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Phytochemical studies and antioxidant activity of *morinda citrifolia* (Noni) juice

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Abstract
The study identified phytoconstituents, evaluated the antioxidants and wound healing activity of *Morinda citrifolia* (Noni) juice. The tested juice contains alkaloids, cardiac glycosides, reducing sugar, flavonoids, anthraquinones, terpenoids, steroids, and phenols. The juice demonstrated antioxidant activity of about 47.09% measured via its ability to scavenge free radical 1,1-diphenyl-2-picryl hydrazyl (DPPH). Thus, it was recommended that effort should be made to conserve and make this plant available in Zaria, Nigeria to take the advantage of its inherent potential for medical applications.

Keywords: Phytochemicals, *Morinda citrifoli,* antioxidant activity, DPPH

1. Introduction

According to Isah *et al.* [1], the frequent use of plants for traditional medicine has inspired the biological scientific communities which has led to increased research on isolation and identification of phytochemicals found in plants, their uses in pharmaceutical applications. Phytochemical screening gives us the chance to see at a glance the various phytochemicals present in a plant. This may give an idea as to the possible range of bioactivities the plant product may possess. It also serves as initial step in research protocol aimed at the separation, purification and application of compounds inherent in the plant materials. Among the Phytochemicals mentioned as potentially providing health benefits are Phytoestrogens, Terpenoids Carotenoids Limonoides, Phytosteroids, Glucosinolates, Fibers, stibenas, Lignans and Anthocyanins [2]. The researchers added that there has been over 25,000 Phytochemicals discovered from various parts of plants, and these Phytochemicals are mostly found in colorful parts of the plants like fruits, vegetable, nuts, legumes, and whole grains. Chede [3], reported that there is not much scientific fact on the phytochemical components or pharmacological and toxicological activities of Noni in literature. The present work tends to investigate the phytochemicals present in noni juice and to examine its antioxidant activity.

Morinda citrifolia belongs to the Rubiaceae family [4], the plant grows in shady forests, as well as an open rocky or sandy shores. It grows up to 9m and reaches maturity in about 18 months. It tolerates harsh conditions such as Saline Soils, drought conditions and secondary soils, and therefore grown in wide variety of habitants [5].

There is correlation between the indication of pure substance and those of respective crude extracts used in traditional medicine [6] According to WHO, 80% of the world's population depend on plant extract for medicinal purpose [7]. However, Singh [8] reported that the complete physicochemical composition of Noni fruit is not present in scientific literature. There is therefore need for the categorization of the phytochemical constituents of Noni fruit and its pharmacological applications. Widespread claims of therapeutically effectiveness of noni have encouraged the investigation of some of these possibilities.

An antioxidant is a substance that inhibits oxidation and delay damages of cells and tissues resulting from excess free radicals. The use of natural antioxidants is considered better as they are safer than the synthetic antioxidants [9] Scientific evidence suggest oxidative stress as a major attribute to many diseases in humans such as cancer, hyperglycemia and heart disease.

2. Materials and methods

All reagents and chemicals used in the experiments were of analytical grade. The chemical DPPH was obtained from sigma Aldrich while all other chemicals used were obtained from local suppliers.

2.1 Sample collection

Fresh noni fruits were collected from Gaskiya layout Zaria and stored in a polyethene bag to avoid contamination.

2.2 Sample treatment and extraction of the juice

The ripe noni fruits were washed with distilled water, air dried and then placed into a clean dry bottle made of glass stainless steel and tightly covered with a cork. The container was kept in a refrigerator for two weeks, the noni juice separates from the pulp, and the noni juice product was decanted into a clean beaker and then covered with foil paper.

