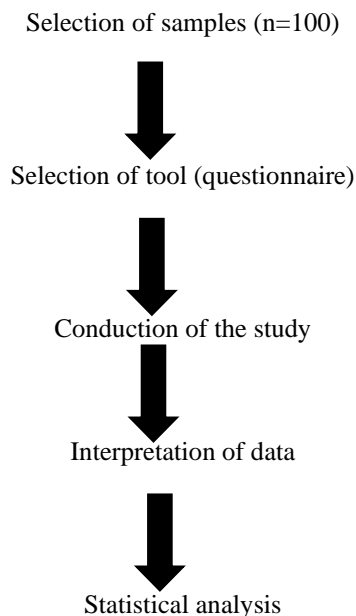


Fig1: Research design on storage and spoilage of milk

A sample of 100 participants aged between 18-50 are randomly selected from the longitudinal cohort of both male and female. Data was collected using validated food frequency and structured interviewer-administrated questionnaires. This questionnaire includes storage, preservation, spoilage, length of cooking of milk are taken. The questionnaire was distributed among the selected group of participants. The data collected was analyzed using Microsoft Excel sheets and the results were expressed in percentage.

## 3. RESULTS & DISCUSSION

a. Type of Milk Consumed

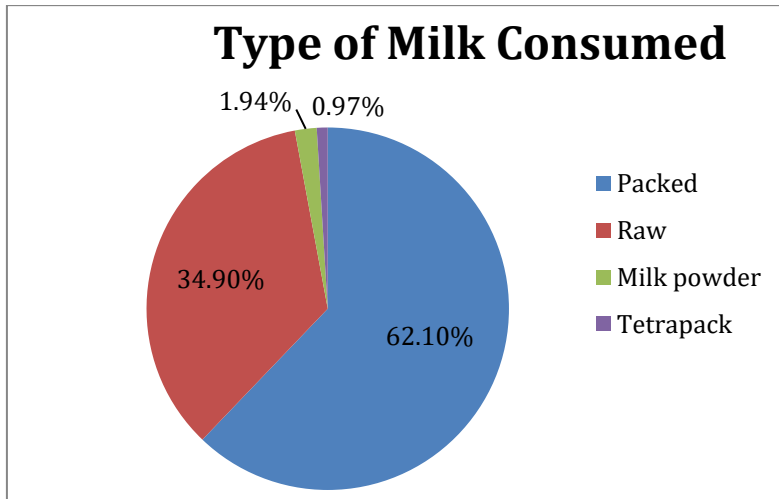


Figure: 2 Type of milk consumed

Accordinging figure:2 Majority of the participants 62.1% use packed milk, 34.9% use raw milk, 1.94% use milk powder and 0.97% use milk packed in tetra pack.

b. Duration of Milk Storage:

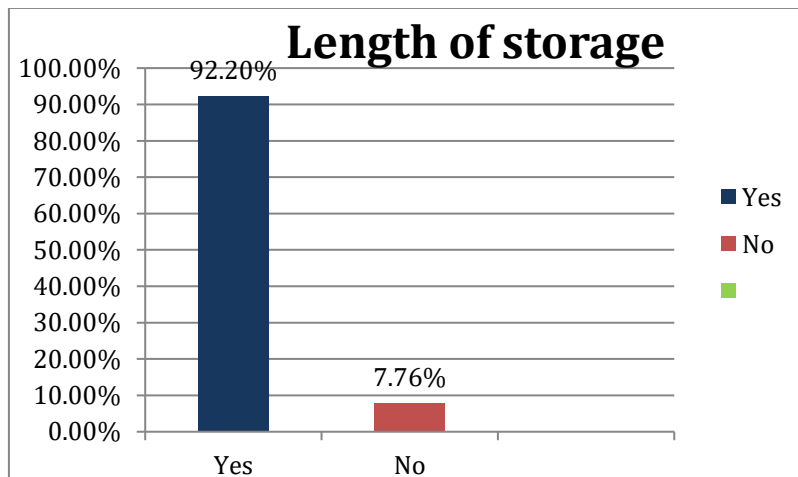


Figure: 3 lengths of storage

According to the figure:3 Majority of the participants, 91.2% store milk for one day, 5.82% store milk for 3 days and 0.97% store milk for more than 3 days.

c. Awareness on Pasteurization

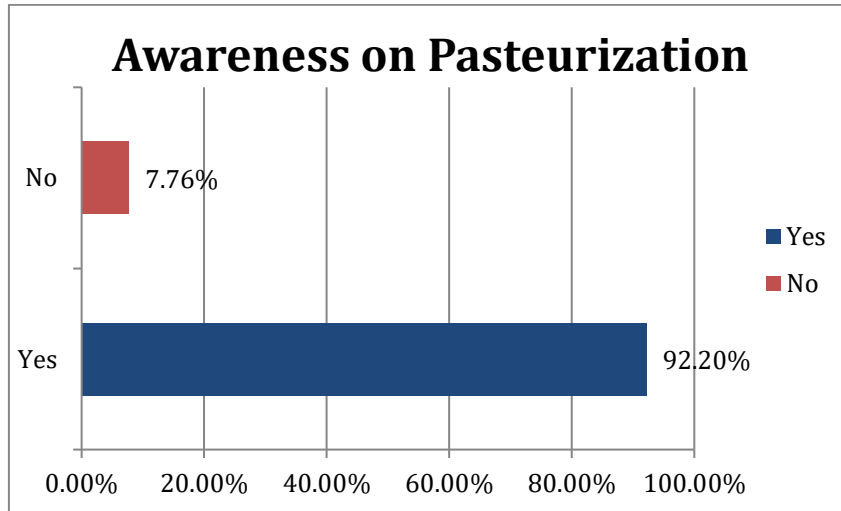


Figure: 4 Awareness on Pasteurization

The figure :4 indicates the question about pasteurization as a method of milk storage for which, 95.1% majority participants answered they were aware of the storage method and 4.85% were unaware of pasteurization

