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Original Research Article

Phytochemical Screening, Antimicrobial and Antioxidant Activity of Sudanese *Albizia Anthelmintica* and *Guiera Senegalensis* Leaves Extracts

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Abstract: The African species *Albizia anthelmintica L.* and *Guiera senegalensis, L.* were obtained from Alnahud town, West Kordofan State Sudan and the samples were identified by plants taxonomist at Department of Horticultural Sciences, Faculty of Agricultural Sciences, University of Gezira, Sudan and then the constituents were extracted by maceration method using ethanol 70% and distilled water. Qualitative analysis was carried out to identify the different classes of secondary metabolites in the plants extracts using conventional chemical tests. All the tested plants *A. anthelmintica* and *G. senegalensis* leaves extracts showed the presence of; tannins, flavonoids, saponins, phenols, phytosterols, carbohydrate, amino acids and proteins, while alkaloids, cardiac glycosides and glycosides were absent in both aqueous and ethanolic extracts of *A. anthelmintica*. And carbohydrate, glycoside were absent in both aqueous and ethanolic extracts of *G. senegalensis*. The observed antibacterial effects of ethanolic extract of *A. anthelmintica* demonstrated the highest activity against *Staphylococcus aureus* and *Escherichia coli.* The Antioxidant activity DPPH solution exhibit a purple color with a high absorbance, so the extracts showed significant antioxidant activity.

Keywords: Phytochemical Screening, Antibacterial and Antioxidant Activity, *A. Anthelmintica* and *G. Senegalensis*.

INTRODUCTION

Several traditional medicinal plants, including *Guiera senegalensis, L.* (known as Ghubaysh), Combretaceae family, and *Albizia anthelmintica, L.* (known as Girfat Aldud) Fabaceae family [1], are shrubs that grow in Western Kordofan-Sudan [2], It's has perceived medicinal properties, as treatment of a variety of diseases due to their safety and efficacy compared to allopathic medicine [3]. The curative properties of medicinal plants are attributed to the presence of various phytochemicals [4]. Anthraquinones, tannins, terpenoids, and glycosides are reported to have antimicrobial activities and flavonoids, tannins, alkaloids and phenols are reported to possess antioxidant properties. The leaves of *A. anthelmintica* and *G. senegalensis* have been used as a cure for infections and wounds [5].

A. anthelmintica genus consists of approximately 150 species most of which are deciduous woody trees and shrubs, and it's known to be rich in phenolics and terpenes in different plant organs [6], and phytochemical investigation revealed the presence of different classes of secondary metabolites such as saponins, terpenes, alkaloids, flavonoids, triterpenoids and glycosides [7]. Eight reports of isolating the polyphenolic constituents from the 80% aqueous methanolic extracts of *A. anthelmintica* leaves and evaluates the antioxidant and cytotoxic activities of the pure isolates, [8].

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G. senegalensis is a shrub of savannah region of West and Central Africa. Its leaves are commonly used in traditional medicine in gastrointestinal disorders, respiratory infections and malaria. Several reports in the literature have described the use of *G. senegalensis* in traditional medicine for treatment of many diseases [9]. *G. senegalensis* extracts have been recognized as being useful against cough, respiratory congestion, and fever [10], also treating cough, easing breathing and for treating lung and bronchial disorders [11], and against malaria [12]. The branches, leaves, bark and roots of *G. senegalensis* are used for the treatment of stomach pains and dysenteric diarrhea [13]. The results of phytochemical screening of *G. senegalensis* leaves extract and evaluated its toxicity using brine shrimp, and its antifungal activity. Five reports conducted that the medicinal extract of *G. senegalensis* leaves may be safe to use as a drink for treatment of various diseases, while possible antioxidant activities were determined using the (DPPH) radical scavenging method. All the tested plants showed the presence of various secondary metabolites such as alkaloids, flavonoids, glycosides, phenols, saponins, and sterols [14].

MATERIALS AND METHODS

Plant Materials

The plant leaves of *A. anthelmintica* and *G. senegalensis* were obtained from Alnahud, West Kordofan State Sudan and the samples were identified by Dr. Yasmin Adam Ali Aburigal, Department of Horticultural Sciences, Faculty of Agricultural Sciences, University of Gezira, Sudan.

