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Development of Sugarfree Lassi

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Abstract: Fermented milk products is in high demand because of their known health benefits and are becoming major part of milk product in Indian Dairy Market. The objective of the present study was to develop sugarfree lassi. As sugar overconsumption continues to increase worlwide and contributes to multiple health related issues. Replacing sugar with fermented milk products can have positive results. Different sugar substitutes are added at the different concentration and the prepared product has been evaluated on the basis of 9 point hedonic scale. Among the different sugar substitutes , stevia instant lassi scored highest for overall acceptability. Final product is analyzed for microbial as well as physico-chemical properties for its nutritional content.

Keywords – *Lassi, Fermented Milk Product, Sugar-Free*

I. INTRODUCTION

A. LASSI

Lassi, one amongst the soured milk merchandise is right for serving with hot dishes because it helps the body to digest the spicy food. Lassi could be a organic process aid for the afternoon meal; it settles the upset stomact and it's the right cooling agent (Anonymous, 2006) [1]. in conjunction with all essential nutrients needed for growth, development and tissue differentiation, soured milk contain growth hormones-gastrin and hypoglycaemic agent (Arora, 2006) [2]. In India, an excellent variation is according in technology of lassi preparation furthermore because the basic ingredients used. Presently, the types of lassi accessible in several markets of Bharat area unit plain lassi, soft drug lassi, Amritsari lassi, Soy lassi, Vanilla lassi, Saffron lassi, Makhaniya lassi and lassi ready victimisation pulp or juice of fruits like-Mango lassi, Mango-pineapple lassi, Mango-strawberry lassi, Banana lassi and Pineapple lassi, etc.

Lassi may be a creamy, frothy hard milk drink blending with water and numerous fruits or seasonings and forever served chilled. Lassi may be a ancient hard drink of the geographic area region of Bharat. Lassi are often remarked as associate ancient smoothie.

The conception originated somewhere around a thousand BC, in geographic area and Multan in Bharat. Lassi comes from the Indo-Aryan word Lasika that means humor or secretion like. Enriched with the goodness of milk, lassi isn't solely in style for its style, however conjointly for its calming impact. what is a lot of, the probiotic content in lassi makes it an ideal dose to cure many digestion connected problems. In fact, the presence of true bacteria helps in easing gut movements and action enteral ailments like amoebiasis, gastritis, ulcer.

Adding lassi to daily diet offer's innumerous health edges. Especially, adding it to the breakfast could be a nice plan because the key ingredient of lassi is curd. it's an ideal mixture of health and style. Lassi helps in digestion because it contains true bacteria, that lubricates the intestines and smoothens the entire method of digestion. it's conjointly a wonderful supply of probiotics and ensures correct well being and health of the person. "Lassi helps in changing the food into energy and assures high energy levels because of the presence of proteins, vitamins, minerals, calcium, potassium, metallic element and different enzymes essential for the body. It even helps in reducing accumulated fat, particularly on the belly. It's an excellent supply of carboxylic acid and cholecarciferol, that helps in boosting the system. This increased system works in dashing up the metabolism.

B. CURD

Curd could be a ancient yoghurt or soured milk product, originating from the Indian landmass, typically ready from cow's milk, and generally buffalo milk, or goat milk. it's well-liked throughout the Indian landmass. Curd is formed by the bacterial fermentation of milk in which lactose in milk is converted into lactic acid by good bacteria's or microorganisms known as probiotics.

Probiotics are live microorganisms or microorganism that square measure kind of like helpful microorganisms found within the human gut. They're additionally referred to as friendly microorganism or sensible microorganism. Curd has excellent microorganism that aid digestion within the gut. It improves the biological process ability of curd. Probiotics also are thought of to be powerful immunity builders and their presence makes curd one among the foremost vital immunity booster food. Probiotics in curds acts as a gentle laxative however just in case of symptom and dysentry it's a boon.

Curd contins CLA (Conjugated Linoleic Acid) that has several functions within the body of that is dominant the body's fat gain. Curd with the assistance of probiotics is incredibly useful for heart ailments, for doddering state in preventing and delaying degeration of body, purifies blood, keeps gastrointestinal system healthy. Curds includes a glycemic index of twenty eight that is low and thus not spikes the aldohexose level. When the body doesn't have enough smart bacterium, unhealthy bacterium will thrive.