d. Knowledge on Milk Spoilage

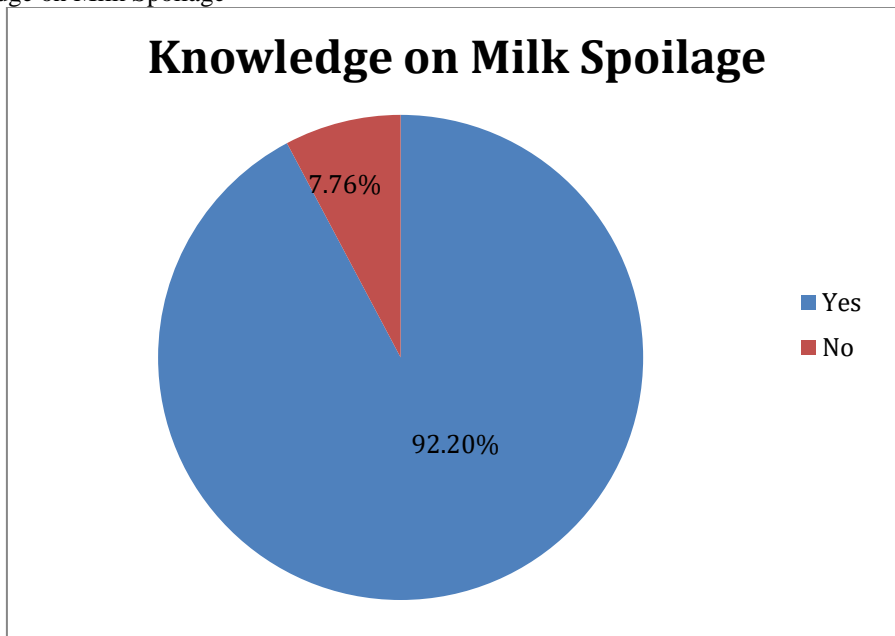


Figure: 5 Knowledge on milk spoilage

According the figure:5 When asked about knowing of different ways of milk spoilage. 7.76% were aware of few ways of spoilage of milk and 92.2% were unaware of the ways of milk spoilage.

4. CONCLUSION

Since milk is almost always a daily staple in Indian households, it should be used to promotes way that promotes health rather than increasing the risk of contracting an infection or other disorder by consuming spoilt milk. According to the data collected, the majority of housewives, who traditionally provide the majority of the family's food, are aware of the various ways milk might spoil and how they should store it to avoid it. The majority of the subjects were also familiar with various milk-coagulation recipes.

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**REFERENCES**

- Ann-Kristin Nyman, Martin Patrick Ongol, Michael Tukei; MILK Symposium review: Microbiological quality and safety of milk from farm to milk collection centers in Rwanda. *Journal of Dairy Science*, Volume 103, Issue 11, November 2020, Pages 9730-9739
- D. Grace, F. Wu, A.H. Havelaar MILK Symposium review: Foodborne diseases from milk and milk products in developing countries—Review of causes and health and economic implications. *Journal of Dairy Science*, Volume 103, Issue 11, November 2020
- Evershed RP, Payne S, Sherratt AG, Copley MS, Coolidge J, Urem-Kotsu D, et al. Earliest date for milk use in the near east and southeastern Europe linked to cattle herding. *Nature*. 2008;455:528–31)
- Lucille Garnier,1,2 Florence Valence,2 and Jérôme Mounier1,Diversity and Control of Spoilage Fungi in Dairy Products: An Update.\*. Published online 2017 Jul 28
- Middle East Journal of Applied Science & Technology (MEJAST), (Peer Reviewed International Journal) Volume 2, Issue 4, Pages 72-79, October-December 2019
- Michael lu et al.,Spoilage\_of\_Milk\_and\_Dairy\_Products. January 2017,In book: The Microbiological Quality of Food (pp.151-178)
- Rajesh Dhakane, 2Rekha Gulve, 3Anant Shinde, 4Amol Jadhav, 5Satish Bhusnar, Spoilage\_and\_preservation\_of\_milk\_and\_milk\_products\_A\_review., published 2019.
- Valente Velázquez-Ordoñez, Benjamín Valladares-Carranza, Esvieta Tenorio-Borroto, Martín Talavera-Rojas, Jorge Antonio Varela-Guerrero, Jorge Acosta-Dibarrat, Florencia Puigvert, Lucia Grille, Álvaro González Revello and Lucia Pareja.,Microbial Contamination in Milk Quality and Health Risk of the Consumers of Raw Milk and Dairy Products.,Published: May 28th, 2019.