

## EFFECT OF HERBAL ADDITIVES ON LACTOSE STATUS OF MILK

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### Abstract

Lactose intolerance is a common problem among infants and adults, whereby the body fails to hydrolyse lactose due to the deficiency of the enzyme lactase leading to symptoms such as abdominal pain, intestinal gas, diarrhea, nausea, foul smelling stool, slow growth etc. Considering this difficulties, the present study was conducted to assess the efficiency of different medicinal herbs such as ginger, turmeric, cardamom, tea powder, coffee powder and anjal to hydrolyze lactose present in seven different kinds of milk such as cow milk, goat milk, buffalo milk, nanjil, Hatsun, Avin milk and Arokya milk in order to find remedies for lactose intolerance. Lactose content of all the milk samples estimated spectrophotometrically using standard procedures revealed buffalo milk (80mg/ml) to be rich in lactose. Among the herbal additives tested for lactose reduction efficiency, ginger, tea and coffee exhibited highest activity specifically ginger was able to digest lactose in all kinds of milk used for the study.

**Key words:** Lactose intolerance, Lactase, milk, medicinal herbs.

### 1. Introduction

Lactose is a simple sugar found in milk and is a major component of whey. It act as a major carbohydrate during the neonatal period. From an evolutionary and biological view point, lactose is a unique sugar as it exists as a free molecule only in milk. Interestingly, human milk has the highest content of lactose among all the mammals(Solomons, 2002).In humans lactose

compensates 40% of energy needs, facilitates mineral absorption, reduces the risk of GIT infection and promotes growth and development of CNS (Janice, 2004).

Lactase-phlorizin hydrolase, more commonly known as lactase, a small intestine  $\beta$ - galactosidase is responsible for cleaving lactose in to absorbable monosaccharides namely glucose and galactose. Lactase has two active sites, own which splits lactose and another hydrolyzing phlorizin as well as range of dietary glycolipids. A number of actions of the phlorizin site are useful in humans and this may explain why some enzyme activity is retained after weaning. Lactase is present on the optical surface of enterocytes in the small intestine brush border with its highest expression found in the mid- jejunum (Campbell *et al.*, 2005). Deficiency of lactase enzyme in the body leads to a condition called lactose intolerance, whereby the body fails to digest the intaken lactose, a condition prevalent among adults and to some extent in newborns. Symptoms range from mild to severe based on the amount of lactose consumed and amount a person can tolerate. Yet, the common symptoms include abdominal pain, abdominal bloating, intestinal gas, diarrhea, nausea, foul smelling stool, weight loss, slow growth, malnutrition. Breast fed babies may experience excessive flatus, watery stools which may be yellow or green depending on severity of the condition (Bhan *et al.*, 1982). Considering this difficulties the present study was conducted to assess the efficiency of different medicinal herbs upon lactose hydrolysis thereby to find remedies for lactose intolerance.

## **2. Materials and methods**

### **2.1 Collection of milk samples**

Seven kinds of milk samples namely cow milk, goat milk, buffalo milk, nanjil, hatsun, avin and arokya milk were collected for this study. Samples were collected in a sterile container and transported immediately to the laboratory for further study.

### **2.2 Collection and preparation of extracts from spices**

For this ginger, turmeric, cardamom, tea powder, coffee powder and anjal were collected from local markets. Spices were made dried, powdered and used for extraction (Ramakrishnan and Venkataraman, 2008).

### 2.3 Determination of lactose content of milk samples

All the collected milk samples (Cow milk, Goat milk, Buffalo milk, Nanjil milk, Hatsun, Avin and Arokya milk) were tested for their lactose content separately using spectrophotometer at 540nm (Vujicic *et al.*, 1977).

### 2.4 Determination of efficiency of herbal extracts upon lactose hydrolysis

All the milk samples were treated with crude herbal extracts such as ginger, tea, coffee, turmeric, anjal and cardamom individually (8gm/ml). To these, 1ml of ZAPT (Zinc acetate phosphotungstic acid) was added. The mixture was then made in to 10ml with distilled water and the contents were filtered after 10 minutes using whatmann no.1 filter paper. With 0.5 ml of the filtrates, 0.5ml of NaOH solution was added and diluted to 10ml with distilled water and mixtures were filtered. 5 ml of this filtrates were diluted to 10ml using distilled water. 5ml of above filtrates were mixed with 5ml of glycine NaOH buffer, 0.5ml methylamine solution and 0.5ml of sodium sulphite. The contents were mixed thoroughly and heated in water bath at 65°C for 25 minutes and cooled in ice for 2 minutes to stop the reaction. Absorbance of all the samples were then read at 540nm using spectrophotometer. A standard curve was drawn by plotting absorbance against concentration of lactose for determining its level in all the treated samples.

## 3. Results and Discussion

In this study, the status of lactose concentration in different milk types were tested using different herbal additives spectrophotometrically using standard procedures and compared with each other. On comparison, buffalo milk was found to possess the highest lactose concentration of 80mg/ml followed by Avin milk (75mg/ml), goat and Arokya milk (71.5mg/ml), Hatsun milk (67mg/ml), cow milk (62.5mg/ml) and then Nanjil milk with a concentration of 50mg/ml. Thus buffalo milk proved to be rich in lactose and nanjil milk to be the least (Table 1). Among all the herbal additives tested for lactose digestion, tea and coffee additives showed reduced levels of lactose content in nanjil milk, cow milk and Arokya milk while ginger extracts showed effective reduction in lactose content in all the tested samples. In toto, ginger and tea exhibited more lactose reduction activity. These results were supported by the reports of Ramakrishnan and Venkataraman (2008) who reported the efficiency of ginger and tea extracts to potentially reduce the lactose content of different brands of milk products. Amutha *et al.* (2010) reported the

effective lactose reduction capacity of tea extracts such as three roses, chakra gold and magholai as a result of their findings based on test conducted in different types of milk including cow, goat, buffalo etc.

The current study suggest the use of coffee and tea for overcoming lactose intolerance along with cow's milk, anjal, coffee, and tea in hatsun milk, ginger in arokya, avin and buffalo milk. However the usage of different tea types were also found effective in buffalo milk. Least reduction of lactose was noted with Arokya milk. Similar efficiency was noted with the activity of tea and coffee upon cow milk. Hence it could be recommended to consume cow's milk mixed with ginger and tea or coffee based on the present findings as most of the individuals use cow's milk. On the other hand individuals are recommended to follow a combination of ginger with tea for buffalo milk.

**Table 1 Amount of lactose in test Samples**

List of milk Samples	Lactose content of milk treated with herbal additives (mg/ml)					
	Anjal	Cardamom	Coffee	Ginger	Tea	Turmeric
Cow milk	50	37.5	25	32.5	25	56
Goat milk	32.5	50	32.5	37.5	25	56
Nanjil	25	37.5	25	25	37.5	25
Hatsun	62.5	37.5	50	25	25	56
Arokya	62.5	62.5	56	50	56	62.5
Avin	50	56	37.5	37.5	50	62.5
Buffalo	71.5	62.5	37.5	32.5	32.5	50

## Conclusion

Lactose intolerance is a severe gastrointestinal disorder now a days. Therefore betterment in the management of the same are he need of the hour. The present study focused on resolving this problem could well identify the ability of ginger to induce lactose catabolism as the results highlighted that the combined form of milk with ginger or tea or coffee reduced the lactose content in promising level.

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