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EXPLORING THE THERAPEUTIC WONDERS OF GOAT MILK

Abhishek Arun Fadatare , Tanvi Shahir Ghuge , Prof. Pradnya K. Khelbude
Lokamangal College of Pharamacy, Wadala , Solapur 413222

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ABSTRACT

Goat milk has long been a staple in various cultures for its nutritional benefits, but recent studies have uncovered its potential therapeutic effects, making it a subject of growing interest in the field of health and wellness. Exploring the Therapeutic Wonders of Goat Milk, aims to delve into the scientifically backed benefits of goat milk , including its digestive , anti-inflammatory , and immune-boosting properties. The existing literature on the subject, conduct experiments to further investigate its efficacy in treating common ailments such as skin conditions, lactose intolerance, and digestive disorders, and explore its broader applications in modern healthcare. The goal is to provide a comprehensive understanding of how goat milk can serve not only as a dietary supplement but also as a therapeutic agent, offering an alternative or complementary solution to various health challenges. Through this exploration, the project seeks to highlight the untapped potential of goat milk in improving human health and well-being.

KEYWORDS- *Goat milk, Antioxidant, Anti-inflammatory, Anti- tuberculosis, ACE-Angiotensin Converting Enzyme*

INTRODUCTION

India is an agricultural country. Agriculture is the main occupation in India. But they do a combination of agriculture and animal husbandry. In animal husbandry mainly cows, bullocks , goats , buffaloes , sheep etc. Some of them do traditional agricultural work and some do dairy farming. Dairy industry mainly includes cow, buffalo and to some extent goat and sheep. Cow and buffalo milk available at dairy everywhere but goat milk is less in the market. Now a days this modern technology good genetic goat breed increases in milk .Various experiments have been done on larger number of Indian goats to increase goat's milk. Table-1. As it is said that “goat is poor man’s cow” so in most of the developing countries like India, goat milk is mostly consumed by rural people and its demand is increasing with growing

population (*Indian Farmer 5(10):1133-1137 ; October-2018)* . Milk is the perfect food considering the growing population. Goat's milk is used to treat some ailments. Besides many beneficial effects of goat milk, the advantages of breeding goats, such as the lower cost of animals, the need for less feed and water, and often not requiring the specialized housing that larger livestock need, are reasons to promote the improvement of goat milk production worldwide. Goat milk is a valuable food source of animal protein, phosphorus, and calcium, especially in countries with low consumption of meat.(Devendra,2013)

Table1: Top SEVEN countries in goat milk production, number of dairy goats and milk produced per doe (FAOSTAT, 2022)

COUNTRIES	GOAT MILK PRODUCTION %	NO. OF DAIRY GOATS
1) INDIA	32.6%	6.65B
2) SUDAN	6.05%	1.16B
3) PAKISTAN	5.31%	1.02B
4) BANGALADESH	4.78%	915.18M
5) FRANCE	3.74%	717.61M
6) TURKIYE	2.82%	540.43M
7) INDONESIA	1.93%	370.36M

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Chemical Composition

1. Proteins: High indigestible proteins like casein and whey, forming a softer curd compared to cow's milk, which aids digestion.(source: Park et al. 2007)
2. Medium-Chain Fatty Acids (MCFAs): Rich in caprylic and capric acids with anti-inflammatory and antimicrobial properties.(Lee, J.,etal.,2020).
3. Oligosaccharides: Act as prebiotics , promoting gut health by supporting beneficial bacteria.(*Rojas et al., 2018).*
4. Vitamins: Contains essential vitamins such as A, D, and B12, which support immune function and skin health.(Park et al. 2007)
5. Minerals: Abundant in calcium, selenium magnesium, and phosphorus, contributing to bone health.
6. Amino Acids : Includes taurine , which plays a role in cellular repair and immune support.
7. Phospholipids: Aid in cellular function and enhance overall health benefits.

