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KOOZH- The traditional fermented product

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INTRODUCTION

There is a very famous quote by Mark Twain," Part of the secret of success in life is to eat what you like and let the food fight it out inside." It is rightly said that what we consume helps us in building our immunity and fighting various diseases. During this pandemic, we have realized that we need food that helps in building our immunity. Our indigenous fermented products are such a good source of probiotics and help in increasing good gut health. We should stick to our roots and try our traditional food products, as they are nutritious and healthy. Ragi Koozh is one of the Traditional fermented products which contains a lot of strains of *Lactobacillus* and many other Lactic Acid Bacteria and many studies suggest that these screened microbes have probiotic potential. Some of the strains have the potential to survive low pH and bile salts condition. Millets and Ragi used for the production of Koozh are even rich in nutrients especially micronutrients. Koozh is the Tamil name for porridge made from millet. It is made from *Kezhvaragu* or *Cumbu* flour and broken rice (called Noyee in Tamil) in a mud pot. It is consumed in breakfast and during festival time by the rural population. Because of its cooling effect and easily digesting power, it is selling as a cool drink by summer street vendors in South India. Finger Millet, a traditional South Indian weaning food is also consumed in the fermented form, as *Koozh* in rural and urban households.

TRADITIONAL HEALTH BENEFITS

Koozh is a part of daily diet of rural and agricultural workers and is proved to be a nourishing health food. During its fermentation, increase levels of thiamine, riboflavin and niacin contents are observed. It is mostly given to children at weaning age.

RAGI KOOZH

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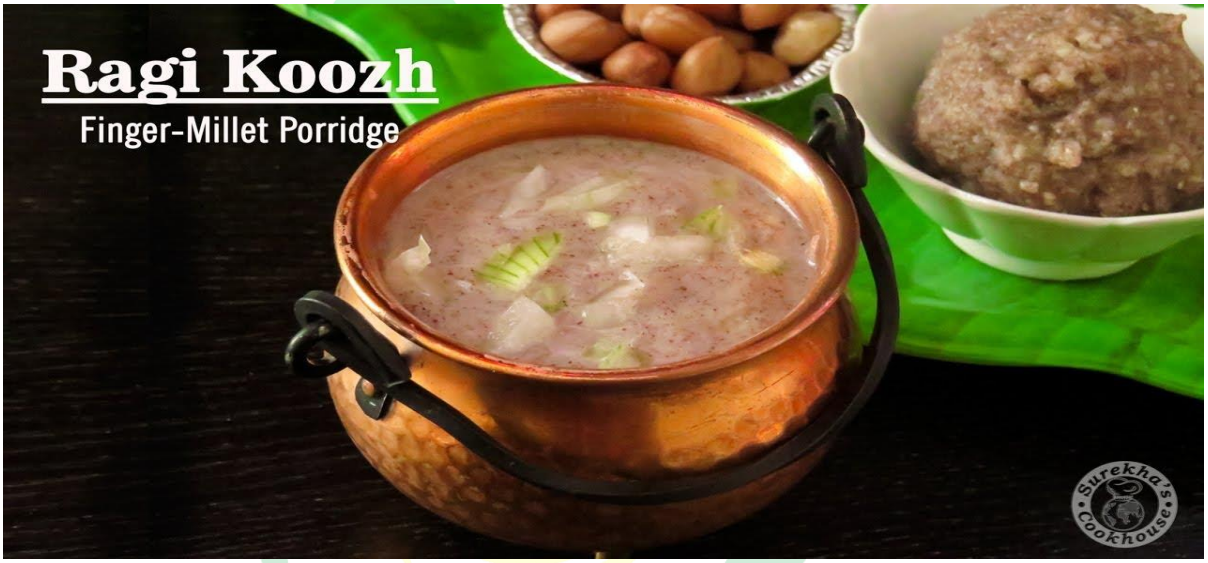
Finger Millet (Ragi, *Eleusine coracana*) is a notable drought resistant crop which is used as a staple prime food in India. It serves a good source of carbohydrate (72.0%), protein (7.3%), dietary fiber (11.5%), amino acids and phytochemicals (phenolic compounds). It is nutritionally rich in minerals such as calcium, magnesium, phosphorus and manganese which plays an important role in energy metabolism and is also essential for the normal growth of body tissue. Malting of ragi improves its digestibility, sensory and nutritional quality as well as lowers the antinutrients. The malted and fermented ragi flours are mostly used in the preparation of weaning food, instant mixes, beverages and pharmaceutical products.



