

## UNIQUENESS OF GOAT MILK IN HUMANS

Latha Sundarraaj\*, R. Thelshath, A. Hari Nandhini, C. Rejitha and Dr. R. Srinivasan

India.

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\*Corresponding Author: Latha Sundarraaj  
India.

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### ABSTRACT

People have probably been aware of the value of goats for human diet since the commencement of domestication. Goat milk has long been touted as a nutraceutical due to its easier digestion and lower allergy profile compared to cow's milk. Many of the initial assertions, meanwhile, were anecdotal. Goat milk provides an excellent source of protein, calcium, niacin, pantothenic acid, phosphorus, potassium, vitamin B2, B1, and vitamin A for human diets, similar to that of cows. The basic etiological genesis of food allergies, and specifically cow milk allergy (CMA), has been suggested to be enhanced gastrointestinal absorption of antigens followed by unfavorable local immune reactivity. An alternative for cow's milk for infants and allergy sufferers has been suggested: goat milk those who get discomfort from cow's milk or other foods. The hypoallergenic qualities of goat milk are extremely important for human health and medicine because of the bioactive components of milk. It is thought that the proteins in goat milk are easier to digest and absorb than those in cow milk. Because caprine milk has less  $\alpha$ 1-casein, when acidified, the curd becomes softer and more friable. Drinking goat milk has been associated in numerous studies with a lower incidence of constipation, diarrhoea, and other gastrointestinal problems. Goats are important sources of food since they generate milk and meat. Goat milk is similar to both human and bovine milk in many ways, although having certain unique nutritional and therapeutic qualities. Because goat milk contains more short and medium chain triglycerides, which provide developing newborns with energy, it is used to treat malabsorption illnesses. In terms of nutrition and health, a class of nutritional products that contain live probiotic bacteria in fermented goat milk seems promising. Milk and colostrum are naturally occurring substances that are non-toxic and have many uses in dermatology and cosmetics. They have substantial biological potential as well. Additionally, they are becoming more widely recognized as active ingredients with the ability to control the amount of blackheads and acne lesions, regulate the production of sebum, reduce inflammation, and provide a variety of moisturizing, protective, toning, smoothing, anti-irritating, whitening, calming, and antiaging effects.

**KEYWORDS:** Milk, Colostrum, Nutritional and Therapeutic value, Mal absorption, Skin Regeneration, Cosmetics.

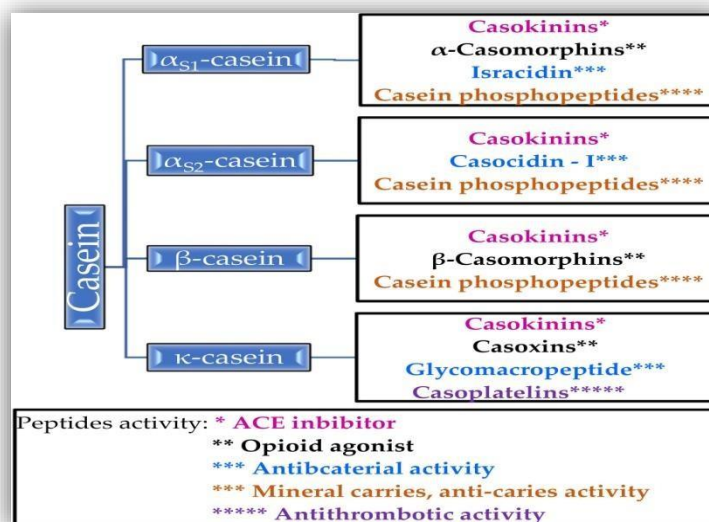
### INTRODUCTION

The value of goats for human nourishment has probably been recognized since the commencement of domestication. The goat - and goat milk products - were once regarded as the "poor man's cow". Goat milk has been touted as a