Therapeutic Potential

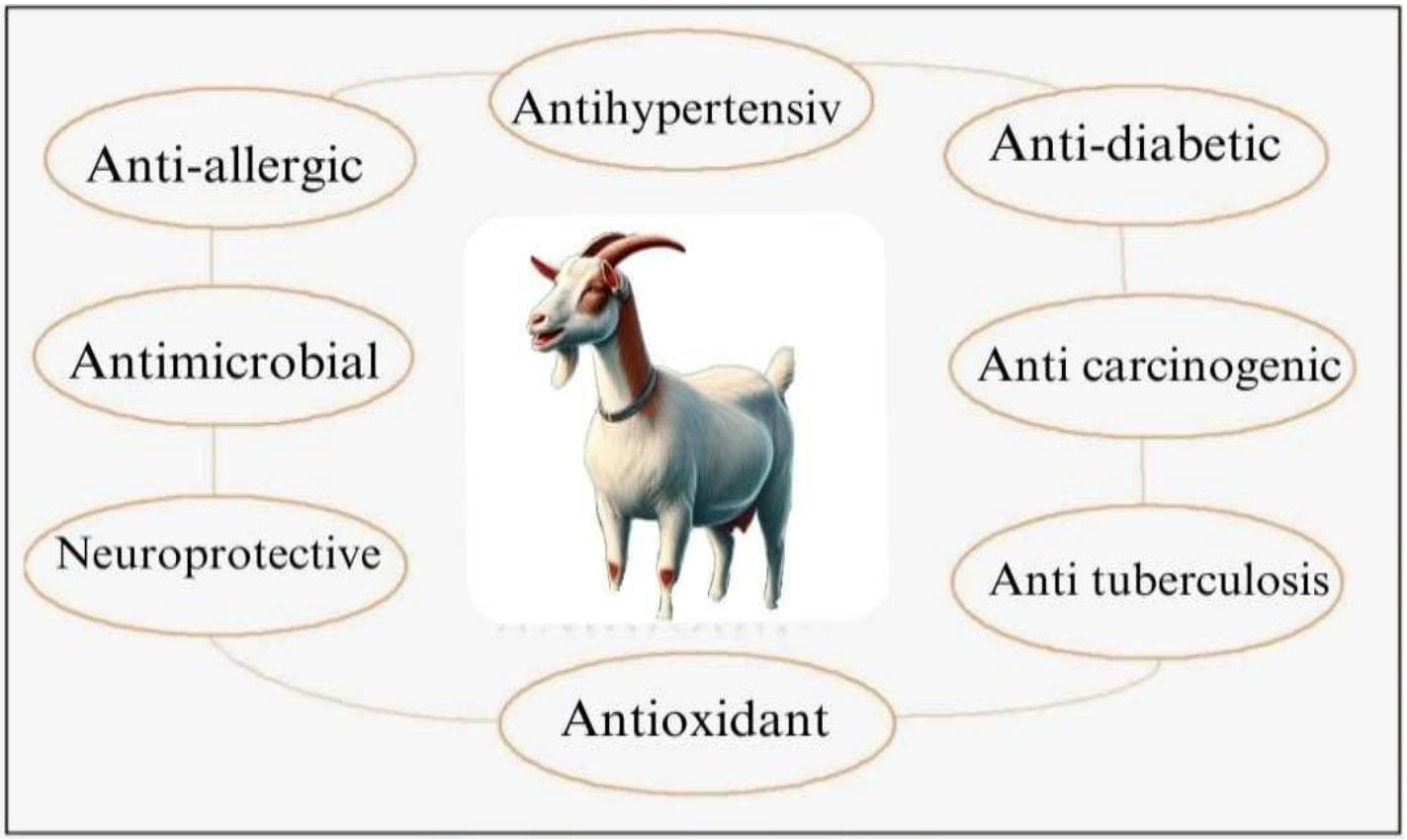


Figure 1: Pharmacological activities of Goat milk

Antihypertensive

Goat milk may help to lower blood pressure is through its high potassium content. Potassium is an essential mineral that plays a crucial role in maintaining healthy blood pressure. It helps to counterbalance the effects of sodium in the body, which can contribute to high blood pressure. By consuming goat milk, Which is rich in potassium, individuals may be able to help reduce their blood pressure and alleviate the risk of cardiovascular disease.(Pascual et al., 2018).

