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Comparative Study of Casein and Lactose in Processed and Unprocessed Milk Samples from Quetta

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Abstract: Milk is one of the most important nutritional constituent of our diet because it is largely composed of proteins and along with vitamins and minerals. Present study was based on the comparative study of casein and lactose present in processed and unprocessed milk samples collected from Quetta city of Balochistan Province of Pakistan. In this study, two types of milk sample processed and unprocessed milk were selected includes Processed milk i.e., Milk pack, Olpers, Pakola, Tarang, Nesvita, Every Day, Dairy Omang and Premier Dairy Fresh, whileunprocessed milk goat, cow and buffalo milk samples were taken from two different places of Quetta city. For experimental purpose, two different instruments were used such as, isoelectric precipitation method was used for determination of lactose content, while polarimeter method used for casein content. From the results of the present study, it was concluded that the amount of both casein and lactose were higher in processed milks but lower in unprocessed milks. Our present research work provides a good assessment about the amount of casein and lactose found in different processed and unprocessed milk.

Key words: Milk · Casein · Lactose · Processed · Unprocessed

INTRODUCTION

Milk is a perfect natural food it is an opaque liquid, white in color produced by the mammary glands of mammals. The exact component of milk varies from species to species but some significant amounts of saturated fats, protein, calcium and vitamin C are present in milkof every species. Its pH ranges from 6.4 to 6. Now a day's, milk is present in different form like skimmed milk, organic milk, jersey and Guernsey milk, flavored milk, heat treated milk, UHT milk, evaporated milk, condensed milk, rawmilk, filtered milk, dried milk. Cheese and yogurt are the fermented products of milk [1]. Chemical composition of milk shows large amount of minerals, fats, protein, carbohydrates and vitamins, respectively. The basic constituents are lipids, calcium, phosphorous, iodine, magnesium, zinc, potassium, sodium, chloride, iron, selenium, copper, fluoride, chromium, molybdenum and vitamins, which are the most significant food source B1 (Thiamin), B2 (Riboflavin), B3 (Niacin), Biotin pantothenic acid, B6(Pyridoxine) Folate, B12, C (Ascorbic acid) A (retinol) D, E, K. casein and lactose [2,3]. The main protein of milk is casein that constitutes about 80% of total milk protein [4]. In milk, casein exists as a calcium salt or calcium caseinate[5].Lactose is a milk sugar as its amount varies from species to species but lactose makeup around 2-8% of milk. It is the only carbohydrate that can be synthesized by mammals [6, 7]. Buffalo is very important animal and the people of subcontinent mostly liked it. Buffalo milk is more favorite than cow's milk. Goat has been referred as the "Poor man's cow'' due to his great contribution to the health and nutrition of the landless and rural poor. Goat milk differs from cow or human milk in having better digestibility, alkalinity and buffering capacity. Sheep milk is an excellent raw material for the milk processing industry especially in cheese production. Sheep milk has higher specific gravity, viscosity, refractive index, titratable acidity and lower freezing point than average cow milk [7]. Therefore, present study was conducted to compare the lactose and casein

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contentsinfresh milk samples and processed milk samples inorder to provide better understanding about the nutritional value of different processed and unprocessed milk samples.

MATERIALS AND METHODS

In the present study, samples of processed milk and unprocessed milk were taken from Quetta market on dated 15th May, 2015. Methods used for the determination of casein and lactose milk are as follows;

Determination of Casein: Casein was isolated by fractional isolation precipitation method 100 ml of sample was centrifuged at 20-25 min at room cream/fat was removed. Now this skim milk was transferred into 500ml glass beaker and distill water was added up to equal volume 0.5 N HCL was taken in burette and added drop wise in the milk with constant stirring. It drop pH of milk to 4.8, so casein was easily separated as it was precipitated. Now the precipitation was allowed to settle down for 30min at room temp. Precipitated milk was filtered, washed dried and weight and taken out percentage yield.

