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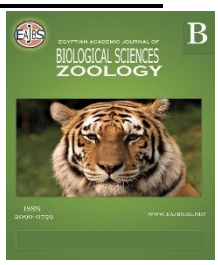

Milk and Dairy Products, Good or Bad for Human Health: Review Article

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ABSTRACT

Numerous macro- and micronutrients are thought to be present in milk. It has a healthy mix of protein, fat, carbs, and other nutrients that support good nutrition and advantageous health effects. When compared to the milk of other animals, goat milk is thought to be superior in terms of a host of health advantages and a lower risk of allergy. To improve the quality and shelf life of goat milk and its products, a number of processing procedures have been used, including pasteurization, ultrafiltration, microfiltration, and ultrasound. A wide variety of dairy products are made with goat milk, including yogurt and cheese, Marketable products made by the use of cutting-edge processing methods include goat milk powder, fermented milk, and others. It has been demonstrated that goats raised on pasture-based feeding methods produce milk with a higher level of nutrients than their counterparts. Potential bioactive components found in goat milk support the maintenance of the body's normal metabolism and function. This review sheds light on the essential nutritional components and bioactive elements found in goat milk, as well as their potential contribution to the creation of diverse functional foods employing various processing techniques. In comparison to other milk options.

INTRODUCTION

In terms of providing milk and other dairy products to humans, goats are the earliest domesticated animals ever. Even though goats produce just around 2% of the milk consumed worldwide, their importance in the improvement of human nutrition and economic status cannot be overstated (Park,2017) milk production is anticipated to reach 15,500,000 tons annually, with 83 percent of the total coming from developing countries. Goat milk has numerous advantages for physiological and health maintenance, and in the elderly and younger population's diets (Zobel *et.al.*,2020). Goat milk differs from human milk or cow milk in terms of special alkalinity, better-buffering capacity shown in Figure (1), and therapeutic potential in human nutrition and medicine (Verruck *et.al.*, 2019).

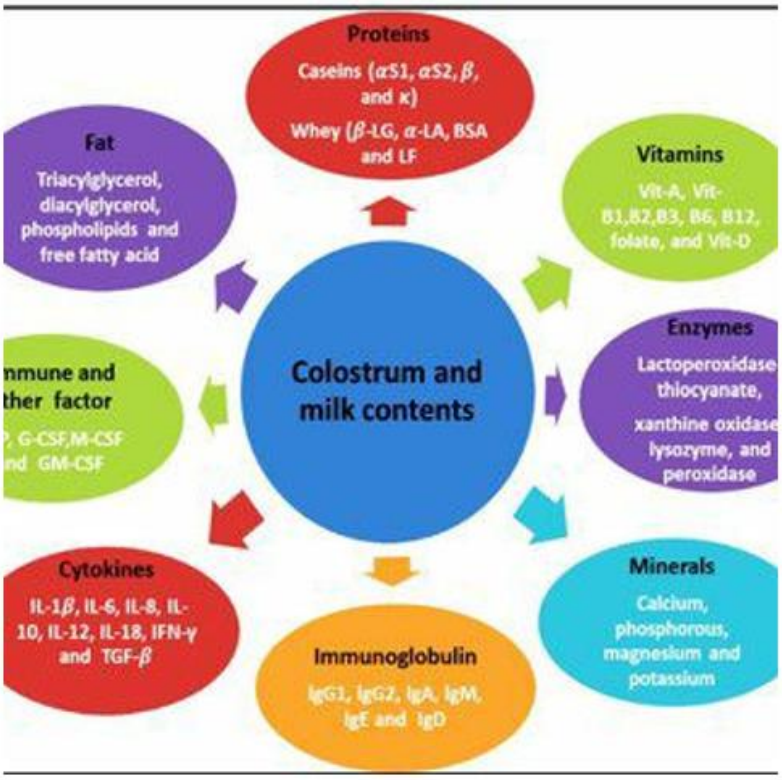

Fig. 1. Colostrum and milk contents (Pulina *et. al.*, 2018).

