Communication in Physical Sciences, 2021, 7(4): 370-377

Comparative Study of the Medicinal Values of *Indigoferatinctoria* and *Gossypium Hirsutum*

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Received: 24 September 2021/Accepted 05 December 2021/Published online:28 December 2021

Abstract: *Phytochemical screening was carried out using official and recommended analytical methods while the antimicrobial sensitivity test was implemented using the agar well diffusion method. From the phytochemical analysis of indigoferatinctoria extract, the results gotten, indicated the presence of significant concentrations of saponins, alkaloids and steroids, compared to the concentrations of flavonoids, tannins, glycoside, steroids(which were relatively minimal) and hydroxyl-anthraquinones (which was absent). The antimicrobial sensitive tests conducted on chloroform extract showed no activities against the selected bacteria, i.e Salmonella typhi, E.coli. Also, Staphylococcus aureus was not affected when treated with chloroform extract of Indigoferatinctoria but rather against ampicloxacillin control at 500 mg|ml The ethanolic extract showed minimal activities against E. coli and Staphylococcus aureus but not against Salmonella typhi Distilled water extract of indigoferatinctoria displayed activity against E.coli and Staphylococcus aureus but not against Salmonella typhi. Results recorded for phytochemical analysis indicated the presence of glycosides, alkaloids and steroids in all Gossypium hirsutum extract but not for tannins, flavanoid, and saponins extracts. The antimicrobial sensitivity test for antimicrobial of some selected organism against gossypiumhirutum extract shows no activities when treated with the plant extract in both ethanol and distilled water extract but shows minimum activity with chloroform extract against Salmonella typhi at 80mg/ml and 100mg/ml. From the results obtained,gossypiumhirsutum extract showed no activity against the pathogen The antimicrobial activity of Indigoferatinctoria and Gossypium hirsutum may be harnessed for the treatment of infections caused by bacteria if toxicological tests confirm gives negative results*

Keywords: *Indigoferatinctoria, Gossypium hirsutum, phytochemical and analysis, antimicrobial*.

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1.0 Introduction

A therapeutic plant is currently receiving more research interest than manufactured medications because of their mild or nontoxic nature (Seelanan*et al*, 1997). The use of plants to cure or alleviate various medical ailments dates back to the crude days. Several investigations have confirmed that some plants characterized as wild have significant nutrient contents such as minerals, fundamental unsaturated fats and fiber substances (Tukan *et al.*, 1998). Studies conducted by the world health organization revealed that between 65-80% of the population in developing nations relies on the customary prescription for their essential medicinal services and treatment. Because they believe that they are assessable, modest and are the product of known sources (Ashwini *et al*. 2011). *Indigoferatinctoria L* belongs to the family known as Fabaceae and some therapeutics benefits have been reported for the leaf of the plant, It is a sub bush; found in clammy deciduous timberlands and plain. The plant has hostile to lethal property (Warrirer*et al* 2007). The flavonoid part of Indigoferatinctorial has been reported to exhibit some chemopreventive activity against benzeo pyrene-mediated lung disease (Kameswaran*et al.*2008). Several studies have been reported for the chemical constituents *of Ingofera tinctorial* L and their impacts on its applications. Verma and Suresh (2002) published the phytochemical contents of leaf extract of Indigoferatinctoria Linn to include the presence of significant concentrations of alkaloids, terpenoids, glycosides and flavonoids. Adjeroh*et al*., (2020) investigated the chemical composition of *Indigofera tinctorial pod* and reported moisture, crude fiber, carbohydrate, protein and ash contents to include 68.68, 14.83, 12.17, 2.63 and 1.01 % respectively. Phytochemical components identified from hot and cold ethanol extracts were alkaloids, flavonoids while tannins, saponins and cardiac glycosides were absent. Sharma and Agrawal (2015) investigated the potency of the aerial part of *Indigofera tinctorial L*. as a curative agent against some diseases using free radical and oxygen indices. The published results indicated that this plant part exhibit strong pharmaceutical activity and showed excellent antioxidant capabilities. Studies conducted by Srinivasan*et al*. (2015) towards the evaluation of the free radical scavenging potential using high performance thin layer chromatography gave results that indicated that the aqueous extract has mean concentrations of 267, 753.43, 349 mg/g of phenolics, flavonoids and antioxidants respectively. The extract also showed 2,2-diphenyl-1-picryhydrazy activity of 52.08 %, nitric oxide activity of 23.12 % and oxygen activity of 26.79 %).

