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A REVIEW ON CAMEL MILK

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ABSTRACT

Milk is consumed on a daily basis by millions of people across the globe because of the many nutritional advantages it provides, such as supporting bone growth and development in young children owing to its high calcium and vitamin D content. Menopausal women in particular, where calcium insufficiency is a major risk factor for osteoporosis development, have found it to be helpful. Camel's milk contains a variety of vitamins, including B vitamins (B1, B2, and C), and vitamin E.

KEYWORDS: Milk, high calcium and vitamin D.

INTRODUCTION

Artio-dactyla requests a camel, which is a member of the family Camelidae. Bactrian camels (Camelus bactrianus) and Arabian or dromedary camels (Camelus dromedarius) are both kinds of camels Especially in arid regions like the Middle East and Arabia, camels have long played an important role in many civilizations. Camels may be bred to adapt to a wide range of climates. The fact that they're used in transportation, sports, and as a source of meat and dairy contributes to the economy and people's food security).

According to the latest FAO data, there are about 29 million camels in the world, with roughly 95% being dromedary (one humped) camels. The lactation period of a camel may last anywhere from nine months to eighteen months. Breed, animal health, lactation stage, and environmental conditions all have an impact on how much milk is produced. However, improved diet, water, and veterinary procedures may boost the milk production of camels because of the similarity in udder shape.

Milk is consumed on a daily basis by millions of people across the globe because of the many nutritional advantages it provides, such as supporting bone growth and development in young children owing to its high calcium and vitamin D content. Menopausal women in particular, where calcium insufficiency is a major risk factor for osteoporosis development, have found it to behelpful.

As a food supply and source of income for most people in underdeveloped nations, milk plays an important role. There are about 150 million families in the world that are actively involved in milk production Small-scale farmers benefit the most from it because of the rapid cash flow. Camel's milk is an excellent source of essential nutrients for humans. Furthermore, it has medicinal advantages.

According to the present study, camel's milk is a natural source of bioactive components with a unique composition and potential health advantages.

Milk from a cow that was fed camels
Compared to cow's milk, camel's milk has a lower pH (6.2–6.5) and is opaque white with a somewhat salty flavour Triglycerides make about 96% of the fat composition, with cholesterol at 30 mg/100 g dry matter Compared to cow's milk, its fat contains less short-chain fatty acids (Additionally, the fat globules are smaller on average when compared to fat globules from cow, buffalo, and goat milk (Canned milk may create issues in technical applications, due to its high digestibility.

Camel's milk contains a variety of vitamins, including B vitamins (B1, B2, and C), and vitamin E. (Vitamin C levels in citrus fruits and vegetables are three to five times greater than in cow's milk, making citrus fruits and vegetables an essential component of the diet in regions with limited accessto green foods.

Camel's milk has been shown to have anti-diabetic, bactericidal, and anti-hepatitis properties (Some of its distinctive inhibitory frameworks, such as lactoperoxidase/thiocyanate/ hydrogen peroxide, lacto-ferins, lysozyme, immunoglobulines, and free greasy

acids, protect it against microbial contamination.

Comparing camel's milk to cow's milk

Camel milk differs significantly from cow milk in many ways (To provide one example, cow's milk contains b-lactoglobulin (b-LG), a protein that may cause allergic responses in certain people. There are also more antibacterial compounds in camel's milk's whey protein than in cow's. These include lactoferrin, lysozyme and immunoglobulin as well as lactoperoxidase.

Mineral-binding properties and immunoglobulins may be revealed by these variations in camel's milk proteins following hydrolysis Compared to cow's milk, camel's milk is paler in colour and hasa saltier aftertaste. Its density is also somewhat lower at an average of 1.029 g/cm3. From 6.4 to 6.7, the pH scale ranges. The water content fluctuates between 87 and 90 percent, with a freezing point between 57 and 61 degrees Celsius.