For the sale of goat milk and its products, problems with sanitation management and the requirement to apply standards and quality checks continue to be a challenge (Utaaker *et. al.*, 2021) Due to the apocrine secretory system of the mammary gland, goat milk naturally contains more somatic cells than cow milk. A study showed that Changes in milk quality were connected to SCC > 600.103/mL at a farm with extremely tight sanitation regulations (5.58 LSCS). The outcomes demonstrated that goat milk's technical properties can be dramatically impacted by even a tiny value of SSC (Watkins *et. al.*, 2021)

Drinks made from plants that are based on soy, rice, almonds, or oats are gaining popularity (Zhu *et. al.*, 2020). Many Nordic people may naturally include milk and dairy products in their diets because dairy is a fundamental part of their culinary tradition. According to a number of media reports and organizations, eating dairy raises the chance of developing chronic conditions such as cancer, cardiovascular disease, type 2 diabetes, and obesity. Type 2 diabetes, as shown in Figure (2) cardiovascular conditions, and malignancies are currently the main reasons for years lost to illness in the Nordic nations (Ranadheera *et. al.*, 2019).

The rising prevalence of obesity also considerably raises the potential for developing these chronic conditions. Understanding how including milk and dairy products in the diet can affect health is crucial given the rising prevalence of these chronic illnesses (Baldin *et. al.*, 2014). In addition to randomized controlled trials, this narrative review also makes use of systematic reviews and meta-analyses of observational data, summarizes the most recent research examines the relationship between dairy intake (but not butter) and the danger of being overweight, having type 2 diabetes, having heart disease, being osteoporotic, getting cancer, and dying overall (Kompan *et. al.*, 2017). We are mostly interested in addressing the following queries: 1) For regular shoppers, does consume a lot of, generally speaking, milk and dairy products improve or impair health, as well as a higher or lower risk of contracting serious diseases and passing away from

any cause? 2) Is it ethical to suggest that persons who can tolerate lactose abstain from ingesting milk and dairy products in general? 3) Do there exist any data that would support a shift away from milk toward plant-based beverages? Osteoporosis and bone health Milk and dairy products supply a range of minerals necessary for developing strong bones in adolescence and preserving bone health as adults, preventing osteoporosis and bone fractures in older life (Song *et. al.,* 2020). Protein, calcium, phosphorus, magnesium, manganese, zinc, vitamin D, and vitamin K are essential for maintaining strong bones, according to the European Commission. (2012) Regulation of the European Commission. Milk and dairy products contain significant amounts of all of these nutrients, excluding vitamin D, of course (Turkmen, 2017).

