

Cow Milk as a Nutritional Staple: Key Health Benefits and Nutrient Profile

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Abstract

The multifaceted benefits of whole cow milk and its byproducts have been recognized for centuries, particularly in cultures such as India's where both spiritual and nutritional values are imbued in this natural resource. The unique combination of lipids, proteins, amino acids, vitamins, and minerals contained in cow milk is crucial for the growth and development of both humans and animals. With growing scientific inquiry into the therapeutic properties of cow milk, it is essential to continue exploring its potential benefits in modern health care.

Keywords: Cow Milk; Health Benefits; Byproducts; Nutritional Staple

Introduction

There exists a wealth of documentation regarding the use of cow milk in ancient Vedas, highlighting its significant role in Indian mythology, culture, and dietary practices. Cow milk is traditionally regarded as a vital component of panchagavya within Ayurvedic therapeutics, recommended for the treatment of various health conditions. Furthermore, the concept of panchagavya extends its benefits to the environment by enhancing soil fertility, promoting the production of earthworms, and safeguarding crops against bacterial and fungal infections, among other advantages. Cow milk, known for its sweet taste, cooling properties, high nutritional value, tonic effects on vital organs, ease of digestion, and its role in boosting immunity and longevity, is a subject of significant interest.

Composition of Cow Milk

Cow milk represents a distinct combination of lipids, proteins, amino acids, vitamins, and minerals essential for the growth

and development of young animals and humans alike. In India, cow milk typically comprises approximately 4.6% lactose, 4.65% fat content, 0.54% minerals, 3.4% proteins, and 86% water Ananno AA, et al. [1]. The proteins in cow milk are primarily composed of β -casein (27%), κ -casein (9%), α -casein (36%), and peptides (27%). Additionally, cow milk contains phospholipids such as cephalin, lecithin, sphingomyelin, and vitamins A, B2, B3, and K Ananno AA, et al. [1].

Cow's milk serves as an abundant source of immunoglobulins, hormones, growth factors, cytokines, nucleotides, peptides, polyamines, enzymes, and numerous bioactive peptides. Priyanka P, et al. [2]. It also contains lactoferrin, which exhibits microbicidal properties. Among the various proteins present, casein, a phosphoprotein, constitutes the highest quantity, accounting for approximately 80% of the total protein content in cow's milk. Casein is a primary source for the provision of all essential amino acids. However, it is important to note that cow's milk is notably deficient in

sulphur-containing amino acids, namely methionine and cysteine.

The National Bureau of Animal Genetic Research (NBAGR) has highlighted the superior milk quality of Indian cattle breeds, specifically noting that five high milk-yielding native breeds-Red Sindhi, Sahiwal, Tharparkar, Rathi, and Gir-exhibit a 100 percent presence of the A2 allele in the beta casein gene. In contrast, other Indian breeds show approximately 94 percent, while exotic breeds such as Jersey and Holstein Friesian have only about 60 percent. The A2 allele is significant as it enhances the availability of Omega-6 fatty acids in milk, with pure Indian desi cows producing A2 milk that contains lower levels of Betacosmophorine-7 (BCM-7) compared to hybrid cows that primarily produce A1 milk. This body of research underscores the nutritional benefits of milk and dairy products, suggesting they play a role in meeting dietary recommendations and may help mitigate prevalent chronic diseases.

Cow's milk plays a significant role in human health, providing approximately 8 grams of protein per serving, which is comparable to that found in soy milk, while other plant-based milks contain noticeably less. Recent studies indicate that consumption of cow's milk and dairy products is linked to a decreased risk of childhood obesity Anderhout SM, et al. [3]. In adults, dairy intake has been associated with improvements in body composition and enhanced weight loss during energy restriction. Furthermore, it appears to offer a neutral or reduced risk of type 2 diabetes and cardiovascular diseases, particularly stroke. Additionally, evidence suggests that milk and dairy consumption may positively affect bone mineral density, although no connection to an increased risk of bone fractures has been established Chitra A [4].

Whole Cow Milk: A Nutritional and Medicinal Treasure

Milk, especially whole cow milk, has long been celebrated for its rich nutritional profile and myriad health benefits. This dairy product is more than just a source of hydration; it acts as a potent ally in promoting health and preventing disease, underscored by its remarkable medicinal properties.

One of the notable health benefits of cow milk is its ability to combat anemia in infants. Additionally, it supports gut health by limiting the proliferation of harmful bacteria while fostering the growth of beneficial gut flora Nautiyal CS [5]. Milk contains specific enzymes, including xanthine oxidase, lactoperoxidase, and lysozyme, which exhibit antibacterial properties. Furthermore, bioactive peptides such as β -casomorphins, exorphin, and serorphin help alleviate diarrheal conditions, highlighting milk's overall role in digestive health. Regular consumption of milk is particularly

beneficial for individuals with gallbladder diseases, diabetes, and high lipid levels Bettiol W [6].

In the realm of cancer prevention, cow milk presents significant promise. The cis-isomer of linoleic acid found in milk has demonstrated antineoplastic properties, effectively inhibiting tumor growth. Research suggests that dairy consumption is inversely associated with several types of cancer, including colorectal, bladder, gastric, and breast cancer, although its relationship with prostate cancer remains inconsistent Singh BP, et al. [7]. These findings further underscore the potential of milk as a health-promoting food.

The benefits of cow milk extend beyond liquid form; its byproducts, particularly cow ghee, are integral to traditional medicine. Formulations based on cow ghee, known as Ghrita, are designed for targeted delivery of hydrophobic botanicals, promoting various health benefits such as cognitive enhancement (Brahmi ghrita) and skin healing (Shatadhauta ghrita) Gurav N, et al. [8,9], Wayal SR, et al. [10]. Curd, another dairy byproduct, acts as a probiotic powerhouse that strengthens the immune system and supports digestion by suppressing harmful microorganisms Schnurer J, et al. [11]. Its consumption can also help lower cholesterol levels, thus preventing obesity, and offers therapeutic effects such as aiding in dandruff management Irvine SL, et al. [12] and treating piles Singh BP, et al. [7].

Desi ghee, a concentrated fat derived from cow milk, has been identified as a rich source of essential fatty acids (omega-3 and omega-9) and critical vitamins (A, D, E, and K) Ahmad N, et al. [13]. The medicinal properties of ghee are vast, including anti-inflammatory, wound-healing, and memory-enhancing effects Simon A, et al. [14]. Its role in supporting liver function and cardiovascular health further solidifies its place in a nutritious diet.

Conclusion

In conclusion, cow milk emerges as a nutritional and medicinal treasure, deeply rooted in the traditions of Indian society while also proving its worth through scientific inquiry. Its diverse health benefits, coupled with its ecological advantages, underscore its importance as a staple in human diets and as a subject for ongoing research in the realms of nutrition and health.

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