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Phytochemical Screening and Antioxidant Activity of *Coronilla valentina*

Bulus Godiya Gambo[1], Magomya Asabe Mercy[2], Iyen Sandra Ifeoma[3]
Federal University Wukari, Nigeria
bulusgodiya360@gmail.com

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Abstract

This study investigated the phytochemical constituents and antioxidant activity of *Coronilla valentina*. The leaves and stems of the plant were air-dried, powdered, and extracted using hexane, ethyl acetate, acetone, and methanol. Phytochemical analysis revealed the presence of tannins, phenols, flavonoids, terpenoids, and alkaloids in both leaf and stem extracts. The quantitative analysis of phytochemicals in the crude extracts of *Coronilla valentina* revealed notable concentrations in both leaves and stems. In the leaf extract, phenols were found to be the most abundant at 2.43 mg/g, followed by alkaloids at 2.23 mg/g, flavonoids at 2.21 mg/g and saponins at 0.43 mg/g. Conversely, the stem extract exhibited a different pattern, with tannins being the most abundant at 2.54 mg/g, followed by phenols at 2.10 mg/g, alkaloids at 1.70 mg/g, flavonoids at 1.14 mg/g and saponins at 0.33 mg/g, respectively. The antioxidant activity of the extract was assessed using the DPPH free radical scavenging assay across concentrations from 0.0313 to 0.500 mg/mL, with ascorbic acid as the standard. Absorbance readings for the leaf and stem extracts decreased with increasing concentrations, whereas percentage inhibition increased, indicating enhanced antioxidant activity at higher concentrations when compared to the standard. Methanol extracts of both the leaf and stem demonstrated higher radical scavenging activity with percentage

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inhibition of 64.76% and 71.64% respectively. Among the tested extract of both the leaf and the stem, methanol and ethyl acetate extracts exhibited lower IC_{50} value demonstrating stronger DPPH radical scavenging activity with an IC_{50} value of 0.069 and 0.068 ug/mL, which is comparable to the standard with an IC_{50} 0f 0.069 mg/mL. while hexane extracts of both the leaf and stem revealed higher IC_{50} value with an IC_{50} value of 0.29 and 0.17 ug/mL indicating weak antioxidant activity. Our findings in this study support the potential use of *Coronilla valentina* as a source of natural antioxidants.

Keywords: Phytochemical screening, Antioxidant activity, *Coronilla valentina*

INTRODUCTION

Plants contain bioactive compounds that are both physiologically and therapeutically significant (Ingle *et al.*, 2017). The value of plants for both human and animal health is demonstrated by the growing interest in natural remedies in contemporary medicine. About 50% of all pharmaceuticals used in clinical settings worldwide today are derived from natural ingredients (Chopra & Dhingra, 2021). The extraction of vital components for medicinal use from plants previously used in traditional medicine has been made possible by scientific advancements. Phytochemicals are used as direct therapeutic agents and are obtained from a variety of plant parts, including as leaves, bark, seeds, seed coats, flowers, roots, and pulp (Ingle *et al.*, 2017).

Crude extracts from various parts of plants are used in Ayurvedic medicine to treat numerous diseases (Singh *et al.*, 2015). Nowadays, traditional therapeutic methods play a significant role in complementary and alternative medicine (Pereira & Bartolo, 2016). According to the World Health Organization, more than 80 percent of the global population depends on traditional medicine for their primary health care needs (Ozioma & Chinwe, 2019). For their pharmacological function, plants are being extensively investigated as the source of material for major modern drugs. In the Ayurvedic method of medicine, crude extracts of various sections of medicinal plants were used to treat various forms of infectious disease (Singh *et al.*, 2015). Though their effectiveness and mechanisms of action haven't always been scientifically proven, these straightforward pharmaceutical formulations' active chemical constituents frequently mediate positive reaction (Bhat *et al.*, 2012). Therefore, it's critical to extract plant metabolites in order to identify biologically active substances, comprehend their role in illness prevention and treatment, and recognize any harmful effects.

Coronilla valentina is used by local people to treat a range of health issues such as digestive disorders, respiratory ailments, skin conditions, and even as a natural remedy for anxiety or stress. However, there is scarcity of scientific validation regarding the medicinal uses and bioactive compounds isolated found in its leaves and stems. Also, the precise phytochemical composition, mechanism of action, and specific therapeutic application of *Coronilla valentina* remain unknown. Therefore, this work was designed to enhance the availability of scientific data on the phytochemical compound and antioxidant activity of *Coronilla valentina* so as to unlock its full potential in medicine, pharmacology and biodiversity conservation.