Goat milk may help to lower blood pressure is through its medium-chain fatty acid (MCFA) content. MCFAs have been found to have anti-inflammatory properties, which may help to improve vascular function and reduce blood pressure. MCFAs have also been found to have antioxidant properties, which may help to protect against oxidative stress and inflammation in the body.(Nagy et al., 2019).

Goat milk contains bioactive peptides, which have been found to have ACE inhibitory activity. ACE inhibitors are a type of medication that helps to relax blood vessels and reduce blood pressure. The bioactive peptides present in goat milk may help to achieve similar effects, making it a potential natural remedy for high blood pressure.(Jankovic et al., 2020)

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Antiallergic

Anti-inflammatory properties of goat milk have been shown to reduce allergy symptoms such as swelling and itching(Pascual et al., 2018; Li et al., 2017).The unique proteins present in goat milk, including casein and whey, are easier to digest, reducing sensitivity to allergens.

Medium-chain fatty acids (MCFAs) present in goat milk have been found to boost immune function, reducing overreaction to allergens (Nagy et al., 2019; Lee et al., 2020). Immunoglobulins and antioxidants in goat milk strengthen the immune system, helping to combat allergic reactions (Rodríguez et al., 2017; Jankovic et al., 2020).

The lactose-free composition of goat milk (in most cases) prevents digestive issues, reducing systemic allergic response(Rachid et al. 2021).Oligosaccharides present in goat milk promote gut health, enhancing immune tolerance and decreasing allergic sensitivity (Morrow et al., 2016; Rojas et al., 2018).

Antioxidants

1. Vitamins A, D, and E in goat milk act as antioxidants. They neutralize free radicals, reducing oxidative stress and preventing cell damage.
2. Medium-Chain Fatty Acids (MCFAs) in goat milk have anti-inflammatory and antioxidant properties. These acids reduce inflammation and help protect cells from oxidative damage. *(Lee, J., etal., 2020)*

Antituberculosis

1. Antibacterial Properties: Goat milk contains immunoglobulins (antibodies) and lactoferrin, which have antibacterial activity. These help in fighting Mycobacterium tuberculosis, the bacterium responsible for TB.
2. Anti-inflammatory Effects: Goat milk's medium-chain fatty acids (MCFAs),such as caprylic and capric acids, have anti-inflammatory properties, reducing inflammation in the lungs and respiratory system, Which is crucial for TB treatment. *(Sharma,S.,&Rathi,P.2019).*

Antimicrobial

1. Immunoglobulins & Lactoferrin: Goat milk contains antibodies (immunoglobulins) and lactoferrin, which bind to and neutralize harmful microbes, preventing their growth. *(Sharma,S.,&Rathi,P.2019).*
2. Prebiotics (Oligosaccharides): These help promote the growth of beneficial gut bacteria, enhancing overall immunity and reducing harmful microbial growth in the digestive tract.

Neuroprotective Effects

1. Rich in Omega-3 Fatty Acids: Goat milk contains omega-3 fatty acids (such as DHA), which are essential for brain health. DHA supports the formation of neuronal membranes and promotes neurogenesis, improving cognitive function and protecting against neurodegeneration.
2. Bioactive Peptides: Goat milk contains bioactive peptides like casein-derived peptides and lactoferrin, which have been shown to have neuroprotective effects. These peptides can reduce neuro inflammation, promote neuroprotection and may help in reducing oxidative stress in the brain. *(Nagy et al., 2019)*

Skin Care

Healing Properties

Goat milk supports the healing of skin wounds, cuts, and minor burns due to its anti-inflammatory and moisturizing properties. It promotes tissue regeneration and can aid in the treatment of conditions like dry, cracked skin or eczema.