Extraction of Plant Materials

Fifty grams of each coarsely powdered plant material were macerated in 500 ml of ethanol 70% for 72 hrs, in a conical flask at room temperature with intermittent shaking and was filtered; the resulting solution was evaporated at room temperature. After drying; the weight of the dry extracts were determined and the extracts were kept at room temperature until use. The same procedure was applied for the aqueous extract. The dry extract was weighed and portion of it used for phytochemical screening while the rest was used for the other tests. Percentage yield (%W/W) of plants materials in water and alcohol extracts were calculated separately [15].

$$\text{Percentage yield (\% W/W)} = \frac{\text{Quantity of dried extract (g)} \times 100.}{\text{Quantity of powdered sample (g)}}$$

Phytochemical Screening

Phytochemical analysis of the plants extracts of *A. anthelmintica* and *G. senegalensis* was done using standard tests for the presence of secondary metabolites as described in [16, 17], as standard methods.

Antibacterial Sensitivity Test Using Well Diffusion Method

Concentration of sample extracts were prepared by take 150mg from extract and dissolved in 1ml of distilled water. Mueller Hinton agar media was prepared, 2-3drops of pathogen culture media were added in melt agar and mixed well, and sterile Petri dish was divided into 2 sectors, having cefuroxime and nystatin, the content of the test tube poured aseptically to the Petri dish. The media was left to harden at room temperature. A well was made at the center of each sector. Each well was filled with the antibiotic having the same name of the sector. The plate was left on the bench for 2-3 hrs then the plate was incubated in the incubator for18-12 hrs the diameter of clear zone of inhibition was measured. Bacteria samples were disposed according to the regulations of the University of Gezira.

Antioxidant Activity

This method was carried out according to that described in [18, 19]. Sample stock solutions (1000 ppm) were diluted to final concentrations of 250, 125, 50, 10 and 5 µg/ml in methanol. 1.0 ml of a 0.3 mM 2, 2 diphenyl-1-picryl hydrazyl (DPPH) in methanol solution was added to a 2.5 ml solution of the different concentrations of the extracts and allowed to react at room temperature for 30 minutes. The absorbance of the resulting mixture was measured at 518 nm and converted to percentage antioxidant activity (%).

RESULTS AND DISCUSSION

Table 1: Yield Percentage of *A. anthelmintica* and *G. senegalensis* leaves Extracts

S.NO	Sample	Extract	Weigh of plant sample (g)	Weigh of dry extract (g)	Yield %
1	*A. anthelmintica*	Aqueous	20	3.6	18.0
		Ethanolic	20	2.7	13.5
2	*G. senegalensis*	Aqueous	20	1.8	09.0
		Ethanolic	20	1.2	06.0

Table 2: Phytochemical Screening of *A. anthelmintica* and *G. senegalensis* Leaves Extracts

S.NO	Constituents	Reagent	*A. anthelmintica*		*G. senegalensis*	
			Ethanolic Extract	Aqueous Extract	Ethanolic Extract	Aqueous Extract
1	Klkaloids	Wagner's	+	+	-	-
		Mayer's	+	+	-	-
		Hager's	+	+	-	-

2	Amino acids and Proteins	Ninhydrine	+	+	+	+
3	Carbohydrate	Molishch's	-	-	-	-
		Bendect's	-	-	+	+
4	Flavonoids	Sodium Hydroxide	+	+	+	+
		Lead Acetate	+	+	-	+
		Ammonia Solution	+	-	+	+
5	Reducing Sugars	Fehling	-	-	+	+
6	Phenols	Ferric Chloride	+	+	+	+
		Gelation	+	-	-	+
7	Glycoside	Borntrager's	-	-	-	-
8	Phytosterols	Liebermann Burchard	-	+	+	+
		Salkowski's	+	+	+	+
9	Saponins	Foam	+	+	+	+
		Frothing	+	+	+	+
10	Tannins	Gelation	+	+	+	+
		Alkaline Reagent	+	+	-	+
		Ferric chloride	+	+	+	+
11	Cardiac Glycosides	Kellar- Kiliani	-	-	-	-

