

The effect of processing methods on the nutritional properties of “ogi” produced from three maize varieties

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Abstract

Three maize varieties, white local farmer's variety, yellow farmer's variety and quality protein maize were used to produce ogi. Traditional method of preparation and improved method were employed. There was a slight increase in the protein content of all ogi produced using the improved method of preparation showing that the improved method is more efficient than the existing traditional ogi processing system as regards the retention of protein. Fermentation reduced fibre, ash and carbohydrate content, but the fibre, ash and carbohydrate contents of ogi produced using improved processing method far exceeded that of traditional processing method. It was also observed that white local farmer's and yellow farmer's varieties are preferable to quality protein maize for ogi preparation with the traditional method because the former two varieties retained more protein than quality protein maize.

Key words: Fermentation, carbohydrate, fibre, protein, white local farmer's and yellow farmer's varieties, quality protein maize

Introduction

“Ogi” is a porridge prepared from fermented maize, sorghum or millet in West Africa. It is a staple of that region and serves as a weaning food for infants. The traditional preparation of ogi involves soaking of maize in water for 1 to 3 days followed by wet milling and sieving to remove bran, hulls and germ^{2,12}. The pomace is retained on the sieve and later discarded as animal feed while the filtrate is fermented (for 2-3 days) to yield ogi, which is sour, white starchy sediment. Banigo et al.⁵ have used the improved method of preparation of ogi.

Materials and Methods

White local farmer's variety (WM) and yellow farmers variety (YM) were purchased at Oba market, Akure, Nigeria and quality protein maize, Ev.8363-SRBC3 (QPM), was collected from International Institute of Tropical Agriculture, IITA, Ibadan, Oyo State, Nigeria. Ogi was prepared from different maize varieties using different methods. In the first method, the maize varieties were steeped, wet milled, sieved and fermented separately at 30±2°C by the maize natural microflora. In the second method, the maize varieties were dried, milled and inoculated with a mixed culture of *Lactobacillus plantarum* and *Saccharomyces cerevisiae* in ratio of 1.1. The pH of the fermenting foods was measured on a Jenway pH meter standardized with appropriate buffers. The titrable acidity was also determined. Proximate composition of the maize varieties and their products was determined as described by A.O.A.C.⁴. The results were subjected to statistical analysis using ANOVA.

Results and Discussion

The nutrient composition of fermented maize varieties is shown in Tables 1-3. There was a slight increase of the protein content of all ogi produced using the improved method by Banigo et al.⁵, indicating that no protein losses occur during

processing. The improved method is far more efficient than the existing traditional ogi processing system as regards the retention of protein. Protein is a limiting factor in the diets of the people of most underdeveloped and some developed areas of the world. Banigo and Muller⁶ reported losses up to 50% of the protein of the whole grain on being processed into ogi under traditional processing method. QPM gave maximum amount of protein over the other two maize varieties in ogi produced using the improved method. It was also observed that QPM gave the least amount of protein when ogi was produced using the traditional processing method.

Fermentation significantly decreased the ash content of flours from 1.83±0.21% in quality protein maize to 0.43±0.15% when the traditional processing method was used and to 1.43±0.21% when improved dry milling method was used. The ash content of flours ranged from 1.60±0.07% in yellow maize to 0.30±0.20% for traditional processing method and to 1.03±0.15% for improved dry milling method. Moreover the ash content of WM flour was from 1.53±0.21% in white local farmer variety to 0.43±0.15% for traditional processing method and to 0.97±0.25% for improved dry milling method. Akubor and Chukwu³ reported decreases in the ash content of fermented oil seeds.

Crude fibre content of the samples also significantly decreased in the improved dry milling method and completely lost in the traditionally prepared ogi. El-Tinay et al.⁹ reported that fibre tends to decrease during fermentation. The fat content, however, increased significantly and this can be attributed to the fact that certain fungi produce microbial oil during fermentation¹.

Carbohydrate contents of all maize varieties with the traditional processing method were significantly decreased ($p \leq 0.05$). This goes along the findings of several workers^{3, 10, 13}. The decrease could be attributed to the selective utilization of carbohydrates

Table 1. Proximate nutrient contents of grain, flour, ogi¹ and ogi² from quality protein maize (QPM).

