



A REVIEW ON IMPORTANCE OF CAMEL MILK FOR HUMAN HEALTH

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Abstract: Many researchers have shown that camel milk is the most similar to human milk of all the milks. Compared to other ruminant milk, camel milk has low cholesterol, low sugar, and high levels of minerals and vitamins. Camel milk may be medicinal due to its anti-hypertensive, anti-diabetic, and anti-carcinogenic properties. Lactose intolerant people can frequently digest it without any difficulty. It has low fat content, protein that is protective and insulin-like, and lactose as the main carbohydrate. As a treatment, camel milk is also consumed. It has anti-tumor characteristics, is capable of treating a wide range of disorders, including diabetes, autism, diarrhea, and it also has powerful immune system components that aid in disease prevention. Under the strain of commercial development, technological improvements made possible by a collection of basic and applied research were used to promote the transformation of camel milk into pasteurized milk, cheese, milk powder, or other goods. Camel milk is gaining popularity around the globe due to its appetizing and interesting products, in addition to its beneficial nutritional qualities. There is room for more investigation on the difficulties of camel milk research.

Keywords: Camel milk, Medicinal.

Introduction

The camel has been an important part of civil law and order, defence, and conflicts since ancient times. According to the Food and Agriculture Organization (FAO, 2008), there are currently 22 million camels in the world, of which 89 per cent are one-humped dromedary (*Camelus Dromedarius*) camels and 11 per cent are two-humped Bactrian (*Camelus Bactrianus*), which are typically found in Asia's cold deserts. There are 0.4 million camels in India as per the 2012 census (DAHD, 2014).

The camel, with its distinctive bio-physiological traits and adaptable ways of surviving in severe conditions, is a significant part of the fragile desert ecology of India. It is one among the animals that the Quran mentions as miracle of god. It is common for camels to consume specific herbs in order to produce the milk for therapeutic purposes. In the past, camels were primarily used as draught animals in agricultural and transportation tasks, but this use of the animal has significantly decreased as a result of the mechanisation of farming and transportation. Therefore, camel husbandry practises are intended to promote camel as milch animal in order to maintain the camel population in these places.

1. Basic Introduction to Camel Milk

In the hot and arid parts of the world, camel milk is crucial for human nourishment. All of the necessary nutrients found in other milk are present in camel milk. In several parts of the world, including India, Russia, and Sudan, fresh and fermented camel milk has been used for human consumption and for the treatment of a number of illnesses, including jaundice, Tuberculosis, asthma, etc.

Camel milk and its components have recently been discovered to have additional potential therapeutic characteristics, including anti-carcinogenic, anti-diabetic, and anti-hypertensive effects. It has also been suggested that children who are allergic to cow's milk can consume camel milk.

1.1 Milk Production Potential

- Under the extreme conditions of the desert ecosystem, camels are able to produce more milk than any other form of species and that too for longer periods of time, while only needing a small amount of nutrition.
- Between 2,000 to 4,200 Liters of milk is produced overall throughout an 8–18 month lactation period.
- The average daily milk production is predicted to be between 3 and 10 Liters, but under better nutrition, husbandry techniques, water availability, and veterinary care, the supply might reach to 20 Liters daily.

1.2 Composition of Camel Milk

- Water- In camel milk, the water content ranges from 87 to 90 per cent.
- Fat - Only 2 per cent of camel milk is fat, and that fat is mostly made up of polyunsaturated fatty acids and omega fats.
- Sugar - Lactose is the primary carbohydrate component of milk. The lactose found in milk is easily broken down by the human enzyme lactase; hence lactose intolerance in humans is not manifested. It lies between 4.8 and 5.8 per cent.
- Protein - Allergens are not present in camel milk. One of the proteins found in camel milk is insulin. Numerous defensive proteins included in camel milk help to maintain the body's health. Camel milk

1.3 Physiochemical Properties of Camel Milk

- Camel milk has an opaque white appearance due to the presence of finely homogenized milk fats. It tastes salty and frothy, which may be the result of grazing on particular bushes and herbs in the arid area.
- According to reports, camel milk is less viscous than cow's milk.
- Fresh camel milk has a pH that ranges from 6.4 to 6.7
- Camel milk freezes at a temperature between -0.57 and -0.61 ° C.

