DEVELOPMENT OF PROBIOTIC RICH RECIPES

Project Submitted to

MAHATMA GANDHI UNIVERSITY

In partial fulfilment of requirement for the
Award of Degree of
BACHELOR OF SCIENCE
IN
HOME SCIENCE
BY

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Certified as bonafide research work

Examiner

Project Guide

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18/04/2023

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PROBIOTICS: PRODUCT DEVELOPMENT ON PROBIOIC RICH RECIPES

CHAPTER 1

INTRODUCTION

Probiotics are live microorganisms that are intended to have health benefits when consumed or applied to the body. They can be found in yogurt and other fermented foods, dietary supplements, and beauty products.

Although people often think of bacteria and other microorganisms as harmful “germs,” many are actually helpful. Some bacteria help digest food, destroy disease-causing cells, or produce vitamins. Many of the microorganisms in probiotic products are the same as or similar to microorganisms that naturally live in our bodies. {national center for complementary and interative health}

The World Health Organization’s (WHO) 2014 definition of probiotics: “live microorganisms that when administered in adequate amounts confer a beneficial health effect on the host.”

The US Food and Drug Administration (FDA) uses other terms for live microbes for regulatory purposes; live microbes used in animal feeds are called “direct-fed microbials” , and, when intended for use as human drugs, they are classified as “live biotherapeutics” However, no legal definition of probiotics exists in the United States or in other countries, which allows the marketing of products labeled as “probiotics” that do not meet the fundamental criteria stipulated in the scientific definition. As public awareness of probiotics increases, the use of the term has implications both for the violation of the standard of truthful and not misleading labeling and for consumer confidence in this product category. In the absence of a legal definition of the term “probiotic,” it is incumbent on industry participants to adopt and adhere to the scientific definition of the term. If the products are not properly characterized and validated, the category will suffer.

The statement that probiotics “improve the balance of microflora” is often made. However, it is not clear what this assertion means or how is it measured. Probiotics have been shown to alter populations or activities of colonizing microbes, but does this correspond to an “improved balance”? Improved balance is often equated with increased fecal levels of lactobacilli or bifidobacteria. This is a measure not of balance but of fecal microbiota alteration. Since no scientific consensus exists on the composition of a “healthy microbiota,” the health implications of such microbiota alterations remain unclear. Furthermore, it is difficult to measure intestinal microbiota; fecal microbiota is not equivalent to intestinal microbiota, and luminal microbiota is not equivalent to epithelial microbiota. Probiotics may, in fact, facilitate a return to normal status after a perturbation of the microbiota (e.g., because of the use of antibiotics or illness) or may reduce the degree of change invoked by such challenges. This function more closely supports the concept that probiotics can improve the balance of microbiota. A few studies have measured a probiotic-enhanced return to baseline levels after antibiotic use in humans. The concept of probiotic-induced improved balance of microbiota would benefit from further study. {Clinical Infectious Diseases, Volume 46, Issue Supplement_2, February 2008, Pages S58–S61, https://doi.org/10.1086/523341}

In 2011, a report was released by the Agency for Healthcare Research and Quality (AHRQ) based on research sponsored by the National Institutes of Health and the FDA and conducted by the Southern California Evidence-based Practice Center reviewing the safety of probiotics. The report was an exhaustive review of the literature including 622 studies of organisms from 6 genera: Lactobacillus, Bifidobacterium, Saccharomyces, Streptococcus, Enterococcus, and Bacillus. The authors of the report concluded that, although the existing probiotic clinical trials reveal no evidence of increased risk, “the current literature is not well equipped to answer questions on the safety of probiotics in intervention studies with confidence.” The vast majority of the existing published studies simply have not adequately assessed and reported on safety. In a commentary on this report, Wallace and MacKay point out that “to explore the question ‘are probiotics safe’ using a drug-based framework assumes that the literature will include drug-like safety and toxicology data.” Indeed, one can presume that this type of data was omitted from the majority of clinical trial reports in the literature because the researchers didn’t have any reason to think that such detailed safety assessments would be either necessary or even appropriate. Wallace and MacKay suggest that the research community should recognize that the most appropriate way to evaluate the safety of such products is based on the “totality of evidence” at least in healthy populations. This evidence includes its long history of safe use as well as data from clinical trials, and animal and in vitro studies. To make the point that the results of the AHRQ report should be used to support rather than raise doubts about the safety of probiotics, they make an astute comparison to the study of apples, stating that “if the AHRQ intended to answer the question ‘are apples safe?’ it would likely come to the same conclusion, which is that the current literature is not well equipped to answer questions on the safety of apples with confidence.”