MATERIALS AND METHODS

Collection of Plant Materials

Coronilla valentina leaves and stems were obtained from its natural habitat in Wukari Local Government Area of Taraba State, Nigeria in May, 2023 and was identified by Forestry and Wild Life Department of the Federal University Wukari. The plant materials were properly cleaned with distilled water, cut into tiny pieces, and allowed to air dry in the shade for two weeks. They were then crushed into fine powder using mortar and pestle and stored in an airtight container until needed.

Extraction of Plant Samples

The extraction procedure used was cold maceration. The extracts of the leaves and stems were prepared by soaking 100g of the powdered materials in 250ml of hexane for 72 hours while stirring constantly. After the mixture was concentrated using a rotatory evaporator and gravity filtered, any leftover solvents were eliminated by letting it lie in a vacuum oven overnight at room temperature. The filtrate was then weighed and the process was carried out again on the residue using methanol, acetone, and ethyl acetate in that sequence of polarity. The extracts were well labelled as *Coronilla valentina* leaf hexane extract (CVLH), *Coronilla valentina* leaf ethyl acetate extract (CVLEA), *Coronilla valentina* leaf acetone extract (CVLA), *Coronilla valentina* leaf methanol extract (CVLM), *Coronilla valentina* stem hexane extract (CVSH), *Coronilla valentina* stem ethyl acetate extract (CVSEA), *Coronilla valentina* stem acetone extract (CVSA), and *Coronilla valentina* stem methanol extract (CVSM), They were stored in a desiccator until required (Ushie *et al*., 2021)

Phytochemical Screening of Plant Extracts

The plant extracts were subjected to qualitative analysis for secondary metabolites; alkaloids, flavonoids, tannins, phenols, glycosides, saponins, terpenoids, steroids, and cardiac glycosides using standard methods as described by some researchers.

Detection of Alkaloids

Meyer's test procedure, which involved adding 3 milliliters of plant extract to a test tube, was used to identify alkaloids, 3 mL of potassium mercuric iodide solution, Mayer's reagent, was then added to the mixture and stirred. It was evident that alkaloids were present when a white or cream-colored precipitate formed.

Detection of Flavonoids

The alkaline reagent test method was utilized to identify flavonoids. A small amount of 2M sodium hydroxide solution was added to the plant extracts. When 1% hydrochloric acid solution is added, a strong yellow tint forms and eventually becomes colorless, indicating the presence of flavonoids.

Detection of Tannins

A fraction of the extract was combined with distilled water and cooked on a water bath in order to identify any tannins present. Following heating, the mixture was filtered, and the filtrate was then mixed with ferric chloride solution. Tannins are detected by the development of a blue-black or brownish-green tint.

Detection of Phenols

The extracts (3 mL) were mixed with 6 ml of distilled water, and 2 drops of 10% ferric chloride were then added to the extract solution. Phenols are present when blue or black color begins to appear.

Detection of Glycosides

A 1% diluted solution of hydrochloric acid was used to hydrolyze the plant extracts. They were then subjected to a Modified Borntrager's test to check for glycosides. After adding ferric chloride solution, the extracts were cooked for five minutes. Equal amounts of benzene were employed for extraction after cooling. After isolation, the benzene layer was treated with an ammonia solution. The ammonia layer turned pink to crimson, indicating the presence of anthraquinone glycosides.

Detection of Saponins

The Froth Test was used to identify saponins. Distilled water was used to dilute the extracts to a 20 mL volume. In a graduated cylinder, the liquid was agitated violently for fifteen minutes. The appearance of a 1centimeter foam layer on top suggests the presence of saponins.

Detection of Terpenoids

The extracts (0.2 g) were mixed with 3 mL of saturated H_2SO_4 and 2ml.of chloroform. The appearance of a reddish-brown interface indicated the presence of terpenoids

Detection of Steroids

In a test tube, 1 mL of each extract was mixed with 5 drops of concentrated H_2SO_4. The presence of steroids was indicated by the appearance of a red color.

Detection of Anthraquinone

A water bath containing 2 milliliters of HCl was used to heat the extracts for five minutes. Equal parts of chloroform were added to the filtrate followed by the filtration of the resulting solution and its cooling to room temperature. Few drops of 10% NH_3 was added into the solution and the mixture was heated until the appearance of a rose-pink which indicates the presence of anthraquinone.

