

Curd Bacteria with Varied effects due to Different Types of Sugars

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Abstract

The present investigation is based on the effect of different types of sugars on the growth of curd bacteria in vitro. It was observed that upon the utilization of sucrose, dextrose, fructose and lactose; most potential sugar type was lactose for the growth of curd bacteria. This was followed by fructose. Curd has been currently stated as an important probiotic for human health. It has various utilities in food. It is important to increase its biomass/weight by using certain ingredients like sugars. After in vitro experimentation this can be further taken to large scale cultures. Curd consists of maximum amount of *Lactobacillus acidophilus* bacteria. Thus this bacteria holds importance as a probiotic and its cultures need to be increased for human health supplements production.

Introduction

Lactobacillus is a genus of bacteria which can convert sugars into lactic acid by means of fermentation. Milk contains a sugar called lactose, a disaccharide (compound sugar) made by the glycosidic bonding between glucose and galactose (monosaccharides) (6,7). When pasteurized milk is heated to a temperature of 30-40 °C, or even at room temperature or refrigerator temperature, and a small amount of old curd or whey added to it, the *Lactobacillus* in that curd or whey sample starts to grow(2). These convert the lactose into lactic acid, which imparts the sour taste to curd. Raw milk naturally contains *Lactobacillus* (1)

Aims and objectives

Based on the above criteria, the aims and objectives of the present research are:

1. Obtaining curd bacterial culture using simple nutrient agar (NA) media
2. Addition of sucrose in curd and inoculation in NA to obtain increment of curd bacterial culture
3. Addition of dextrose in curd and inoculation in NA to obtain increment of curd bacterial culture
4. Addition of fructose in curd and inoculation in NA to obtain increment of curd bacterial culture
5. Addition of lactose in curd and inoculation in NA to obtain increment of curd bacterial culture
6. Comparative account of increment in curd bacteria in presence of different types of sugars utilised

Materials & Methods

28 gm of NA powder is added to 1000 ml of boiling water and boiled, stirred and autoclaved. This is utilized for the experimentation.

5 samples were prepared:

- a. Simple curd sample
- b. 1ml curd + 0.1 gm sucrose
- c. 1 ml curd + 0.1 gm fructose
- d. 1 ml curd + 0.1 gm lactose
- e. 1 ml curd + 0.1 gm dextrose

Pouring of NA media was done in laminar air flow cabinet after proper sterilization. Solidification was done after pouring of media in petriplates. The 5 samples were added to petriplates with NA media by spread plate method.

- a. Inoculation of 1 ml curd sample in NA by spread plate method
- b. Inoculation of 1ml curd + 0.1 gm sucrose in NA by spread plate method
- c. Inoculation of 1ml curd + 0.1 gm fructose in NA by spread plate method
- d. Inoculation of 1ml curd + 0.1 gm dextrose in NA by spread plate method
- e. Inoculation of 1ml curd + 0.1 gm lactose in NA by spread plate method

Lawn of bacteria can be seen in petriplates. The different inoculums used in different petriplates can be weighed.

Weight of simple NA media containing petriplate taken was 40.42 gm

Weight of NA media with curd bacteria as inoculums = 41.40 gm

Weight of NA media with curd bacteria containing sucrose as inoculum = 46.50 gm

Weight of NA media with curd bacteria containing fructose as inoculums = 43.70 gm

Weight of NA media with curd bacteria containing dextrose as inoculums = 42.59 gm

Weight of NA media with curd bacteria containing lactose as inoculums = 50.44 gm

Weight of bacteria was calculated = wt of (NA+inoculums) petriplate – wt of NA petriplate

