

The Effect of Drying on the Phytochemical Composition of *Azadirachta Indica* Leaf Extract

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Abstract

Azadirachta indica (Common name Neem) belongs to the family of Meliaceae. It is planted both for ornamental and medicinal purposes and recently in Northern Nigeria and other Sahel regions to check encroachment by Sahara desert. A survey by the United Nation Commission for Trade and Development (UNCTAD) indicated that about 33% of drugs produced in the developed countries are derived from plants. The fresh leaves of *Azadirachta indica* were collected from Nsukka towns. Some of the fresh leaves of *Azadirachta indica* were sun dried. Phytochemical studies were carried out on the crude aqueous leaf extracts (decotion of both the fresh leaves and dry leaves) using standard phytochemical methods (Chemical method and thin layer chromatography method). The result of the study showed that both fresh leaves and dry leaves extracts (decotion) contain the following phytochemical; Reducing sugars, Flavonoids, (Quercetin, 3-Rutinoside, 3-Rhamnoside) Saponins, Anthraquinone, Tannins, Steriodal aglycone, Cardiac glycosides, Cyanogenic glycosides, Terpenoids and Sugars (Fructose, Rhamnose, Xylose and Mannose). The result of this study showed presence of vitamin C in the fresh leaves extract (decotion) of *Azadirachta indica* but was not detected in the dry leaves extracts. This showed that drying affects phytochemical contents of this medicinal plant. Therefore in preparing this folk medicine, It is very necessary to use fresh leaves to ensure retention of phytochemical properties after preparing the herbal medicine.

Keywords - Phytochemical, Decotion, *Azadirachta indica*, Chromatography, Medicinal.

1.0 INTRODUCTION

Medicinal plants are the sources of many important scientific drugs of the modern world. Quinine from Cinchona bark, Reserpine from Rauwolfia root, Digotoxin from Digitalis leaf, Atropine from Belladonna root and leaf, Morphine from Opium Capsule, are just few examples of the innumerable modern scientific drugs that are prepared from medicinal plants ([1] –[3])

Phytochemical report by many researchers ([4]-[10]), showed that most medicine contain active ingredients which are therapeutically important and potent in medicine such ingredients includes alkaloids, saponins, tannins, flavonoids, essential oils, resins, glycosides and anthocyanins, sterols, triterpenoids and others. Several studies showed that processing methods have effect on the phytochemical components of medicinal plants

([11] –[14]). This study is aimed among others things to evaluate the phytochemical composition of *Azadirachta Indica* (Neem) fresh leaves and dry leaves extracts and to investigate the effect of drying process on the phytochemical composition of the dry leaves extract of Neem plant.

2.0 Materials and Methods

2.1 Materials

2.1.1 Material (Fresh Leaves):-

Azadirachta indica (Family Meliaceae) leaves were collected from Nsukka town (Eastern Nigeria). The crude aqueous extracts (decotions) of these medicinal plants as being used by herbal practitioners were used for this study.

2.1.2 Material (Dry Leaves)

Azadirachta indica (Family Meliaceae) leaves were collected from Nsukka town (Eastern Nigeria). These fresh leaves were sun dried being turned regularly to ensure quick drying and even dry process. The crude aqueous extracts (decotions) prepared from the dried leaves of these medicinal plants as being used by herbal practitioners were used for a comparative study.

2.2 Methods:-

2.2.1 Preparation of Medicinal Plant Extracts (Fresh Leaves)

A decoction (herbal dose obtained by boiling of part of plants) of the medicinal plant *Azadirachta indica* were prepared by boiling 175g of the leaves in 500ml of water. Thoroughly washed leaves of *A. indica* were placed in a clean heat resistant container and 500ml of water was added. The boiling lasted for about 10 – 15 minutes on low heat. The resulting liquid was filtered through strain and used for the study.

2.2.2 Preparation of Medicinal Plant Extracts (Dry Leaves)

A decoction (herbal dose obtained by boiling of part of plants) of the medicinal plant *Azadirachta indica* were prepared by boiling 175g of the dry leaves in 500ml of water. Thoroughly washed leaves of *A. indica* were placed in a clean heat resistant container and 500ml of water was added. The boiling lasted for about 10 – 15 minutes on low heat. The resulting liquid was filtered through strain and used for the study.

2.2.3 Phytochemical Analysis of *Azadirachta Indica* Plant Extract (Fresh Leaves and Dry Leaves)

Standard phytochemical methods ([15]) were used to test for the presence of alkaloids, flavonoids, glycosides, cardiac glycosides, cyanogenic glycosides, anthracene glycosides, proteins, carbohydrates, reducing sugars, saponins, steroidal aglycine, anthraquinone, tannins, lead sub acetate and ferric chloride.

2.2.4 TLC Techniques

The TLC method was used for the detection of the various secondary metabolites in the crude extract of *A. indica* (Fresh and Dry Leaves). The samples of the plant extract were spotted 2cm from the base of the plate using a capillary tube and allowed to dry before developing in appropriate solvent system in chromatographic tank.