Quantitative Determination of the Phytochemicals

The quantitative determination of the identified secondary metabolites in *Coronilla valentina* leaves and stems was conducted using the standard methods described in the literature.

Determination of Total Phenols

Total phenols were determined using the procedures outlined by Mudasir (2011) and Iqbal *et al.* (2019). To generate a fat-free sample, a 250 mL titration flask was filled with a 5 g sample of the plant material. 100 mL of n-hexane was then added twice, for a total of 4 hours each time. The filtrates were then disposed of. The next step was adding 50 mL of diethyl ether twice, heating it for 15 minutes each time, letting it cool to room temperature, then filtering the mixture through a separating funnel. Two full shakes and the addition of about 50 mL of a 10% NaOH solution were required to separate the organic layer from the aqueous layer. The aqueous layer was washed three times with twenty-five milliliters of deionized water. After adding 10% HCl solution to the resultant total aqueous layer, the

aqueous layer in the separating flask was acidified twice with 50 mL of dichloromethane (DCM) to bring it down to pH 4.0. The organic layer was then removed, allowed to dry, and weighed. Using the weight of the organic layer as a base, the proportion of phenols was computed by difference.

Determination of Alkaloids

Alkaloids were determined using the procedure outlined by Sathya (2013). CH_3CO_2H (10%, 200 mL) in C_2H_5OH was added in a 250 mL beaker containing a 5 g sample of the plant material. The mixture was covered and left for four hours. Filtration of the mixture was followed by concentration of the filtrate over a water bath until only 25% of the original volume was left; concentrated NH_4OH was then mixed with the concentrated filtrate until the precipitation process was finished. After allowing the mixture to settle, the precipitate, or alkaloids, was collected onto filter paper that had been previously weighed. The precipitate was dried after being washed using diluted NH_4OH. The weight of the dried precipitate was used to compute the proportion of alkaloids using difference.

Determination of Saponins

Saponins were determined using the procedure described by Sathya (2013). A 250 mL conical flask containing a 20 g sample of the plant material was filled with 100 mL of 20% ethanol. The mixture was cooked for four hours on a hot water bath, stirring constantly, until it reached a temperature of around 55°C. After heating the combination, Whatman No. 42 filter paper was used to filter it. After that, 200 milliliters of extra 20% ethanol were employed to eliminate the residue once more. The combined extracts were concentrated to 40 mL over a water bath heated to around 90°C. The concentrated extract was put into a 250 mL separating funnel, and 20 mL of diethyl ether ($(CH_3CH_2)_2O$) was then added. The aqueous layer was recovered and the diethyl ether layer was discarded after the mixture was well shaken. This cleaning process was repeated. After adding 60 mL of n-butanol to the aqueous layer, the combined n-butanol extract was twice cleaned with 10 mL of 5% NaCl solution. The remaining liquid was warmed in a 250 mL beaker that had been previously weighed with water. The residue was dried in an oven until it had a consistent weight following evaporation. Using the weight of the dried residue as a foundation, the difference was utilized to determine the fraction of saponins.

Determination of Flavonoids

The method described by Sathya (2013) was used to determine the flavonoid content. Aqueous methanol (80%, 100 mL) was used to extract a 10 g sample of the plant material many times at room temperature. The liquid was extracted and filtered using filter paper before being placed into a 250 mL beaker that had been previously weighed. The substance was filtered, then allowed to evaporate in a water bath until it was entirely dry. After that, the dry residue was weighed. The weight difference between the dried residue and the extracted sample's original weight was used to compute the flavonoid percentage.

Determination of Tannins

Tannin quantitative analysis was done using the spectrophotometric technique. A 0.5 g sample of leaves and stems is put into a plastic bottle. The sample is filtered into a 50ml container. Next, 5 ml of the filtered sample was combined with 2 ml of 0.1M HCl and 0.008M $K_4Fe\ (CN)_6.3H_2O$ in a test tube. The absorbance at a wavelength of 395 nm is measured with a spectrophotometer in ten minutes.