Exfoliation & Skin Renewal

Goat milk contains lactic acid, an alpha hydroxy acid (AHA), which acts as a gentle exfoliant. Lactic acid removes dead skin cells, improving skin texture and revealing smoother, fresher skin underneath. Regular use promotes skin renewal, giving the skin a glowing appearance and reducing the appearance of scars or blemishes.(Kazimierska, et.al.2021)

Dengue Prevention

1. Immune System Support:

Immunoglobulins: Goat milk contains natural antibodies (immunoglobulins) that can help support the immune system in fighting infections, possibly aiding the body's defense against the dengue virus.(Mahendru,G,.et al.2011)

2. Enhancing Immune Function:

Selenium plays a key role in the functioning of immune cells (e.g.T-cells, macrophages, and natural killer cells), which are crucial in fighting viral infections. It enhances the proliferation and activation of these immunecells, making the immune response to infections like dengue more effective. Selenium deficiency

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Can impair immune responses, making the body more vulnerable to infections, while adequate selenium levels boost the body's ability to mount a defense.(*Ramos,R. G., et al.,2018)*

Carcinogenic Properties

Anticarcinogenic effect: Goat milk has a high content of conjugated linoleic acid (CLA) *(Jirillo et al., 2010).* Anti-carcinogenic properties of CLA have been reported against mammary and colon cancer in animal models, as well as in vitro models of human melanoma, colorectal *(Palomboetal.,2002)* and breast cancer. The mechanism by which CLA inhibit tumor development is not fully understood, although perturbation of the eicosanoid dependent cell signaling systems, antioxidative effects, and disturbance of the receptor mediated actions of oestrogen have all been suggested.

Anti-Diabetic Properties

Goat milk has been studied for its potential benefits in managing type 2 diabetes due to its unique nutritional profile and bioactive compounds.(Hernandez-ledesma,et al.2020). The potential benefits and mechanisms of action:

1. CLA: Enhances insulin sensitivity, reduces glucose uptake in a dipocytes, and increases glucose oxidation.
2. MCTs: Improve insulin sensitivity, reduce glucose levels, and increase ketone production.
3. Immunoglobulins: Modulate immune response, reduce inflammation, and improve insulin sensitivity.
4. Lactoferrin: Exhibits antioxidant and anti-inflammatory properties, improving insulin sensitivity. *(Jankovic et al.,2020)*

Healing Drops

Goat milk is highly nutritious and beneficial for lactating mothers. It is rich in calcium, protein, healthy fats, and essential vitamins like vitamin A and D.

Uses of Goat Milk for Lactating Mothers:

1. Boosts Milk Production: The nutrients in goat milk, especially calcium and protein, help support milk production.(Haenlein,G.F.W.2004)
2. Improves Bone Health: High calcium content supports both the mother's and baby's bone health.
3. Eases Digestion: Goat milk is gentle on the stomach and less likely to cause bloating or discomfort.
4. Rich in Antioxidants: Contains selenium and zinc, which boost immunity and help the mother recover post-pregnancy.
5. Skin Health: The fatty acids and vitamin E in goat milk promote skin health, which can benefit mothers dealing with postpartum skin issues.

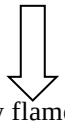
Unique Preparation: Goat Milk and Almond Energy Drink

This drink is nutrient-dense, easy to prepare, and specifically designed to nourish lactating mothers.

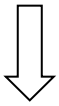
Ingredients:- 1cup fresh goat milk (warm or chilled), 8-10 almonds (soaked overnight), 1-2 dates (sweetness), cardamom powder (for flavor),1 tsp honey or jaggery.

Preparation

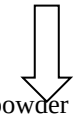
Blend the soaked almonds and dates into a fine paste.



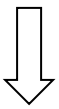
Heat the goat milk on low flame infusing warm milk.



Mix the almond-date paste in to the milk.



Add cardamom powder and sweetener.



Serve warm or chilled.

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Benefits

Almonds enhance the milk's protein content and add vitamin E, promoting energy and recovery. Dates act as a natural sweetener and boost iron levels, which are essential postpartum.

The drink is easy to digest and provides sustained energy.

CONCLUSION

Goat milk offers a wealth of therapeutic benefits, from boosting immune function to promoting skin health and providing anti-inflammatory effects. Its rich nutritional profile, including bioactive peptides, vitamins, and antioxidants, supports overall well-being and aids in the treatment of various conditions. While further research is needed, goat milk remains a valuable natural remedy that can complement traditional medical treatments for improved health.

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