Opacity and fat content all affect the colour of cow's milk, which is opaque white with a yellowish tint owing to carotene (. Cattle milk has a water content that ranges from 79 to 90%. Cow's milk hasa pH range of 6.4 to 6.6, depending on the breed. It has a density of 1.030 g/cm3 and a freezingpoint of 0.4 C. It is very dense and extremely cold. Cow's milk has an average fat content of 3.6 percent, a protein content of 3.0 percent, and lactose content of 4.6 percent.

Camel's milk has a more varied composition than cow's milk. The percentage of chemicals in camel's milk varies greatly depending on the region and season. Camel's milk has a consistent lactose level of 3.5 to 4.5 percent (Camel's milk contains the majority of it as its primary source of energy. It also includes a limited number of distinct oligosaccharides that protect babies from infections, stimulate the creation of Bifidobac- terium environments, and assist in the development of the neurological system. Moreover.

Protein content may range from 2.15 to 4.90 percent depending on the breed of camel being milked. Despite the fact that casein content (as1, as2, b, and j-casein) is comparable between camel and cow milk, whey protein level varies significantly between the two milks. The casein-to-whey protein ratio in cow's milk is greater than in camel's milk, for this reason.' There is a difference in the hardness of coagulum between camel's and cow's milk due to this.

Camel milk's primary protein is casein, which accounts for 52–87% of total proteins, with whey proteins accounting for the remaining 20%–25%. (Devendra et al., 2016). The as1 to as2 to b to j- casein ratio fluctuates significantly in camel's milk, being 22:9.5:65:3.5. Casein in camel's milk is divided into four fractions, each with their own accounting. Camel's milk contains 65 percent more b-casein than a-casein (out of a total of 21 percent) than cow's milk).

In comparison to camel's milk, cow's milk has similar percentages of b-casein and a-casein (36 and 38 percent, respectively), as well as a greater concentration of j-casein (13 percent), which isroughly four times lower in camel's milk (3.47 percent) (. As b-casein is more sensitive to peptic hydrolysis in the stomach, it is more digestible and less allergenic for individuals. the increased b- casein in camel's milk makes it better for human health.

Camel's milk casein micelles vary in size from 20 to 300 nm, while cow's milk casein micelles are between 40 and 160 nm. Camel's milk casein micelles have a bigger average diameter and a higher mineral charge (Attia et al., 2001). Camel's milk's primary whey protein is a-lactalbumin. It's easier to digest and has more antioxidant activity than cow's milk a-lactalbumin, therefore it's better forbaby formula.

Camel's milk lacks b-lactoglobulin, making it less allergenic, but other whey proteins, such aslactoferrin and immunoglobulins, may be found in the protein). It is a glycoprotein called lactoferrinthat is responsible for the binding of two ferric ions. Camel's milk contains between 0.02 and 2.1 g/L of this substance (). Has anti-infectious, immunomodulatory, and anti-tumor properties, Antimicrobial agent lysozyme is also found in camel's milk at a greater concentration of 150 lg/L in comparison to cow's milk (70 lg/L). Neonatal passive immunity is mostly dependent on immunoglobulins (IgG), which are found in whey proteins. Camel's milk's predominant immunoglobulin is IgG. As described by Park & Haenlein, it's produced at approximately 100 g/L in colostrum but drops quickly during breastfeeding to less than 10 g/L.

It's important to remember that the variations in the protein profiles of fermented camel and cow's milk may change their composition (. The structure of b-casein in fermented camel's milk gives it more antioxidant peptides. The proline content of camel's milk b-casein is higher due to the shorter length and higher concentration of the amino acid. Its breakdown produces bioactive peptides and releases antioxidant amino acids like phenylalanine and tryptophan).

There is a wide range of fat content in camel's milk, from 1.2% to 4.5% (). Camel's milk fat content has been reported to reach up to 6.4% by, and its profile is characterised by the presence of unsaturated and long chain fatty acids in greater quantities. This aids in the reduction of serum cholesterol levels in humans. Unsaturated acids make up 35–50% of the fat while long-chain fatty acids account for 92–99% of the fat. Camel milk fat has a "waxy texture" due to structural changes. Camel's milk is whiter because it contains less carotene than cow's milk.

