

Original Article

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Preliminary Phytochemical Screening of Nimoalasis

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ABSTRACT [ENGLISH/ANGLAIS]

Nimoalasis is an herbal mixture consisting of dried, powdered stem bark of *Prosopis africana*, leaves of *Morinda lucida* and *Voacanga africana* dispensed by an herbalist for the remediation of body pains, rheumatism, insomnia and headache. These components were screened for their phytochemical constitution, antifungal and anti bacterial properties. Phytochemical screening involved the use of cold infusion and decoction, by standard methods. Phytochemicals identified included alkaloids, anthraquinones, flavonoids, tanins, cardiac glycosides, saponins, steroids, terpenoids and phlobatanins. It was observed that the infusion method produced more phytochemicals than the decoction method, though not significantly different statistically. The plant parts also showed antifungal and antibacterial activities. The implications of these are highlighted.

Keywords: infusion, decoction, phytochemicals, *Prosopis africana*, *Morinda lucida*, *Voacanga africana*.

RÉSUMÉ [FRANÇAIS/FRENCH]

Nimoalasis est un mélange d'herbes composé de séché, poudre d'écorce de tige de *Prosopis africana*, feuilles de *Morinda lucida* et *Voacanga africana* dispensés par un herboriste pour l'assainissement des courbatures, les rhumatismes, l'insomnie et les maux de tête. Ces composants ont été testés pour leur constitution phytochimique, antifongiques et anti propriétés antibactériennes. Criblage phytochimique impliqué l'utilisation d'infusion à froid et la décoction, par des méthodes classiques. Les composés phytochimiques identifié alcaloïdes inclus, les anthraquinones, les flavonoïdes, les tanins, des glucosides cardiotoniques, des saponines, des stéroïdes, des terpénoïdes et phlobatanins. Il a été observé que la méthode d'infusion produit plus de substances phytochimiques que la méthode de décoction, mais pas statistiquement significativement différente. Les parties de la plante ont également montré des activités antifongiques et antibactériennes. Les implications de ceux-ci sont mis en évidence.

Mots-clés: infusion, décoction, composés phytochimiques, *Prosopis africana*, *Morinda lucida*, *Voacanga africana*.

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INTRODUCTION

The use of natural plant products remain the main stay for the health and healing needs of the third world. Long before recorded history, man has employed plant and plant products for food and healing. The use of these products in their natural forms had been by direct consumption, decoction, concoction, effusion or infusion. By trial and error, both the medicinal and poisonous plants/plant products were identified.

The world health organization estimated that 80% of people worldwide rely on herbal medicine for some aspects of their primary health care. In the last twenty years in the United States, increasing interest in returning to natural or organic remedies has led to an increase in the use of herbal medicines. In Germany, roughly 600 to 700 plant-based medicines are available and are prescribed by approximately 70% German physicians as the efficiency

and efficacy of many medicinal plants are been scientifically validated [1,2].

About 119 drugs of known structure are produced commercially from less than 90 species of higher plants. With over 250,000 species of higher plants on earth, it is logical to presume that many drugs that are more useful will be found in the plant kingdom if the search for these entities is carried out in a logical and systematic manner. Ethnobotany, ethnomedicine, folk medicine and traditional medicine can provide information that is useful as a 'pre-screen' to select plants for experimental pharmacological studies [3].

"Nimoalasis" is the name given to the herbal mixture in the present study. It consists of the leaves of *Morinda lucida* and *Voacanga africana* and the stem bark of *Prosopis africana* in dried, powdered form. The method of application is usually by chewing, decoction, or mixed with *akamu* (a boiled paste of *Sorghum bicolor*, *Pennisetum*

glaucum or *Zea mays* or a mixture of these, usually used for breakfast or as light meal). Its therapeutic functions include remedies against body pains, rheumatism, insomnia and headache.

The herbalists claim good patronage. This is usually an indication of the efficacy of the mixture, which lends credence to the need for the screening of the mixture.

MATERIALS AND METHODS

The stem barks of *Prosopis africana* and leaves of *Morinda lucida* and *Voacanga africana* were collected from Ejule, Ofu Local Government Area of Kogi State, Nigeria, in June-July 2009. The plant parts were identified and authenticated by the curator in the Department of Biological Sciences, Kogi State University, Anyigba. Voucher specimens were deposited in the University Herbarium.