Gossypium hirsutum L. is one of the most commonly encountered plants in our environment, exhibiting high yields. Comparative study of the medicinal values of *Indigoferatinctoria* and *Gossypium hirsutum.*(Kameswaran *et al.*2008).

2.0 Materials and Methods

2.1 Sample collection and preparation

New *Indidoferatinctoria* and *Gossypium hirustum* were purchased randomly at PZ advertise from yankoli in Minna, Niger State.

The leaves were dried for constant weight at room temperature after which they grounded to powder form with mortar and pestle to expand the surface zone. The aqueous extract of the sample was prepared by soaking 100g of dried powder of each sample in 500cm^3 of distilled water, chloroform and ethanol for 24 hours. The filtrate was placed on a water bath at 100^{O}C for distilled water extract and 70^{O}C for both chloroform and ethanol extract used for phytochemical screening and against antimicrobial screening.

2.2 Phytochemical screening

2.2.1 Preparation of reagents

10% sodium hydroxide solution was prepared by dissolving 10 g of sodium hydroxide pellet in 100 mL volumetric flask and made up to the mark with distilled water.

5% ferric chloride solution

was prepared by dissolving 5g of ferric chloride in 100 mL of the volumetric flask and was made up to the mark with distilled water.

50% H_2SO_4 solution

was prepared by diluting 50 mL of concentrated H_2SO_4 in a 100 mL volumetric flask and made up to the mark with distilled water.

10% HCl solution was prepared by diluting 10 mL of concentrated HCl in 100 mL of the volumetric flask and made up to the mark with distilled water.

13.35 g of Mercuric Chloride was dissolved in 60 mL of distilled water to give a solution A.5g of Potassium Iodide was dissolved in 20 mL of distilled water to give a solution B.These two solutions(A and B)were mixed and made up to 1000 mL with distilled water in a 1000 mL volumetric flask (AOAC,1990).

In the preparation of Wegner's reagent, 1.27g of a sublimed solution of iodine and 2 g of potassium iodide was dissolved in a beaker containing 20 mL of distilled water. . This was transferred into a 1000 mL volumetric flask and made up to the mark with distilled water (AOAC,1990).

2.2.2 Phytochemical screening of extract **(Softwares 1993; Trease and Evans, 1989; Harborne, 1973).**

To test for the presence of flavonoids, 3 cm^3 aliquot of the filtrate was added to 1cm^3 of 10% NaOH sodium hydroxide, if a yellow shading was built up this demonstrates the conceivable nearness of flavonoid compounds(El-Oleyi*et al.*, 1994; Harbone, 1973).

The presence of tannins was carried out as follows: Ferric chloride solution 5% was added dropwise, to 2-3cm^3 of the concentrate and the colour changed to blue-dark, demonstrating the nearness of tannins (Harbone, 1973; Trease and Evans, 1989).

To test for saponins, 10 cm^3 of the concentrate was put in a test tube and blended in with 5cm^3 of distilled water and shaken enthusiastically for stable relentless foam. The foaming was blended in with 3 drops of olive oil and shaken vivaciously, at that point watched for the formation of emulsion (Harbone, 1973).

The presence of glycosides was carried out by using Fehling solution (Harbone, 1973). The presence of alkaloids in the samples was confirmed using Wagner's and Mayer's reagents.

