MICROBIOLOGICAL SAFETY OF HERBAL DRINKS SOLD IN ADO EKITI METROPOLIS

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ABSTRACT

The microbiological safety of three indigenous herbal preparations (Jedi, Iba and Opaeyin herbal drinks) from five different hawkers in Ado Ekiti Metropolis was investigated. The assessment of the microbial contamination on the herbal products were carried out using standard methods: total viable counts, coliform counts and fungal counts. The average results for total viable count in Jedi herbal drink, Iba and Opaeyin herbal drink were 7.4 x 10^5cfu/ml, 6.3 x 10^5cfu/ml and 6.3 x 10^5cfu/ml respectively while the average counts for coliforms in Jedi, Iba and Opaeyin were 6.3 x 10^4cfu/ml, 6.4 x 10^4cfu/ml and 4.8 x 10^4cfu/ml respectively. Also, the average fungal counts for Jedi, Iba and Opaeyin herbal were 4.9 x 10^3cfu/ml, 4.4 x 10^3cfu/ml and 4.1 x 10^3cfu/ml respectively. The results of this work showed the presence of microorganisms that could impair these herbal products, and which may in be a source of infection consumer, therefore, strict Good Manufacturing Practices should be considered in the production and sale of these herbal drinks in Ado-Ekiti Metropolis, and even elsewhere.

Key words: Herbal drinks, Microbiological safety, total viable counts, coliform counts, fungal counts

INTRODUCTION

Herbal medicine is the oldest form of healthcare known to mankind. It has been practiced by all cultures throughout history and has become an integral parts of development of modern civilization[1]. Research had it that about 70-80% of the world population especially in developing countries depend on non-convectional medicines mainly of herbal origins for their primary health care because of its easy accessibility and cheapness[2,3]. The synthetic/convectional medications used in the recent age are derived from plants, for example, the antimalarial drug quinine from *Cinchona* sp[4]. Tapsell[5] reported that about 25% of the prescription drugs dispensed in the United States contain at least one active ingredient derived from plant materials. Most of the herbal preparations are used in different forms and may carry a number of various types of microorganisms originating from soil usually adhering to leaves, stems, flowers, seed and

root of the herbs[6]. The safety and effectiveness of alternative medicine have not been scientifically established. Moreover, adulteration, inappropriate formulation or lack of understanding of plant and drug interactions have led to the ill effects accrued to herbal medicine[7].

Herbal drinks are hawked almost everywhere in Ado Ekiti, Nigeria and most of the hawkers are the producers. Some of them are produced with water and alcohol. There are different types of herbal drinks sold in Ado-Ekiti metropolis but the ones of interest are Jedi herbal drink used for treating pile, Iba herbal drink for treating malaria and Opaeyin used for backache. They are very bitter and some are viscous, which could be the reasons why the hawkers sell them with roasted meat. They are consumed by the youths and elderly because of their belief in its efficacy. Unfortunately, researches have not been carried out to determine the microbiological safety of these herbal products.

Therefore, this study was focused to determine the level of microbial contamination in herbal drinks sold in Ado Ekiti.

MATERIALS AND METHODS

Three different herbal preparations (Jedi, Iba and Opaeyin herbal drinks) were purchased randomly from five different identified hawkers in strategic parts of Ado-Ekiti metropolis (Figure 1).

Figure 1. A map of Ado Ekiti which is a town in Ekiti State in the Western zone of Nigeria and its major inhabitants are the Yorubas. It is surrounded by other town like Ikare Ekiti, Effon Laye, Ifaki, Itapa Ekiti.

A.   Bacteriological Analyses

Total Viable Count: The method of Abba *et al.*,[8] where a ten fold serial dilution of the samples were made. About 1ml of the sample was pipetted from the 10^{-5} dilution tube into well labeled petri dishes. Then 20ml of molten Plate Count Agar was added into each plate and was swirled gently to allow for proper mixing. The plates were incubated for a maximum of 48hrs at $37^{O}C$. Then the colonies were counted using a colony counter

(Stuart Digital, Poland). The sample from each hawker was examined in triplicates and the average was recorded. The total viable counts were compared with standards that should be present in any drink or consumables which acted as the quality control in this study.

Coliform Count: The same procedure was followed as in the total viable count only that about 20ml of sterilized molten MacConkey Agar was added into each plate and was swirled gently to allow for even distribution. The plates were incubated at $37^{O}C$ for 24hrs at inverted position. After 24hrs the colonies were counted and recorded.

B.   Mycological Analysis

The fungal count was carried out by pipetting 1ml of the herbal sample and was plated on Potato Dextrose Agar containing 0.01% chloramphenicol. The plates were incubated for 3 days at $25^{O}C$.