Camel milk's mineral composition is comparable to that of cow milk, particularly in the amount of Ca, P, Mg, Na,

and K. The major difference is in the amount of Zn, Cu, Fe, and Mn in camel's milk, which is greater. Camel's milk's higher iron concentration may help prevent anaemia due to iron deficiency. Additionally, since citrate concentrations in camel's milk are lower than in cow's milk, the antimicrobial activity of lactoferrin is increased in the former. There is a wide range of mineral concentration in camel's milk, from 60 to 90 percent. Camel's milk has a salty flavour because of the high concentration of chloride in the diet that the animals consume.

Camel's milk also has a greater concentration of the antioxidant ascorbic acid. As a result, its goods will have a longer shelf life, and their antioxidant and antiradical properties will improve Camel's milk mineral salt and vitamin contents vary depending on breed, diet, water consumption and lactation stage. The vitamin C and niacin content of camel's milk is greater than that of conventional dairy products, making it a healthier alternative. Nevertheless, it lacks folic acid, pantothenic acid, and the B vitamins B1, B2, and A. Vitamin B6 and B12 levels are almost same in camel and cow milk Camel's milk, on the other hand, keeps its temperature better than cow's milk. When the temperature of camel's milk is raised to 80 degrees Celsius, 32–35 percent of the whey proteins break down, while at 90 degrees Celsius, 47–53 percent of the whey proteins are denaturized. 70% of whey proteins are denaturized in cow's milk when heated to 80°C; at 90°C, denaturation occursto an even greater extent (80%).

Camel's milk contains much more inhibitory structures, such as lysozyme and lactoferrins, than cow's milk. So it may be kept at room temperature for an extended length of time instead Peptides and proteins included in this food have a significant effect on a wide range of bioprocesses, including absorption, digestion, growth, and immunity. Camel's whey contains a diverse range of proteins, including as immunoglobulin, serum egg whites, a-lactalbumin, lactophorin, and peptidoglycan, all of which are found in large quantities.

Camel's milk is good for you.
Breast milk is the most essential food for newborn mammals since it contains all of the nutrients themother's body needs. Milk contains immunologically protective and healthy growth-promoting biologically active chemicals and components. There are many nutritional and therapeutic advantages of drinking camel's milk, including its ability to fight germs and cancer, as well as its antioxidant and anti-hypertensive qualities.

To find out what impact peptides derived from dietary proteins may have on human health (such anti-oxidant activity or mineral binding or blood pressure lowering or immunomodulatory function) considerable research has been conducted on peptides from these sources Milk protein peptides of this kind are well-known. During storage or processing, obscure protease enzymes like milk plasmin may hydrolyze proteins and liberate bioactive peptide fragments (Mohanty et al., 2016). Itis also possible to extract the bioactive peptides via enzymatic hydrolysis using micro- intestinal and digestive enzymes. When it comes to peptide activation, the sequence and makeup of the aminoacids matter.

Camel's milk protein hydrolysates have recently been shown to contain health-promoting bioactive characteristics Lactoferrin, lysozyme, lactoperoxidase, hydrogen peroxide, and immunoglobulins are all present in camel's milk, giving it antibacterial and antiviral characteristics. Gram-positive and Gram-negative bacteria, such as Staphylococcus aureus, Listeria monocytogenes, and Escherichia coli, may be suppressed by these chemicals. Camel milk has a greater concentration of antimicrobial components than cow milk. Milk's beneficial qualities are totally destroyed after 30 minutes at 100 degrees Celsius. The anti-rotavirus activities of camel milk whey proteins are further enhanced in the treatment of non-bacterial gastroenteritis.

