

Camel Milk: A Nutritional and Medicinal Source

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Abstract

Camel serve as multipurpose animal and one of the features is milk production. Camel milk has more similar chemical composition with human milk as compare to any other ruminant's milk. Camel milk is different from other animal milk. It is low in cholesterol and sugar while high in minerals, vitamin C, higher protective proteins like lactoferrin, lactoperoxidase, immunoglobulins and lysozyme. Camel's milk has exceptional medicinal properties like antioxidative agent, antimicrobial, healing in joint inflammation, treatment of paratuberculosis, antiaging, immune system booster and cosmetic agent. Insulin concentration in camel milk is high that's why it is important for diabetic human patients. Camel milk is high in magnesium and zinc minerals that provide antiulcer property. Regardless of the fact that camel milk has such characteristics; it's less refreshing in this manner its utilization is limited to pastoral areas. Further research work is needed to a certain medicinal value and chemical composition of camel milk.

Keywords: Camel Milk; Chemical Composition; Protective Protein; Medicinal Value

Introduction

For centuries, camel milk has been an essential source of nutrition for people of different cultures that are living in harsh environments like dessert. Now it is being commercially produced sold in markets of many countries. According to Food and Agriculture Organization (FAO), a total of 35.0 million camels are present in this world. About 44% population is present in East Africa, 26% in West Africa, 15% in North Africa and 15% in Asia, as shown in figure 1 [1]. Out of total population about 89% are one-humped dromedary camels (*Camelus dromedaries*) and 11% are two-humped (*Camelus bactrianus*) [1]. Generally two-humped camels are present in the cold deserts. Camel milk known as "White Gold of Dessert", it is more similar to human milk as compare to other ruminant's milk [2]. It contains low sugar and cholesterol, high vitamin C and high minerals (Sodium, Potassium, Iron, Zinc, Copper and Magnesium). Many protective proteins like lactoferrin, immunoglobulins, lactoperoxidase and lysozyme are present in it [3]. For a long time, camel milk has been considered as potential treatment for different diseases like jaundice, dropsy, anti-hypertension, leishmaniasis and many more [4]. It has been testified that camel milk is important for lactose intolerant person because it contains low amount of β -casein and lack of β -lactoglobulin which are responsible for allergic reactions [5]. Moreover, camel milk contains protective protein and insulin hormone which is used for the treatment of diseases like autism diabetes, diarrhea, and as anti-tumors [6]. Camel milk is a gift with very strong immune chemical mediators, therapy for peptic ulcers, anti-malignant, anti-platelet and anti-thrombotic properties [7,8]. Recent researches have confirmed that camel milk has special features in terms of antioxidative property, antiviral, antifungal, antibacterial, anti-hepatitis, anticancer, treatment

of paratuberculosis, hypoglycemic activity, treatment for autoimmune diseases, preventives of aging, cosmetic and detergents [9,10]. Scientists and researchers are doing work on it to find more accurate and precise role of camel milk in field of medical science.

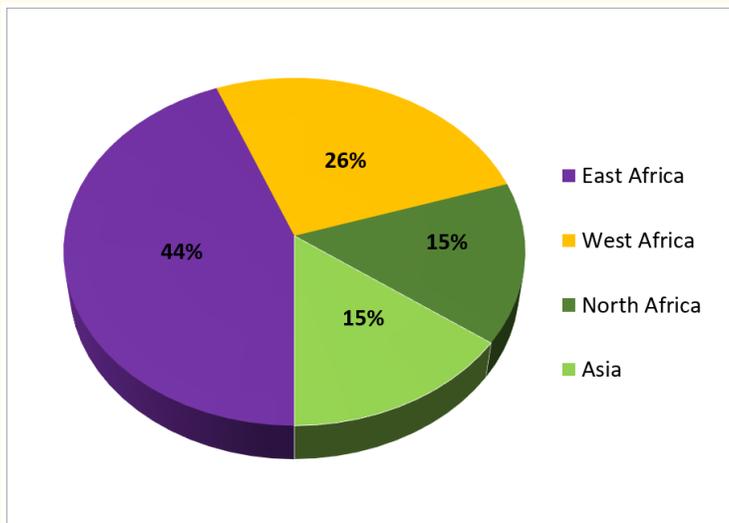


Figure 1: Camel Distribution by Region.