The test for the presence of steroid was carried by the addition to the sample, in 2cm^3 of chloroform, followed by the addition of 2 cm^3 of tetraoxosulpate (VI) acid to obtain a dark reddish-brown dark colored at the interface (Harbone, 1973).

The steps employed to test for hydroxyl anthraquinones involve the shaking of 5 cm^3 of the sample, followed by the addition of 10 cm^3 benzene and 5 cm^3 of 10% ammonia solution. The blend was shaken and the nearness of pink, red, or violet in the ammoniacal (lower) stage indicates the presence of anthraquinones (Harbone, 1973).

2.3 Determination of antibacterial assay

The affectability test was conducted using *Salmonella typhi, E.coli* and *Staphylococcus aureus as references in the* Agar well diffusion method. Nutrient Agar plates were set up and marked. . A volume of 0.1 ml of each

institutionalized (McFarland standard) of the test life forms was vaccinated into independent plates utilizing spread plate strategy. A stopper borer was disinfected by dunking it into 70% liquor and going it through fire and is then used to drill four equidistant openings on the outside of the plate with one at the middle. One-tenth of the millimeter (0.1ml) of every one of the concentrated focus was brought into the four fringe openings while the gap in the inside would contain a control (Ampiclux). The agar plate was left for about an hour to permit the dispersion of the concentrates through the medium. They were then hatched at 37 ºC for 24 hours. For each triplicate culture plate, the inhibition zone around each very much was then estimated and the mean worth was acquired and recorded in millimeter (mm).

2.3.1 Scoring and reading

The outcome was taken by considering the zone of development and inhibition of the living organism by the test divisions. Activities and inactivity were observed in concurrence with the standard and adequate techniques (Hassan, 2004).

3.0 Results and Discussion

Table 1 presents results obtained from the phytochemical screening of leaf extract of *Indigoferatinctoria. The results indicate that f*lavonoid and saponins were present in chloroform and aqueous extracts of *indigoferatinctoria* but absent in the ethanol extract. Saponins, alkaloids and steroids were present in all three extracts, namely, ethanol, chloroform and aqueous extracts. Glycosides and hydroxyl anthraquinones were absent in all the extracts. The results indicate that the aqueous extract contains many phytochemicals from *indigoferatinctoria* leaf, followed by chloroform extract and least by ethanol extract.

Table 1 Results of Phytochemical analysis of an extract from *Indigoferatinctoria*

Chemical constituents	Ethanol extract	Chloroform extract	Distilled water extract
Flavanoid	_	+	+
Tannins	_	_	+
Saponins	+	+	+
Glycosides	_	_	+
Alkaloids	+	+	+
Steroids	+	+	+
Hydroxyl-anthraquinones	_	_	_

From Table 2, which presents a list of phytochemicals detected in leaf extracts of *Gossypium hirsutum, ethanol extract is observed to indicate the presence of all the phytochemicals except hydroxyl anthraquinones.* The chloroform extract contained all except tannins, saponins and hydroxyl anthraquinones while the aqueous extract indicated the absence of flavonoids and hydroxyl anthraquinone only. Therefore the ethanol extract gave the highest concentration or yield of phytochemical while the chloroform extract presented the least. The antimicrobial sensitive tests results for chloroform extract of *Gossypium hirsutum* leaf (Table 3) show no activities against the selected bacteria, that is, *Salmonella tyhiE.coli* and *Staphylococcus aureus* was not affected when treated with *Indigoferatinctoria* chloroform extract but rather against aampicloxacillin control at 500 mg|ml. However, the ethanol extract of the leaf (Table 4) shows activities against *E. coli* and *Staphylococcus aureus* in minimum amount but there was no observable activity against *Salmonella typhi* while distilled water extract of *indigoferatinctoria*from also shows activity against *E.coli* and *Staphylococcus aureus* (Table 5 and not against *Salmonella typhi*.

