

Comprehensive Chemical, Nutritional, and Antioxidant Profiling of Homemade Milk Kefir Drink

Presented By:

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Introduction

*Pereira et al., 2021;
Antioxidants*

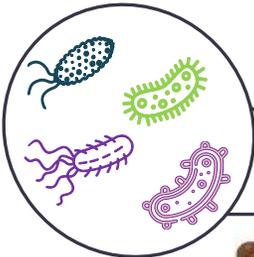
Antioxidant

Reduces Cholesterol levels

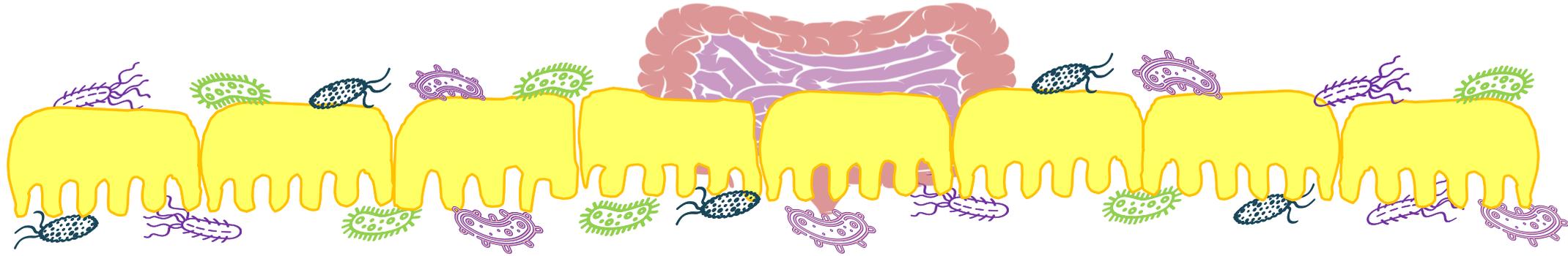
Anti-inflammatory

*Muneefa et al., 2016;
Journal of Medicinal
Plants Studies*

*Bourrie et al.,
2016; Frontiers
in Microbiology*



**Probiotic Rich –
Kefir Drink**
Produced by the microbial activity of ‘kefir grains’



Improves Gut Microbiota

 *Lactobacillus*

 *Bifidobacterium*

 *Streptococcus*

 *Lactococcus*

Kefir Drink Production Processes

Traditional Method

- Natural fermentation using kefir grains.
- Incubation at room temperature for around 18-24 hours.
- Variable microflora and characteristics.
- Suitable for small-scale production.
- No specific additives.

Industrial Method

- Controlled fermentation using starter cultures.
- Precise control of fermentation conditions.
- Consistent microflora and characteristics.
- Suitable for large-scale production.
- May involve addition of additives.



Objectives

- I. To evaluate physiochemical and nutritional properties of homemade milk kefir drink.

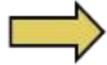
- II. To determine antioxidant activity, total phenolic compounds and volatile bioactive compounds of homemade milk kefir drink.

Methodology

Formulation of Homemade Cow milk kefir drink



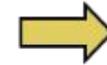
Boiling milk



3% (w/v) Kefir grains inoculum



Fermentation for 24hrs at 25°C



Sieving kefir grains for **REUSE**



Milk Kefir drink stored at 4°C.



Optimized using RSM:

Independent variable: kefir grains inoculum (2-4% w/v)

Dependent variables: pH, CFU/ml, and overall acceptability

Drink Analysis

Physicochemical analysis

- Moisture – Hot air oven
- Acidity – Titration *(AOAC 2000)*
- pH – Digital pH meter
- Viscosity – Digital viscometer

DPPH radical-scavenging activity: UV spectrophotometric method
Total Phenolic compounds: Folin-Ciocalteu method
(Ozcan et al. 2019)

Bioactive Compound Identification: GC-MS Analysis
(Al-Mohammadi et al. 2021)

Sensory analysis: 9-point hedonic rating scale
(Mishra et al. 2015)