Camel's milk composition

Camel milk is opaque in appearance with white color, faint sweetish odor and sharp taste; sometimes salty [11]. The change in the taste of milk is due to the different type of fodder, forage and source of drinking water [3]. Camel milk has finely homogenized fats that's why it has opaque white color. Density of camel milk ranges from 1.026 to 1.035 and pH 6.2 to 6.5. Both parameters ranges are lower than that of cow's milk [6]. According to researchers, the composition of milk varies due to the difference of origin and time of the year for sampling [5]. Other factors like feeding conditions, physiological stage, seasonal variations, genetics or health status of camel are also responsible for change in milk composition, taste and sometimes color [5]. Generally, the camel milk contains 87% water as a major component, while other ingredients are lactose 4.4%, fat 3.5%, protein 3.4% and ash 0.79%. In the table 1, the comparison of milk compositions between different specie is given.

Components	Water %	Protein %	Fat %	Lactose %	Ash %
Camel	86-88	3.0-3.9	2.9-5.4	3.3 -5.8	0.6-0.9
Cow	85-87	3.2-3.8	3.7-4.4	4.8-4.9	0.7-0.8
Buffalo	82-84	3.3-3.6	7.0-11.5	4.5-5.0	0.8-0.9
Sheep	79-82	5.6-6.7	6.9-8.6	4.3-4.8	0.9-0.1
Goat	87-88	2.9-3.7	4.0-4.5	3.6-4.2	0.8-0.9
Human	88-89	1.1-1.3	3.3-4.7	6.8-7.0	0.2-0.3

Table 1: Composition Of Camel's Milk With Other Species [12].

Camel milk as medicine

For a long time, camel milk has been used to provide a likely treatment for different illness or diseases in different areas of the world. Different researches have shown that camel milk is an essential nutritional, medicinal and functional source of food [4,12]. Camel milk contains bioactive substance that's why provides health benefits. All over the world, the owners, breeders and keepers are convinced that camel milk has distinct medicinal properties. As having medicinal properties, the effectiveness of camel milk is especially for jaundice, dropsy, conditions affecting the spleen and lungs [13]. Camel milk is a complete and ideal nutritive mixture in all type of milk. Health benefits of camel milk are far better than any other alternative of this kind [14].

Boost immunity

Camel milk contains compounds that are helpful against many microbial organisms [15]. It contains two active components that are lactoferrin and immunoglobulins. These proteins present in camel's milk, may give its immune boosting properties. Lactoferrin is anti-fungal, anti-inflammatory, antioxidant and antibacterial in nature [16]. Lactoferrin has property to inhibit the growth of many infectious organisms that include *E.coli*, *Clostridium*, *K. pneumonia*, *H. Pylori*, *S. aureus* and *C albicans* [17]. Additionally camel milk has whey protein which is responsible to fight harmful microorganisms. Antioxidant property helps our body to fight free radical damage [18].

Promotes development

Different proteins in different quantities are present in the camel milk, many of proteins are lacking in goat or cow milk. It can help in promoting proper development and growth of organs and bones [19]. Protein is one of the most fundamental building blocks of the body and this milk gives a great deal of it. Actually, in numerous societies, this milk is given to malnourished babies and children, as it can improve wellness and health significantly. This milk was first used as an approach to prolong ventures through the desert whenever food and different odds of fluid food were restricted [12].

Allergic reactions

Camel milk has been associated with decreasing allergic reactions in the individuals who generally drink it [20]. Lactose tolerance is common problem in humans occurred due to lack/deficiency of enzyme. The enzyme needed to digest the sugar in dairy known as lactose. So, camel milk is safe for lactose intolerant individuals [1].

Heart health

Camel milk has a complete and unique set of fatty acids that can help to improve balance of cholesterol in the body. Camel's milk helps to decrease the chances of heart attack, atherosclerosis, strokes and also helps in lowering high blood pressure [21].

