Chapter 7 Exploring Potential Therapeutic Properties of Camel Milk

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ABSTRACT

This chapter highlights the potential health benefits of camel milk including antioxidant, anti-cancer activity, antihypertensive properties, antidiabetic activity, antimicrobial activity, hypoallergenicity activity, and anti-Crohn's disease. In addition to the most recent identified functional properties of camel milk. The bioactivity of conjugated linoleic acid (CLA), D and L amino acid, as well as oligosaccharide in camel milk will be also discussed. The proposed mechanisms behind these properties and potential health benefits are explained. This chapter also describes composition and nutritive value of camel milk and their association to functional properties. The current available information in the literature on camel milk is covered too.

INTRODUCTION

Over thousands of years, food has provided energy and nutrients to sustain life. During the last few decades, human dietary behaviour has changed and become more informative and complex. This change has been accompanied with a change in life style, food hygiene, with more emphasis to reduce the use of artificial additives including antimicrobial agents and the use of antibiotics and other antimicrobial substances, hence a new concept of food has been introduced to provide nutritious food with certain functionality to improve human health and welfare.

Traditional foods are those that are usually eaten to fulfil basic nutrients to body as well as cultural and social wellbeing; while functional foods are those, which provide health benefits beyond basic nutritional needs by virtue of some ingredients. The term (functional food) emerged in the middle of last century (Doyon, 2008). Camel milk has been used by the locals in Somalia for its perceived health benefits such as tuberculosis, fever, malaria and many others illnesses without real evidence for its real health benefits (Asresie & Yusuf, 2014). The Food and Agricultural Organization statistics (FAOSTAT) in 2019 reported that the annual production value of camel milk worldwide in US\$ doubled between

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2006 to 2016, and expected to increase in the future as shown in Figure 1. This chapter aims to study the potential health benefits of camel milk including antioxidant, anti-cancer activity, antihypertensive properties, anti-diabetic activity, antimicrobial activity, hypoallergenicity activity, and anti-Crohn's disease.

BACKGROUND

Camel Milk Composition

Long time ago, camel milk has been used as essential food in arid regions worldwide. Camel milk is described as an opaque-white, frothy, indeed have a sweet, sharp, and salty in taste (Al haj & Al Kanhal, 2010). This sense of taste description is general and varies slightly according to the type of feed and water accessibility (Farah, 1996). For example, when camel has free access to water, the water content of camel milk corresponds to 87% (Sisay & Awoke, 2015). Conversely, when water is scarce, the water content of camel milk increases to 91% due to the secretion of antidiuretic hormone, decrease of fat content, and type of eaten forage (FAO, 2013).

The major components of camel milk proteins are casein (β -casein followed by α s1-casein, and α s2casein), and whey protein (α -lactalbumin (α -LA), lacto(trans)ferrin(LF), and lactophorin (Groenen, Dijkhof, & Van der Poel, 1995), peptidoglycan acidic protein (Kappeler, Heuberger, Farah, & Puhan, 2004; Sharma et al., 2011), whey acidic protein (WAP), glycosylation-dependent cell adhesion molecule 1 (GlyCAM-1, lactophorin, PP3), in addition to peptidoglycan recognition protein short variant (PGRP-S), lactoperoxidase (LP), and obviously immunoglobulins (Kappeler, Farah, & Puhan, 1998). Additionally, camel milk contains the immune proteins peptidoglycan recognition protein (PGRP), lactoferrin, lysozyme, and lactoperoxidase, and insulin-like compounds (Gul, Farooq, Anees, Khan, & Rehan, 2015). Moreover, annotated genome sequences have been published for camels, and can be utilized for proteomic analysis (Wu et al. 2014). Compared to other mammalian milks, camel milk shows

Figure 1. The gross production of whole fresh camel milk (estimated as current million USD) change between 1991 to 2016 (FAOSTAT, 2019). Reproduced with permission of Food and Agriculture Organization of the United Nations.



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