Nutritional analysis

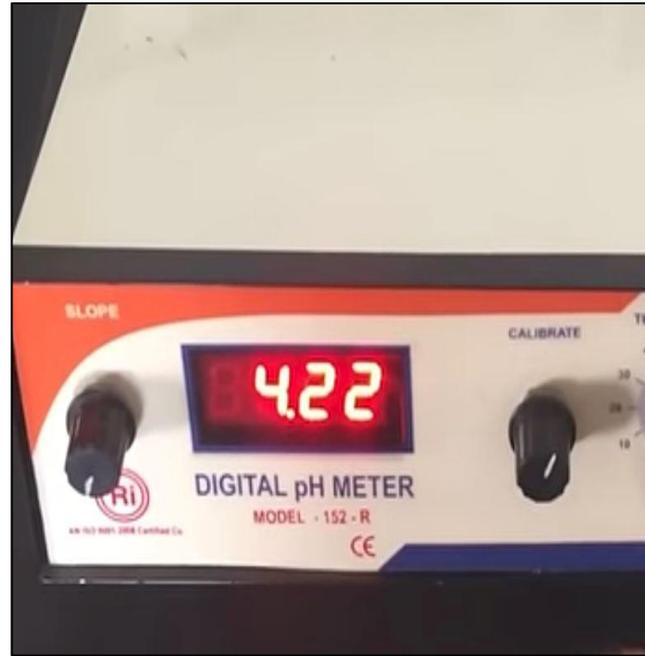
- Protein – Kjeldahl method *(AOAC 2000)*
 - Carbohydrate – Summation method
 - Calories Summation method *(Kumari et al. 2018)*
 - Fat – Rose-Gottlieb Method *(FSSAI 01.123:2022)*
 - Ash – Muffle furnace
 - Calcium *(IS-14792:1961)*
 - Zinc
 - Iron
 - Magnesium
 - Chloride
 - Iodine
 - Manganese
 - Phosphorous
 - Potassium
 - Sodium
- AAS *(IEC-62321-5-2013)*
- Flame photometry *(IS-12760:2012)*
- (IEC-14792:1961)*

Results

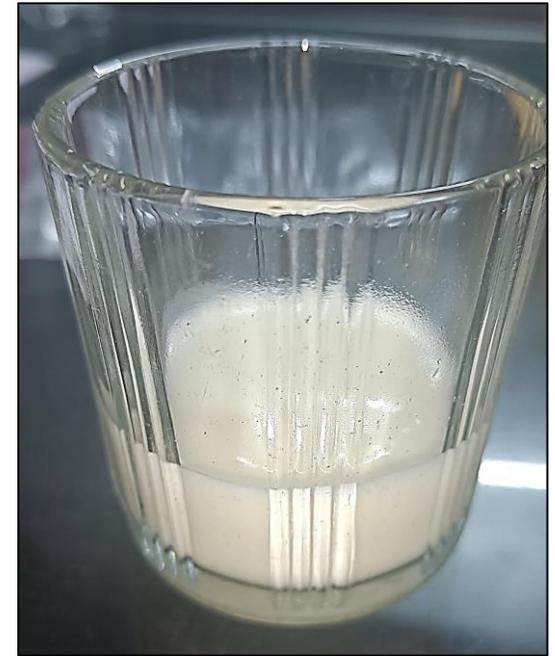
Optimized Homemade Cow Milk Kefir Drink



CFU/ml = 2.06×10^8



pH = 4.22



Overall acceptability = 6.1

Drink Analysis

Parameters	Homemade Milk Kefir Drink	Market Probiotic Products	Nutrient Content Claim (FSSAI/SP/2021)
Colony Forming Unit (CFU/ml)	1.06×10^8	$10^7 - 10^8$	Probiotic-Rich source ($\geq 10^8$)
pH	4.2	-	-
Overall Acceptability	6.1	-	-
Protein (g/100ml)	3.6	1 – 3	Protein Source (≥ 2.7 g/100ml i.e. 5% RDA/100ml)
Fat (g/100ml)	3.4	0 - 5	-
Sodium (mg/100ml)	59.4	16 – 74	Low Sodium (≤ 120 mg/100ml)
Calcium (mg/100ml)	29.3	-	Calcium Source (30% RDA/100ml)
Iron (mg/100ml)	2.9	-	High Iron (≥ 2.85 g/100ml i.e. 15% RDA/100ml)
Zinc (mg/100ml)	3.9	-	High Zinc (≥ 2.55 g/100ml i.e. 15% RDA/100ml)
Magnesium (mg/100ml)	44.1	-	-
DPPH Antioxidant potential (%)	54	-	-
Phenolic Compound (mgGAE/100ml)	18	-	-