Diabetes treatment

Camel milk contains lot of essential biomolecule; insulin is one of them which is important for human health and blood sugar regulation [22]. For prevention of diabetes a balance between glucose and insulin is very important. If a continue stream of camel milk is added in diet for a diabetic patient, it will decrease the need of insulin injections. It can also be helpful in prevention of this disease [23].

Stimulates circulation

The significant concentration of iron in camel milk makes it ideal for preventing anemia. As iron is a basic segment of red blood cells. It can increase blood circulation and oxygenation of the body's organs and extremities [24].

Autism treatment

Camel milk has high concentration of exceptional organic compounds. These compounds have been known to have powerful effects on the neurological system. It can even prevent autoimmune disorders [25]. It is reported that when camel milk was taken habitually,

autistic symptoms have been reduced or erased completely. However exact pathways are unknown, but this is potentially invaluable remedy for a disastrous affliction [26].

Treatment of Skin Diseases

Rejuvenating properties of camel milk have been asserted in prior cosmeceutical studies for quite some years [27]. The beneficial effects of consuming camel milk on skin have been attributed to the presence of ample quantity of vitamin C present in it. The antioxidant, fibroblastic, angiogenic and proliferative capabilities of vitamin C confer a dermo-protective quality to camel milk by alleviating desiccation and imparting firmness to the skin [28]. Following ingestion, proteins in camel milk are digested to produce bio-active peptides which can act as natural antioxidants and angiotensin converting enzyme inhibitors [29].

Crohn disease/syndrome

Crohn syndrome is a type of pernicious inflammatory bowel syndrome that may involve different areas of digestive tract ranging from mouth to anus. Common indications of the disease include fatigue, anorexia, emaciation, vomiting, diarrhea and severe abdominal pain. However, pruritis, conjunctivitis and arthritis are also commonly associated with clinical manifestation of this disease. Through the years, a myriad of risk factors ranging from environmental to microbial have thought to been at the root of this syndrome. *Mycobacterium avium subspecies paratuberculosis* transmitted to humans by consumption of unpasteurized bovine milk is considered predominant microbial cause of this disease. In such cases, camel has been prescribed to alleviate symptoms. The application of empirical therapeutic knowledge and subsequent efficacy of camel milk in mitigating severity of the disease has led researchers to postulate inherent bactericidal properties against *Mycobacterium avium subspecies paratuberculosis*. Scientists believe that camel milk contains a paratuberculosis specific peptidoglycan recognition protein capable of binding and neutralizing the contagion [30].

Anti-neoplastic capabilities

Prior studies have alluded towards the efficacy of camel milk in eradication of cancer cells (HepG2-MCF7) by inhibiting protein kinases, due to presence of iron - binding glycoproteins, immunoglobulins and lactoferrins in exorbitantly high concentrations. Presence of lactoperoxidase enzyme and peptidoglycan recognition proteins act as natural preservatives against microbial contamination, conferring an anti-neoplastic property to the camel milk. The antibodies naturally present in camel milk are capable of binding and destroying cancerous cells [31]. Recent studies have found these proteins to be quite promising in averting metastasis during the course of breast cancer [32], lung cancer, hepatocellular carcinoma and leukemia. Moreover the hepatoprotective and thrombolytic activity inherent to camel milk has also been shown to hamper proliferation and metastasis of tumor cells in animals and humans [28].

Conclusion

Camel milk is considered one of the best milk in the world. It contains all the ingredients that are essential for the body. For human body camel milk is easy to digest. Camel's milk calcium is more absorbable than other animals' milk. It contains insulin which is beneficial for diabetic patients. So, camel milk is amazing in terms of antimicrobial, anti-hepatitis, anti-arthritis, preventing aging, treatment of paratuberculosis, remedy for autoimmune disorders/diseases and cosmetics. Elucidation of the therapeutic role of camel products is ongoing. Clearly, scientists and researchers are doing work on it to find more accurate and precise role of camel milk in field of medical science.

Conflict of Interest

Authors have no conflict of interest in publishing this article.

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