Finger millet Koozh presents a low-calorie diet for all age groups especially growing infants and pregnant women. Recently, due to poor scientific consideration traditionally processed foods' commercialization has been restricted. But ragi has some of the fundamental qualities which gives it an upper edge compared to other cereals for malting and preparation of malted foods. This is an investigation report which depicts a food chemical evaluation of unfermented control, naturally fermented ragi koozh and probiotic fermented ragi koozh.

Preparation of Ragi Koozh and Unfermented Control

The ragi grains were cleaned, powdered and sieved. The sifted flour was cooked by boiling with water with continuous stirring. To the cooked ragi flour, sterilized water was added and inoculated with probiotics *Lactobacillus acidophillus* and *Bifidobacterium* culture for probiotic fermented ragi koozh (T3) while (T2) was left for natural fermentation. In

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unfermented control the similar process was followed and refrigerated. The fermentation in the two treatments was carried out for 24 hours and also to check the survivability of the introduced probiotics. Samples were taken every 5 hours and population of both the culture were enumerated by plate count method in MRS medium and TPY medium for *Bifidobacterium.*

Analytical methods used for analysis:

Protein, carbohydrate, reducing sugars, phosphorus and potassium were determined according to the standard procedure. Moisture content, acidity of the sample and vitamins like thiamine, riboflavin and niacin was analyzed according to the AOAC method 2000. Titrable acidity is expressed in terms of lactic acid and volatile acid in terms of acetic acid. Total solids of fermented products were determined by drying weighed sample of the homogenate at 50°C in vacuum for 24 hours. Iron was determined by atomic absorption spectrometry. Quantitative amino acids analysis was performed by paper chromatography method.

Safety of the Fermented Food

The fermented food developed can be tested for the presence of Clostridium, Streptococcus and Bacillus cereus in Sulphite agar medium, Baired parker and Nutrient agar medium respectively by pour plate method. As per a research paper, the physicochemical properties of the unfermented ragi koozh (T1). Naturally fermented ragi koozh (T2) and

probiotic fermented ragi koozh (T3) are elucidated in Table 1. Amino acid content is

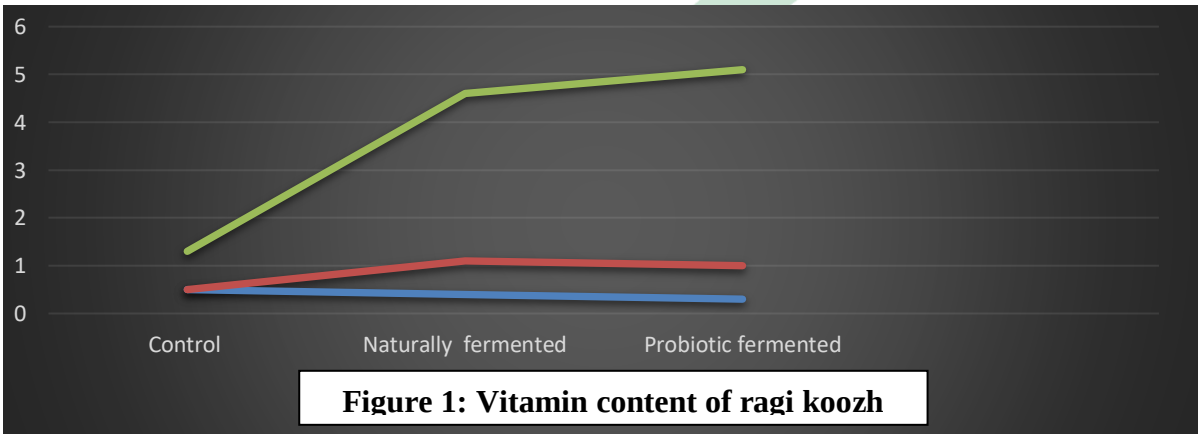

Figure 1: Vitamin content of ragi koozh

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tabulated in Table 2. Vitamin content is illustrated in Figure 1. The survival study of the probiotics is presented in Table 3.