It should be noted that just as no 2 probiotic strains can be expected to have exactly the same clinical effect, each probiotic strain, including those that have not yet been developed, would be anticipated to have a different safety profile. Perhaps more importantly, the safety of a commercially available probiotic product depends not only on the probiotic organism but on the other constituents of the

product, be it a food or medicinal formulation.{ Doron S, Snydman DR (2015). “Risk and safety of probiotics”. Clin Infect Dis (Review). 60 Suppl 2 (Suppl 2): S129–234.}

1.1 History of Probiotics

1.2

The term probiotic is a relatively new word meaning “for life” and it is currently used to name bacteria associated with beneficial effects for humans and animals. The original observation of the positive role played by some selected bacteria is attributed to Eli Metchnikoff, the Russian born Nobel Prize recipient working at the Pasteur Institute at the beginning of the last century, who 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” (Metchnikoff, 1907)

At this time Henry Tissier, a French paediatrician, observed that children with diarrhoea had in their stools a low number of bacteria characterized by a peculiar, Y shaped morphology. These “bifid” bacteria were, on the contrary, abundant in healthy children (Tissier, 1906). He suggested that these bacteria could be administered to patients with diarrhoea to help restore a healthy gut flora.

The works of Metchnikoff and Tissier were the first to make scientific suggestions about the probiotic use of bacteria, even if the word “probiotic” was not coined until 1960, to name substances produced by microorganisms which promoted the growth of other microorganisms (Lilly and Stillwell, 1965). Fuller (1989), in order to point out the microbial nature of probiotics, redefined the word as “A live microbial feed supplement which beneficially affects the host animal by improving its intestinal balance”. A quite similar definition was proposed by Havenaar and Huis in ‘t Veld (1992) “a viable mono or mixed culture of bacteria which, when applied to animal or man, beneficially affects the host by improving the properties of the indigenous flora”. A more recent, but probably not the last definition is “live microorganisms, which when consumed in adequate amounts, confer a health effect on the host” (Guarner and Schaafsma, 1998).

1 .2 Probiotics and food products

The range of food products containing probiotic strains is wide and still growing. The main products existing in the market are dairy-based ones including fermented milks, cheese, ice cream, buttermilk, milk powder, and yogurts, the latter accounting for the largest share of sales

Non dairy food applications include soy based products, nutrition bars, cereals, and a variety of juices as appropriate means of probiotic delivery to the consumer .The factors that must be addressed in evaluating the effectiveness of the incorporation of the probiotic strains into such products are, besides safety, the compatibility of the product with the microorganism and the maintenance of its viability through food processing, packaging, and storage conditions. The product's pH for instance is a significant factor determining the incorporated probiotic's survival and growth, and this is one of the reasons why soft cheeses seem to have a number of advantages over yoghurt as delivery systems for viable probiotics to the gastrointestinal tract. Current technological innovations provide ways to overcome probiotic stability and viability issues offering new options for their incorporation in new media and subsequent satisfaction of the increasing consumer demand. Microencapsulation technologies have been developed to protect the bacteria from damage caused by external environment. By the introduction of a straw delivery system containing a dry form of the probiotic bacterium beverage manufacturers can now provide it to the consumer. In addition, viable spores of a spore forming probiotic are available in the market offering advantages during processing. In the same time, the potential of lantibiotics'—substances with antimicrobial properties—production by bifidobacteria is being explored in order to be applied in the food area