The subsequent are often signs of a gut bacterium imbalance: Autoimmune issues, like thyroid problems, autoimmune disorder and sort one polygenic disease, Digestive problems, like irritable internal organ syndrome, constipation, diarrhea, symptom or bloating, Sleep problems, Skin rashes and allergies, Sugar cravings, Unexplained fatigue or sluggishness, Unexplained mood disorders, like depression or anxiety, Unexplained weight gain or weight loss

C. Diabetes Mellitus and Sugar Substitute

India is that the polygenic disorder capital of the planet. Excessive amounts of added sugars square measure associated with Associate in Nursing increased risk of type a try of hereditary disease, probably owing to negative effects on the liver and a far better risk of fat. Natural sugars like those found in fruits and vegetables are not connected to hereditary disease risk — whereas artificial sweeteners square measure. additionally to sugar consumption, overall diet quality, weight, sleep quality, exercise and life science all play employment at

intervals the event of this illness.Diabetes happens once within the body isn't from now on able to effectively regulate aldohexose levels. This happens as a result of secreter stops producing enough endocrine, once the cells become proof against the endocrine that is created. hypoglycemic agent is that the inner secretion required to maneuver sugar out of the blood and into the cells — so every eventualities result in chronically elevated aldohexose levels. High aldohexose levels over a extended quantity can cause complications like degree accumulated risk of cardiopathy, equally as nerve and urinary organ damage, so it's a necessity to remain them under control.

There square measure two main varieties of hereditary disease, each with fully totally different causes:

Type 1: happens once the system attacks the secreter, destroying its ability to supply endocrine. it's relatively rare, largely genetic, and exclusively accounts for 5–10% of all hereditary disease cases

Type 2: happens once secreter stops producing enough endocrine, once the body's cells no longer answer the endocrine it produces. It accounts for quite ninetieth of hereditary disease cases and is mainly triggered by diet and method factors.

Sugar substitutes square measure substances that square measure employed in place of sweeteners with sugar (sucrose) or sugar alcohols. they'll even be called artificial sweeteners, non-nutritive sweeteners (NNS), and work unit sweeteners. Sugar substitutes might even be helpful for people trying to scale back. they provide sweetness to foods and drinks whereas not adding loads of extra calories. Most of these contain nearly no calories. Victimization sugar substitutes in place of sugar can facilitate forestall dental decay. They in addition may facilitate with aldohexose management in people with genetic abnormality.

II. MATERIALS AND METHODS

Table 1: List of glasswares, instruments, ingredients

Glasswares	Instruments	Ingredients	Chemicals
Beaker	Digital Thermometer	Milk	Potato Dextrose Agar
Conical Flask	Analytical Balance	Sugar	Nutrient Broth
Burette	Infrared Moisture Meter	FOS	Agar Agar Type I
Measuring Cylinder	Incubator	Erythritol	Sodium Hydroxide
Stirrer	Autoclave	Stevia	Phenopthalein
Test Tube	Hot Air Oven	Flavours	indicator
Petriplate	Muffle Furnace	Active Culture (Type T Dahi Culture)	
Crucible			

Fructooligosaccharide- It is a type of a natural sweetner mainly obtained from bee, sugarane, insulin. FOS is 50% of sucrose consists of 1.5 to 2 kcal/g of calories. It has various health benefits such as improves digestion, promotes absorption of minerals, reduces cholestrol, no tooth decay, anticarcinogenic, extends product shelf life, improves flavour and texture, boosts immunity.

Table 2: Composition of FOS

Amount per serving	Per 5g
Total Energy	10.6 kcal
Fats	0 g
Protiens	0 g
Carbohydrate	4.8 g
Dietary Fibre	4.8 g

Erythritol- It is a type of artificial sweetner mainly obtained from grapes, peaches, pears. Erythritol used is 70 times sweeter than sugar consists of 0.24kcal/g. It has various health benefits such as no spikes in blood sugar and insulin, antioxidant effects, reduces risk of heart disease, helps with weight loss, reduces risk of bloating, and beneficia for teeth. Not safe for pets.

Table 3: Composition of Erythritol

Amount per serving	Per 6g
Energy	0 kcal
Fat	0 g
Carbohydrate - of sugar - of polyols	100g 0 g 100g
Protien	0 g

Stevia- It is a type of natural sweetener, derived from the leaves of Stevia rebaudiana. Stevia used is 150 times sweeter than sugar Contains 0 calories and has benefits as follows controls diabetes, weight control, cancer prevention, improves bone health, regulates blood pressure, improves oral health, cures allergies.