nutraceutical for decades due to its simple digestion and reduced allergic qualities when compared to cow milk; nevertheless, many of the initial claims were anecdotal. Inspired by the finding that, although having a fat level comparable to that of cow, goat milk seldom develops a cream layer<sup>[1]</sup> obtained that 91% of goat milk fat globules, lower vitamin B12 levels in goat milk, and "about equal" folic acid levels in goat and cow milk.<sup>[2]</sup> In the first week after giving birth, goats given Salt with trace minerals (which contains cobalt) had higher levels of vitamin B12 throughout their milk and colostrum than did those given merely iodized salt. After this point, the amount of B12 in goat milk was unaffected by trace-mineralized salt or a daily 50 mg cobalt supplement per goat. When trace minerals were added to the goat's diet, there was no change in the amount of free folic acid in the milk.<sup>[3]</sup> Goat milk was found to be lacking in folic acid and vitamins B12 and B6, which are critical for healthy human newborn development, when it came to human nutrition only later.<sup>[4]</sup> Goat milk, like that of cows, provides the human diet with an acceptable to exceptional quantity of protein, calcium, niacin, pantothenic acid, phosphorus, potassium, riboflavin, thiamine, and vitamin A, Iron, vitamin C, and vitamin D are not found in sufficient amounts in cow or goat milk (unless fortified). Goat milk lacks essential nutrients such as folic acid, vitamin B12, and vitamin B6 compared to cow's milk.<sup>[5,6]</sup> Goat milk's less allergic qualities as compared to cow milk are among its key advantages and have helped to make it a popular substitute for cow milk. Families are still known to purchase dairy goats or convert to goat milk in order to avoid consuming cow's milk. Caprine arthritis encephalitis is a viral disease that affects goat production worldwide, resulting in losses for both animals and money.<sup>[7]</sup>

**Goat Milk Casein Genetic Variants**

$\alpha$ S1-CN,  $\alpha$ S2CN,  $\beta$ -CN,  $\beta$ -LG, and  $\alpha$ -LA, the five main proteins found in goat milk, are said to resemble their homologs in cow milk quite a bit.<sup>[8]</sup> At the time, research indicated that the most prevalent protein in cow milk, bovine  $\alpha$ S1-CN, was not present in goat milk. claimed that goat milk's softer curd and easier digestion were caused by the absence of  $\alpha$ S1-CN in the milk; Increased gastrointestinal absorption of antigens followed by unfavorable local immune reactivity has been suggested as one of the primary etiological causes for the development of food allergies, including cow milk allergy (CMA).<sup>[9]</sup> Extended consumption of cow's milk has been linked to an inflammatory reaction in the intestinal membrane's lamina propria in infants with cow milk allergy (CMA). Its symptoms are only temporary since, after several months of a diet devoid of cow milk, all illness markers revert to normal.<sup>[10]</sup>



**Figure 1: Activities of released casein peptides.****Nutritional Value and Curative Properties**

Its numerous physiologically active components are primarily responsible for its significant nutritional and therapeutic properties in aberrant or disease-related human nutrition and health scenarios. Studies have demonstrated that goat milk's nutritional and medicinal benefits over cow milk are due to its lipid content, particularly the fatty acids present in it, rather than variations in protein or minerals.<sup>[11,12]</sup> For newborns and allergy sufferers who have sensitivities to cow's milk or other foods, goat milk has been suggested as a cow milk substitute.<sup>[13]</sup> Goat milk's hypoallergenic qualities are extremely significant for human health and medicine, especially in light of the bioactive components of milk. Goat milk manufacturers and end users, particularly in industrialized nations in lately, have been keenly interested in this premise.<sup>[14]</sup> When it comes to fat globule size, compared to cows and other animals, goats produce less milk. Goat, cow, buffalo, and sheep milk were found to have average fat globule diameters of 3.49, 4.55, 5.92, and 3.30  $\mu\text{m}$ , respectively.<sup>[15]</sup> Goat milk's fat globules are smaller than those of cow's milk, which makes it more digestible.<sup>[16]</sup> Additionally, caprine milk has a higher capacity for buffering than bovine milk, making it beneficial for the treatment of ulcers.<sup>[17]</sup> Proteins from goat milk are also thought to be easier to digest and absorb amino acids from than those from cow milk. Because there is less  $\alpha\text{s1}$ -casein in caprine milk, the curd it forms when acidified is softer and more friable. It seems to reason that smaller, more friable goat milk curds would be more quickly destroyed by stomach proteases, resulting in improved digestibility.