Hundreds of different bacteria species are the natural and predominant constituents of intestinal microbiota. Among the numerous intestinal microbes, those anticipated to exhibit potential health benefits to the host through modulation of the intestinal microbiota are commonly selected as probiotics. Species belonging to the genera Lactobacillus and Bifidobacterium have been reported to be the beneficial probiotic bacterial strains. The representative species include L. acidophilus, L. casei, L. plantarum, B. lactis, B. longum, and B. bifidum (Kailasapathy & Chin 2000; Ishibashi & Yamazaki 2001). Some of the major health benefits attributed to probiotics include improvement of gastrointestinal microflora, enhancement of immune system, reduction of serum cholesterol, cancer prevention, treatment of irritable bowel-associated diarrhoeas, antihypertensive effects as well as improvement of lactose metabolism (Saarela et al. 2000; Nagpal et al. 2012). This article reviews on the past studies involving the use of probiotics in strengthening the immune system, prevention of bowel diseases, modulation of hypocholesterolemic effect as well as promoting dermal and oral health. Besides that, potential uses of probiotics for the management of anxiety and depression as well as boosting dermal and oral health are also discussed.

AIM OF THE STUDY

1 .To do a brief study on probiotics

2 .To develop some probiotic based refreshing drinks

3

OBJECTIVES OF THE STUDY

1 .To prepare innovative probiotic based refreshing drinks

2. To evaluate the sensory attributes of the developed recipes

4 .To develop a e booklet for the popularisation of the developed probiotic drinks

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CHAPTER 2

REVIEW OF LITARATURE

A number of health effects are associated with usage of probiotics. There are differing degrees of evidence supporting the verification of such effects, and the Consultation recognizes that there are reports showing no clinical effects of certain probiotic strains in specific situations (Andersson et al. 2001). While a rigorous review of each topic was not within the scope of the Consultation, an attempt was made to provide guidelines on parameters for measuring health benefits. The use of probiotic microorganisms to confer health benefits on the host must indicate the dosage regimens and duration of use as recommended by the manufacturer of each individual strain or product based upon scientific evidence, and as approved in the country of sale. While this practise is not currently in place, the Consultation strongly recommended that each product should indicate the minimum daily amount required for it to confer specific health benefit(s). Such evidence should, where possible result from in vitro, animal (where appropriate) and human studies. Examples have been cited below to illustrate studies on specific strains and clinical outcomes. In doing so, the emphasis should not be on one particular strain being termed as superior to another, rather that the benefit conferred and the methods used to obtain and measure said benefits are of most importance. Joint {FAO/WHO Expert Consultation on Evaluation of Health and Nutritional Properties of Probiotics in Food Including Powder Milk with Live Lactic Acid Bacteria, October 2001}

2.1 History of Discovery and Definitions of Probiotics

Experiments for studying effects of bacteria on treating health problems and promoting good health have been performed for a long time. Theodor Escherich has been credited as the first pediatric infectious disease physician and described Bacterium coli commune (now referred to as Escherichia coli) in 1886 [9]. While working under Theodor Escherich, Dr. Józef Brudziński treated infants for acute infectious diarrhea by using a Bacillus lactis aërogenes suspension described in publications from 1899 [10,11]. Although Élie Metchnikoff [12] believed that intestinal putrefaction can shorten life, he noted the work of Dr. Brudziński and similar work by Dr. Henry Tissier and recommended people “to absorb

large quantities of microbes". He believed that lactic bacteria can fight against intestinal putrefaction. He also wrote that Stamen Grigoroff observed many centenarians in Bulgaria, which is a region where yahourth (yogurt) was commonly consumed [12]. The fact that diet affects the types of bacteria that develops within the intestinal tract was first clearly established by Herter and Kendall in 1910, but suggested as early as 1886 by Escherich and Hirschler .