1.4 Mineral Compositions of Camel Milk

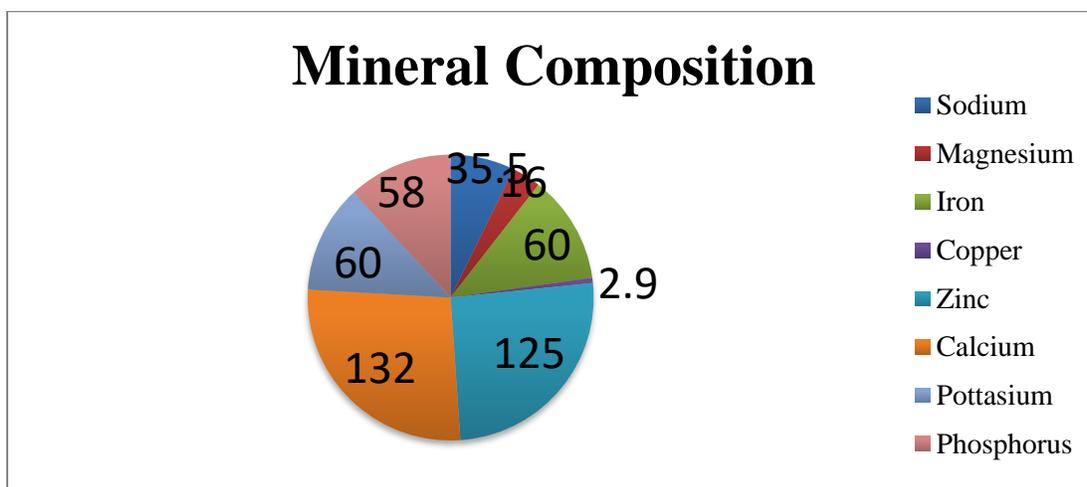


Figure: Mineral composition of camel milk in mg/100g

(Source:Wajiha Gul *et al*, 2015)

1.5 Comparison of Camel Milk with Human Milk

Animal	Water (%)	Fat (%)	Protein (%)	Lactose (%)	Sodium mEq/l	Calcium Mg (%)
Human	87	3.80	1.20	7.00	7.00	34
Camels	86-91	1.90-2.20	2.80-3.60	2.80-4.20	11.40	80

(Source:Yagil, 2000)

1.6 Compositional Differences of Camel and Cow Milk

Parameters	Camel Milk	Cow Milk
Water (%)	90	87
Total solids (%)	10.00	13.00
Fat (%)	2.00	4.00
Insulin (IU/ml)	40.50	16.30
Iron (Mg/100g)	0.05	0.27
Calcium (Mg/100g)	132	120
Potassium (Mg/100g)	152	140
Zinc (Mg/100g)	0.50	0.40
Vitamin C (Mg/ml)	35	10
Niacin (Mg/ml)	4.60	0.60
Pantothenic acid (Mg/ml)	0.90	3.80
β -lacto-globulin(Mg/ml)	0	3500
Whey acidic protein(Mg/ml)	157	0
Peptydoglycon recognition protein(Mg/ml)	107	0
β -lacto albumin (Mg/ml)	3500	1200
Kappa caesin (%)	5.00	14.00
Whey protein (%)	1.00	0.80
Omega -6 (%)	3.50	5.20
Omega - 7 (%)	11.60	2.30

(Source:Singh *et. al.*, 2006)

- Lactose is present in milk at a concentration of 4.8%, yet lactose intolerant people can easily metabolise this milk sugar.

2. Therapeutic Value of Camel's Milk

Diarrhea, tuberculosis, autoimmune illnesses, gastrointestinal disorders; allergies, cancer, IDDM (insulin dependent diabetes mellitus), crohn's disease, and autism are among the ailments effectively treated with camel milk (Wernery, 2006).