The hepatitis C and B viruses are inhibited and prevented from replicating in cells by lactoferrin and IgG found in camel's milk.. Hepatitis C virus peptides may be recognised by the IgG even at doses where human IgG fails to identify virus. Camel's milk can also treat hepatitis B because it boosts the immune system and prevents the virus from replicating its DNA. Camel's milk has a therapeutic effect against drug-resistant TB because of the presence of antibacterial components. Cough, shortness of breath, and fever may all be relieved by drinking camel's milk.

There are ACE-inhibitory peptides in the basic structure of several dietary proteins, including milk proteins. Fermented camel's milk contains these peptides as well. Proteins are broken down into peptides and amino acids by probiotic bacteria used in fermentation.

Fermented camel's milk contains bioactive peptides that may help reduce cholesterol (Orotic acid, found in camel's milk, has been shown to lower cholesterol levels in humans. Probiotic strains may be found in raw camel's milk and fermented dairy products. Camel's milk was utilised in the dairy industry to cultivate Lactobacillus, Bifidobacterium, Enterococcus, and Streptococcus species.

Due to the presence of insulin and insulin-like substances and immunoglobulins in a tiny size, camel's milk is effective against diabetes types 1 and 2. Camel's milk has a high concentration of insulin, up to approximately 52 units per litre. Due to the positive effects on the pancreas and liver caused by these components, less insulin is needed. (As part of the diabetic treatment, camel's milk lowers blood sugar, improves lipid profiles, and decreases insulin resistance).

Camel's milk may also help youngsters with cow's milk allergies by lessening their allergenicity. As a result of this allergy being created, you should avoid products with high concentrations of a-casein and low concentrations of hypoallergenic b-casein. Anaphylaxis, the life-threatening allergic reaction, may be caused by consuming cow's milk, especially in babies. Camel's milk immunoglobulins are also comparable to those found in human milk, making it safe for young children to drink It is also okay to drink camel's milk if you have lactose sensitivity. Comparing camel's milk to cow's milk, which is high in D-lactate, camel's milk has a greater L-lactate concentration. The L-lactate lowers the allergenicity of milk. Due to the fact that immunoglobulins from camel's milk don't react with the IgE of youngsters allergic to cow's milk, camel's milk helpsto alleviate allergic symptoms.

Camel's milk may also benefit autistic individuals, according to recent research. A powerful opioid responsible for brain damage is formed in the intestines of people with this auto- immune illness when the casein in milk breaks down. Cattle milk has a higher concentration of the hormones becasine than human milk, making it more prone to produce opioids.

Camel's milk also contains protective proteins (lactoferrin, lysozyme, and immunoglobulins) that may help in brain development Cancer treatment, including for blood, lung, liver, and breast types, is another perk of the pill. In cell lines and processes under oxidative stress, it inhibits the growth of HepG2 and MCF7 cells and stimulates death receptors.

Camel's milk enhances gut microbiota by increasing the amount of Allobaculum, Akkermansia, and Bifidobacterium that is produced as a result of consuming it. Camel's milk, according may increasethe quantity of Allobaculum, which may have a beneficial impact on the organ's physiological function. Short-chain fatty acids produced by this species are beneficial for colon health, weightloss, and inflammation reduction. Mucin-degrading probiotic Akker- mansia is well-known for itsbeneficial benefits on obesity, metabolic diseases, diabetes, and inflammation. (Wang et al., 2018). Camel's milk has a high protein content.

The amount of protein in camel's milk varies according on the breed and time of year. A 2008 research by. found that in December, it reaches 2.9 percent of its maximum content and 2.48 percentof its minimum level. Not only is camel's milk whey protein packed with soluble proteins, but it also contains native proteases including chymotrypsin A and cathepsin D. The proteins found in camel's milk have the potential to be bioactive on their own or to serve as building blocks for the development of other bioactive peptides.

Proteins found in Casein

Camel milk's primary protein, casein, accounts for 52–87% of the total amount of protein There are three major components: as1-casein, as2-casein, and b-casein, as well as a small percentage of j- casein, in this protein. There is more b-casein in camel's milk than in cow's milk (65 percent of totalcasein) (36 percent). The hydrolysis of b-casein is simpler than that of as-casein. Camel's milk, on the other hand, has much less as1-casein (21%), compared to bovine as1-CN (38%).