2.3 Test for the presence of phytochemicals in the juice sample

A 2cm^3 Noni juice sample was poured into 10 different test tubes labelled A1-A10. All procedures used were fully described by Edrah *et al.* [10], This is also summarized as follows:

(a) Test for tannins: The juice sample A_1 was treated with 15% ferric chloride solution.
(b) Benedicts test: To 1mL of the test solutions A_2, 6mL of Benedict's reagent was added. The mixtures were shaken thoroughly, and then placed in a boiling water bath for 3minutes.
(c) Test for alkaloids: To test tubes A_3, 5mL of Wagner's reagent (Iodine in potassium iodide) was added.
(d) Test for cardiac glycosides: 0.5mL glacial acetic acid was dissolved in 50mL test solution A_4, and a drop $FeCl_3$ of solution, then 0.5mL concentrated H_2SO_4.
(e) Test for Saponins: Deionized water was added to the juice sample in a test tube A_5 with thorough stirring.
(f) Test for Flavonoids: 10mL ethanol was added to 2mL juice extract in test tube A_6.
(g) Test for Anthraquinones: A mixture of chloroform and juice sample (A_7) was stirred for 5minutes; the solution was then filtered and the filtrate shaken with equal volume of 10% aqueous ammonia.
(h) Test for Terpenoids: 2mL chloroform and few drops of concentrated H_2SO_4 were added to sample A_8.
(i) Test for steroids: To 2mL of the juice in A_9, 2mL glacial acetic acid, 2mL acetic anhydride and 3 drops of concentrated sulphuric acid (H_2SO_4) were added.
(j) Test for Phenols: Ferric chloride in 5mL of ethanol, 1 mL distilled water, and few drops of 10% aqueous
(k) ferric chloride ($Fecl_3$) solution was added to juice sample labelled A_{10}.

The changes observed in each case were recorded and the inference was deduced as shown in Table 3.1

2.4 In vitro antioxidant activity test

The free Radical Scavenging Activity of the noni fruit was tested as described by Siddartha *et al.* [11], with slight modifications via 1,1-diphenyl-2-picryl hydrazyl (DPPH) technique 5mg DDPH was dissolved in 100mL methanol, the absorption maximum of the stock solution was measured at 517nm using UV spectrophotometer. The UV spectrophotometer carry 300 and absorption band appear at 1.227. DPPH solution (3mL) was combined with 100µl juice sample, the solution was allowed to stand in the dark for 30min. The absorbance was determined to be 0.6492 at 517nm. The following formula was used to determine percentage of free radical scavenging effect.

$$\%Antioxidant = \frac{(AB + AA) \times 100}{AB} \qquad (1)$$

AB is the absorbance of blank while AA is the absorbance of the antioxidant.

3. Results and discussions

3.1 Testing of Phytochemicals Present in the Noni Juice

The Table 3.1 below indicate the phytochemicals present or absent in the noni fruit juice.

Table 3.1: Phytochemicals Present in Noni juice

Bioactive Components	Results for Juice Extract
Tannis	-
Reducing sugar	+
Alkaloids	+
Cardiac glycosides	+
Saponins	-
Flavonoids	+
Anthraquinone	+
Terpenoids	+
Steroids	+
Phenols	+

Key: + Positive; - Negative

Table 3.2: Antioxidant Activity of *Morinda citrifolia* with DPPH

S/N	Absorbance at 517nm	% of antioxidant
Control	1.227	
Sample	0.6492	47.09

The phytochemical analysis of the *Morinda citrifolia* (noni) juice showed that eight out of the ten tested phytochemicals are present in the juice vis; alkaloids, reducing sugar, cardiac glycosides, saponins, flavonoids, anthraquionine terpenoids and steroids while saponin and tannins are absent, an indication of high concentration of the bioactive compounds (Table 3.1). This finding agrees with Sajana and Maya [12], who reported the presence of steroids, terpenoids, cardiac glycosides, in a sample of noni juice. These bioactive compounds were reported to have many pharmacological and toxicological potency [9]. Result from antioxidant activity showed that the fruit juice had significant effect on the DPPH radical, having radical scavenging activity of 47.09% (Table 3.2). A significant correlation is therefore observed between the result of the DPPH test and the presence of the secondary metabolites that are responsible for the in-vitro antioxidant activity.

