Curd Bacteria Being Affected by Varied 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.

Introduction

The present study is based on the increment of curd bacterial culture by using different types of sugars-sucrose, lactose, dextrose and fructose. It will be observed which type of sugar best causes increment of curd bacteria and this can be used in large scale for curd production in larger amount.

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 and Methods

Preparation of Nutrient Agar (NA) media

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

The method of spread plating was carried out as follows:

Spread plate technique :

• Pipette the required amount of bacteria on the surface of the Petri plate containing media. Spread the curd inoculum over the surface of the agar medium using a spreader L shaped . This spreader is rotated in petriplate on all sides. Incubate the plate inverted at 37 C.

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

Results and Discussion

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 (1,2). Many species in this genus have had their genomes sequenced (3,4).

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). *Lactobacillus* is a member of the lactic acid bacteria group (its members convert lactose and other sugars to lactic acid) (5,6,7).

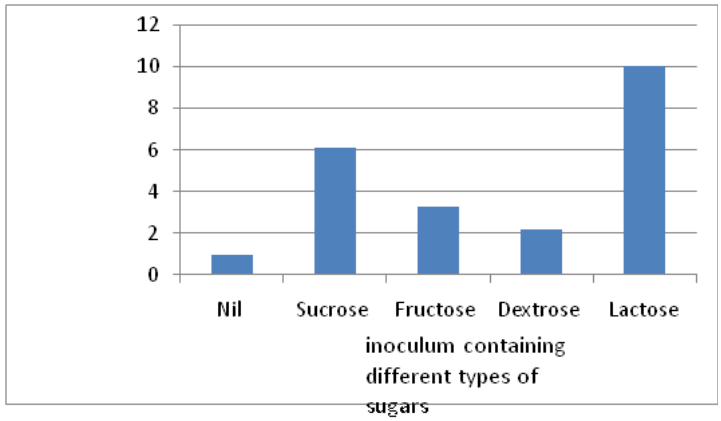
Lactobacillus acidophilus (New Latin 'acid-loving milk-bacillus') is a species of gram positive bacteria in the genus *Lactobacillus. L. acidophilus* is a homofermentative, microaerophilic species, fermenting sugars into lactic acid, and grows readily at rather low pH values (below pH 5.0) and has an 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 (8,9,10).

***Lactobacillus acidophilus* cell structure**

The structure of *L. acidophilus* has many characteristics. This bacterium is a single-celled prokaryotic microorganism that lacks a distinct nucleus. Although, there are many other parts to the cell of this bacterium such as having: a cell wall, a cytoplasmic membrane, a nucleoid, cytoplasm, ribosomes, pili, and flagella (11,12). The overall shape of *L. acidophilus* is one that is rod shaped. This bacterium occurs in small chains and is usually 0.5 to 0.8 micrometre (1 mm=10-6 metre) across by 2 to 9 mm in length. It is also important to note that *L. acidophilus* is non-spore-forming.

Table 1: Fresh weight of curd bacteria in gm in presence of different types of sugars after 1 day by inoculation using spread plate method

S. No.	Types of sugar	Weight of curd bacteria in gms
1.	Nil sugar added (simple NA)	0.98 gm
2.	Sucrose	6.08 gm
3.	Fructose	3.28 gm
4.	Dextrose	2.17 gm
5.	Lactose	10.02 gm



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

It was observed according to table 1 that the weight of curd bacteria was maximum in case of presence of lactose, followed by sucrose and fructose.

Conclusions and Future Scope

Curd bacterial rate of growth can be increased by supplementation of lactose

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 (13).

Curd has probiotic microbes utilized as most beneficial health supplements

Probiotics are microorganisms that are believed to provide health benefits when consumed. The term probiotic is currently used to name ingested microorganisms associated with benefits for humans and animals.The term came into more common use after 1980. The introduction of the concept is generally attributed to Nobel recipient Élie Metchnikoff, who in 1907 suggested that "the dependence of the intestinal microbes on the food makes it possible to adopt measures to modify the flora in our bodies and to replace the harmful microbes by useful microbes". A significant expansion of the potential market for probiotics has led to higher requirements for scientific substantiation of putative benefits conferred by the microorganisms (14,15,16).

Commonly claimed benefits of probiotics include the decrease of potentially pathogenic gastrointestinal microorganisms, the reduction of gastrointestinal discomfort, the strengthening of the immune system, the improvement of the skin's function, the improvement of bowel regularity, the strengthening of the resistance to cedar pollen allergens, the decrease in body pathogens, the reduction of flatulence and bloating, the protection of DNA, the protection of proteins and lipids from oxidative damage, and the maintaining of individual intestinal microbiota in subjects receiving antibiotic treatment (17,18,19).

Scientific evidence to date has been insufficient to substantiate any antidisease claims or health benefits from consuming probiotics (20,21).

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