

Fermented Cereal from Indigenous Raw Materials

Sahana Parveen and Fauzia Hafiz
Food Microbiology section, Institute of Food Science and Technology,
Bangladesh Council of Scientific and Industrial Research, Bangladesh

Abstract: Fermented cereal was prepared from indigenous raw material like parboiled rice and Bengal gram. The approximate analysis, microbiology, edibility of cereal product has been done. It was found to be a high nutritive value and acceptable as a food.

Key words: Fermented cereal, food fermentation, food preservation

Introduction

Fermentation has been used for several thousand years as an effective and low cost means to preserve the quality and safety of foods. Animal and plant tissues subjected to the action of microorganisms and/or enzymes to give desirable biochemical changes and significant modification of food quality are referred to as fermented food.

(Campbell-Platt, 1954). Fermentation is the oldest known form of food biotechnology. Food fermentations involve mixed cultures of microorganisms that grow simultaneously or in succession. According to Steinkraus (1995), the traditional fermented foods contain high nutritive value and developed a diversity of flavours, aromas, and textures in food substrates.

Food fermentations is important in developing countries where the lack of resources limits the use of techniques such as vitamin enrichment of foods, and the use of energy and capital intensive processes for food preservation.

Some important indigenous fermented foods of India are *Bhalla* (Black gram Product), *Bhatura* (White wheat flour Product), *Dhokla* (Bengal gram Product), *Dosa* (Rice and Black gram product), *Illi* (Rice and Black gram product), *Jalebie* (White wheat flour Product), *Khaman* (Bengal gram Product), *Kulcha* (White wheat flour Product), *Nan* (White wheat flour Product), *Papadam* (Black gram Product), *Vadai* (Black gram Product), *Warri* (Black gram Product) etc. (Sanjeev and Sandhu, 1990).

Bangladesh is known for its own traditional fermented foods like *Dadhi* (Yoghurt), *Modhubhat* (Fermented food prepared from germinated rice powder and boiled rice), *Kanjibhat* (fermented rice), *Pantabhat* (fermented cooked rice), *Zilapi* (savory from fermented Bengal gram), *Shidal macch* (fermented fish), *Vapa pitha* (fermented snacks), *Bundia* (fermented Bengal gram) but fermented food from rice and pulse is not known to common people in Bangladesh (Hafiz and Majid, 1996). Most bacterial fermentations produce lactic acids. Many of the indigenous fermentation products of cereals are valued for the taste and aroma active components

Table 1: Ingredients of fermented cereal

Ingredients	Amount
Milk powder	5%
Malt extract	1%
Aspartase	0.1%
Sodium benzoate	0.1%
Vanilla essence	3 drop/100gm

Table 2: Proximate analysis of fermented cereal

Moisture	8.24%
Fat	3.57%
Protein	14.91%
Ash	3.75%
Crude fibre	0.05%
carbohydrate	69.48%

Table 3: Microbiology of Fermented cereal

Total bacterial count/gm	2.5x10 ⁴
Total Coliform MPN/gm	Not found
Total Faecal Coliform MPN/gm	Not found
Salmonell/25gm	Not found
Fungus/gm	Not found
Yeast/gm	Not found

produced and are used as seasonings and condiments. By combining rice with pulse, the overall protein quality is improved (Wang and Hasseltine, 1982).

Ogi is a one of the fermented cereals produce from maize/sorghum/millet is consumed as a porridge by a very large number of Nigerians. It is the most traditional food for weaning infants and the major breakfast cereal for adults. Infants 9 months old are introduced to *ogi* by feeding once per day as a supplement to breast milk. The low income earners use *ogi* principally as an infant food because they cannot afford imported baby foods. Sugar and condensed or powdered milk may be added to *ogi* according to taste. It is often served with soup to hospital patients in Nigeria and Ghana (Banigo and Muller, 1972).

So, from the above importance of fermented foods attempt was taken to prepare fermented cereal from indigenous raw materials and determine its nutritive value and acceptability as a food.