(+) indicate present (-) indicate absent

Table 3: Antibacterial Activity of *A. anthelmintica* and *G. senegalensis* Leaves Ethanolic extracts

S.NO	Micro-organisms	Zoon of inhibition in mm			
		A. anthelmintica	*G. senegalensis*	Control	
		Ethanolic extract	Ethanolic extract	Cefuroxime	Nystatin
1	*Staphylococcus aureus*	20	28	25	-
2	*Escherichia coli*	20	16	25	-

Table 4: Antioxidant Activity of *A. anthelmintica* and *G. senegalensis* Leaves Ethanolic Extracts

S.NO	Plants extracts	Concentration	Scavenging activity
1	*A. anthelmintica*	250 µg/ml	93.8%
		125 µg/ml	93.9%
		050 µg/ml	94.0%
		010 µg/ml	76.4%
		005 µg/ml	45.4%
2	*G. senegalensis*	250µg/ml	72.5%
		125 µg/ml	63.5%
		050 µg/ml	50.5%
		010 µg/ml	45.5%
		005 µg/ml	31.3%

Table 5: DPPH scavenging of *A. anthelmintica* and *G. senegalensis* leaves ethanolic extracts.

S. No	Sample	EC_{50}
1	*A. anthelmintica*	05.50
2	*G. senegalensis*	07.98
3	Rutin (standard)	12.00

Average percentage yields for *G. senegalensis* ethanolic extract was 6.0% and aqueous extract was 9.0% while for, *A. anthelmintica* ethanolic extract was 13.5 % and Aqueous extract was 18%. The phytochemical components of *G. senegalensis* leaves extracts based on aqueous and ethanolic extracts. Tannin, flavonoid, saponins, Phenols, Phytosterols, Carbohydrate, Amino acids and Proteins were present while Alkaloids, Cardiac Glycosides and Glycoside were absent in both aqueous and ethanolic extracts. For *A. anthelmintica*; tannins, flavonoids, saponins, Phenols, Phytosterols, alkaloids, Amino acids and Proteins were present, while Carbohydrate, Cardiac Glycosides and Glycoside were absent in both aqueous ethanolic extracts as shown in (Table.2). The observed antibacterial effects of the *A. anthelmintica and G. senegalensis* leaves extracts have been related to the active phytochemical compounds as tannins, flavonoids and saponins against bacteria *Staphylococcus aureus and Escherichia coli*.

The DPPH free radical scavenging activity of leaves ethanolic extracts of *A. anthelmintica and G. senegalensis* summarized in (Table. 4). At a concentration of 250 µg/ml, *G. senegalensis* extract

scavenged 72.5% of DPPH radicals, whereas that of (125, 50,10 and 5) µg/ml caused 63.5%, 50.5%,45.5% and 31.3% DPPH inhibition respectively. In *A. anthelmintica* at a concentration of 250 µg/ml, extract scavenged 93.8% of DPPH radicals, whereas that of (125, 50, 10 and 5) µg/ml caused 93.9%,94%,76.4% and 45.4% DPPH inhibition respectively. The EC_{50} values for the leaves of *A. anthelmintica and G. senegalensis* extracts (Table. 5) were 5.50µg/ml and 7.98µg/ml, respectively.

However, the standard antioxidant agent Rutin showed a quite constant inhibition. The EC_{50} for the standard Rutin was found to be equal to 12µg/ml and this is good indication that *A. anthelmintica and G. senegalensis* has an antioxidant characteristic higher than the standard sample. The total antioxidant capacity of all the extracts increased significantly with an increase in extract concentration.

CONCLUSION

Medicinal plants appear to be rich in secondary metabolites, which are commonly used in traditional medicine to combat and cure various diseases. The results of this study have shown that the leaves of *A. anthelmintica and G. senegalensis* have various significant antimicrobial and antioxidant activities. However, further studies are required to quantify the identification of the various phytochemical constituents of the two plants.

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Conflict of Interests: The authors declare that they have no conflict of interest.

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