Calculation of Rf

Rf= The distance moved by a spot relative to the solvent front. Specific Rf Values were calculated using the formula

$$R_f = DC/DS$$

Where DC = Distance moved by components

DS = Distance moved by solvent Fronts

2.3 Data Analysis

Data were analyzed with computer using the SPSS version 7.5 software packages. Mean values (SD) experiments with duplicate samplings were taken for analysis. Differences between groups were assessed by one-way Anova while differences within were assessed by student t-test. The acceptance level of significance was $p < 0.05$

3.0 RESULTS

3.1.1 Phytochemical Characteristics of Plant Extract. *Azadirachta Indica* Using Chemical Methods:-

The result of the phytochemical screening of *A. indica* (using chemical methods) showed the following constituents. Aqueous extracts of both the fresh and dry leaves of *A. indica* were found to contain reducing sugars, flavonoids, saponins, anthroquinones, tannins, carbohydrates, cyanogenic glycosides, cardiac glycosides. Vitamin C was detected in the fresh leaves extract but was not present in dry leaves extract.

TABLE 1: PHYTOCHEMICAL SCREENING OF MEDICAL PLANT (CHEMICAL METHODS)

Test	Plants Extracts	
	A	B
Vitamin C	+ve	Nil
Biuret test	Nil	Nil
Million test	Nil	Nil
Reducing sugar test	+ve	+ve
Flavonoids with $AlCl_3$	+ve	+ve
Flavanoids with dil Ammonia	+ve	+ve
Saponins-Emulsion	+ve	+ve
Alkaloids (Mayer's reagent	Nil	Nil
Alkaloids (Wagner's reagent)	Nil	Nil
Saponins Stable	+ve	+ve
Alkaloids (Picric acid)	Nil	Nil
Alkaloids (Draugendroff's reagent)	Nil	Nil
Anthraquinone	+ve	+ve
Tannins with lead sub acetate solution	+ve	+ve
Tannins with ferric chloride	+ve	+ve
Molish test	+ve	+ve
Anthracene glucoside	Nil	Nil
Steroidal aglycone	+ve	+ve
Cardiac glycosides	+ve	+ve
Cyanogenic glycosides with feeling's solution	+ve	+ve
Cyanogenic glycosides with dil H_2SO_4	+ve	+ve

Where A = *A. Indica* (Fresh leaves)

B = *A.Indica* (Dry leaves)

3.1.2 The Result of Phytochemical Screening (TLC method) of *Azadirachta Indica* Plant Extract:

The extracts of *Azadirachta indica* (both fresh and dry leaves) showed presence of flavonoids (Quercetin, 3 – rutinose and 3 - Rhamnose), Terpenoids, saponins, sugars (fructose, Rhamnose, Xylose and Mannose). Vitamin C was detected in the fresh leaves extract but was not present in dry leaves extract

TABLE 2: VITAMIN C (ASCORBIC ACID) DETECTION IN PLANT EXTRACTS

Plant extract	+ Reference compound	Compound isolated	Rf X 100 in system A	Rf x 100 in system B	Rf x 100 in system C	Colour in UV light
A.Indica fresh leaves	Vitamin C (Ascorbic Acid)	A	96	22	50	Dark blue
A.indica dry leaves	-	-	-	-	-	-

System A = Water

System B = Ethanol

System C = Ethanol-10% acetic acid (9:1)

4.0 Discussion:

The result of the phytochemical studies showed constituents which agrees with the report of other researchers who have done phytochemical studies on *Azadirachta indica* ([2], [5], [6], [16]-[18]) Vitamin C was detected in *Azadirachta indica* extract (only in the fresh leaves but not in the dry leaves). The absence of vitamin C in the dry leaves extract of *Azadirachta indica* indicates that the drying of the leaves depletes the vitamin c content in the fresh leaves. This observation is in agreement with other studies done by some researchers on the effect of drying on the phytochemical constituents of medicinal plants. ([11]-[14])

CONCLUSION

The result of this study showed that both the fresh leaves and dry leaves aqueous extracts of *Azadirachta Indica* plant contain active ingredients (phytochemicals) which are therapeutically important and potent in medicine. This study also showed that drying has adverse effect on phytochemical constituent of plant since Vitamin C was present in the fresh leaves extract but not detected in the dry leaves extract. Conclusively medicinal plants are more potent when fresh parts of the plant are used. Drying and others processing methods should be minimize since they have adverse effect on the phytochemical components.

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Highlights of this manuscript is given below

- ❖ Highlight 1 A. Indica fresh leaves extract contains active ingredients which are therapeutically potent in medicine.
- ❖ Highlight 2 A. Indica dry leaves extract contains active ingredients which are therapeutically potent in medicine.
- ❖ Highlight 3 Vitamin C was detected in A. Indica fresh leaves extract but not present in dry leaves extract
- ❖ Highlight 4 Drying depletes the Vitamin C content of A. Indica fresh leaves
- ❖ Highlight 5 Herbal medicine should be prepared using fresh parts of plants to ensure maximum potency.
- ❖ Highlight 6

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