IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS)
e-ISSN: 2278-3008, p-ISSN:2319-7676. Volume 9, Issue 3 Ver. IV (May -Jun. 2014), PP 33-35
www.iosrjournals.org

Microbial Quality of "AKAMU" (OGI) Sold in NNEWI Markets, Anambra State, Nigeria

*Ezendianefo, J.N. and Dimejesi, S.A.
Department of Microbiology Tansian University, Umunya, Anambra State, Nigeria

Abstract: *The study was on microbiological quality of "akamu" (ogi) sold at Nnewi markets. The "akamu" samples were collected aseptically from five different markets in Nnewi. These samples were taken to the laboratory immediately and were analyzed using standard microbiological and biochemical methods. Escherichia species, Staphylococcus species, Klebsiella species, Streptococcus species and Pseudomonas species were the bacteria isolated while Mucor species, Aspergillus species and Fusarium species were the fungi isolated. The total bacteria counts ranged from 3.0 x 10^8 to 7.5 x 10^8 cfu/g while that of fungi ranged from 0.6 x 10^8 to 1.0 x 10^8 cfu/g. The high microbial count is attributable to poor hygienic practices during the processing and post processing handling of the "akamu".*

Keywords*: Akamu, Microbial count, Hygienic practices and Nnewi.*

I. Introduction

"Akamu" (ogi) is a name given to a popular fermented cereal porridge made from these crops: maize, sorghum, millet, to mention but a few. "Akamu" is a nutritive diet that is mostly eaten at infancy as a weaning food. But adults also enjoy this delicacy. Production of "akamu" is carried out mainly by local producers, and there is risk of high microbial contamination which often makes the food products undesirable due to the presence of organisms that cause food spoilage, food poisoning or food intoxication in the food product (Awada *et al.*, 2005).

Food poisoning and infection can lead to fatal consequences in infected individuals, and the major risk factors are attributable to contaminated raw materials, poorly controlled fermentation conditions, poor personal/environmental hygiene and post processing handling.

More so, production of maize pap is laborious, time-consuming and the issue of locality differences which results in the variable nature, non specified quality indices, unknown shelf life and lack of safety indices of the "akamu" products.

Therefore, there is every need to develop methods to extend the shelf life while maintaining the economic, safety, nutritional and total quality of "akamu" in order to meet the increasing demand and also proffer health benefits to the final consumers.

The aim of this research work is to examine the microbiological quality of "akamu" by isolation, characterization and identification of the microbial species present in different selected samples of "akamu" in Nnewi metropolis.

II. Material And Methods

Five representative "akamu" samples were purchased from local producers in five different open markets in Nnewi. The samples were taken to the laboratory in sterile containers for analysis within 24 hours. Five grams of each "akamu" (ogi) samples was dissolved in 45ml of distilled water. Then 1 ml of the sample suspension was diluted using a ten-fold serial dilution prior to their inoculation on nutrient agar, MacConkey agar and Sabouraud dextrose agar.

The microbiological examination of the "akamu" samples included the enumeration and identification of microbiological contents as described by Duiguid, (1975) and Okafor (1999).

The total viable counts was obtained using TVC = N/VxD where TVC = Total Viable count, N = mean colony, V = volume plated and D = Dilution.

The organisms isolated were then sub-cultured and the pure cultures were characterized using Gram staining and biochemical tests such as motility test, catalase test, coagulase test, citrate test, indole test, Methyl red test, Voges-Proskauer test and sugar fermentation test.

Also, the conformation of both bacterial and fungal isolates were done with reference to standard bacteriological and mycological manuals.

III. Results

Table 1 shows the total viable count of bacterial and fungi isolates while
Table 2 and 3 show the characteristics of fungal and bacterial isolates respectively. The pH of the "akamu" samples ranges from 4.0 to 5.0 which denote acidity.

Table 1: Total viable count of microbials in "akamu" samples.

Total Microbial Counts cfu/g

Sample	pH	NA	SDA	MA
A	4.0	3.0×10^8	0.6×10^8	2.5×10^8
B	4.5	7.5×10^8	1.0×10^8	2.1×10^8
C	5.0	6.0×10^8	0.8×10^8	1.8×10^8
D	4.9	4.0×10^8	0.9×10^8	3.5×10^8
E	4.8	6.0×10^8	0.7×10^8	3.1×10^8

Key:
NA = Nutrient Agar
MA = MacConkey Agar
SDA = Sabouraud Dextrose Aga

Table 2: Characteristics of Fungal Isolates

Isolate	Spore morphology	Microscopic appearance	Hyphal appearance	Mycelium appearance	Reproduction type	Probable identity
1	Whitish and smooth	Branched with round cylindrical columella	Aseptic	Whitish- grey	Sporangiospore	*Mucor species*
2	Bluish	Branched with septate	Septate	Cotton texture	Many conidia	*Fusarium species*
3	Yellowish/ dark	Branched portions	Septate	Threadlike	Conidiospore	*Aspergillus species*