GC-MS Analysis

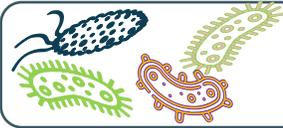
Total Number of bioactive compounds were 32 out of which 13 selected bioactive compounds which shows potential properties

Compound Name	Nature of the compound	Potential Bioactive Properties
2-Furanmethol	Furan	Antiviral
6-Oxa-bicyclo[3.1.0]hexan-3-one	Bicyclic lactone	Anti-convulsant activity, anti-microbial, antidiabetic & antiobesity
4H-Pyran-4one, 2-3-dihydro-3,5-dihydroxy-6-methyl	Pyranone	Antioxidant & Anti-inflammatory
Butanoic acid, 2-ethyl-2-methyl	Free Fatty Acid	Antimicrobial & Anti-inflammatory
2,4:3,5-Dimethylene-I-iditol	Polyol	Antimicrobial, Mutagenic & Cytotoxic
D-Fructose, 1,3,6-trideoxy-3,6-epithio	Fructose	Carbohydrate
1-Butene,4-isothiocyanato-1-(methylthio)	Isothiocyanate	Antioxidant
Ethanol, 2-(2-butoxyethoxy)-acetate	Ester	Anti-inflammatory, Antioxidant & Antiproliferative
sec-Butyl nitrite	Nitrite	Antibacterial
β -D-Glucopyranose, 4-O- β -D-galactopyranosyl	Glucose-galactose disaccharide	Aniviral & Antioxidant
Methyl 2,3-di-O-acetyl-4-O-methyl- α -D-xylopyranoside	Xylose derivative	Antimicriobial
2-Acetylamino-3-hydroxy-propionic acid	Amino acid derivative	α -glucosidase inhibitory, Antioxidant, Antimicrobial & Antidiabetic

Conclusions



Homemade Cow Milk Kefir Drink



Rich Probiotic Source (**10^8 CFU Count**)

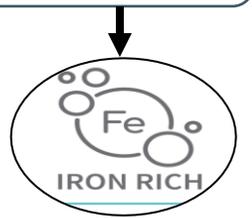
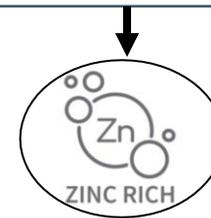
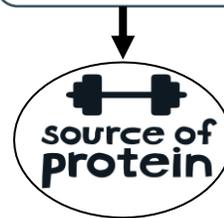


Improves gut microbiota & gut health



High antioxidant properties (**54%**)

High Nutritional Content



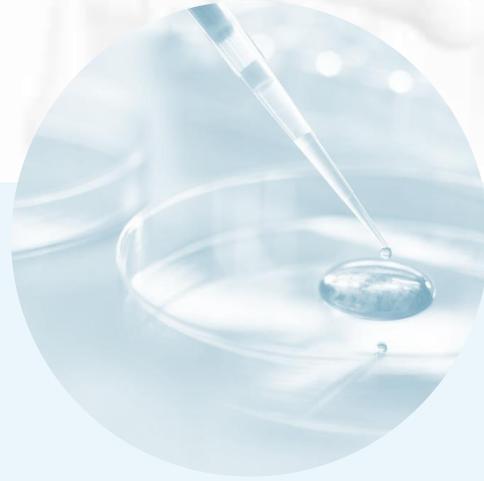
Antimicrobial, anti-inflammatory, Antiviral & Antidiabetic properties.

Future Scope

- Developments of different variants from homemade milk kefir drink such as synbiotic drinks, spread, gummies or candies.
- Researches are required to explore the relationship between the homemade milk kefir drink with various gastrointestinal diseases and neurodegenerative diseases.

References

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THANK YOU

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