Research Journal of Recent Sciences ISSN 2277-2502
Vol. **1(5),** 69-71, May **(2012)** *Res.J.Recent Sci.*

Short Communication

Comparative Determination of Biochemical Constituents between Animals (Goat, Sheep, Cow and Camel) Milk with Human Milk

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Available online at: www.isca.in
(Received 19th Feruary 2012, revised 26th Februry 2012, accepted 20th March 2012)

Abstract

This experiment was conducted in 2010, in laboratory of Biochemistry and Molecular Biology Department, Faculty of Science and Technology, Al-Neelain University, The objectives of this experiment were to make comparative determination of chemical constituents between human, goat, cow, camel and sheep milks. The investigation shown that protein, fat, total solid and ash content is low in human milk as compared with other types of milk, but lactose content is high in human's milk as compared with other milks. In addition, sheep milk has a number of unique properties that makes it the most preferred milk as compared to milk of other domestic animals. All chemical and physical characters between five types of milk shown highly significant difference at ($P \leq 0.05$)

Keywords: Lactose, milk, camel, goat and total solid.

Introduction

Milk is a key contributor to improving nutrition and food security particularly in developing countries. Improvements in livestock, dairy technology and milk quality may offer the most promise in reducing poverty and malnutrition in the world[1]. Chemically, milk is described as an emulation of fat in watery solution of sugar, mineral salts with protein in a colloidal suspension[2]. Nutritionally, when milk and milk products are not consumed during adult year, it may cause depletion to bone of human body, to obtain the needed of this essential nutrient must consumed milk and its products[3].

Milk composition of mammalian species varies widely with reference to genetic, physiological, nutritional factors and environmental conditions. The use of milk proteins to give food desirable organoleptic or textural properties is strongly influenced by their functional properties. Functionality is defined as "any property of a food, or a food ingredient, except its nutritional ones, that affect its utilization. Some scientists propose a more accurate definition by classifying functional properties of proteins into three major groups: i. Properties depending on the behavior of proteins in water. ii. Properties depending on interactions between macromolecules. iii. Properties depending on interactions with amphiphilic molecules or with a gas phase. Whey proteins make up approximately 20% of the protein in milk, by weight. Lactoglobulin is the most common whey protein by a large margin[4]. Fat composition in milk varies widely in the composition due to genetic, lactational, and nutritional factor difference between different species[5]. The protein content of sheep's milk is higher than in women, cow, camel and goat's milk and also found that fat content in sheep's milk is high between the other four milks[6]. The lactose content of human's milk is higher than in goat's milk reported by[7] but the lactose content of camel and cow's milk is 4.5 and 4,9%, respectively stated by[6]. The lactose content of sheep's milk is 3.57 %[8]. The total solid in sheep milk is higher than in goat, cow, camel and sheep reported by[6] The ash content is low in human's milk as compared to cow and camel's milk stated by[6], but ash content in cow and camel's milk is similar. Where, the ash content of goat and sheep's milk is 0.55 and 0.89%, respectively reported by[7]. he moisture content is low in sheep's milk as compared with women, goat, cow and camel's milk given by[7].

The objectives of this study are assessment the differences between women, goat, cow, camel and sheep's milk chemically and physically.

Statistical analysis: Three samples were taken, analyzed and averaged. Data were assessed by using Analysis of Variance (ANOVA) as described by[9].

Material and Methods

Milk collection: Milk was obtained from five species: human (*Homo sapiens*, n = 23), cow (*Bos taurus*, n = 4), goat (*Capra hircus*, n = 2), sheep (*Ovis aries*, n = 6) and camel (*Camelus dromedarius*, n= 37). Human milk was obtained from Turkey Hospital; un-pasterilization milks of cow, goat and sheep were collected from Khartoum State while camel milk was obtained from camel farm in Omdurman State. All the samples are collected in the morning in sterilization labelled bottle and kept in the refrigerator at 4^{o}C.

Methods: chemical methods included protein, fat, ash, moisture content and total solid were determined according to method described by[10], but lactose content was determined according to method described by[11].

Results and Discussion

The table -1 indicated the protein content of women milk is lower than in sheep, goat, camel and cow, but it is high in sheep milk as compared with women, goat, camel and cow. These findings are support those results given by Siddig[6]. The lactose content is high in women as compared with goat, cow, camel and sheep milk. These results are agreement with those values reported by[7]. The fat content (6,9%) in sheep milk is lower than the result (3.57%) obtained by[8], but fat content in sheep milk is higher than in human, goat, cow and camel milk. These findings are online with those results reported by[6]. The total solids in sheep, goat and cow milk are higher than in human and camel milk, but it is almost similar in human and camel milk. These results for women and goat are agreement with those values reported by[6], but lower than those values given by[12]. The ash content is low in human milk as compared with the other four milks (goat, cow, camel and sheep). These results are similar to those findings reported by[6]. The moisture content in sheep milk is lower than in human, goat, cow and camel milks. These results are agreement with those values reported by[7].

Table-2 show pH value of goat, cow, camel and sheep milk is similar (6.6), but it is still high in human milk as compared with other four milks. The pH value in human milk is neutral(7.2).These findings are agree with[13]. The specific gravity of sheep milk is higher than in human, goat, cow and camel milk. This indicated that the density is high in sheep milk as compared with the other four milks. These results are agreement with those values reported by[14]. Titrable acidity is high in sheep and cow milk as compared with the other three milks. These findings are confirmed the results of pH obtained.

Conclusion

The given results are shown significantly difference in chemical and physical characters in five types of milks at $P \leq 0.05$. Sheep milk has a number of unique properties that makes it the most preferred milk as compared to milk of other domestic animals.

Acknowledgement

We thank Adam S.I for assistance throughout the work and for editorial review.

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Table – 1
Chemical constituents of human, goat, cow, camel and sheep milks

Type of milk	Protein %	Lactose %	Fat %	Total solid %	Ash %	Moisture %
Human	$1,25^{d}$	6.95^{d}	3.20^{c}	11.8^{cd}	0.21^{b}	88.25^{ab}
Goat	3.30^{c}	4.40^{dc}	3.90^{b}	12.0^{c}	070^{a}	88.0^{b}
Camel	2.95^{c}	4.30^{d}	3.60^{c}	11.7^{d}	0.75^{a}	88.35^{a}
Cow	3.40^{b}	4.80^{bc}	3.75^{b}	12.8^{b}	0.71^{a}	87.23^{c}
Sheep	6.35^{a}	5.00^{b}	6.90^{a}	19.3^{a}	0.85^{a}	80.70^{d}

***** Mean value have different letters within the column are significantly difference at ($P \leq 0.05$).

Table – 2
Physical characters human, goat, cow, camel and sheep milks

Parameters	Women	Goat	Camel	Cow	Sheep
pH value	7.2	6.6	6.5	6,6	6.6
Specific gravity mg/100 ml	1.031	1.029	1.029	1.032	1.033
Titrable acidity %	0.13	0.14	0.15	0.12	0.18

Each value is calculated as average of four replicates