Many of the starter cultures and probiotics now used in yogurt making were first described in the late 1800s or early 1900s. The name "Streptococcos" was first used in 1874 by Albert Theodor Billroth . Streptococcus thermophilus (later reclassified as Streptococcus salivarius subsp. Thermophilus by Farrow and Collins in 1984 but revived back to Streptococcus thermophilus by Schleifer et al. in 1991) was described by S. Orla-Jensen in 1919. In 1901, Martinus Beijerinck proposed the genus Lactobacillus to include Gram-positive, fermentative, facultatively anaerobic, non-sporeforming bacteria .Stamen Grigoroff discovered Bulgarian bacillus (now Lactobacillus delbrueckii ssp. Bulgaricus) in 1905 .Lactobacillus acidophilus (originally called Bacillus acidophilus) was described by Ernst Moro in 1900 .In 1899 and 1900, Henry Tissier first described Bacillus bifidus communis, later referred to as Lactobacillus bifidus and now referred to as Bifidobacterium .]. He found that Bifidobacteria was the main type of bacteria comprising the gut micro flora of breast-fed babies and Bifidobacteria could treat acute gastroenteritis .

Dr. Isaac Carosso recommended to his patients who suffered from gastrointestinal problems to consume yogurt. Afterwards, he started producing yogurt and founded the Danone Company in 1919 .

The term "probiotic" (meaning "for life") originated in 1953 from Werner Kollath to mean "active substances that are essential for a healthy development of life" . Lilly and Stillwell used the term probiotic as "substances secreted by one organism which stimulate the growth of another" in 1965. Parker described probiotics as "organisms and substances which contribute to intestinal microbial balance" in 1974. Fuller defined probiotics as "A live microbial feed supplement which beneficially affects the host animal by improving its intestinal microbial balance" in 1989. A panel from the International Scientific Association for Probiotics and Prebiotics defined probiotic as "live microorganisms that, when administered in adequate amounts, confer a health benefit on the host" in 2014 .) [Google Scholar]

Health Aspects

e selection of the probiotic organisms depends upon a

Health claims. Probiotic must be able to exert their bene ts

On the host through the growth and /or activity in the human

Body. Most proven probiotics strains are human origin, a

Strong case can be made that they are normal commensals and,

Therefore, safe to use. To achieve the health bene ts, probiotic

Bacteria must be viable and available at high concentration,

Typically 105 to 107 CFU/g of product (Mishra, Prasad 2000).

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Ability of probiotics to give health bene t to human being.

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Bowel syndrome, and In ammatory Bowel Disease (IBD;

Crohn's disease and ulcerative colitis), diarrhea, cancer,

Depressed immune function, inadequate lactase digestion,

Infant allergies, failure-to-thrive, hyperlipidaemia, hepatic

Diseases, helicobacter pylori infections and AIDS (see the all

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2.2 Probiotics their role in treatment and prevention of disease

- A probiotic is a “live microbial food ingredients that, when ingested in sufficient quantities, exerts health benefits on the consumer”. Probiotics exert their benefits through several mechanisms; they prevent colonization, cellular adhesion and invasion by pathogenic organisms, they have direct antimicrobial activity and they modulate the host immune response. The strongest evidence for the clinical effectiveness of probiotics has been in their use for the prevention of symptoms of lactose intolerance, treatment of acute diarrhea, attenuation of antibiotic-associated gastrointestinal side effects and the prevention and treatment of allergy manifestations. More research needs to be carried out to clarify conflicting findings on the use of probiotics for prevention of travelers’ diarrhea, infections in children in daycare and dental caries, and elimination of nasal colonization with potentially pathogenic bacteria. Promising ongoing research is being conducted on the use of probiotics for the treatment of Clostridium difficile colitis, treatment of Helicobacter pylori infection, treatment of inflammatory bowel disease and prevention of relapse, treatment of irritable bowel syndrome, treatment of intestinal inflammation in cystic fibrosis patients, and prevention of necrotizing enterocolitis in premature infants. Finally, areas of future research include the use of probiotics for the treatment of rheumatoid arthritis, prevention of cancer and the treatment of graft-versus-host disease in bone marrow transplant recipients. (S.Doron, S. Gorbach ,Expert review of anti-infective therapy ,2006)