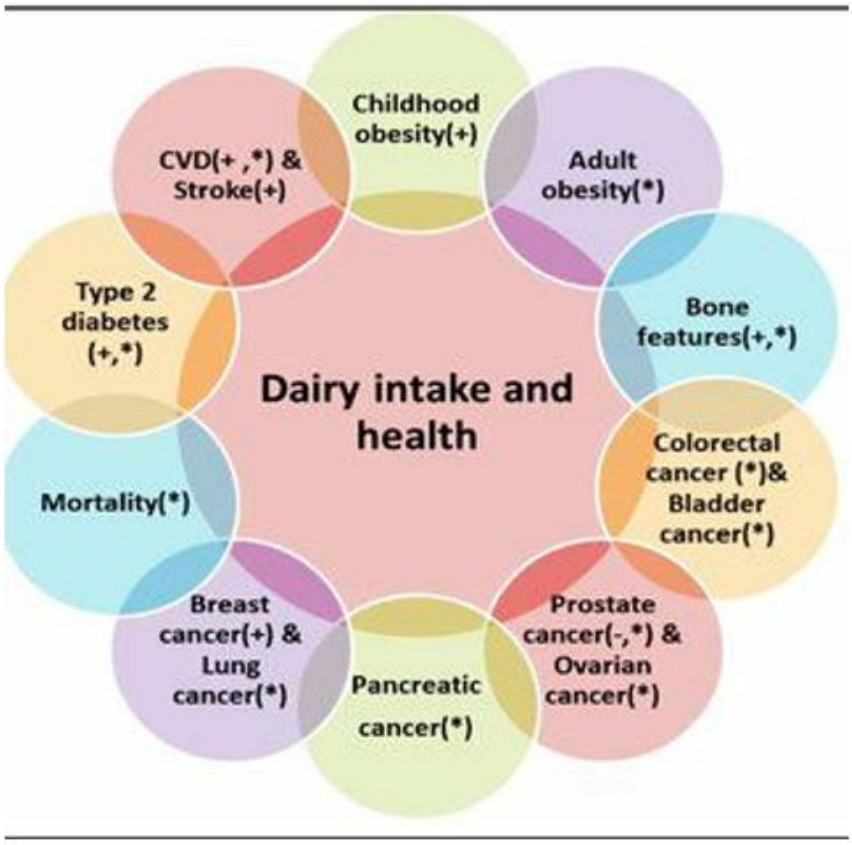

Fig. 2. Dairy intake and health (Sandrucci *et. al,* 2019).

Osteoporosis is now known as a "pediatric disease with geriatric ramifications" since it has been linked throughout middle and older age, especially in women, osteoporotic fractures are substantially more common. According to a recent study, with the exception of those who drink very little calcium, magnesium consumption may be more important than calcium in terms of bone growth in children and adolescents. It has not been demonstrated that calcium intake has a significant impact on overall bone density (Delgadillo *et. al.,* 2015).

The main determinant of bone mass was mineral content or density, even if magnesium intake and absorption were also significant markers. Despite the fact that Magnesium is mostly found in milk and other dairy products, it is questionable how far these findings may be extended to the general population, which helps young people build their bones.

According to children who had low baseline dairy intake, Huncharek et almeta-analysis.'s, found that dairy products increased the mineral content of the bones, whether

or not vitamin D supplements were given. Children who consumed a lot of dairies at baseline, however, did not show any effect. The number of dairy products or dairy calcium in a child's diet may eventually reach a level where it has no further effect on the density or content of their bone mineral. Adults experience reduced bone loss as they age thanks to interactions that stop bone resorption and encourage bone formation with respect to protein, calcium, phosphorus, and vitamin D . Due to the intricate relationships between dietary factors and the complicated causes of bone fractures, it has proven challenging to determine whether a low intake of milk and dairy products in adulthood increases the risk of osteoporosis and bone fractures. According to current meta-analyses, adult consumption of milk and dairy products does not lower the incidence of bone fractures and osteoporosis. But a recent in-depth analysis found that calcium and dairy are crucial for the well-being of adult bones (Clark *et. al.,* 2017).

Dietary Recommendations for All Americans 2015–2020 A statement was made to the effect that Fat-free and dairy products containing 1% fat, like milk, yoghurt, and cheese, as well as fortified soy drinks, also known as "soymilk," are part of healthy eating patterns. Individuals who refuse to eat or are unable to Numerous minerals, including proteins, calcium, magnesium, potassium, and vitamin D, are frequently found in dairy products. People that consume dairy products ought to other foods and vitamin A (enriched soy drinks, for example)'. Although

Obtaining the necessary amounts of nutrients via foods, and plant-based beverages, as opposed to supplements, typically comprise inorganic chemical calcium forms,

which could actually raise cardiovascular risk. Dairy products such as milk should still be respected as the best source of calcium because the calcium in dairy is organic (Delgadillo *et. al.,* 2015). Future research must nevertheless examine whether or not the importance of dairy product vitamin D fortification strategies to reduce the risk of bone fracture in a favorable way. regarding osteoporosis and bone health The available data support milk and its beneficial effects Effects of dairy consumption on bone health in young persons, but with scant evidence about adult bone health.and the possibility of bone fractures as people age (Rupp *et. al.,* 2019).