Table 1: Physicochemical properties of Ragi koozh

Treatment	Uninoculated control	Naturally fermented koozh	Probiotic fermented Koozh
Moisture %	42.0	83.0	80.0
pH	6.5	3.5	3.7
Titrable acidity g/100g	0.0	3.0	2.8
Volatile acidity g/100g	0.0	0.03	0.03
Total solids g/100g	58.0	18.0	20.0
Proteins g/100g	7.3	10.10	10.50
Carbohydrate g/100g	72.0	35.0	39.0
Fat %	1.2	1.6	1.8
Potassium mg/100g	0.270	0.270	0.270
Iron mg/100g	0.003	0.0046	0.0046
Calcium mg/100g	0.32	0.35	0.035

The difference between the unfermented control and ragi koozh fermented under natural and probiotic fermentation were traceable to the effect of fermentation. Due to fermentation, the protein content was found to increase significantly on both naturally fermented ragi koozh (10.10g/100g) and probiotic fermented ragi koozh (10.20g/100g). It may be due to reduction in carbohydrate and partly by the biomass produced during fermentation. The reducing sugar content was also increased to significant levels under both conditions of fermentation. The carbohydrate content was dramatically reduced after fermentation, it may be due to the utilization of the micro flora as carbon and energy source. There was no change in phosphorus and potassium while the iron content was found to increase after fermentation. Due to higher overall initial concentration of the starter, the probiotic culture fermented the grain efficiently than the natural fermentation. Thiamine content was found to increase under naturally fermented ragi koozh while it decreased under probiotic fermented ragi koozh may be due to the reason that probiotic fermented ragi koozh has synthetic capacity for thiamine. Three-fold increase in riboflavin and niacin content was observed in fermented ragi than uninoculated control.

Table 2: Amino acid content of Ragi koozh

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Amino acid g/100g	Control	Naturally fermented	Probiotic fermented
Arginine	1.2	4.3	6.7
Histidine	0.5	5.5	5.5
Lysine	0.1	1.9	1.9
Phenylalanine	0.0	4.8	7.1
Tyrosine	0.1	1.0	0.7
Methionine	0.6	1.2	1.4
Threonine	0.3	5.8	6.0
Cystine	0.0	2.3	1.7
Leucine	0.1	1.0	2.0
Isoleucine	0.2	1.5	1.5
Valine	0.7	3.0	3.0

The ragi koozh fermented with probiotic yielded more amino acids than natural fermentation. In general, the fermented ragi koozh under both natural and probiotic condition yielded more amino acid content with high concentration of valine, threonine, leucine and phenylalanine maybe due to the synthetic capacity of microbial population. Lysine, a limiting amino acid was found to increase by 19 times its initial content. Lysine extracted the strains of *Lactobacillus plantarum*. The pH decreased after fermentation with increased acidity. In probiotic culture, it is due to the production of lactic acid. Under natural fermentation, it is due to the acid secreted by the undefined micro flora. The solid content decreased due to the increase in volatile solids.

Table 3: Viability of probiotics in ragi koozh

Duration of fermentation (hrs)	*Lactobacillus acidophilus* log cfu / ml	*Bifidobacterium* Sp log cfu / ml
0	2	2.5
5	6	6.0
10	6.5	6.0
15	8	7
20	8	7
24	6.5	6.0

The survival study of the introduced probiotic population was found to increase up to 15 hours of fermentation and declined further. The sensory evaluation revealed the acceptance of both fermented ragi koozh. Probiotic fermented ragi koozh was found to be more preferable than naturally fermented. On the safety aspect fermented ragi koozh revealed negative for the presence of *Staphylococcus*, *Clostridium* and *Bacillus*. In ragi koozh prepared under natural and probiotic fermented condition, lactic acid bacteria predominate. LAB apart from lactic acid production, it also produces secondary metabolite like bateriocin and other antimicrobials which prevents pathogens and spoilage microorganisms and now are

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used in food additives against food pathogens. Nisin, for instance, is a 34-residue peptide that is very active against gram positive bacteria including spore formers like *Clostridium botulinum.*

CONCLUSION

Koozh is a fermented product popular in South India is quite a nutritious and immunity boosting food product. It is a fermented product and has potentially high number of good bacteria and that have probiotic potential. Hence these bacteria will help in improving the gut health. Even fermenting millets or ragi will enhance the amounts of thiamine, niacin and riboflavin. While using finger millet or ragi which is good source of proteins, vitamins, minerals (being richest source of Calcium), dietary fibers and phytochemicals. Malting ragi even improves the digestibility by converting complex carbohydrates and proteins into simple sugars and amino acids. Malting also helps in removing the antinutritional factors from Ragi. The fermented Ragi koozh is rich in amino acids especially valine, threonine, leucine and phenylalanine.

LAB used for fermentation even produces secondary metabolites such as bacteriocins and other antimicrobials that inhibit the growth of pathogens making the product safe and stable from attack of pathogens and spoilage causing microorganisms.

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