



## **Importance of Camel milk as a probiotics on Human Health**

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### **ABSTRACT**

*Milk is the best ideal diet for humans as it contains all the necessary requirements of body such as carbohydrates, proteins, vitamins, lipids, water and other minerals. Milk and milk products are consumed in regular diet throughout the world due to its several health benefits. Majority of the world population consume cow, buffalo, goat, sheep and yak milk due to its easy availability. Very few human populations consume camel milk due to lesser availability of camels. Camel milk is also considered to be the white gold of dessert as it comprises of large number nutrients and minerals which shows many beneficial effects on humans such as anti-diabetic, anti-ageing, anti-bacteria and anti-viral activities. Camel milk also contains large number of abundant proteins which helps in improving the immunity functions. Apart from all the nutritional aspects, camel milk also contains large number of probiotic bacteria which helps the host in regulating several body functions. The entire review will highlight the importance of camel milk as probiotics on human health.*

**Keywords:** Camel milk, Probiotics, Human health, Health benefits.

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### **INTRODUCTION**

Camel is an even toed ungulate animal of genus *Camelus* that habitats in the arid regions of the earth. *Camelus dromedaries* and *Camelus bactrianus* are the two species of camels found throughout the world [2]. Camels have been used since centuries for transportation, milk and meat [3]. Camel milk has been a very important source of nutrition for people living in arid and semi arid zones of the world. Due to its high therapeutic effects and nutritional value, camel milk has turned into a growing interest for researchers [4]. In Quran camel is declared as wonder of god (Attia H et al; 2001). Dromedary camels usually habitat in desert area and are generally used for transportation for small distance. Besides it, their milk is also used as dietary supplement by some communities residing in desserts namely raikas and rabaris since many decades [1]. Camel milk has been used as medicine for treating several infections by many communities of dessert in Asia and Africa since centuries [5]. Camel milk is quite different than milk of other animals and somewhat more relevant to human milk as its composition contains very small amount of sugars and cholesterol and large amount of minerals such as potassium, copper, zinc, iron, magnesium and calcium in greater quantity [6]. Camel milk has been also used in treating and curing several diseases such as asthma, anti-hypersensitivity, jaundice, leishmaniasis and dropsy [3]. In 1990s, the medicinal properties of camel milk were investigated. According to the researchers, camel milk contains reactive proteins in its composition which boosts the immunological defense mechanism [7]. A study also reported that these proteins have antibacterial and antiviral properties [8]. Besides this, camel milk also has a hypoglycemic effect while treatment due to which combination of insulin and insulin like proteins shows good result in treating diabetes. In past, camel milk was used in curing crohn's infection and food allergies [9]. We have compiled all the updated literature describing the composition and probiotic effects of camel milk on human health. Therefore, the entire review will briefly illuminate the advantageous impacts of camel milk on human health.

### **MEDICINAL VALUES OF CAMEL MILK**

Camel milk has been used in the treatment of number of clinical infections and diseases since ancient times. Camel milk is not just a good source of nutrients but it also has large number of medicinal

properties as it contains high concentration of vitamin C and also contains good proportion of antibacterial substances in comparison to cow milk [1]. Camel milk contains large number of bioactive compounds such as peptides and proteins which are naturally found in its compositions and have also been reported to have beneficial effects of immunity, growth and digestion. Apart from this, camel milk has also been reported to have beneficial effects on diabetic patients and patients with high cholesterol [3].

#### **ANTI-DIABETIC EFFECTS OF CAMEL MILK**

Diabetes mellitus is a medical complication caused due to high increase in blood sugar levels. There are two types of diabetes: Type I and Type II. Type I is more severe which insulin dependent is that is also called juvenile diabetes. Approximately 10% of people suffer from type I diabetes which is fatal unless treated with insulin. Type II diabetes is caused due to insufficient production or improper functioning of insulin in the body [11]. Approximately 90% of the patients suffer from type II diabetes throughout the world. According to the previous studies, consumption of camel milk on regular basis has provided effective management for patients suffering from type I as well as type II diabetes [15].

Researchers in the past have assumed the following possibilities for anti-diabetic effect of camel milk on humans that is 1) Presence of good concentration of insulin/insulin like substances in the composition of camel milk. The whey protein found in camel milk is rich in half-cystine which is similar to insulin; 2) Immuno-modulatory effect of camel milk on beta cell function; 3) the human, goat, bovine milk contains insulin in their composition but the insulin found in camel milk is resistant to low pH or the acidic environment of gut and avoids coagulum. It is assumed to be encapsulated in nanoparticles that make it possible to survive at low pH in stomach. Studies of Sbouis demonstrated the effect of heat treatment on the anti-diabetic property of camel milk in Alloxan induced diabetic dogs. In his study, he reported that pasteurized and raw milk of camel can be used as treatment for treating diabetic dogs. The technique of pasteurization not only helps to preserve the milk for long time but it also saves the therapeutic particularity if camel milk [12-16].