Table 2 Results of Phytochemical analysis of *Gossypium hirsutum* leaves extract

Test	Distilled water	Ethanol	Chloroform
Flavonoid	+	+	+
Tannins	-	+	-
Saponins	+	+	+
Glycosides	+	-	+
Alkaloids	+	+	-
Steroids	+	+	+
Hydroxyl anthraquinones	-	-	-

Keys: - absent, + predence

Table 3 Chloroform extract of *Indigoferatinctoria* leaf

Diameter of zone of inhibitor in "mm"				
Organisms	**concentration in mg/ml**			
	60 mg|ml	**80 mg|ml**	**100 mg|ml**	**Ampicloxacilln 500 mg|ml**
Salmonella tyhi	_	_	_	16.00
E.coli	_	_	_	10.00
Staphylococcus aureus	_	_	_	34.00

Table 4 Ethanolic extract of *Indigoferatinctoria* leave

Diameter of zone of inhibitor in "mm"				
Organism	**concentration in mg/ml**			
	60 mg|ml	**80 mg|ml**	**100 mg|ml**	**Ampicloxacillin 500 mg|ml**
Salmonella typhi	_	_	_	10.00
E.coli	7.00	9.00	9.00	30.00
Staphylococcus aureus	6.00	8.00	9.50	35.00

Table .5: Distilled water extract of *indigoferatinctoria* leave extract

Diameter of zone of inhibitor in "mm"				
Organism	**concentration in mg/ml**			
	60 mg|ml	80 mg|ml	100 mg|ml	Amplicloxacillin 500 mg|ml
Salmonella typhi	_	_	_	16.00
E.coli	\5.00	8.00	11.00	30.00
Staphylococcus aureus	8.00	8.30	12.00	34.00

The sensitivity test for antimicrobial of some selected organism against *gossypiumhirutum* leave extract shows no activities when treated with the plant extract in both ethanol and distilled water extract but minimal activity was observed for the chloroform extract against *Salmonella typhi* at 80 and 100 mg/ml respectively. Also, the *gossypiumhirsutum* leaf extract showed no activity against the pathogen.

Table 6 ethanol extract of *Gossypium hirusutm*

Diameter of zone of inhibitor in "mm"				
Organism	**concentration in mg/ml**			
	60 mg|ml	80 mg|ml	100 mg|ml	Ampicloxacillin 500 mg|ml
Salmonella typhi	_	_	_	35.00
E.coli	_	_	_	25.00
Staphylococcus aureus	_	_	_	15.00

Table 7 Distilled water extract *Gossypium hirusutm*

Diameter of zone of inhibitor in "mm"				
Organism	**concentration in mg/ml**			
	60 mg|ml	80 mg|ml	100 mg|ml	Apicloxacillin 500 mg|ml
Salmonella typhi	_	_	_	10.00
E.coli	_	_	_	32.00
Staphylococcus aureus	_	_	_	32.00

Table 8 chloroform extracts *Gossypium hirusutm*

Diameter of zone of inhibitor in "mm"				
Organism	concentration in mg/ml			
	60 mg|ml	80 mg|ml	100 mg|ml	Ampicloxacillin 500 mg|ml
Salmonella Typhi	_	3.00	3.20	12.00
E.coli	_	_	_	28.00
Staphylococcus aureus	_	_	_	30.00

4.0 Conclusion

Preliminary phytochemical evaluation of leaf extracts of *Indigoferatinctoria* and *Gossypium hirsutum* shows that the yield of phytochemical is strongly dependent on the choice of solvent. Ethanol seems to be the best solvent for *Gossypium hirsutum* but distilled water is the best solvent that gives the highest yield for phytochemicals in *Indigoferatinctoria*. Hydroxyl anthraquinones were absent in all the extracts. Extracts from *Indigoferatinctoria* demonstrated displayed significant inhibition regarding the control. It is conclusive from the results of the study that synergistic interaction of the detected phytochemicals has some role in its biological activities.

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Conflict of Interest

The authors declared no conflict of interest

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