**Effects of Goat Milk on Human Nutrition and Health through Diet and Therapy**

Lactose, the main carbohydrate found in goat milk, helps the body absorb more calcium, magnesium, phosphorus, and vitamin D. Goats convert all of the betacarotene in their food to vitamin A, which is why goat milk naturally contains more vitamin A than cow's milk. Many nutrients, including as potassium, selenium, zinc, calcium, chloride, phosphorus, and copper, are better found in goat milk than in cow milk. For those who are intolerant to lactose, goat milk is a preferable substitute. Goat milk is popular because it is easier to digest than cow's milk, which could explain its appeal.<sup>[18]</sup> Cow's milk intolerances can be eased by eating goat's milk cheese and yoghurt. A baby's normal biological diet is modelled by the content of human breast milk. With its nutritional value, easy digestion, support for proper organ development, and defence against food poisoning, its chemical composition also helps prevent inflammation and infection. A variety of dairy products, such as ice cream, paneer, channa, srikhand, condensed milk, dried whole milk, butter oil, and flavoured milk, are made from goat's milk.<sup>[19]</sup> Probiotic bacterial strains and physiologically active metabolites are frequently found in these products.<sup>[20]</sup>

Its immune-system-regulating properties include antiviral and antioxidant properties. Vitamins D and E, along with all the B vitamins, including thiamine, riboflavin, and niacin, are abundant in goat milk. Goat milk contains little folate.<sup>[21]</sup> As opposed to goat and human milk, cow milk contains reduced levels of sodium, phosphorus, zinc, copper, and manganese. Goat milk's increased vitamin content makes it regarded as healthier than cow's milk. For infants and young children, goat milk can be used as a supplement, but it is not a good substitute for human milk, much like cow milk is.<sup>[22,23]</sup> Goat milk has more easily digested proteins, which are absorbed more efficiently. When acidified, goat milk's lower  $\alpha\text{s1}$ -casein content produces a more delicate and crumbly curd.<sup>[24,25]</sup>