Table 4: Composition of Stevia

Amount per serving	Per 0.043g
Energy	0 kcal
Fat	0 g
Carbohydrate	0 g
Protien	0 g

Method- Fresh milk was collected with fat and SNF, 6.0% and 9.0% respectively, milk heated at 90 degree celsius then cooled at 43 degree celsius, after cooling of milk starter culture was added at 1-2% i.e. type t dahi culture consists of Streptococcus thermophilus and Lactobacillus bulgaricus. Milk is then incubated for 7 hours at 42 degree celsius. Ready curd was cooled and blended. The blended curd is then mixed with various sugar substitues for different trials to get the final product which is done on the basis of sensory evaluation on 9 point hedonic scale Total 4 trials were taken to finalize the product.

Trial 1: In trial 1 blended curd of 250 ml per is mixed with 3 combinations in three different amounts of sugar and FOS at 7%, 8%, 9%. In which 9% of sample is sensorised. Sugar is added 22.5g, FOS is added 28g, and the combination of sugar

and FOS is added 12g, 14g respectively in 250 ml per blended curd.

Table 5: trial 1 composition of lassi

Sugar Substitutes	9%	8%	7%
(A) Sugar	22.5 g	20 g	17.5 g
(B) FOS (11.2%)	28 g	25g	22 g
(C) Sugar + FOS (1:1) (4.5% + 5.6%)	11.2g	10 g + 13 g	9 g + 11g

Trial 2: In trial 2 blended curd of 250 ml per is mixed with five sugar replacements and one sugar itself for reference -

Table 6: trial 2 composition of lassi

Sugar Substitutes	
(A) Sugar (9%)	22.5g
(B) FOS (11.2%)	8g
(C) Sugar + FOS (4.5% + 5.6%)	12g + 14g
(D) Stevia (0.0.6%) (150 times sweeter than sugar)	0.15g
(E) FOS + Erythritol (1:1) (5.6% + 0.064%)	1.5g + 0.16g
(F) Stevia + Erythritol (1:1) (0.03% + 0.064%)	0.07g + 0.16g

Trial 3: In trial 3 blended curd of 250 ml per is mixed with four sugar replacements- ,

Table 7 trial 3 composition of lassi

Sugar Substitutes	
(A) Sugar + FOS	11.25g+14g
(B) Stevia	0.15g,
(C) Stevia + Erythritol	0.07g+0.16g,
(D) Erythritol (0.128%) (70 times sweeter than sugar)	0.32g.

Trial 4: In trial 4 blended curd of 250 ml per is mixed with selected two samples of sugar substitues -

Table 8: trial 4 composition of lassi

Sugar Substitutes	
(A) Stevia	0.15g
(B) Stevia + Erythritol	0.07g+0.16g

III. SENSORY EVALUATION

The sensory properties of the different products is usually evaluated and ranked on the basis of scores given by the panel of judges to the product. They like or dislike the various parameters. The lassi with different subjected to sensory evaluation for taste, overall acceptability by a panel of trained judges for acceptance or rejection. Samples were presented in succession and panelists were asked to give mark evaluation variables according to 9- point Hedonic scale as described by Larmond (1977). The 9-point Hedonic scale was used, where the lowest point 1 = extremely dislike and highest point 9 = extremely like and the result of the analysis of variance revealed that sensory result assigned by judges on taste were found statistically significant.

PHYSICOCHEMICAL ANALYSIS:

The lassi sample was analyzed by adopting SOP given below. Fat was determined by Gerber methodology as represented in IS: SP: eighteen, half XI (1981).Protien was determined by Kjeldahl methodology as per AOAC (1995). Carbohydrate was calculable by Lane-Eynon's methodology represented in IS: 1479, half II (1961). Ash was calculable by muffle chamber as represented in Ranganna (1986). Moisture content was determined by infrared moisture meter. Total solids make up my mind by measurement methodology represented in IS: SP: eighteen, half XI (1981). ph of lassi was determined by digital hydrogen ion concentration meter (digital ph meter). Titratable acidity of lassi (expressed as dairy product acid) was measured by IS: 1479, half I (1960).