2.3 Probiotics and their fermented food products

- Probiotics are usually defined as microbial food supplements with beneficial effects on the consumers. Most probiotics fall into the group of organisms' known as lactic acid-producing bacteria and are normally consumed in the form of yogurt, fermented milks or other fermented foods. Some of the beneficial effect of lactic acid bacteria consumption include: (i) improving intestinal tract health; (ii) enhancing the immune system, synthesizing and enhancing the bioavailability of nutrients; (iii) reducing symptoms of lactose intolerance, decreasing the prevalence of allergy in susceptible individuals; and (iv) reducing risk of certain cancers. The mechanisms by which probiotics exert their effects are largely unknown, but may involve modifying gut pH, antagonizing pathogens through production of antimicrobial compounds, competing for pathogen binding and receptor sites as well as for available nutrients and growth factors, stimulating immunomodulatory cells, and producing lactase. Selection criteria, efficacy, food and supplement sources and safety issues around probiotics are reviewed. Recent scientific investigation has supported the important role of probiotics as a part of a healthy diet for human as well as for animals and may be an avenue to provide a safe, cost effective, and 'natural' approach that adds a barrier against microbial infection. This paper presents a review of probiotics in health maintenance and disease prevention. (S. Parvez, K. A. Malik, S. Ah Kang, H-Y Kim ,Journal of applied microbiology ,2006)

2.4 Probiotic immunomodulation in health and disease

Probiotics, microorganisms that have a favorable influence on physiologic and pathological processes of the host by their effect on the intestinal flora, may play a role in improving human health. One of the putative effects is the modulation of immune function. Thus, the mucosal immune system and methods to assess its function are reviewed briefly. Probiotic modulation of humoral, cellular and nonspecific immunity is reviewed, with emphasis placed on immune response in disease models. There are very few reports of human intervention studies with probiotics. However, some of the possible future directions for research with respect to probiotics, immunity, and human health are discussed. Although the application of probiotics has demonstrated trends with respect to altered aspects of immune response, the underlying mechanisms by which that occurs are unclear (K. Erickson, N. Hubbard ,The Journal of nutrition ,2000)

2.5 Probiotics as modulators of gut flora

Probiotic ingestion can be recommended as a preventative approach to maintaining the balance of the intestinal microflora and thereby enhance 'well-being'. Research into the use of probiotic intervention in specific illnesses and disorders has identified certain patient populations that may benefit from the approach. Undoubtedly, probiotics will vary in their efficacy and it may not be the case that the same results occur with all species. Those that prove most efficient will likely be strains that are robust enough to survive the harsh physico-chemical conditions present in the gastrointestinal tract. This includes gastric acid, bile secretions and competition with the resident microflora. A survey of the literature indicates positive results in over fifty human trials, with prevention/treatment of infections the most frequently reported output. In theory, increased levels of probiotics may induce a 'barrier' influence against common pathogens. Mechanisms of effect are likely to include the excretion of acids (lactate, acetate), competition for nutrients and gut receptor sites, immunomodulation and the formation of specific antimicrobial agents. As such, persons susceptible to diarrhoeal infections may benefit greatly from probiotic intake. On a more chronic basis, it has been suggested that some probiotics can help maintain remission in the inflammatory conditions, ulcerative colitis and pouchitis. They have also been suggested to repress enzymes responsible for genotoxin formation. Moreover, studies have suggested that probiotics are as effective as anti-spasmodic drugs in the alleviation of irritable bowel syndrome. The approach of modulating the gut flora for improved health has much relevance for the management of those with acute and chronic gut disorders. Other target groups could include those susceptible to nosocomial infections, as well as the elderly, who have an altered microflora, with a decreased number of beneficial microbial species. For the future, it is imperative that mechanistic interactions involved in probiotic supplementation be identified. Moreover, the survival issues associated with their establishment in the competitive gut ecosytem should be addressed. Here, the use of prebiotics in association with useful probiotics may be a worthwhile approach. A prebiotic is a dietary carbohydrate selectively metabolised by probiotics. Combinations of probiotics and prebiotics are known as synbiotics