Table 3: Characteristics of Bacterial Isolates

Characteristics	1st Isolate	2nd Isolate	3rd Isolate	4th Isolate	5th Isolate
Colony morphology	Moist and yellow	Low convex and discrete	Pinkish	Large and moist	Small, rough, oval & greenish yellow
Microscopic morphology	Cocci in clusters	Cocci in chains	Rod-shaped	Rod-shaped	Rod-shaped
Gram reaction	+	+	-	-	-
Catalase test	+	-	+	-	+
Coagulase test	+	-	-	-	-
Motility test	+	-	+	-	+
Indole test	-	-	+	+	-
Methyl red test	+	-	+	-	-
Voges proskauer test	+	-	+	+	-
Citrate test	-	-	-	+	+
Glucose test	A	A	A G	A G	A
Lactose test	A	A	A G	A G	-
Sucrose test	A	A	A G	A G	A
Maltose test	A	A	A G	A G	-
Probable organisms	*Staphylococcus species*	*Streptococcus species*	*Escherichia coli*	*Klebsiella species*	*Pseudomonas species*

Key: + = positive, - = negative, A = acid produced, G = gas produced

IV. Discussion

The result showed that there is higher bacterial than fungal counts in the "akamu" samples. This is probably because of high moisture content in the "akamu" and the pH which is acidic.
The high bacterial count in samples B and D (7.5×10^8 and 4.0×10^9 respectively) is an indication that the "akamu" was not prepared under hygienic condition which attracted contaminants.
Staphylococcus species isolated is understandable since it is a normal flora of human body which could be transferred into the product during processing.
Pseudomonas species, *Escherichia coli* and *Klebsiella species* could come in through the process water and the processors.

The fungi isolated which are *Mucor species*, *Fusarium species* and *Aspergillus species* could be contaminants from the raw materials.
More so, the high microbial count could be attributed to the rate of exposure during sales.

V. Conclusion And Recommendations

The isolation of the microorganisms from the "akamu" samples confirmed that it could serve as a vehicle for the transmission of potentially pathogenic microorganisms. Since a total of five bacteria and three fungi were isolated during experiment, caution should therefore be taken by both the producers and the consumers concerning this dependable food product called "akamu", in order to ensure that health benefits are conferred on the consumers while the shelf life of "akamu" is elongated by the absence of those microorganisms that bring about decomposition.

It is therefore recommended that the following strategies should be mapped out and embarked upon in order to reduce to a tolerable level or totally eliminate microbial contamination on "akamu".

Some of these strategies have been approved as regulations by the Department of Health Education & Welfare, Public Health Services and Food & Drug Administration (FDA) and local agencies over current trends in the manufacturing, processing, packaging or holding of human food generally referred to as GMPs (Good Manufacturing Practices).

- The local producers of "akamu" should be enlightened on the importance of observing these regulations – GMPs.
- Infected personnel should be restricted from participating in the production of "akamu".
- Portable water should be used during the production of "akamu".
- Better preservative techniques should be used to prolong shelf life of "akamu" product.
- The regulatory agencies especially the NAFDAC (National Agency for Food and Drugs Administration and Control) should ensure strict compliance to the regulations by the grass root.
- The government of the federation should map out extensive public enlightenment campaign especially in the rural areas to educate both the local producers and consumers of "akamu".

Finally, the government should also introduce the use of probiotics to the local producers of "akamu" and sell to them at a very subsidized rate. The probiotics are meant to mimic the normal microbial flora in humans like the ones found on breast milk that offer protection against diseases.
The most frequently used ones for now are *Lactobacillus species* and *Bifidobacterium species*. More research should be done to introduce more of these probiotics.

References

[1] Arora, D.R. and Arora, B.B. (2012), *"Test book of Microbiology", CBS Publishers and Distributors Pvt Ltd New Delhi India,* Pages 319-321 and 43-47.
[2] Awada *et al* (2005), *http://www.nature.com/bjc/journal /v95/n5/full/6603291a.html.*
[3] Banwart, G.J. (2004), *"Basic Food Microbiology", CBS Publishers and Distributors Pvt. Ltd New Delhi India,* Page 529.
[4] Cortez and Wild-Altamirano (1972), *http:www.fao.org/docrep/t0395e/t0395e03html.*
[5] Duguid, J.P. (1975). *Medical Microbiology* 12th edition, Vol II, Churchill Living Stone, Edinburgh pp 70-189.
[6] Frazier, W.C. and Dennis C.W. (2008), *"Food Microbiology", Tata McGraw-Hill Publishing Company Ltd New Delhi India,* Page 489
[7] Nout, M.J.R. (1994), *"Fermented Foods and Food Safety", Food Res. Int'l Co. Ltd,* Pages 291-298
[8] Nzelu, (2005), *Nutrition & Food Science, Micronutrient adequacy of homemade complementary foods. Emerald Group Publishing Limited,* Volume: 41 issue:1