1) Camel milk against gastrointestinal disorders

- High levels of anti-inflammatory proteins found in camel milk are beneficial for gastrointestinal and intestinal illnesses. Improved glucose metabolism is provided by the composition's vitamin-rich composition and high proportion of mono and polyunsaturated fatty acids.
- Also, it was discovered that camel milk that has been fermented contains an enzyme called Angiotensin I-converting enzyme (ACE), which makes it easier for humans to digest milk proteins.

2) Camel Milk against Diarrhea

- According to recent studies on the use of camel milk for digestive system health, all children who have consumed it and have 20 bouts of diarrhea per day are cured and start having regular bowel movements.
- Due to camel milk's high anti-rotavirus antibody content, it can also be used to treat young infants who suffer diarrhea brought on by rotavirus contamination of their food (Yagil, 2013).

3) Camel Milk as a Therapy for Tuberculosis

- Mal *et. al.* (2006) proposed that protective proteins found in camel milk may have a function in boosting the immunological defence system. These camel milk proteins' antibacterial activities eliminate *Mycobacterium tuberculosis*.

4) Camel Milk as a Therapy for Milk Allergies

- According to Shabo *et. al.* (2005), camel milk helped youngsters to quickly improve severe food allergies.
- Camel milk contains immunoglobulins that are comparable to those found in mother's milk, which lessen allergic reactions in youngsters and improve their future sensitivity to foods. Camel milk proteins are crucial for preventing and treating food allergies.

5) Camel Milk as a Therapy for IDDM (Insulin Dependent Diabetes Mellitus)

- Agarwal *et. al.* (2002) reported that in India, a study between juveniles with diabetes who were normally treated and those who also drank camel milk revealed that the group consuming camel milk had considerably lower blood sugar and lower levels of HbA1C. Additionally, there was a notable decrease in the insulin injection quantities. Because camel milk has following properties:-

a) Camel milk exhibits insulin-like properties. (Breitling, 2002).

b) Large amounts of insulin (150 U/ml) are present in camel milk. (Zagorski *et al.*, 1998).

c) Although human, cow, and goat milk contain insulin, it is broken down in the stomach's acidic environment. Camel milk does not react to acid and does not produce coagulum, hence this does not happen. (Abu-Lehiya, 1987).

- According to Agrawal *et. al.* (2003) and Ejtahed *et. al.* (2015), camel milk's inability to coagulate in the human stomach contributes to the hypoglycemic effect in type-1 and type-2 diabetes, respectively.

6) Camel Milk to Strengthen the Immune System

- According to Hoelzer *et. al.* (1998) and El-Agamy (2000), camels have a stronger immune system than humans, and tiny immunoglobulins that can be transfer from camel milk into human blood.
- Since immunoglobulins are present in camel milk throughout lactation, consuming milk will give you a tool against autoimmune illnesses by boosting your immune system instead of making you depressed.

7) Camel Milk against Cancer

- Several research studies revealed that consuming camel urine and camel milk reduced the growth of cancer cells (Magjeed, 2005).
- Therefore, a team of experts has created a medication formula for the treatment of cancer. The findings demonstrated a high rate of success in the treatment of blood cancer (leukemia) along with Lung, liver, and breast cancer.

8) Camel Milk in Treatment of Autism

- Shabo and Yagil (2005) found that camel milk possessed the following qualities, which led to remarkable improvements in autistic children's behavior and eating.
- a) Camel milk does not cause autism symptoms since it does not contain any amount of lactoglobulin or casein.
 - b) Camel milk also contains protective proteins, such as immunoglobulins which is essential for immune system maintenance.