(L. Fooks, G. Gibson ,British Journal of Nutrition ,2002)

2.6 Probiotics their role of treatment and prevention of disease

A probiotic is a “live microbial food ingredients that, when ingested in sufficient quantities, exerts health benefits on the consumer”. Probiotics exert their benefits through several mechanisms; they prevent colonization, cellular adhesion and invasion by pathogenic organisms, they have direct antimicrobial activity and they modulate the host immune response. The strongest evidence for the clinical effectiveness of probiotics has been in their use for the prevention of symptoms of lactose intolerance, treatment of acute diarrhea, attenuation of antibiotic-associated gastrointestinal side effects and the prevention and treatment of allergy manifestations. More research needs to be carried out to clarify conflicting findings on the use of probiotics for prevention of travelers’ diarrhea, infections in children in daycare and dental caries, and elimination of nasal colonization with potentially pathogenic bacteria. Promising ongoing research is being conducted on the use of probiotics for the treatment of Clostridium difficile colitis, treatment of Helicobacter pylori infection, treatment of inflammatory bowel disease and prevention of relapse, treatment of irritable bowel syndrome, treatment of intestinal inflammation in cystic fibrosis patients, and prevention of necrotizing enterocolitis in premature infants. Finally, areas of future research include the use of probiotics for the treatment of rheumatoid arthritis, prevention of cancer and the treatment of graft-versus-host disease in bone marrow transplant recipients.

(S. Doron, S. Gorbach ,Expert review of anti-infective therapy ,2006)

2.7 Potential use of probiotics in clinical practice

Probiotics are defined as live microorganisms that, when administered in adequate amounts, confer a health benefit on the host. There is now mounting evidence that selected probiotic strains can provide health benefits to their human hosts. Numerous clinical trials show that certain strains can improve the outcome of intestinal infections by reducing the duration of diarrhea. Further investigations have shown benefits in reducing the recurrence of urogenital infections in women, while promising studies in cancer and allergies require research into the mechanisms of activity for particular strains and better-designed trials. At present, only a small percentage of physicians either know of probiotics or understand their potential applicability to patient care. Thus, probiotics are not yet part of the clinical arsenal for prevention and treatment of disease or maintenance of health. The establishment of accepted standards and guidelines, proposed by the Food and Agriculture Organization of the United Nations and the World Health Organization, represents a key step in ensuring that reliable products with suitable, informative health claims become available. Based upon the evidence to date, future advances with single- and multiple-strain therapies are on the horizon for the management of a number of debilitating and even fatal conditions.

(G. Reid, J. Jass, M. T. Sebulsky, J. McCormick, Clinical Microbiology Reviews ,2003)

CHAPTER 3

METHODOLOGY

Methodology refers to the overarching strategy and rationale of your research projects .it involves studying the methods in your field and the theories or principles behind them ,in order to develop an approach that matches the study

The study entitled "probiotic based refreshing drinks"

The methodology adapted to the study includes various steps to make recipes of some fermented based probiotic drinks

3.1 Identification of probiotic based food items

3.2 Designing suitable probiotic based refreshing drinks

3.3 Hedonic scale

3.1 Identification of probiotic based food items – The most common fermented foods that naturally contain probiotics, or have probiotics added to them, include yogurt,, kefir, kombucha, sauerkraut, pickles, miso, tempeh, kimchi, sourdough bread and some cheeses