The stem barks were cut into pieces of about 3cm² and together with the leaves, washed separately and air dried at room temperature for two weeks and pounded into powder (the same treatment given by the Herbalist). 5g (Five grams) of each powdered sample was weighed into 25ml of distilled water for 24 hours (cold maceration method). For the boiling method, 10g (Ten grams) of the powdered samples were weighed into 50ml of distilled water and boiled for 1 hr 30min. In both cases, the residues were discarded. The filtrates were used for the preliminary phytochemical screening.

The extracts obtained were subjected to preliminary phytochemical screening following standard methodology [4,5].

The crude extracts obtained were subjected to anti-microbial and antifungal tests, to determine the efficacy of the plant extracts against *Escherichia coli* (Bacteria) and *Aspergillus niga* (fungi).

Pure cultures of *E. coli* and *A. niga* were isolated and cultured in an artificial medium which serve as the growing medium for the microbes. Nutrient agar was used for *E. coli* while potatoes dextrose agar was used for *A. niga*.

A punching device was used to cut filter paper into uniform smaller sizes and sterilized. These served as sensitivity discs.

The discs were then immersed into each extract contained in a test tube. The test tubes were allowed to stand for forty (40) minutes in order to ensure proper absorption of the solution after which the discs were removed and

allowed to dry. The dried discs were used for sensitivity test.

This was done by sterilizing a wire loop on the flame until it was red hot. It was then used to pick some colony of microbe and streak randomly on the media. The prepared disc from the test tubes above was placed on each media containing some colony of microbes (18) were incubated at 37°C for 24,48,72 hours respectively after which the zones of inhibitions were measured with the aid of transparent ruler and recorded as sensitivity test.

The data of the measurement were subjected to One Way Analysis of Variance (ANOVA).

RESULTS

Secondary metabolites identified from the leaf extract of *Morinda lucida* included Alkaloids, Anthraquinone, Flavonoids, Tanins, Cardiac glycosides, Terpenoids, Saponins, Steroids and Phlobatanins. Tannins was not identified by the cold extraction method while Cardiac Glycosides and Steroids were not identified by the boiling method of extraction.

Voacanga africana leaves showed Alkaloids, Anthraquinone, Flavonoids, Tannins, Saponins, Steroids, Terpenoids and Phlobatanins. Extract obtained by the boiling method did not indicate the presence of Tanins. Cardiac Glycoside was not identified.

Extracts from the stem of *Prosopis africana* were found to contain Alkaloids, Anthraquinones, Tannins, Cardiac glycosides, Saponins, Terpenoids and Phlobatanins. Flavonoids and Steroids were absent.

More phytochemical compounds were identified by cold infusion method of extraction than those indicated by decoction. Phytochemicals contained in the leaves of *Morinda lucida* and *Voacanga africana* were slightly higher than those contained in the stem of *Prosopis africana*. More phytochemicals were identified in extracts from *Morinda lucida* than in extracts of *Voacanga africana* and *Prosopis africana* in both methods of extractions.

Anti-microbial Activities

Results obtained revealed that the extracts exhibited inhibitory effect on the growth of the tested microorganisms. *Morinda lucida* leaf exhibited higher inhibitory effect on both the fungi and bacteria when compared to the leaf extract of *Voacanga africana* but statistical analysis showed that there are no significant differences ($P_p > 0.05$) between the extracts.

The inhibition of fungi and bacteria growth by extracts from *Morinda lucida* is significantly higher than inhibition by the extracts of *Voacanga africana* and *Prosopis africana*. In a similar trend the plant extracts exhibited a significantly

higher inhibitory effect on the bacteria than on the fungi. Hence, the extracts possess higher antibacterial activity than antifungal activities (Pp < 0.05).

Table 1: This table shows phytochemicals identified in the constituent plant parts of "Nimoalasis" using cold infusion and decoction methods of extraction.

