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The Presence and Types of Microorganisms in "Adoyo" a Local Anti-Malaria Herbal Drinks

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Abstract: 'Adoyo' a local anti-malaria herbal drink was examined for the presence and types of microorganisms. Though, an acidic drink, it was observed to harbour bacteria of the genera *Lactobacillus, Streptococcus, Acetobacter, Leuconostoc, Bacillus, Proteus, Escherichia* and *Staphylococcus*; Yeasts, of the general *Saccharomyces*, and Candida while the molds were *Geotrichum sp.' Aspergillus sp.' Fusarium sp.' Penicillium sp.' Botrytis sp.' and Alternaria sp.* However, these organisms are typical of food spoilage agents, but the presence of *Escherichia coli* also indicates the occurrence of faecal contamination.

Key words:'Adoyo", Anti-malaria herbal drink, Enantia chlorantha, Cymbopogan citrates, Citrus paradisi, Ananas comosus

Introduction

'Adoyo', a local medicinal herbal drink is used for treating many ailments, and it is especially used as an anti-malaria drug. It is also taken to quench thirst. Malaria is prevalent in Africa (Ademowo *et al.*, 1995) and Africans have many different local herbal anti-malaria drugs. 'Adoyo', one of such anti-malaria drinks is now very popular among some Nigerians as the orthodox anti-malaria drugs are considered to be expensive. 'Adoyo' is prepared by boiling pieces of *Enantia chlorantha* (African Yellow wood) and the leaves of *cymbopogan citratus* (lemon grass), in Omidun (the supernatant fluid from processed 'Ogi'- a wet milled and fermented maize product]. The Omidun is added in large quantity to overflow the mixture. The whole content is allowed to cool and poured into calabash or plastic pail. The unpeeled fruits of *Citrus paradisi* (grape fruit) and *Ananas comosus* (pineapple) are cut into the content of the calabash or plastic pail and thoroughly mixed. The liquid part of this mixture which is normally yellow in colour due to the presence of *Enantia chlorantha* bark is dispensed with cups for sale especially in the local markets (Adesola, 1981). At times, especially on a hot day, ice-block is added to this drink to chill it. The efficacy of this drink as an anti-malaria drug is unknown, although, some of its materials are medicinal and rich in vitamins. *Cymbopogan citratus* infused in hot water has been known as a diuretic and an anti-malaria drug (Sakeeb, 1997), *Enantia chlorantha* bark is of numerous local medicinal importance including its use as an antipyretic in the curing of fever. It is also used in treating ulcers and tuberculosis (Adegoke *et al.*, 1968) *Ananas comosus* (Platt, 1962) and *Citrus paradisi* (Kosh, 1962) are very rich in vitamins.

All the raw materials for 'Adoyo' are of plant origin and generally contaminated with microorganisms from the soil. Omidun, the supernatant solution from processed Ogi is known to harbour yeasts such as *Sacharomyces sp., Candida sp., Rhodotorula sp., Debaryomyces hansenula* and bacteria such as Lactobacillus sp., Corynebacterium sp. and a number of molds (Ekundayo, 1985). These raw materials for Adoyo preparation are usually purchased from the market, cut into pieces without prior treatment for use . The procedure for processing and distribution of 'Adoyo' for consumption may pre-dispose it to microbial contamination, hence, its examination for the presence and types of microorganisms.

Materials and Methods

Samples of 'Adoyo' were purchased from twenty different hawkers from different markets at different locations and times in Abeokuta, Ogun State in sterile medical bottles and taken to the laboratory for microbiological analysis. The pH measurement of each sample was taken with a standardized pH meter, while a loopful inoculum of each 'Adoyo' sample was transferred to sterile plates of Nutrient Agar (NA), Potato Dextrose Agar (PDA) and MRS Agar for growth and isolation of microorganisms (Harrigan and McCance, 1976). The NA and MRS Agar plates were incubated at 35 $\pm$ 2°C for 24 hours while the PDA plates were incubated at 28 $\pm$ 2°C for 72 hours. All observable different colonies were re-isolated and purified for cultural, morphological and biochemical tests for the identification. Bacteria isolates were identified with the help of the Bergey's manual of determinative Bacteriology (Buchanan and Gibbons, 1974) while Lodder (1970), 'The yeasts- a Taxonomic study" and Gold (1979), "The Biology of Fungi" were used to interprete the results on the Fungi isolated.