3.2 Designing suitable recipes –According to identified food items , five probiotic based refreshing drinks are designed

A recipe booklet on probiotic foods

1. Rice water refreshing drink

2. Raw mango juice

3 probiotic jigarthnada

4 Dahi sandwich

6 Special wrap

7

6. Stuffed coleslaw

3.2.1 RICE WATER REFRESHING DRINK

INGREDIENTS

Rice water - 240 g

Coriander leaf - 10gm

Ginger - 2 g

Cumin seeds - 0.5g

Salt - to taste

PREPARATION

Blend all the ingredients with required water and serve with ice cubes

3.3.2 RAW MANGO JUICE

INGREDIENTS

Raw mango (salted raw mango in brine) - 70 g

Green chilli - 1 nos

Salt - a pinch

Pepper - a pinch

Ginger - 2g

Sugar - 3.5g

Carbonated soda - 30 ml

PREPARATIONS

Blend all these ingredients together and serve it with icecubes

3.3.3 PROBIOTIC JIGARTHANDA

INGREDIENTS

Khoa - 10g

Sugar - 2g

3-4 badam gum - 5g

Curd - 75 g

Nannari sarbath - 15ml

Condensed milk - 10ml

Milk - 200ml

Ice-cream - 1 scoop

PREPARATIONS

Soak badam pisin in water for 4-8 hours

Boil 2 cups of milk in a wide pan .in a separate pan add 3 tbsp. sugar and stir it in a low flame till it turns into light caramel .add this to the boiling milk and mix well .keep scrapping the walls of the pan and reduce the milk to one cup chill until use

Next boil 2 cups of milk with 2-3 tablespoon sugar and chill that too

Keep ice-cream ,nannari syrup ,soaked badam pisin ready

To assemble jigarthanda .take a serving glass .pour some nannari syrup

Place a generous portion of badam pisin

Add 3 – 4 tbsp. khoya

2 tsp. of condensed milk and pour chilled milk topped with ice-cream

Serve immediately

3.3.4 DAHI SANDWICH

INGREDIENTS

Hung curd - 50g

Carrots - 15g

Cucumber - 15g

Onion - 10g

Tomato - 7g

Sweet corn - 5g

Coriander leaf - 3g

Green chilli - 1nos

Salt - to taste

Sugar - 8g

Black pepper - a pinch

Bread 75g

PREPARATIONS

Chop all the veggies. Add these chopped veggies to the hung curd ,add salt and sugar . Combine this well

Heat up a pan and toast that bread. Spread some butter on them and add generous quantity of the prepared stuffing on the half of the bread slices

Cover the remaining buttered slices.

3.3.5 SPECIAL WRAP

INGREDIENTS

Carrots - 10g

Onion - 10g

Cucumber - 10g

Paneer - 15g

Hung curd - 50g

Salt - a pinch

Pepper - a pinch

Wheat parota - 1 nos

PREPARATIONS

To a bowl add all veggies, fried paneer and hung curd, add salt and pepper and combine this well.

Spread this mix inside the wheat parotta and roll this

3.2.6 STUFFED COLESLAW

INGREDIENTS

Cabbage - 10g

Onion - 10g

Carrots - 10g

Capsicum - 10g

Pepper - a pinch

Salt - a pinch

Hung curd - 50g

Mayonnaise - 5g

Bread slice - 75g

PREPARATIONS

To a bowl finely slice all the veggies add mayonnaise ,hung curd , salt and pepper . combine all these well and add this to the bread slice

SENSORY EVALUATION SCORE CARD

Name of the food items	Taste of the recipe		Colour of the recipe	Appearance	texture	Average score
Rice water refreshing drink	5.6	5.9	6.2	8	6.4	
Raw mango juice	6.9	6.9	8	7	7.2	

Probiotic jigarthanda	6.9	6.7	8	6.7	7.0
Dahi sandwich	8.5	8.5	7.9	8.5	8.3
Special wrap	7.3	7.1	7.2	7.2	7.2
Stuffed coleslaw	7.7	7.7	7.9	7.6	7.7

HEDONIC SCALE RATING

Hedonic Scale is a scale that indicates the extent of respondents' overall liking or disliking for something

Hedonic scales are well tried and tested in consumer research for capturing liking data (Stone and Siddel, 1985)

Review of the developed recipes were rated through hedonic scale by the students of St. Teresa's college, Ernakulum

CHAPTER 4

RESULT AND DISCUSSION

The results of the present study “development of innovative probiotic products can be discussed under the following headings

