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## Comparative Microbial Quality of Jedi Drinks Sold in Two Major Cities in Nigeria

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**Abstract:** The microbial quality of ten samples of Jedi herbal preparations sold for the treatment of anal fistula in major motor parks of Sagamu and Ibadan, both in Nigeria was studied and compared. Phytochemical analysis of the samples revealed that all the samples contained Saponins and Tannins. Alkaloids and cardenolides were also present to varying extent. These secondary metabolites are known to be responsible for the prevention of anal fistula. 100% contained *Pseudomonas aeruginosa*, 80% from Sagamu contained *Klebsiella* spp; 60% from Ibadan contained *Bacillus* spp, 30% of the samples contained *Staphylococcus aureus* and 70% contained fungi. Antibiotic sensitivity patterns revealed that the Gram-negative isolates were most sensitive to ofloxacin, a quinolone antibiotic while the Gram-positive isolates were most sensitive to Streptomycin, an aminoglycoside.

**Key words:** Jedi, anal fistula, phytochemical, cardenolides, antibiotic

### INTRODUCTION

WHO estimates that 80% of the world's population presently uses herbal medicine for some aspect of primary health care (WHO, 2001). Africa and indeed Nigeria is not an exception. This may not be unconnected with the fact that Africa is reported for the extraordinary richness of its flora, which totals tens of thousands of species. Besides, alternative medicines, such as herbal medicines are gaining in popularity because of typically low side effect profiles (Wilt *et al.*, 2000), low cost (Vanderhoof, 2001) and high level of acceptance by patients and the majority of the population. Some managed care organizations now offer these therapies as an expanded benefit (Langyan and Ahuja, 2005).

In Nigeria, there appears to be an overwhelming increase in the public awareness and usage of herbal medicinal products in the treatment and/or prevention of diseases as a result of active mass media advertisement embarked upon by the producers and marketers of the herbal medicinal products premised upon high cost of the conventional pharmaceutical dosage forms, inaccessibility of the orthodox medical services to a vast majority of people particularly in the rural areas and the reservations by the public due to a vast majority of fake, substandard or counterfeit drugs in the market.

However, this high profile patronage is despite all the identifiable problems associated with the use of herbal medicines among which are lack of precise dose and unhygienic method of preparation; to mention but a few. One of the diseases for which the use of herbal medicine has enjoyed unprecedented patronage in south-western Nigeria is anal fistula popularly called "Jedijedi" or "Jedi" by the inhabitants of the region. This

disease is characterized with pain, discharge-either bloody or purulent, pruritus ani-itching, systemic symptoms if abscess becomes infected apart from the belief of reduced libido in males having the disease.

Jedi drinks are made of medicinal plant parts macerated in water inside either glass bottle or plastic containers for about 3 days before being sold to interested consumers of which commercial motor drivers are majority. It is dispensed using plastic or glass cup depending on the quantity required by the consumers.

This study aims at comparative phytochemical analysis of Jedi preparations sold in 5 major motor parks of Sagamu (Ogun State) and 5 major motor parks of Ibadan (Oyo State) with a view to ascertaining the plants' contents similarities since the sellers are reluctant to disclose the identities of the plants often used in the preparation as well as determining the microbial load cum contents of the preparations, which is of public health concern and the antibiotic sensitivity patterns of the isolates to commonly prescribed antibiotics.

### MATERIALS AND METHODS

Mueller-Hilton agar medium, Cetrimide agar medium, MacConkey agar medium, Mannitol agar medium and Sabouraud Dextrose agar medium, all ATER products by Topley House 52, Bury, Lancashire, BL96AS, UK.

**Collection of samples:** Samples were purchased from a major seller each from 5 major motor parks in Sagamu (Ogun State) and 5 major motor parks in Ibadan (Oyo State) into sterile bottle containers. A major seller here is defined as one who has shop where customers often assemble to buy and drink Jedi preparations.

**Phytochemical study:** The following phytochemical tests were carried out on the samples. Test for alkaloids was performed using Wagner and Dragendoff reagents (Sofowora, 1994). 0.5 g of the extract was added to 5 ml of 1% aqueous Hydrochloric acid on a steam bath. This was filtered and 1 ml portion treated with a few drops of Dragendoff reagent and another 1 ml portion similarly treated with Wagner's reagent. The formation of precipitates was an indication of the presence of alkaloids.

The blood haemolysis test was used to test for Saponins (Sofowora, 1994).