Weight of simple curd cultured in NA= 41.40-40.42

Weight of curd in presence of sucrose= 46.50-40.42

Weight of curd in presence of fructose=43.70-40.42

Weight of curd in presence of dextrose=42.59-40.42

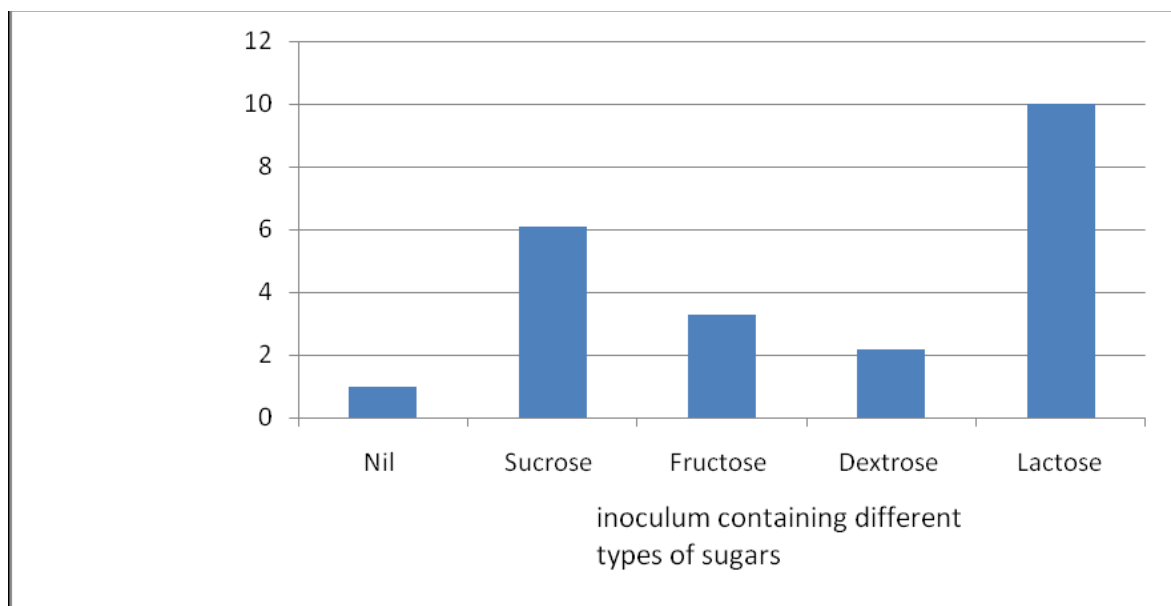
Weight of curd in presence of lactose=50.44-40.42

Observations

Lactobacillus, is a genus of Gram-positive, facultative anaerobic or microaerophilic, rod-shaped bacteria. They are a major part of the lactic acid bacteria group. In humans they are part of the vaginal microbiota. Many species in this genus have had their genomes sequenced.

Lactobacillus is a Gram-positive (it retains crystal violet dye), facultative anaerobe (it can produce energy through glycolysis and fermentation when oxygen is not present) (4,5). *Lactobacillus* is a member of the lactic acid bacteria group (its members convert lactose and other sugars to lactic acid) (3).

Lactobacillus acidophilus (New Latin 'acid-loving milk-bacillus') is a species of gram positive bacteria in the genus *Lactobacillus*. *L. acidophilus* is a homofermentative, microaerophilic species, fermenting sugars into lactic acid, and grows readily at rather low pH values (below pH 5.0) and has an optimum growth temperature of around 37 °C (99 °F). *L. acidophilus* occurs naturally in the human and animal gastrointestinal tract and mouth. Some strains of *L. acidophilus* may be considered to have probiotic characteristics. These strains are commercially used in many dairy products, sometimes together with *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus* in the production of acidophilus-type yogurt. Its genome has been sequenced (8,9)



Graph 1: Weight of curd bacteria in grams obtained by inocula containing different types of sugars

Conclusions

The present study revealed that curd bacteria can be increased in their biomass and rate of growth by addition of lactose in the inoculums followed by fructose. This can cause more formation of curd in less time. The process done in vitro can be scaled up in large bioreactors.

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