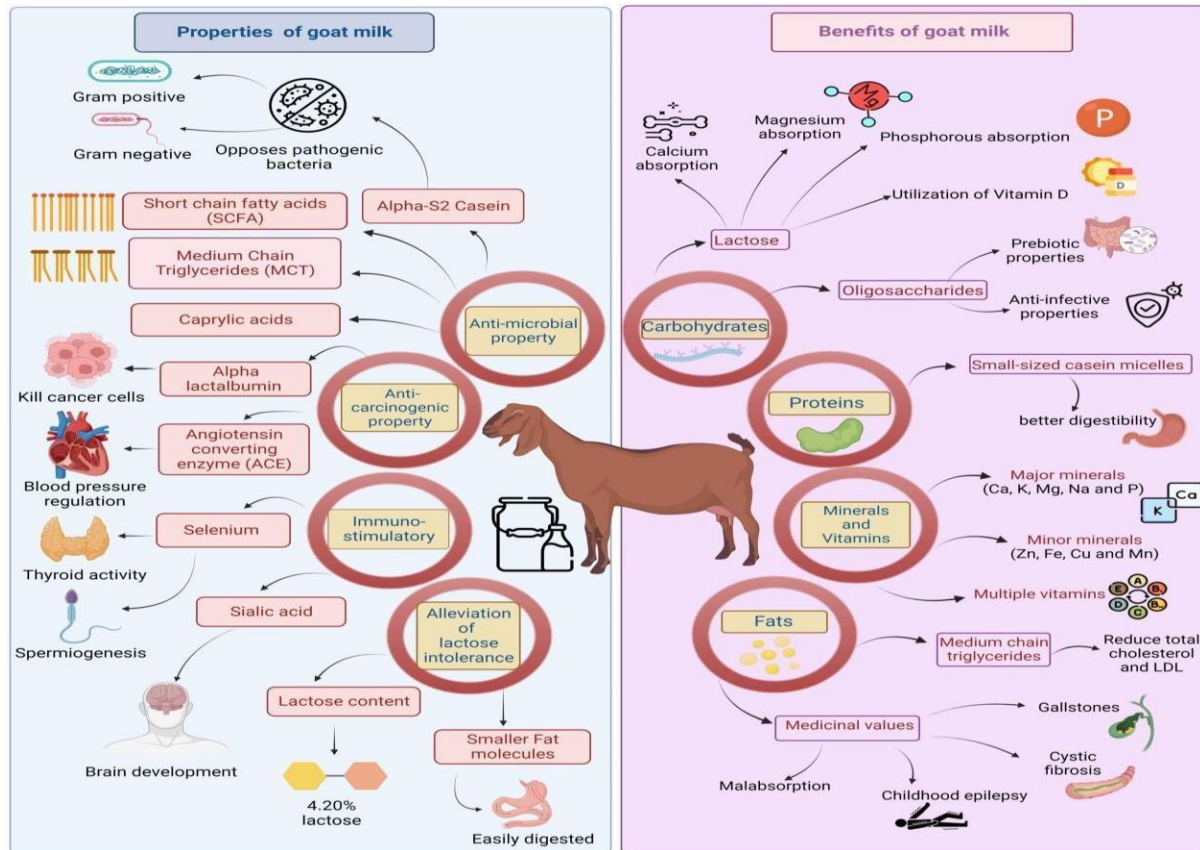


Figure 2: Nutritional Value and Medicinal Effects on Human.

### Health Prevention of Diseases Causing Malnutrition




Goat milk consumption is associated with a lower incidence of constipation, diarrhoea, and other gastrointestinal problems, according to several research. It has not been established that the impression of abdominal pain is influenced by the faster stomach emptying and lesser goat milk acid-induced coagulation.<sup>[26]</sup> Goat milk may be able to shield the digestive system from some of the damage that heat stress and intestinal inflammation may do, according to recent studies on animals. A variety of bacteria, such as those that cause cholera (*Vibrio cholerae*), dysentery (*Shigelladysenteriae*), typhoid (*Salmonella typhi*), pneumonia (*Klebsiellapneumoniae*), and food poisoning (*Staphylococcus aureus*), can be effectively combated by the lactoperoxidase protein found in goat milk. Studies demonstrating the antibacterial properties of goat milk have used bovine lacto-peroxidase.<sup>[27,28]</sup> An immune system that is functioning properly depends on the mineral selenium. The selenium content in goat milk is significantly higher than that of cow milk, indicating that the mineral and its by-products may help people stay healthy by strengthening their immune systems. The innate and adaptive responses of the immune system depend on natural killer (NK) cells, T lymphocytes (T-cells), and B lymphocytes (B-cells). IgA, IgG, IgE, IgM, and IgD are comparable immunological classes. In addition to other factors, dietary status can predict the body's immunological response in part. Goat milk has anti-inflammatory and antioxidant properties that are essential for all biological processes. Numerous illnesses, including cancer, are brought on by oxidation, and the body's primary defence against infection is inflammation.<sup>[29]</sup>

**Comparing the amount of vitamins in 100 grams of Goat and Cow milk to that in Human milk<sup>[30]</sup>**

| MAMMALS | Vit A (IU) | Vit B6(MG) | Vit C(MG) | Vit D (IU) |
|---------|------------|------------|-----------|------------|
| GOAT    | 185        | 0.046      | 1.29      | 2.3        |
| COW     | 126        | 0.042      | 0.94      | 2.0        |
| HUMAN   | 190        | 0.011      | 5.00      | 1.4        |