Antioxidant Assay of the Leaves and Stem Crude Extracts of *Coronilla valentina*

The antioxidant activities of the extract were determined using modified method of Ushie *et al.* (2021). DPPH solution (0.1M) were prepared in 95% methanol and each extracts' solution (20, 40, 60, 80, and 100µg) was also prepared in 95% methanol. The extracts (3 mL) solution were added to 1 mL of DPPH and absorbance measured at 517 nm using spectrophotometer after 30 minutes. The absorbance of the blank (lcm^3 DPPH solution added to 3ml 95% methanol) was also measured. The radical scavenging activity were calculated using the following formula:

$$\text{Inhibition (\%)} = \frac{A - B}{A} \text{ X } 100$$

Where A = Absorption of the blank sample without extract

B = Absorption of the extract.

RESULTS AND DISCUSSION

Nature and Yield of Crude Extracts of the Leaf and Stem of *Coronilla valentina*.

The nature and yield of crude extracts obtained from *Coronilla valentina* leaves and stems using various solvents is shown in Table 1.

Table 1: Nature and Yield of Crude Extracts of the Leaf and Stem of *Coronilla valentina*

Plants	Solvent Extracts	Weight (g)	Yield of Extracts (%)	Colour	Texture
Leaf	CVLH	101.96	3.83	Black	Sticky
	CVLEA	97.94	3.30	Dark Brown	Sticky
	CVLA	100.73	2.98	Dark Green	Solid
	CVLM	97.90	1.31	Green	Solid
Stem	CVSH	100.73	1.26	Black	Sticky
	CVSEA	111.97	1.46	Dark Brown	Sticky
	CVSA	101.15	1.87	Dark Green	Solid
	CVSM	101.25	3.22	Green	Solid

Keywords: CVLH; *Coronilla valentina* Leaf Hexane, CVLEA; *Coronilla valentina* Leaf Ethyl acetate, CVLA; *Coronilla valentina* Leaf Acetone, CVLM; *Coronilla valentina* Leaf Methanol; CVSH; *Coronilla valentina* Stem Hexane, CVSEA; *Coronilla valentina* Stem Ethyl acetate, CVSA; *Coronilla valentina* Stem Acetone, CVSM; *Coronilla valentina* Stem Methanol

Diverse visual characteristics of the extracts, such as stickiness, solidity, and varying colours were observed. The extraction yields of the leaf of *Coronilla valentina* revealed differences among solvents, with hexane (3.83 %) and ethyl acetate (3.30 %) exibited higher efficiency compared to acetone (2.98 %) and methanol (1.31 %), for the stem extracts methanol gave the highest yield (3.22%) followed by acetone (1.87 %), ethyl acetate (1.46 %) and hexane (1.26 %). The observed variations in the extraction yield may be caused by the solvents' polarity, the kind of constituents used, the range of bioactive compounds, and the way those compounds solubilize in various solvents (Nawaz *et al.*, 2020; Bako *et al.*, 2023). Different chemical properties of the plant parts (leaves and stems) result in differences in how soluble they are in different solvents (Kumar *et al.*, 2013).

Phytochemical Screening of Leaf and Stem Extracts of *Coronilla valentina*

The leaf and stem extracts of *Coronilla valentina* were screened for the presence of some phytochemicals and the results are presented in Tables 2 and 3, respectively.

Table 2: Phytochemical Screening of Leaf Extracts of *Coronilla valentina*

Phytochemicals	**Reagents**	**Extracts**			
		Hexane	**Ethyl acetate**	**Acetone**	**Methanol**
Flavonoids		+	++	++	+
Phenols		-	++	++	+
Tannins		+	+	++	++
Saponins	Froth Test	-	-	-	-
Glycoside	Keller Killani Test	++	+	+	++
Terpenoids		+	+	++	+
Steroids		+	++	++	+
Anthraquinones		+	++	++	+
Alkaloids	Mayer's Reagent	+	++	+	+

Keywords: ++ = Abundantly present**, + =** present**, =** absent**.**

Table 3: Phytochemical Screening of Stem Extracts of *Coronilla valentina*

Phytochemicals	**Reagents**	**Extracts**			
		Hexane	**Ethyl acetate**	**Acetone**	**Methanol**
Flavonoids		+	++	++	+
Phenols		++	+	+	++
Tannins		+	+	+	+
Saponins	Froth Test	-	-	-	-
Glycoside	Keller Killani Test	+	+	++	++
Terpenoids		+	+	+	+
Steroids		++	++	+	++
Anthraquinones		+	+	++	++
Alkaloids	Mayer's Reagent	+	+	++	+