Secondary metabolite	Method of extraction	<i>Morinda lucida</i>	<i>Voacanga africana</i>	<i>Prosopis africana</i>	Remarks
		Leaf	Leaf	Stem	
Alkaloid	Infusion	+	+	+	Present in all samples
	Decoction	+	+	+	
Anthraquinone	Infusion	+	+	-	Present in all samples
	Decoction	+	+	+	
Flavonoid	Infusion	+	+	-	Not present in <i>Prosopis africana</i>
	Decoction	+	+	-	
Tannin	Infusion	-	+	+	Present in all samples
	Decoction	+	-	+	
Cardiac glycoside	Infusion	+	-	+	Not present in <i>Voacanga africana</i>
	Decoction	-	-	+	
Saponin	Infusion	+	+	+	Present in all samples
	Decoction	+	+	+	
Steroid	Infusion	+	+	-	Not present in <i>Prosopis africana</i>
	Decoction	-	+	-	
Terpenoid	Infusion	+	+	+	Present in all samples
	Decoction	+	+	+	
Phlobatanin	Infusion	+	+	+	Present in all samples
	Decoction	+	+	-	

NOTE: + indicates presence while - indicates absence

DISCUSSION

The activity of the extract varied from the bacteria to the fungi. The observed variation in the susceptibility of bacteria and fungi to the extracts may be due to differences in the physiological and structural integrity of the organisms [6].

Herbs and herbal extracts contain different phytochemicals with biological activity that can be of valuable therapeutic index. Much of the protective effects of fruits and vegetables have been attributed to phytochemicals which are non-nutrient plant compounds. Different phytochemicals have been found to possess a wide range of activities, which may help in protection against chronic diseases. For example, phytochemicals such as Saponins, Terpenoids, Flavonoids, Tannins, Steroids and Alkaloids have anti-inflammatory effects [7].

Table 2: This table shows inhibition of *E. coli* by aqueous extracts of the leaves of *Morinda lucida* and *Voacanga africana* and the stem of *Prosopis africana*.

Extracts	<i>Morinda lucida</i>	<i>Voacanga africana</i>	<i>Prosopis africana</i>
Leaf	0.5000	0.3333	-
Stem	-	-	0.3000
Bark	-	-	-

Glycosides, Flavonoids, Tannins and Alkaloids have hypoglycemic activity Saponins are reported to possess hypocholesterolemic and anti-diabetic properties [8]. Terpenoids have also been reported to decrease blood sugar level in animals. Steroids, Terpenoids and Resins showed anti-inflammatory action [9]. That Steroids and

Saponins are responsible for central nervous system activities has been indicated [10].

Table 3: This table shows inhibition of *Aspergillus niga* by extracts of *Morinda lucida*, *Voacanga africana* and *Prosopis africana*.

Extracts	<i>Morinda lucida</i>	<i>Voacanga africana</i>	<i>Prosopis africana</i>
Leaf	12.600	11.633	-
Stem	-	-	10.800
Bark	-	-	-

More phytochemicals were identified in extracts from *Morinda lucida* than in extracts from *Voacanga africana* and *Prosopis africana* in both methods of extraction. Flavonoids, Cardiac glycosides, Saponins, Steroids, Tannins, Terpenoids, Phlobatanins, Anthraquinone which were identified in these extracts could suggest the use of the bark and leaves in the concoction of "Nimoalasis" in the remediation of body pains, rheumatism, Insomnia and headache. The result obtained proves a strong support for its use in traditional medicine. These plants can also have other medicinal values such as anti-fungi and anti-bacterial activities. This study has proved that the extracts from this plant parts have inhibitory effects on *Aspergillus niga* (fungi) and *Escherichia coli* (Bacteria).

Several factors may be responsible for the presence of some phytochemicals in the plants at various times. These compounds have varying degrees of volatility. The method of extraction may have a decisive implication on the phytochemicals identified in herbal potions.

Thus, it becomes imperative to mimic the *modus operandi* of the herbalist in the light of the observed differences in the identified phytochemicals using the cold infusion or decoction.

CONCLUSION

It is concluded that the presence of some of these phytochemicals implies that the plants have a wide range of activities which help in the protection against diseases. More so, the anti-microbial activities tests also showed that the extracts have inhibitory effects on the growth of both the fungi and bacteria and therefore can be used in the treatment of mycotic and bacterial infections.

Due to the clinical significances of numerous phytochemicals, there is a need to gain understanding of

the precise mechanism of action of all the phytochemicals in order to understand more of their medicinal importance.

Toxicity test should equally be carried out to confirm whether the plant extracts could in any way be toxic to living tissues of man or animal.

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