Because regular goat milk lacks certain vital minerals (including iron, vitamin B12, and folic acid), it is highly recommended to use commercial formulas. A deficiency in folic acid or vitamin B12 has been linked to megaloblasticanemia in infants given homemade goat milk formulas. Because goat milk contains more salt than human milk, giving it to a new-born on its own can cause hypernatemia, brain hemorrhages, and azotemia.<sup>[31,32]</sup>

**Comparing the mineral contents (AMT/ 100 g) of goat and cow milk to that of human milk**

| MINERALS (mg) |  |  |  |
|---------------|---|--|---|
| CALCIUM       | 134   | 122  | 33  |
| PHOSPORUS     | 121   | 119  | 43  |
| POTASSIUM     | 181   | 152  | 55  |
| CHLORIDE      | 150   | 100  | 60  |
| ZINC          | 0.56  | 0.53   | 0.38  |
| IODINE        | 0.022   | 0.021  | 0.007   |
| SELENIUM      | 1.33  | 0.96   | 1.52  |

Goat milk-derived dairy products are thought to have the greatest marketing potential. Fermented goat milk with live probiotic cells is a category of products with significant potential for use as medicine and nutrition in the future. Goat milk helps with absorption issues and inflammatory bowel diseases. Fermented goat milk possesses anti-oxidative, anti-atherogenic, and anti-thrombotic qualities that may reduce the risk of cardiovascular disease.

**Cosmetical and Dermatological Products made with Milk and Colostrum**

Growing interest in natural products in recent years has led to the widespread use of milk and colostrum-based products in cosmetics and pharmaceuticals in the form of lotions, ointments, etc. The effects of milk or products produced from milk on fibroblasts and/or keratinocytes in vitro will also be covered in this section, which are skin cells. Colostrum-based products are becoming more and more popular since these substances, especially the milk-derived proteins have shown incredible therapeutic promise in the treatment and prevention of a wide range of ailments. There are a lot of colostrum-supplemented powders, capsules, lozenges, drinks, and chewing gum on the market. In addition to their roles as antioxidants, anti-inflammation, and tissue development agents, the products are used to promote epidermal cell differentiation and proliferation, strengthen the immune system, and heal injured gastrointestinal tissues, and promote wound healing.<sup>[33]</sup> Researchers are attempting to employ milk proteins, which have promising qualities, for treating burn injuries, to replace skin. Preliminary research indicates that adding bioactive milk proteins, lactoferrin, and whey proteins to a synthetic polymer scaffold (polycaprolactone) improved keratinocyte and fibroblast proliferation, dissemination, and infiltration. They are increasingly acknowledged as active ingredients that can offer a range of moisturizing, protective, toning, smoothing, anti-irritation, whitening, soothing, and anti-aging effects in addition to reducing the quantity of acne lesions and blackheads, regulating sebum secretion, and easing inflammatory changes. As a result, it may be applied to wounds to effectively heal them.<sup>[34]</sup>

## CONCLUSION

Dairy products made from goat milk are seen to have the most marketing potential. Medical researchers are always interested in milk proteins due to their natural origin, non-toxicity, and various actions. These components are taken into consideration for treating skin conditions, boosting immunity, preventing cancer, and eliminating microbes. There are several studies on milk raw ingredients; however there aren't many clinical trials that support their efficacy. It seems that milk-based products are utilized more frequently as nutritional supplements than as pharmaceuticals. A "useful alternative to cow milk" is recommended for caprine milk since it seems to include some growth factors and bioactive components that may not be as easily available in bovine milk. Consuming caprine milk and the dairy products that go along with it reduced allergy issues and strengthened disease resistance mechanisms in humans as opposed to eating bovine milk. Regarding the nutritional value and health impacts, the distinctive qualities of goat milk have been pretty well studied. Goat milk appears to have qualities that make it excellent for treating or preventing a number of medical disorders due to its improved digestibility, appropriate protein and fatty acid composition, and presence of bioactive substances. As a result, clinical trials on products made only from milk or colostrum are required.

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