Results and Discussions

All the examined 'Adoyo' samples were yellow coloured, non homogenous liquid, acidic with pH ranging from 2.60

± 0.2 to 4.05 ± 0.2 (Table 1). This low pH should be of advantage in 'Adoyo' as it should limit the type of microorganisms associated with it. However, bacteria, yeasts and molds were isolated from 'Adoyo'. This is not surprising as the raw materials of 'Adoyo' are plant materials which are usually in contact with the soil. Many of these microorganisms might have come from the soil and are often associated with fruits and vegetables, especially the molds and the yeasts (Jay,

Table 1: The pH and the microbial from 'Adoyo'

Sample No	Colour	Consistrency	PH	Microbial Isolates		
				Bacteria	Yeast	Mold
1	Yellow	Rough, non-homogeneous	3.5 ± 0.1	Lactobacillus sp	Saccharomyces sp	Geotrichum sp Fusarium sp
2	"	"	3.8 ± 0.1	E.coli, Lactobacillus sp	Saccharomyces sp	Geotrichum sp Aspergillus sp
3	"	"	3.7 ± 0.1	E.coli, Lactobacillus sp	Saccharomyces sp	Rhizopus sp Aspergillus sp
4	"	"	3.75 ± 0.2	E.coli, Lactobacill us sp Micrococcus sp	Saccharomyces Candida sp	Aspergillus sp Fusarium sp
5	"	"	4.0 ± 0.0	E.coli, Lactobacillus sp faecalis S. aureus	Candida sp	Rhizopus sp S. Penicillium sp
6	"	"	2.6 ± 0.2	S. faecalis Acestobacter sp	Candida sp	Geotrichum sp Penicillium sp
7	"	"	2.9 ± 0.1	S. faecalis Lactobacillus sp		Aspergillus sp Fusarium sp
8	"	"	2.8 ± 0.2	Acetobacher sp		Rhizopus sp Fusarium sp
9	"	"	3.6 ± 0.1	E.coli	Saccharomyces sp	Aspergillus sp Fusarium sp
10	"	"	2.8 ± 0.2	Leuconostoc sp Micrococcus sp	Candida sp	Botrytis sp Alternaria sp
11	"	"	3.1 ± 0.1	Lactobacillus sp Bacillus sp	Saccharomyces sp	Fusariu sp Aspergillus sp
12	"	"	4.05 ± 0.2	E.coli Acetobacter sp	Candida sp	Penicillium sp
13	"	"	3.9 ± 0.2	E.coli Acetobacter sp	Saccharomyces sp	Geotrichum sp Fusarium sp
14	"	"	3.3 ± 0.1	Leuconostoc sp Bacillus sp	Candida sp	Alternaria sp Penicillium sp
15	"	"	3.7 ± 0.1	Micrococcus sp Acetobacter sp		Botrytis sp Fusarium sp
16	"	"	3.4 ± 0.2	S. aureus Micrococcus sp	Candida sp	Penicillum sp Rhizopus sp Fusarium sp
17	"	"	3.8 ± 0.1	E. coli Bacillus sp		Fusarium sp Rhizopus sp Alternaria sp
18	"	"	2.9 ± 0.1	S. faecalis Bacillus sp	Saccharomyces sp	Botrytis sp Penicillium sp
19	"	"	3.2 ± 0.2	Proteus sp Acetobacter sp		Rhizopus sp, Aspergillus sp
20	"	"	3.9 ± 0.1	E. coli Bacillus sp		Fusarium sp, Aspergillus sp

1978). The fruits were added to the preparation after it was boiled. Omidun used 'as the liquid in 'Adoyo' harbours microorganisms (Ekundayo, 1985). Many Saccharomyces species are fermentative and osmopholic while many Candida sp are acid tolerant and osmophilic (Gold, 1979). The molds also can tolerate pH range between 2-11 and due to their asexual spores, are ubiquitous (Jay,1978). They are known to cause spoilage (Thelma and Rosa, 1981). The presence of the bacteria *Lactobacillus sp, Leuconostoc* sp, and *Acetobacter sp*, may be due to their high affinity for fruits (Gold, 1979). The presence of *Streptococcus faecalis* may not necessarily be due to faecal contamination as it is always present on plants (Jay, 1978) while the presence of *E.coli* indicated faecal contamination. However, the general tendency for 'Adoyo' to be faecally contaminated during processing could not be waved.

The presence of *Micrococcus sp* and *Staphylococcus aureus* and *Bacillus sp*, probably indicated contamination from the environment or personnel processing or hawking the food. Many of the microorganisms isolated probably originated from 'Adoyo' raw materials and possess spores which need prolonged thermal processing to destroy them. 'Adoyo' therefore harbours microorganisms which are mainly spoilage in nature although there is the indication of faecal contamination. Pre-treatment of the raw materials such as rinsing in 1% Sodium hypochlorite before use, boiling of the 'Adoyo' mixture twice at about 18 hours interval after the first boiling and cooling and sterile storage and sale may eliminate the presence of microorganisms and thus, making it safer for consumption. The individual raw materials that make 'Adoyo' are of medicinal importance and rich in vitamins. This drink needs to be toxicologically investigated for its use as a drink for quenching thirst.

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