RESULTS

The results of total viable counts for the three herbal drinks samples from five different hawkers are shown in Table 1. The average bacterial counts for Jedi and Iba herbal drinks were 7.4 x 10^5cfu/ml and 6.3 x 10^5cfu/ml while Opaeyin herbal drink had an average bacterial counts of 6.3 x 10^5cfu/ml. These results differed from the works of Abba et al.,[8] who reported average bacterial counts that ranged between 1.0 x 10^7 and 1.8 x 10^8cfu/g in herbal preparations sold in Kaduna Metropolis. However, the results of this study meet the standard limit of 10^5cfu/g for total aerobic count given in European Pharmacopoeia as reported by Okunlola et al.[9].

Table 1: The Total Viable Counts for three herbal drink samples from five different hawkers.

SAMPLES	H_1	H_2	H_3	H_4	H_5	AVERAGE COUNT
Jedi	8.5 x 10^5	8.5 x 10^5	7.6 x 10^5	6.7 x 10^5	5.8 x 10^5	7.4 x 10^5
Iba	7.6 x 10^5	6.6 x 10^5	4.5 x 10^5	6.7 x 10^5	6.5 x 10^5	6.3 x 10^5
Opaeyin	7.4 x 10^5	5.5 x 10^5	5.9 x 10^5	5.8 x 10^5	7.2 x 10^5	6.3 x 10^5

Table 2: The Coliform Counts for three herbal drink samples from five different hawkers.

SAMPLES	H_1	H_2	H_3	H_4	H_5	AVERAGE COUNT
Jedi	6.8 x 10^4	6.6 x 10^4	6.5 x 10^4	5.1 x 10^4	6.5 x 10^4	6.3 x 10^4
Iba	6.4 x 10^4	7.0 x 10^4	5.9 x 10^4	5.4 x 10^4	7.1 x 10^4	6.4 x 10^4
Opaeyin	4.9 x 10^4	4.6 x 10^4	4.7 x 10^4	4.8 x 10^4	5.0 x 10^4	4.8 x 10^4

Table 3: The Fungal Counts for three herbal drink samples from five different hawkers.

SAMPLES	H_1	H_2	H_3	H_4	H_5	AVERAGE COUNT
Jedi	4.8×10^3	4.7×10^3	4.6×10^3	5.0×10^3	5.3×10^3	4.9×10^3
Iba	3.8×10^3	4.9×10^3	4.7×10^3	4.1×10^3	4.3×10^3	4.4×10^3
Opaeyin	3.6×10^3	4.1×10^3	4.2×10^3	4.5×10^3	4.5×10^3	4.1×10^3

KEY: H1-H5=hawkers number

DISCUSSION

The results of the coliform count for the three herbal drink samples from five different hawkers are shown in Table 2. The average coliform counts for Jedi herbal drinks and Iba herbal drinks were 6.3×10^4cfu/ml and 6.4×10^4cfu/ml respectively while the average counts for Opaeyin herbal drink was 4.8×10^4cfu/ml. The average coliform counts of this work does not conform to the standard limit that coliforms should be absent in herbal preparation as given in European pharmacopoeia and was reported by Okunlola *et al.*[9]. This result renders these herbal drinks under study unfit for human consumption. Since coliforms are the most reliable indicators of faecal contamination, the presence of coliforms in these herbal drinks is an index of the degree of faecal contamination which may indicate a possible presence of harmful disease causing organisms[10].

The results of the fungal counts for the three herbal drinks are shown in Table 3. The average fungal counts ranged from 4.1×10^3cfu/ml in opaeyin herbal drinks and 4.4×10^3cfu/ml in Iba herbal drinks to 4.9×10^3cfu/ml in Jedi herbal drinks. The result of this work compared favourably with the findings of Tournas and Katsoudas[11] who reported a fungal count of 4.1×10^3cfu/g and 2.0×10^3cfu/g in vascuflow herbal tea and marjoram leaves respectively. The presence of these fungi could be as a result of the fungal spores suspended in dust present where the herbs are kept. Since the herbal drinks under this study were prepared with water, the fungi could proliferate, spoil the products and possibly produce mycotoxins which in turn makes the drink dangerous on consumption. The general contamination of these herbal products under this study may be due to the preparation and materials used in preparing the herbal product. It could also be from the personnel (hawkers) that were involved in the process of production.

CONCLUSION

The result of this work showed that herbal drinks contain microorganisms which could impair the quality of the products, since the processes of production, that is, harvesting, drying, storage and the handling influence the microbiological quality of these products. Therefore, Good Manufacturing Practices must be duly followed so as to maintain high quality, safety and efficacy of the herbal preparations.

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