Determination of Lactose: For lactose, first 100ml of milk was taken in to Erlenmeyer flask through volumetric flask than 7.5 ml of conc. H_2SO_4 was added and the same quantity of mercury iodide solution was also added to get precipitation. Milk than filtered and filtrate was diluted. Now polarimeter was filled with diluted milk solution than angel was adjusted according to sheet attached to it and α observed and then calculated.

RESULTS AND DISSCUSION

The main component of milk (Casein and Lactose) was determined by two different methods as shown in Table 1 and Figures 1-2 respectively. The samples were processed and unprocessed milk.From percentage yield actual amount of casein percent in milk was calculated and from polarimeter actual amount of lactose was calculated in processed and unprocessed milk sample. Finally the result was determined to show that whether both casein and lactose were present in higher amount in processed milk and unprocessed milk.

First processed milk samples are taken as discussion in which It was found that casein and lactose amount was higher in Tarang and Milac milk samples than other processed milk samples. While laser amount of casein was found to be in Everyday and lesser amount of lactose was found in Nesvita.. But all milk samples contain casein and lactose amount between 1-4% and 2-5% respectively as reported by Imran *et al*. [8]. Similarly three samples of three varieties of unprocessed milk samples were taken. And it was found that buffalo milk samples are rich source of lactose than other milk samples (Goat, cow) because they contain high percentage of lactose in them (5.58, 5.6, 5.4) therefore it is considered to be the richest source of energy. This result is supported by the work of Ahmad *et al*. [2] and Imran *et al*. [8]. While goat milk contains less amount of casein and lactose than other milk samples of buffalo and cow.

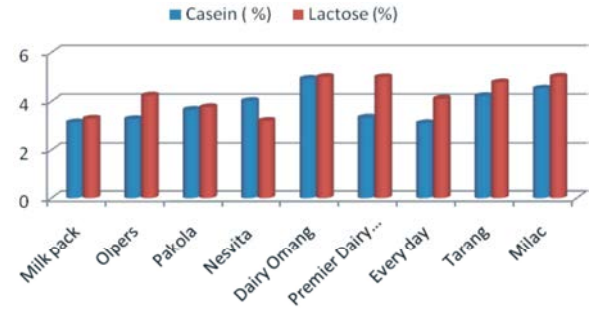

Fig. 1: Percentage of casein and lactose content in proceed milk samples

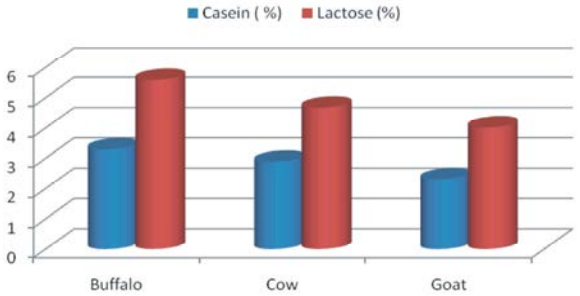

Fig. 2: Percentage of caseing and lactose content in unprocessed milk samples

Table 1: Percentage with SEM of casein and lactose in processed and fresh milk samples

Sr. No.	Milk Samples	Amount of Casein (%)	Amount of Lactose (%)
1	Milk pack	3.13±0.05	3.29±0.01
2	Olpers	3.27±0.07	4.22±0.09
3	Pakola	3.65±0.02	3.76±0.05
4	Nesvita	4.01±0.00	3.20±0.07
5	Dairy Omang	4.90±0.04	4.98±0.01
6	Premier Dairy fresh	3.33±0.04	4.97±0.00
7	Every day	3.10±0.09	4.10±0.08
8	Tarang	4.20±0.08	4.76±0.02
9	Milac	4.50±0.01	4.99±0.03
10	Buffalo	3.29±0.00	5.58±0.02
11	Cow	2.88±0.08	4.67±0.09
12	Goat	2.30±0.05	4.01±0.1

CONCLUSION

By the comparative study of casein and lactose in processed and unprocessed milk was determined by isoelectricprecipitation method and polarimeter respectively. Finally this study concluded that the amount of casein is higher in Dairy Omang in case of processed milk samples and in unprocessed milk samples buffalo milk samples are richer source of casein and also the amount of lactose is higher in buffalo milk samples.

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