The test for anthraquinones was done by shaking 0.5 g of the extract with 5 ml chloroform for 5 min. The mixture was filtered and the filtrate shaken with equal volume of 10% ammonia solution. A pink, violet or red color in the ammoniacal layer (lower layer) indicated the presence of free anthraquinones. Test for tannins was done using Ferric chloride test. A deep green coloration showed the presence of tannins (Trease and Evans, 1989).

The Keller-Kiliani test was used to test for the presence of cardenolides. 0.5 g of the extract was dissolved in 2 ml of glacial acetic acid containing one drop of Ferric chloride solution. This was then underplayed with 1 ml of concentrated H<sub>2</sub>SO<sub>4</sub>. A brown ring obtained at the interphase indicated the presence of a deoxy sugar typical of cardenolides.

About 1 g of the extract was dissolved in 5 ml of 2% potassium hydroxide and filtered. Formation of precipitate on addition of 10% hydrochloric acid to the filtrate confirms the presence of flavonoids.

**Isolation and characterization of isolates:** 0.1 ml of each sample was individually seeded in MacConkey,

Cetrimide, Mannitol salt and Sabauroud Dextrose Agar media respectively and incubated appropriately with all media except Sabauroud Dextrose agar medium incubated at 37°C for 24 h with the latter at 25°C for 5 days. After incubation, each plate was examined for growth with colony counted and characterized by conventional biochemical tests.

**Sensitivity test:** 0.1 ml of overnight grown culture of characterized bacterial isolates was seeded in 20 ml Mueller-Hilton agar medium and the plates allowed to set on bench. Antibiotic disc was aseptically placed on the plate using sterile forceps and the plates incubated at 37°C for 24 h. The diameter of the zone of inhibition around each antibiotic was measured and the result interpreted as <12mm-resistant; 12-18 mm-moderately sensitive and >18mm-sensitive.

## RESULTS

The result of phytochemical analysis reveals the samples as component of varying phytochemicals as shown in Table 1.

Microbial loads vary from park to park within city and between cities under study as shown in Table 2.

## DISCUSSION

The result of phytochemical analysis as exemplified in Table 1 reveals that all Jedi drinks studied contained saponins and tannins while 70% contained alkaloids with 60% from sagamu parks and 80% from Ibadan parks. None of the samples contained anthraquinones while 30% made up of 20% and 40% from Sagamu and Ibadan parks respectively contained cardenolides.

Table 1: Results of phytochemical screening of different samples of jedi drinks from sagamu and ibadan

City	Sample Codes	Alkaloid	Anthraquinone	Saponin	Tannin	Cardenolides
Sagamu	A	-	-	+	+	-
	B	-	-	+	+	-
	C	+	-	+	+	-
	D	+	-	+	+	+
	E	+	-	+	+	-
Ibadan	F	+	-	+	+	-
	G	+	-	+	+	+
	H	-	-	+	+	+
	I	+	-	+	+	-
	J	+	-	+	+	-

Table 2: Microbial counts (cfu/ml) and types found in jedi drinks

Sample code	<i>Pseudomonas aeruginosa</i>	<i>Klebsiella spp</i>	<i>Bacillus spp</i>	<i>Staphylococcus aureus</i>	Fungi
A	5.0 X 10 <sup>3</sup>	3.1 X 10 <sup>3</sup>	-	-	4.1 X 10 <sup>3</sup>
B	4.1 X 10 <sup>3</sup>	-	-	5.0 X 10 <sup>3</sup>	-
C	4.3 X 10 <sup>3</sup>	5.7 X 10 <sup>3</sup>	-	-	5.0 X 10 <sup>3</sup>
D	4.0 X 10 <sup>3</sup>	2.3 X 10 <sup>3</sup>	-	-	5.1 X 10 <sup>3</sup>
E	5.0 X 10 <sup>3</sup>	4.0 X 10 <sup>3</sup>	-	-	6.0 X 10 <sup>3</sup>
F	6.2 X 10 <sup>3</sup>	-	-	6.0 X 10 <sup>3</sup>	-
G	4.1 X 10 <sup>3</sup>	-	2.0 X 10 <sup>3</sup>	-	5.1 X 10 <sup>3</sup>
H	5.1 X 10 <sup>3</sup>	-	4.2 X 10 <sup>3</sup>	-	-
I	5.0 X 10 <sup>3</sup>	-	6.1 X 10 <sup>3</sup>	-	6.0 X 10 <sup>3</sup>
J	6.1 X 10 <sup>3</sup>	-	-	5.5 X 10 <sup>3</sup>	3.5 X 10 <sup>3</sup>