3. Products made from camel milk

1. Cheese –

- The process of creating camel cheese is unique. In fact, the difference in casein proportions—particularly the lower level of casein in camel milk compared to cow milk is 3-4 per cent vs. 13-15 per cent respectively should explain the clotting issues seen in this process. Furthermore, camel milk's casein micelles cannot coagulate well with the bovine chymosin utilized in the dairy industry, resulting in a weak curd. Therefore, the first difficulty confronted by researchers studying camels and dairy plants processing camel milk was obtaining a firm coagulum.
- Camel milk is difficult to coagulate after pasteurization, which forces producers to use raw milk in the production of camel cheese. Due to the high cost of the basic substance, difficulty is also related to the price of camel cheese.

2. Milk powder-

- Camel milk is frequently produced in isolated regions distant from the consumption basin, making it impossible to transfer large quantities of milk without first removing the water that makes up 88 per cent to 90 per cent of its weight. The preservation of liquid milk's nutritional value is another benefit of this method. Spray-drying (hot-drying) and lyophilization are the two main contemporary technologies employed in the production of camel milk powder (freeze-drying).
- The denaturation of proteins in camel milk during high-temperature heat treatment, occurs during spraying, is the main challenge (especially whey proteins),

3. Yoghurt-

- Many strains of common lactic bacteria, including *Lactobacillus Bulgaricus* and *Streptococcus Thermophilus*, have been studied. However, the production of camel milk yoghurt has a textural issue, making the final product sticky and unappealing to the palate. This restriction is caused by the protein makeup and inherent antimicrobial properties of camel milk.
- Better texture has been the subject of tests, but these have only ever been conducted on a small scale in laboratories.

4. Butter-

- Using the same production process as for butter made from cow milk is challenging because butter is not a typical product from camel milk. It is challenging to churn cream at the 8–12 °C temperatures used for churning cow milk due to the high melting point of camel milk fat (41–42 °C). Compared to milk-based butter made from cows. Camel milk butter has a distinct white color and a more buttery, thick consistency; the flavor and aroma are average.
- It has also been tried to make ghee (clarified butter), a popular commodity in India, using camel milk, but the end product was found to be more vulnerable to rancidity and to have a very low yield when compared to buffalo or cow milk.

5. Ice cream –

- Making ice cream with various flavors is a simple technological process. In Kazakhstan, Morocco, and the United Arab Emirates, camel milk ice cream is sold commercially. It uses the same technology as other milks. Ice cream is quite well-liked by people.

3.1 Usage of camel milk in cosmetics/Non-Alimentary Processing of Camel-Milk-

- Today, numerous countries regularly produce soaps and other cosmetic treatments using camel milk (Morocco; Mauritania; Saudi Arabia; India; Holland; China; Australia; etc.). In China, one may buy cabinets full of cosmetics like lipsticks, moisturizers, shampoos, and other lotions.
- Due to its efficacy in treating a variety of skin conditions, including eczema, dermatitis, and acne, camel milk for skin is widely used. The skin is pumped and smoothed by the high concentration of -hydroxyl acid in camel milk. In addition to giving the body nutrients, camel milk also heals and nourishes the skin, making it a blessing for human life. Online retailers provide camel milk in frozen and powdered forms for use in skincare and cosmetics across the globe.

Conclusion

Numerous studies have been conducted on the milk compositions of dairy cows all over the world, and thousands of references are accessible, particularly with relation to milk used for human consumption. Camel milk is most comparable to human milk in terms of its chemical characteristics. Linoleic acid and polyunsaturated fatty acids are more abundant in the lactic acid found in camel milk than short-chain fatty acids, which are found in lower concentrations. It is a good source of vitamins and minerals, particularly iron, vitamin C, and B group vitamins. Camel milk has high protein content and is frequently referred to as a "full meal" because it has all the nutrients needed to sustain life. There are countless benefits to health that it offers.

Due to its abundance of bioactive ingredients, camel milk is used extensively around the globe to cure a wide range of serious illnesses. Because of the increasing consumer interest in camel milk in recent years, output is gradually rising. Camel milk is processed into products like milk, butter, etc. to extend its short shelf life. The products made from camel milk are a good source of nutrition and energy. In order to increase the use of camel milk and to establish these stated health advantages, further thorough researches are required. Hence, without a doubt, camel milk is the desert's "white gold."