Microfiltration Treatment:

The membrane pore sizes used in microfiltration are bigger than those used in ultrafiltration, enabling the passage of objects with dimensions of 0.2 to 2 meters. Among membrane separation techniques is microfiltration. It is a form of treatment that is a non-thermal procedure that enhances the dairy products' microbiological security while reducing bacterial contamination a potential approach to developing Drinks made from the whey that has undergone microfiltration has rheological properties similar to samples that have undergone conventional treatment at lower temperatures, which may be advantageous for nutritional components (Clark *et. al.,* 2017). This technique could affect how successfully technical milk can be converted into other products because of variations in fat particle size. A unique microfiltered goat whey orange juice beverage was examined for its physicochemical, functional, and microbiological properties by Vieira et al (GWOB) show as in Figure (3). The varying feed temperatures at 20, 30, 40, and 50°C had an effect on the GWOBs' microfiltration (0.2 m) in comparison to the standard LTLT procedure (63°C/30 min). to maintain homogeneity, volatile ingredients, and useful properties, and to generate a higher quality microbial population, it is recommended that GWOB be processed at ideal temperatures of 30°–40°C (Podhorecká *et. al.,* 2021).

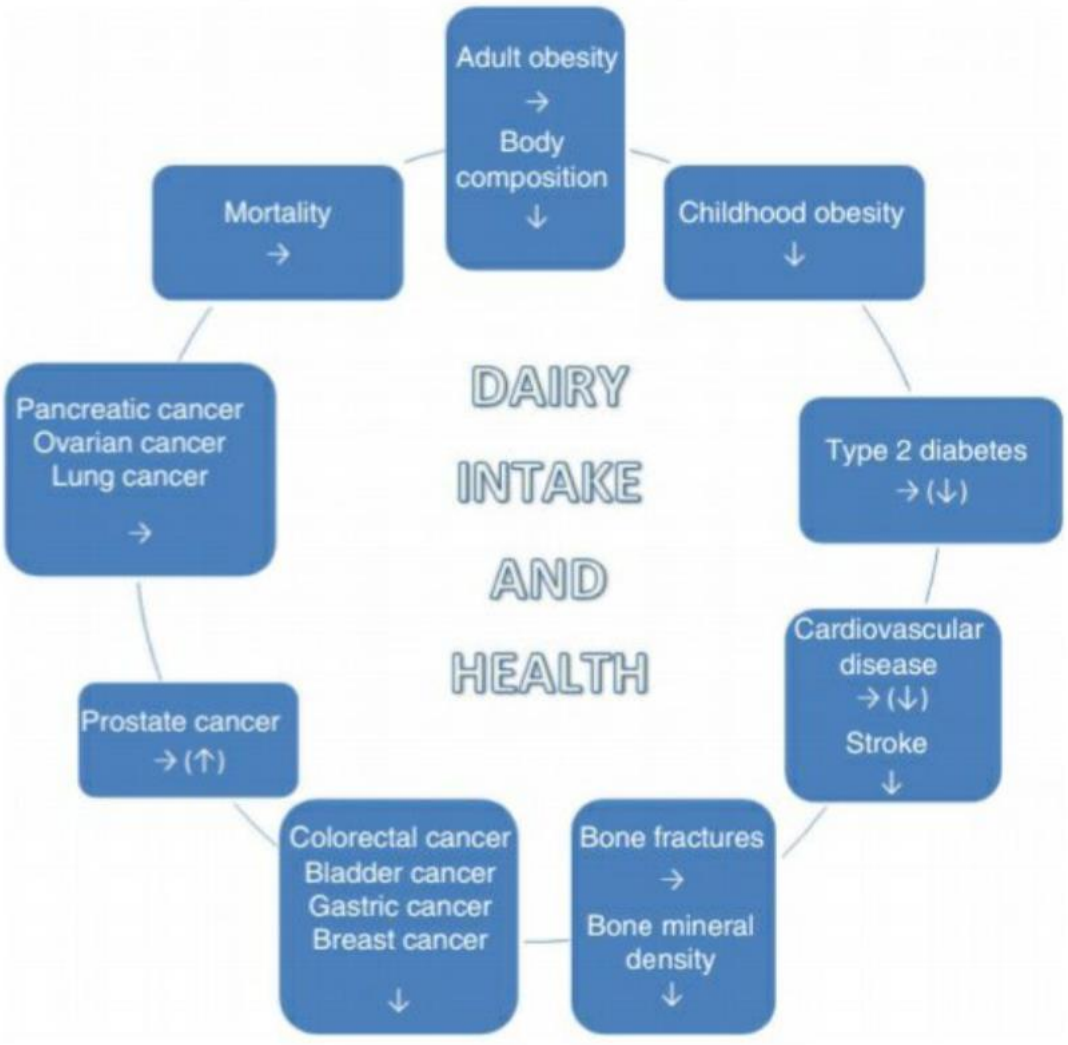

Fig. 3. Overall effect/association between dairy product intake and health outcomes. ↓ favourable effect/association;adverse effect/association; → no effect/association. (Rupp *et. al.,* 2019).

Pulse Electric Field Treatment

The basic idea behind PEF treatment of food products is to concentrate on creating intense electric fields around the product pulses that are comparatively brief in duration. Field intensities are commonly in the 10-80 kV/cm range with pulse lengths ranging from 0.1 to 5 s. creating a spatially consistent field distribution and reducing dwell time dispersion should be made possible by the treatment chamber's design. PEF can be utilized in a variety of applications; however, it is most frequently used to render microorganisms inactive. The voltage that causes the pulses progressively builds up to a peak and then exponentially declines to zero. Square waveforms are less effective at inactivating microorganisms than bipolar and other waveform patterns (Clark *et. al.*, 2017).