#### **ANTI-BACTERIAL EFFECT**

Natural inhibitory systems are found in camel milk that is considered to be much better than cow's milk. Studies in the past showed that camel milk contains various lysozymes (LZ), peptidoglycan recognition protein (PGRP), protective proteins, lactoferrin (LF) and immunoglobulins (Ig's) which exhibits immunological properties and antibacterial responses. The concentration of lysozyme and lactoferrin in camel milk is reported to be higher than cow's milk [7]. Lysozyme plays an important role in showing broad spectrum of antimicrobial responses. It mainly targets the cell wall of bacteria containing peptidoglycan layer which is the main specific site for lysozyme action. It shows muramidase activity against Streptococcus and other Gram positive bacteria. Lactoferrin is a protein that binds with iron and divests the microorganism from iron by binding to it and through this bacteriostatic effect is observed against both Gram negative as well as Gram positive bacteria. However, a study in the past has also reported that few strains of *E. coli* produce siderophores which helps them to bind with Fe. The Lactoperoxidase found in camel milk is highly bacteriostatic against Gram positive bacteria and it is bactericidal against Gram negative bacteria. According to previous studies, presence of immunoglobulins in camel milk is found throughout the entire period of lactation which greatly improves the human immune system on regular consumption of milk in regular diet. For diagnosing mastitis, N-acetyl -  $\beta$  - D - glucosaminidase (NAGase) is one of the most reliable lysosomal enzyme which is found in camel milk. Though milk of camel is rich in NAGase, it is established to have antibacterial activity.

#### **REFERENCES**

1. Abushelaibi, S. Al-Mahadin, K. El-Tarabily, N.P. Shah, M. Ayyash (2017). Characterization of potential probiotic lactic acid bacteria isolated from camel's milk LWT-Food Sci Technol., 79, pp. 316-325.
2. A.M. Kamal, O.A. Salama, K.M. El-Saied. (2007). Changes in amino acids profile and camel's milk protein during the early lactation. Int. J. Dairy Sci., 2, pp. 226-234.
3. Hernández-Ledesma, M.J. García-Nebot, S. Fernández-Tomé, L. Amigo, I. Recio. (2014). Dairy protein hydrolysates: Peptides for health benefits. Int. Dairy J., 38 (2014), pp. 82-100.
4. Kumar, M.K. Chatli, R. Singh, N. Mehta, P. Kumar. (2016). Enzymatic hydrolysis of camel's milk casein and its antioxidant properties. Dairy Sci Technol., 96, pp. 391-404.
5. D.E. Chatterton, G. Smithers, P. Roupas, A. Brodtkorb. (2006). Bioactivity of  $\beta$ -lactoglobulin and  $\alpha$ -lactalbumin technological implications for processing. Int. Dairy J., 16, pp. 1229-1240.
6. G. Konuspayeva, B. Faye, G. Loiseau. (2009). The composition of camel's milk: a meta-analysis of the literature data. J. Food Compos. Anal., 22, pp. 95-101.

7. H. Attia, N. Kherouatou, A. Dhouib. (2001). Dromedary milk lactic acid fermentation: microbiological and rheological characteristics. *J. Ind. Microbiol. Biotechnol.*, 26, pp. 263-270.
8. H. Korhonen, A. Pihlanto. (2006). Bioactive peptides: production and functionality. *Int. Dairy J.*, 16, pp. 945-960.
9. K. Devendra, K.A. Verma, M.K. Chatli, R. Singh, P. Kumar, N. Mehta, O.P. Malav. (2016). Camel's milk: alternative milk for human consumption and its health benefits. *Nutr. Food Sci.*, 46, pp. 217-227.
10. K.A. Al-Shamsi, P. Mudgil, H.M. Hassan, S. Maqsood (2018). Camel's milk protein hydrolysates with improved techno functional properties and enhanced antioxidant potential in *in vitro* and in food model systems *J. Dairy Sci.*, 101, pp. 47-60.
11. M. Khalesi, M. Salami, M. Moslehishad, J. Winterburn, A.A. Moosavi-Movahedi.(2017).Biomolecular content of camel's milk: a traditional superfood towards future healthcare industry. *Trends Food Sci. Technol.*, 62, pp. 49-58.
12. O.A. Al Haj, H.A. Al Kanhal. (2010). Compositional, technological and nutritional aspects of dromedary camel's milk. *Int. Dairy J.*, 20 , pp. 811-821.
13. R.P. Agrawal, S. Saran, P. Sharma, R. Gupta, D.K. Kochar, M.S. Sahani. (2007). Effect of camel's milk on residual b-cell function in recent onset type 1 diabetes *Diabetes Res. Clin. Pract.*, 77, pp. 494-495.
14. R.R. Watson, R.J. Collier, V.R. Preedy (Eds.), (2018). *Nutrients in Dairy and their Implications on Health and Disease.* Academic Press, pp. 451-468.
15. S.R. Ahamad, M. Raish, A. Ahmad, F. Shakeel. Potential health benefits and metabolomics of camel's milk by GC-MS and ICP-MS *Biol. Trace Elem. Res.*, 175 (2017), pp. 322-330.
16. Saadony, M.E. Shafi, S.Y. Qattan, G.E. Batiha, A.F. Khafaga, M. Alagawany.(2020). Probiotics in poultry feed: a comprehensive review *J. Anim. Physiol. Anim. Nutr.*, 104, pp. 1835-1850.

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