MICROBIAL ANALYSIS:

Microbial examinations of the sugarfree lassi were performed to assess microorganism, flora and Yeast load beneath laboratory condition. yeast and mildew count and enumeration of total Coliform and E. coli of lassi sample were examined. All media associated instrumentation were sterilized by use of steam Sterilization at fifteen psi for twenty minutes at 121 degree C in an autoclave. For analysis of ten gram of every sample was aseptically weighted and so diluted to 1:10 (10 gram in 90ml) with facilitate of sterilized H2O and mixed properly. Serial dilutions were ready and so unfold plate technique was used on applicable selective media. Streak Plate methodology was wont to isolate the precise organism. within the Pour Plate methodology, 0.1 cubic centimetre and oneml samples were measuring instrument on the sterilized Petri plates. Sterilized agar medium was cooled to near forty five degree C and was poured on the plates. The media was mixed well by facilitate of mild whirling motion. Then Petri plate were then allowed to solidify. The plates were incubated at needed temperature for 24-72 hours. during this study for every of the sample there have been a pair of Petri plates for zero.1 cubic centimetre and different a pair of for oneml (Badau et al., 1999, Badau et al., 2001). For unfold Plate methodology just about fifteen cubic centimetre of the antecedently autoclaved medium was poured into the sterilized Petri plate and was unbroken at temperature till agar was coagulated.

In Potato grape sugar Agar (PDA) plate zero.2 cubic centimetre sample was born onto a coagulated agar plate then the sample was unfold on the agar plate with the assistance of the sterilized bent glass rod (spreader). By this methodology Yeast and mildew counts were determined (Mosupye et al. 1999, Mudgil et al. 2004). In Streak Plate methodology, the media in conjunction with microbes were transferred with facilitate of a a slim headed loop from milk sugar broth cone-shaped flask and from LST tube and born with facilitate of the loop; the streak was done on to the agar plate. The plate was then incubated at the specified temperature (37 degree C) for twenty-four to seventy two hours. All steps of the media were done beneath the bedded flow of air. Isolation and enumeration of the entire Coliform were performed by MPN methodology. the foremost Probable range (MPN) methodology victimisation Nutrient broth (Harrigen and MacCance, 1976) could be a applied math, multi-step assay accommodates the presumptive, confirmed and completed phases. within the assay, serial dilutions of elite sample ar inoculated into broth media. From the gas positive (fermentation of lactose) tubes, the opposite a

pair of phases of the amount of organisms will be calculable from the applied math tables. usually solely the primary a pair of phases were performed in Coliform analysis for E.coli organism (Speck, M. L. 1976).

IV. RESULTS AND DISCUSSIONS

Trial 1: When sensory evaluation of lassi is done composition with 9% of samples were much reviewed. In which code A i.e. sugar is much liked and code C i.e combination of sugar and FOS is accepted by number of individuals.

Trial 2: When sensory evaluation of six samples was done with codes A, B, C, D, E, F most liked samples were D and F i.e with stevia and the combination of stevia and erythritol respectively.

Trial 3: When sensory evaluation of four samples was done with codes A, B, C, D most liked samples were B and C i.e. stevia and stevia with the combination of erythritol. Samples A and D i.e. sugar with combination of FOS and erythritol respectively were disliked slightly.

Trial 4: In trial 4 two lassi samples were prepared with code A and B i.e. stevia and stevia with the combination of erythritol. On the basis of trial 4, final product was decided and from the sensory evaluation on 9 point hedonic scale stevia lassi was finalized.

Physicochemical Analysis:

Table 9: Result of physicochemical properties

Parameters	Result
Ph	4.28 ± 0.02
Acidity (%)	0.89 ± 0.02
Moisture (%)	86 ± 0.9
Ash (%)	0.69 ± 0.02
Total Solids (%)	21.18 ± 0.14
Protien (%)	3.53 ± 0.11
Carbohydrate (%)	11 ± 0.15

Microbial Analysis:

For E.coli growth estimation: (Nutrient Agar)

Dilution of Culture	Plate Count	Cfu/ml
10-1	312	3.12×10^{-2}
10-2	110	1.1×10^{-4}

For yeast and mold estimation: (Potato Dextrose Agar)

Dilution of Culture	Plate Count	Cfu/ml
10-1	89	8.9×10^{-2}
10-2	76	7.6×10^{-4}

For Coliform:

Coliforms were found to be Nil.

CONCLUSION

In order to provide a healthy and nutritious option for diabetic pateints we have introduced instant sugarfree lassi made from stevia. The milk was collected and heated at 90 degree celsius, after heating the milk was cooled at 43 degree celsius, at that point of temperature starter culture i.e. type T dahi culture was inoculated at 1-2% and incubated upto 7 hours at 42 degree celsius. The curd was blended with various sugar substitutes and trials were performed. Based on the results of trials final product was developed . Sugar replacements used were FOS, stevia, erythritol, sugar as reference and the combination of these sugar substitutes with one another. On the basis of sensory evaluation on 9 point hedonic scale, a lassi with stevia was chosen.

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