References

- 1) Abu-Lehia, I.H. (1989) Physical and chemical characteristics of camel milk fat and its fractions. *Food Chemistry* **34**: 261-271.
- 2) Agrawal, R.P. *et.al.* (2007) Effect of camel milk on residual -cell function in recent onset type 1 diabetes. *Diabetes Research and Clinical Practices*. **77** (3) pp. 494-495.
- 3) Ashwood P. *et.al.* (2006). the immune response in autism: a new frontier for autism research. *J Leukoc Biol.* **80**(1): 11-15.
- 4) Brezovečki A. *et.al.* (2015) Camel milk and milk products. *Mljekarstvo*. **65** (2):81-90
- 5) DAHDF (2014), *Basic Animal Husbandry Statistics-2012*, Department of Animal Husbandry Dairying and Fisheries, New Delhi.
- 6) Ehlayel M. *et.al.* (2011). Camel milk: an alternative for cow's milk allergy in children. *Allergy Asthma Proc.* **32**(3):255–8
- 7) El-Agamy, E.I. (2000) Effect of heat treatment on camel milk proteins with respect to antimicrobial factors: a comparison with cow and buffalo milk proteins. *Food Chemistry*. **68** (2):227-232.
- 8) Ereifej K. *et.al.* (2011) Comparison and characterization of fat and protein composition for camel milk from eight Jordanian locations, *Food Chemistry* **127**: 282-289.
- 9) FAO (2008): Camel milk. Retrieved from www.fao.org/ag/againfo/themes/en/dairy/camel.html.

- 10) Gul W. *et.al.* (2015) Camel Milk: A Boon to Mankind. *International Journal of Research Studies in Biosciences* . **3**(11): 23-29
- 11) Guo H. *et.al.*(2007) Composition, physicochemical properties, nitrogen fraction distribution, and amino acid profile of camel milk. *J Dairy Sci.* **90**:1635–1643.
- 12) Kaskous S. (2016). Importance of camel milk for human health. *Emirates Journal of Food and Agriculture.* **28**(3): 158-163
- 13) Kumar D. *et.al.* (2016) Camel milk: alternative milk for human consumption and its health benefits. *Nutrition and Food Science.* **46**(2): 217-227
- 14) Konuspayeva G. *et.al.* (2021) Recent Advances in Camel Milk Processing. *Animals.* **10****45**
- 15) Magjeed, N.A. (2005). Corrective effect of milk camel on some cancer biomarkers in blood of rats intoxicated with aflatoxin B1. *Journal of Saudi Chemical Society.* **9** (2): 253-263.
- 16) Rao M.B. *et.al.* (1970). Camel's milk and milk products. *Ind. J. Dairy Sci.* **23**: 71-78.
- 17) Singh C. *et.al.* (2014) Therapeutic Value of Camel Milk – A Review. *Advanced Journal of Pharmacie and Life science Research.* **2**(3): 7-13
- 18) Shabo Y. *et.al.* (2005). Camel milk for food allergies in children. *IMAJ.* **7**: 796-798.
- 19) Shabo, Y. and Yagil, R. (2005) Etiology of autism and camel milk as therapy. *International Journal of Diseases of Human Development.* **4** (2): 67-70
- 20) Shori A. B. (2015) Camel milk as a potential therapy for controlling diabetes and its complications: A review of in vivo studies. *Journal of food and drug analysis.* **23**: 609-618
- 21) Undeniable camel milk benefits for skin care and hair growth. (2020). CamelMilk.com
- 22) Yadav A.K. *et.al* (2015). Composition and medicinal properties of camel milk: A Review.
- 23) Camel Milk and its Unique Anti-Diarrheal Properties. *IMAJ.* **15**: 35-36.
- 24) Wernery U. (2006) *Asian Journal Dairy and Food Resources.* **34**(2): 83-91
- 25) Yagil R.(2013). Camel milk, the white gold of the Desert. *Journal of Camel Practice and Research* **13** (1):15-26.