Table 3: Antibiotic sensitivity profiles of isolated bacteria from Jedi drink samples

Antibiotics	<i>Pseudomonas aeruginosa</i> (n = 10)	<i>Klebsiella</i> <i>spp</i> (n = 4)	Antibiotics	<i>Bacillus</i> <i>spp</i> (n = 3)	<i>Staphylococcus aureus</i> (n = 3)
Amoxycillin	100	50	Ampicillin	100	100
Cotrimoxazole	100	100	Cotrimoxazole	100	100
Nitrofurantoin	100	0	Nitrofurantoin	100	100
Gentamicin	100	100	Gentamicin	100	100
Nalidixic Acid	100	25	Nalidixic Acid	100	100
Ofloxacin	100	100	Colistin	100	33.3
Augmentin	100	100	Streptomycin	100	100
Tetracycline	70	0	Tetracycline	100	100

Microbial study reveals that all the samples studied had *Pseudomonas aeruginosa* which ranges between  $4.1 \times 10^3$  and  $5.0 \times 10^3$  for samples collected in Sagamu parks and between  $4.1 \times 10^3$  and  $6.2 \times 10^3$  for samples collected in Ibadan. However, none of the samples collected from Ibadan parks has *Klebsiella* while 80% of samples from Sagamu had *Klebsiella* which ranges between  $2.3 \times 10^3$  and  $5.7 \times 10^3$ . In the same vein, none of the samples from Sagamu possesses *Bacillus spp* while 60% of the samples from Ibadan parks have *Bacillus spp* ranging between  $2.0 \times 10^3$  and  $6.1 \times 10^3$ . *Staphylococcus aureus* was isolated from 20% of the samples collected from Sagamu parks and 40% from samples collected in Ibadan while fungus of *Penicillium* species was isolated from 80% and 60% of samples collected in Sagamu and Ibadan respectively.

Isolation of *Pseudomonas aeruginosa* in all samples studied suggests that root is a major part of the plants used in the preparation of Jedi drinks. This is because *Pseudomonas* is primarily a soil bacterium and for it to be present in all the samples is an indication that the roots were not properly washed/treated before being used. This corroborates unhygienic method of preparation usually associated with herbal products.

The presence of *Klebsiella* and *Bacillus spp* is a function of water used for the preparation and this underscore the fact that the majority of the producers of Jedi drink have no access to potable water.

*Staphylococcus aureus* may have been associated with touch contamination (Joyson *et al.*, 1975). Isolation of fungus, of *penicillium* species may be as a result of continuous opening to air during dispensing to consumers.

Suffice it to say that bacterial isolates from Jedi drinks are a function of the plant parts as well as water used for the preparation.

Nonetheless, all the bacterial isolates recovered from Jedi drinks have been of public health concern. For instance, *Pseudomonas spp* was implicated in infantile gastroenteritis transmitted through water and foods by Thom *et al.*, 1970 while Back *et al.* (1980) and Jiva *et al.* (1988) implicated *Klebsiella* in infantile gastroenteritis. Granum and Lund (1997), McKillip (2000) and Phelps and McKillip (2002) implicated *Bacillus spp* in gastrointestinal infection characterized by diarrhea.

Moreover, *Staphylococcus spp* was implicated in gastrointestinal illness by Sears and Kaper (1996) and Brooks *et al.* (1998).

Antibiotic sensitivity patterns of each bacterial isolate revealed that all *Pseudomonas* were highly sensitive to ofloxacin, Augmentin and gentamicin while least sensitive to tetracycline. *Klebsiella spp* followed similar pattern of sensitivity.

*Bacillus spp* was highly sensitive to gentamicin, streptomycin, cotrimoxazole, Nitrofurantoin and ampicillin while least sensitive to colistin. *Staphylococcus aureus* followed similar pattern of sensitivity with no cotrimoxazole and Nitrofurantoin susceptibility.

**Conclusion:** It is therefore evident that consumers of Jedi drinks are prone to gastroenteritis. This calls for constant monitoring and quality control of herbal medicinal products manufactured, advertised, sold and used in Nigeria of which Jedi drink is part.

Also, consumers of Jedi drink having gastroenteritis as a result of the drink will benefit mostly from ofloxacin, a quinolone; streptomycin and gentamicin, both aminoglycoside.

While the manufacturers of Jedi drink should be more hygienic while government should make provision and accessibility of potable water a point of duty since major isolates are corollary to producers and water used.

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