4. Conclusions and Recommendations

This study revealed the presence of alkaloids, reducing sugar, cardiac glycosides, saponins, flavonoids, anthraquionine terpenoids and streroids in noni juice, which could account for the antioxidant properties and wound healing activity as determined in the Noni juice sample, obtained from a noni plant at Gaskiya Zaria, Nigeria. It is therefore important to understand that there is need for conserving this plant to make it available, and individuals should take it among their best options of fruit due to its vital nutrients. Meanwhile the properties

of noni need further investigation in terms of action and for safe effective utilization of the noni-fruits in pharmaceutical industries, as leads for drug discovery.

Isolation and characterization of the compounds present in Noni juice and validating their therapeutic efficacy against various pathologies is required for clinical implementation.

Pharmaceutical industries should make effective use of noni in drug discovery because of its observed potential in its traditional application for the treatment of various illnesses such as malaria, diarrhea, dysentery, urinary tract infections, wound treatment etc.

Effort should be made to conserve and make this plant available in Zaria, Nigeria in order to take the advantage of its inherent potential in medical application.

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References

1. Isah UB, Aliyu U, Abubakar SB. Phytochemical screening and antibacterial activities of the leaves of Psidium Civiyara and mistleyo tapinathus globiferus. *Zobe Journal of Sciences*. 2021; 4:2141-0623.
2. Ajibola AO, Satake M. Contributions to the Phytochemistry of medicinal plants growing in Nigeria as reported in the 1979-1990 Literatures- A preview. *African Journal of Pharmacy and Parmacological sciences.* 2012;22: 172-2016.
3. Chede E. *Morinda Citrifola, L.* use indigenous Samoan Medicine. *Journal of Herbs, Spices and Medicinal Plants.* 2013; 3:77-92.
4. Nelson S. Species profiles for pacific island agroforestry Morinda citrifolia noni. In: Elevitch CR (ed.). *Permanent Agriculture Resources.* Available from: http://www.taditionaltree.org/ Google Scholar 2003 1-12
5. Veermuthu D,Muniappan A, Savarimuthu I. Antimicrobial activity of some ethnomedicinal plants used by Paliyar tribe from Tamil Nadu, India. BMC complement. *MBC Complementary and Alternative Medicine*. 2006; 6(35). Available from: doi:10.1186/1472-6882-6-35.
6. Usman H, Garba YN, Isa BK, Lawal MD. Preliminary Phytochemical studies on the methanol extracts from the leaves and root bark of Adasonia Digitata. *Zobe Journal of Science.* 2021; 4:69-76.
7. World Health Organization (WHO). Traditional and medicine growing needs potentials. Available from: https:// www.google.com [24th December, 2021]
8. Singh DR. Morinda citrifolia L. (Noni): A review of the scientific validation of the nutritional and therapeutic properties. *Journal of diabetes and Endocrinology*. 2012; 3(6):77-91.
9. Jamuna S, Subramaniam P, Krishmoorthy K. Phytochemical analysis and evaluation of leaf and root parts of the medicinal herb, Hypochaeris radicata L. for in vitro antioxidant activities. *Asian Pacific Journal of Tropical Biomed*. 2014; 4(1): S359-S367. Available from: doi:10.1298/APJTBIPMID:25183112.
10. Edrah SM, Khalifa AA, Hanan SA, Wesam AK, Fouzy. A Qualitative and quantitative Phytochemical analysis and Antimicrobial Activity "retama" extract grown in zliten Libya. *International Journal of Medical Science and Clinical Invention.* 2017; 4:2861-2866.
11. Siddartha B, Anjali P, Riya M, Arpana V, Archana G, Ramendra PP, Chung-Ming C. Determination of Antioxidants by DPPH Radical Scavenging Activity and Quantitative Phytochemical Analysis of Ficus religiosa. 2022;27(4):13-26. Available from: doi:10.3390/molecules27041326
12. Sajana J, Maya P. Phytochemicals and antioxidant study of Morinda Citrofolia. *International Journal of Adverse Research in Biological Sciences*. 2022; 7(4):156-160. Available from: www.ijarbs.com.