Sample	Moisture	Protein	Fat	Fibre	Ash	Carbohydrate
Grain	11.80± 0.20 ^c	11.27± 0.25 ^b	4.93± 0.21 ^{ab}	2.77± 0.21 ^c	3.67± 0.21 ^d	65.63± 0.55 ^b
Flour	9.60± 0.20 ^b	11.07± 0.21 ^b	4.73± 0.21 ^a	2.30± 0.30 ^b	1.83± 0.21 ^c	70.50± 0.20 ^c
Ogi ¹	64.80± 0.32 ^d	9.40± 0.20 ^a	4.63± 0.21 ^a	0.00± 0.00 ^a	0.43± 0.15 ^a	21.13± 0.78 ^a
Ogi ²	5.20± 0.10 ^a	11.30± 0.26 ^b	5.20± 0.01 ^b	2.07± 0.21 ^b	1.43± 0.21 ^b	74.83± 0.21 ^d

Ogi¹ – Prepared using traditional method Ogi² – Prepared using improved method
 Values with the same letter (s) do not differ statistically at 5% level.

Table 2. Proximate nutrient contents of grain, flour, ogi¹ and ogi² from yellow farmer's maize variety (YM).

Sample	Moisture	Protein	Fat	Fibre	Ash	Carbohydrate
Grain	10.73± 0.15 ^c	10.87± 0.15 ^b	5.00± 0.26 ^b	2.10± 0.26 ^b	1.50± 0.26 ^c	69.73± 0.25 ^b
Flour	8.30± 0.17 ^b	10.67± 0.21 ^b	4.63± 0.21 ^a	2.00± 0.26 ^b	1.60± 0.01 ^c	72.77± 0.32 ^c
Ogi ¹	52.40± 0.53 ^d	9.97± 0.21 ^a	5.20± 0.10 ^b	0.00± 0.00 ^a	0.30± 0.20 ^a	32.20± 0.76 ^a
Ogi ²	4.20± 0.10 ^a	10.87± 0.06 ^b	5.30± 0.01 ^b	1.87± 0.21 ^b	1.03± 0.15 ^b	76.37± 0.31 ^d

Ogi¹ – Prepared using traditional method Ogi² – Prepared using improved method
 Values with the same letter (s) do not differ statistically at 5% level.

Table 3. Proximate nutrient contents of grain, flour, ogi¹ and ogi² from white local farmer's variety (WM).

Sample	Moisture	Protein	Fat	Fibre	Ash	Carbohydrate
Grain	10.87± 0.15 ^c	10.67± 0.21 ^b	4.77± 0.38 ^a	2.07± 0.21 ^c	1.27± 0.21 ^c	70.23± 0.32 ^c
Flour	8.50± 0.20 ^b	10.57± 0.15 ^b	4.50± 0.20 ^a	1.87± 0.21 ^c	1.53± 0.21 ^c	72.90± 1.01 ^d
Ogi ¹	55.63± 0.42 ^d	9.80± 0.10 ^a	5.20± 0.01 ^b	0.00± 0.00 ^a	0.43± 0.15 ^a	28.73± 1.10 ^a
Ogi ²	4.30± 0.30 ^a	10.77± 0.15 ^b	5.20± 0.17 ^b	2.03± 0.21 ^c	0.97± 0.21 ^b	76.33± 0.76 ^d

Ogi¹ – Prepared using traditional method Ogi² – Prepared using improved method
 Values with the same letter (s) do not differ statistically at 5% level.

as an energy source by fermenting microorganisms⁸. The increase in the carbohydrate contents of fermented maize varieties when the improved dry milling process was used could be as a result of the reduction in the moisture during oven-drying.

In conclusion, strong starter cultures may reduce fermentation times, improve the nutritional quality, minimize dry matter losses, avoid contamination with pathogenic and toxigenic bacteria and mold and minimize the risk of incidental microflora causing off-flavour. Further research should be directed towards developing better starter cultures, unique microbial strains for nutritive improvement and detoxification and testing of new maize varieties for their suitability as fermentation substrates.

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