According to research, the molecular mass of b-casein and a-casein in camel's milk is greater than that of bovine caseins (28.6 kDa and 35 kDa, respectively). A-casein in bovine weighs 24 kDa Peptides' bioactivity has been widely documented in the scientific literature, but the exact methodby which it works remains a mystery. The majority of research believed that there is a structure–activity connection, while some indicated that the enzyme may be selected to get the appropriate fragment and effect. Casein or whey proteins may be used to make the milk protein hydrolysates. A study found that casein hydrolysates produced potent peptide angiotensin-I-converting enzyme (ACE) inhibitors, whereas a study found that Ile-Leu-Pro Met-His-Ile-Arg of bovine lactoglobulin had significant antihypertensive properties

Whey protein hydrolysate bioactive properties

It is an excellent source of nutrients and key peptides to be found in whey (The use of various methods such as heat treatment, drying, reversible osmosis, and membrane separation has been made to concentrate whey proteins and increase their nutrient value. Whey hydrolysis may also be used to generate bioactive peptide hydrolysates. Enzymatic hydrolysis in vitro may liberate these peptides, as previously described. After then, whey protein bioactive peptides may work on the body's main organ systems and provide these systems with physiological functions (Bioactive characteristics of milk protein hydrolysates include the following:

anti-oxidant action

The food sector is concerned about food oxidation. Free radicals produced by lipid oxidation not only degrade food quality, but they also reduce the shelf life of the product and produce freeradicals that may lead to the breakdown of fatty acids, decreasing the product's safety and nutritional value. A major goal of anti-oxidant therapy is to reduce levels of free radicals andprevent lipid oxidation.

The use of synthetic antioxidants in food products has shown to be cost-effective and efficient, but producers are now looking for natural antioxidants due to concerns about the possible harmful effects of synthetic antioxidants on human health. Protein hydrolysis by enzymes, especially bovine proteins, has been extensively studied for the production of bioactive peptides with putative antioxidant effects. Antioxidant peptides derived from bovine as-casein, for example, exhibited characteristics such free-radical scavenging

and suppression of enzymatic and non-enzymatic lipid peroxida- tion Bovine whey protein hydrolysis also produced peptides with antioxidant activity.

Although the primary mechanism for pep- tides' antioxidant action is still a mystery, investigations have revealed that they are free radical scavengers, metal ions chelators, and lipid peroxidation inhibitors. In terms of anti-oxidant properties, the peptides' sequence as well as their structure and content play a role The kind of pro- tease, peptide structure, degree of hydrolysis, and peptide concentration are all variables that influence the antioxidant activity of bioactive peptides.

More than one study looked at the possibility of using camel's milk as a protein sub- strate to create bioactive protein hydrolysates Several studies, including those found that digesting camel milk casein hydrolysates with gastrointestinal enzymes enhanced its antioxidant potential. It's possible to divide antioxidant capacity tests into two categories depending on chemical processes. The first category comprises electron transfer techniques like ferric ion antioxidant power reduction (FRAP) and 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical-scavenging assay. The HAT-based techniques, such as the oxygen radical absorbance capacity (ORAC) and the total radical trapping antioxidant parameter (TRAP) test, are included in the second category.

CONCLUSION

Lactoferrin, zinc, and mono- and polyunsaturated fatty acids are all found in abundance in camel's milk, making it an excellent source of health-promoting nutrients. In terms of nutrition, whey proteins are vital because they provide the body with energy and necessary amino acids, as well as functional value since they may alter the texture, structure, and overall look of food. There are many minerals and bioactive peptides in camel milk whey, making it a valuable supplement. These bioactive peptides' main usefulness lies in their antioxidant, antibacterial, ACE inhibitory, antidiabetic, and anticholesterol properties.

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