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Table 4: Results of rat feeding trial

Rat	Initial weight in gm	Final weight in gm	Total diet given in gm	Residual diet in gm	Stools in gm	Remarks
Control	232	241	590	265	66	Weight not decreased
	207	179				
	233	235				
Test	227	224	590	310	27	Weight decreased
	253	239				
	210	207				

Materials and Methods

Preparation of fermented mass: Parboiled rice and bengal gram are used for the production of fermented cereal. These raw materials are stored, cleaned and taken in the ratio 1:1. The raw material rice and pulse, was soaked in water at 25-30 °C for 2 hours. After the soaking of the period was over, the water was drained out and the wet pulse was ground to finely and the rice was grounded coarsely. The ground material was mixed smoothly with hot water at 50 °C and 2.3% Sodium chloride. The smoothly mixed ingredients are kept in a container with lid slightly closed and half portion leaving vacant to give room for the fermented mass to rise during the fermentation period. The container was kept in a clean, dry place at 28-30 °C for 20 hours for fermentation. The fermented mass was then allowed to dry at 80 °C in a circulating drier for 6-8 hours. After drying the fermented mass was mixed with other ingredients such as aspartase, malt extract, milk powder, sodium benzoate and vanilla essence. Then the mixed ingredients were packed in a container/packet, sealed and kept in room temperature for 1-3 month or refrigerated up to 6 month. The dried fermented mass was soaked into hot water in 35-40ml water/25gm of dry product for consumption.

Approximate analysis: The product was approximately analyzed by standard methods(AOAC, 1984).

Microbiology: Microbiological analysis was done following the methods of APHA standards 1981.

Rat feeding: The experiment was conducted by following according to the methods of Miller and Bender 1955. For feeding experiment rats of 2 months age, well nourished, healthy from the laboratory colony (Long Evans) were used in the experiment and divided into 2 groups for control and test . In each group there were 3 rats used for each diet. Each group of rat was kept in separate cage and feeding was conducted for 10 day. Body weight of the rats, residual diet etc. were recorded.

Organoleptic taste: Organoleptic taste was done on panel member's of Institute of food science and technology of Bangladesh Council of Scientific and Industrial Research.

Results and Discussion

Fermented cereal was prepared with parboiled rice and Bengal gram with the ratio of 1:1, 1.2 and 2:1. Organoleptically found that the ratio of 1:1 was most acceptable. Dried fermented mass was measured and mixed with different amount of the following ingredients (Table 1).

From the Table 2 it can be assumed that the product have a high nutritive value and it can be consumed by people as a food.

Microbiological analysis was done in the final product and there is no indicator organisms found (Table 3).

Table 4 shows the result of rat feeding trial. There is no toxic effect found on rat.

The importance of this product was, the preparation was very simple, the cost was low, nutritive value was high, easily digestible and acceptable as a food.

It is known that fermented foods contribute to about one third of the diet worldwide. Cereals are particularly important substrates for fermented foods in all parts of the world and are staples in the Indian subcontinent, In Asia, and in Africa. Fermentation causes changes in food quality including texture, flavour, appearance, nutrition and safety. The benefits of fermentation may include improvement in palatability and acceptability by developing improved flavours and textures. In developed countries, they obtain most of their protein from animal products, whereas, in developing countries most of their protein comes from cereal crop. A little information is known about this type of fermented cereals. Only known type is *ogi* which is produced by some housewives as a commercial venture in many parts of the country (Banigo and Muller, 1972). Sugar and powdered milk may be added to *ogi* according to taste. Soybean, Black gram, Mungbean and Bengal gram are the principal legumes used in preparation of fermented foods in various parts of the world (Sanjeev and Sandhu, 1990). The choice of Bengal gram and parboiled rice for fermentation of this work was due to the organoleptical choice of the panel member's of our Institute. Aspartase was used for sweetening and milk powder and malt extract was used for taste. In conclusion it can be said that traditional fermentations are likely to contribute a important role in food supply and this fermented cereal from indigenous raw materials can play a significant role on daily nutrition in developing countries.

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