4.1 Nutrient composition of the developed recipes

4.1.1 Rice water refreshing recipes

4.1.2 Raw mango juice

4.1.3 probiotic jigarthanda

4.1.4 Dahi sandwich

4.1.5 Special wrap

4.1.6 Stuffed coleslaw

4.2 Organoleptic attributes of the developed recipes

4.3 General acceptability of the developed recipes

Table

4.1 Nutrient composition of the developed recipes

Ingredients	quantity	Carbohydrates (gm)	Energy (kcal)	Protein (gm)	Vitamin A(mcg)	Iron (gm)	Calcium (mg)	(mg)
Rice water	240g	44.69	203.55	4.54		0.37	4.28	
Wheat	50g	32.09	160.29	5.29	0.23	2.05	15.47	
Bread	150g	77.85	367.5	11.7		1.65	16.5	
Onion	30g	2.87	14.41	0.45			6.31	
Carrot	35g	1.94	11.63	0.33	316.34	0.21	12.28	
Cucumber	25g	0.87	4.9	0.18	0.22	0.12	4.1	

Tomato	7g	0.19	1.37	0.06	10.56	0.02	0.71	
Sweet corn	5g	0.58	3.66	0.13	0.01	0.07	3.83	
Cabbage	10g	0.33	2.15	0.14	0.34	0.04	5.18	
Coriander leaf	13g	0.25	0.04	0.46	82.51	0.69	18.98	
Capsicum	10g	0.18	1.63	0.11	5.47	0.05	1.48	
Mango(green)	70g	7.41	34.3		8.44		18.9	
Curd	225g	6.75	135	6.98		0.45	335.25	
Khoa	10g	2.05	42.1	1.46		0.58	65	
Milk	200g	9.88	145.79	6.52	4.56		236	

4.2 Organoleptic attributes of the developed recipes

4.3 General acceptability of the developed recipes

From the above data analysis it is found that the most accepted recipe by the students were dahi sandwich

CHAPTER 5

CONCLUSIONS AND SUMMARY

There is scientific evidence supporting the incorporation of probiotics in nutrition as a means of derivation of health benefits. This evidence seems adequate concerning the prevention and treatment of certain conditions while simply promising or even controversial when it comes to others. The best documented effects include bowel disorders such as lactose intolerance, antibiotic-associated diarrhoea and infectious diarrhoea, and allergy, and emerging evidence accumulates concerning their potential role in various other conditions. In the same time as relevant consumer awareness grows, such products are becoming increasingly popular and tend to represent one of the largest functional food markets. Dairy products, particularly yoghurt, continue to be the most important vehicles for delivery of probiotic bacteria to the consumer with the non-dairy sector continuously evolving as well, as a result of food technology advances and the growing demand. A virtuous circle is therefore created: as the range of new products with improved sensory appeal widens, consumer acceptance increases and the food industry invests more on this growing market by development of new processes and products. Nevertheless, the development of probiotics for human consumption is still in its infancy. Further research, in the form of controlled human studies, is needed to determine which probiotics and which dosages are associated with the greatest efficacy and for which patients, as well as to demonstrate their safety and limitations. In addition, the regulatory status of probiotics as food components needs to be established on an international level with emphasis on efficacy, safety, and validation of health claims on food labels. There is no doubt that we will witness a significant increase in the role of probiotics in nutrition and medicine over the next decade and while their application in the prevention and treatment of various disorders should be considered by medical professionals and promoted by the food industry, this should be done with scepticism and respect to the consumer.

Probiotics are live microorganisms that, when consumed in adequate amounts, confer a health benefit on the host. They are found naturally in fermented foods such as yogurt, kefir, and sauerkraut, and are also available as dietary supplements and functional foods. Probiotics have been shown to improve digestion, boost immunity, and prevent certain diseases such as diarrhoea and urinary tract infections. Research on probiotics is on-going, and scientists continue to investigate the potential health benefits of probiotics, as well as the mechanisms of action and optimal delivery methods. Probiotics are generally considered safe and can be a useful addition to a healthy diet. However, it is important to consult with a healthcare professional before taking probiotics, especially if you have a weakened immune system or are taking medication that may interact with probiotics.

CHAPTER 6

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