PEF is a brand-new alternative pasteurizing method that, when properly applied, has the ability to lengthen the shelf life of goat milk while minimizing adverse impacts on its organoleptic properties. This is due to the increased need for processed meals to have more nutritional value and fresh-like qualities. According to the findings, monopolar PEF pasteurization can be recommended to enhance the quality of goat milk at

the industrial level (Podhorecká *et. al.*, 2021). As a replacement for thermal pasteurization, non-thermal processes like PEF have grown in favor. PEF is used at room temperature (20–25°C) and has a brief treatment period, of approximately 1 s. The results of PEF processing are positive, with little energy waste and environmental friendliness, thanks to its low processing cost. PEF has a significant potential for use in pasteurizing milk due to the low changes in the organoleptic and physicochemical features of treated goat milk during milk processing. Other physicochemical characteristics, such as color, were shown to be affected at 20 kV/cm for 5 s, and TSS, and viscosity—had minimal influence. According to the study, neither the PEF procedure nor the study conditions had any heavy metal contamination (Delgadillo *et. al.*, 2015).

Health Benefits:

Whey proteins and casein, which are contained in milk, are crucial for biochemical and physiological processes that have a big impact on human health. For the preparation of food for newborns, the elderly, and some demographic groups with unique nutritional needs, goat milk is regarded as one of the most crucial raw ingredients (Dolatowska-Zebrowska *et. al.*, 2019) Goat milk is becoming more important in the contemporary environment because of its distinctive composition and use as a quality raw material (de *et. al.*, 2021). (Renna *et. al.*, 2012). Infants are nourished and protected by Goat milk a high-quality protein source that also contains unsaturated fatty acids, vitamins, hormones, cytokines, enzymes, growth factors, and bioactive peptides. along with the health benefits of several bioactive ingredients such as antibodies, glycoproteins, and oligosaccharides. Milk aids in the protection of babies by limiting pathogen infections and promoting intestinal epithelial development (Pajor *et. al.*, 2019).

CONCLUSIONS

Since goat milk contains a lot of bioactive substances and useful components, it has the potential to be used in the creation of dairy-based nutraceuticals and functional meals. Numerous Technologies have been employed to enhance goat milk and its products' overall quality, sensory perception, and textural qualities. The goat milk ACE inhibitory peptides' amino acid sequence may also serve as the foundation for the creation of goods with great medicinal potential.

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