Keywords: ++ = Abundantly present**, + =** present**, =** absent**.**

Based on the data presented in Table 2, glycosides were detected in *Coronilla valentina* leaf ethyl acetate and acetone extract, with pronounced abundance in hexane and methanol

extracts. Phenols were moderately present in methanol extracts and abundantly present in ethyl acetate and acetone extracts but were absent in hexane extracts. Tannins were found in varying amounts in all extracts, with the highest abundance in acetone and methanol. Terpenoids were present to a moderate extent in all extracts, with the highest abundance in acetone extracts. Steroids were present in all extracts, most abundantly in ethyl acetate and acetone extracts. Anthraquinones were present in all extracts, with the highest abundance in ethyl acetate and acetone extracts. Alkaloids were present in all extracts, most abundantly in ethyl acetate extracts. Flavonoids, while present in all extracts, were more abundant in hexane and ethyl acetate compared to acetone and methanol. Saponins were not detected in any extract using the froth test. The absence of positive results in certain tests does not necessarily imply the non-existence of these constituents. The presence of bioactive components can arise from various factors such as climate, sample collection methods, geographical origin, drying and storage procedures, sensitivity of the chemical reagents employed, visibility of colour reactions influenced by pigments, analysis methods, and the specific plant under investigation (Mahato *et al.,* 2019).

Table 3 shows that the stem extracts of *Coronilla valentina* display the presence of numerous potentially bioactive phytochemicals. Flavonoids were present most abundantly in ethyl acetate and acetone extracts. Phenols were present in all extracts, with the highest abundance in hexane and methanol extracts. Tannins and terpenoids were present in all extracts, while saponins were absent in all of them. Glycosides and anthraquinones were present in all extracts, with a rich presence in acetone and methanol extracts. Steroids were richly present in all extracts except for acetone extracts. Alkaloids were found to be present in all extracts, with a rich presence in acetone extracts. Compared to the leaf extracts, the stem extracts of *Coronilla valentina* seem to have higher levels of phenols and sterols, potentially offering stronger antioxidant and hormonal/anti-inflammatory activities. Flavonoids and anthraquinones are slightly less abundant in the stems, while tannin and alkaloid levels remain similar. The stem extract presents a distinct, yet still promising, phytochemical profile compared to the leaves, suggesting potentially different therapeutic applications worth exploring in future research.

Quantitative Determination of Selected Phytochemicals of the Extract of *Coronilla valentina* Leaf and Stem.

The quantitative phytochemical analysis of *Coronilla valentina* leaf and stem extracts gave the results presented in Table 4.

Table 4: Quantitative determination of secondary metabolites from the leaf and stem of *Coronilla valentina.*

S/No.	Detected Secondary metabolites	Concentration (mg/g)	
		Leaf	Stem
1.	Alkaloids	2.23	1.70
2.	Saponins	0.43	0.33
3.	Flavonoids	2.21	1.14
4.	Phenols	2.43	2.10
5.	Tannins	1.11	2.54

The quantitative analysis of phytochemicals in the crude extracts of *Coronilla valentina* revealed notable concentrations in both leaves and stems. In the leaf extract, phenols were found to be the most abundant at 2.43 mg/g, followed by alkaloids at 2.23 mg/g, flavonoids at 2.21 mg/g and saponins at 0.43 mg/g. Conversely, the stem extract exhibited a different pattern, with tannins being the most abundant at 2.54 mg/g, followed by phenols at 2.10 mg/g, alkaloids at 1.70 mg/g, flavonoids at 1.14 mg/g and saponins at 0.33 mg/g. Table 4 represents the quantitative distribution of these phytochemicals in the leaf and stem extracts, respectively. The findings here highlight the distinct phytochemical profiles between leaves and stems of *Coronilla valentina*, providing valuable insights for further exploration of their potential medicinal and biological activities.

Antioxidant Activities of Crude Extract from the Leaf and Stem of *Coronilla valentina*

Tables 5 and 6 present the absorbance (at 517nm) obtained for coronilla valentina extracts and vitamin C in the presence of DPPH.

Table 5: Absorbance of *Coronilla valentina* Leaf Extracts and Standard in the presence of DPPH.

Concentration (mg/mL)	Absorbance				
	CVLH	CVLEA	CVLA	CVLM	Vitamin C
0.0313	0.3408	0.2445	0.2872	0.1326	0.1021
0.0625	0.2349	0.2002	0.1860	0.1268	0.0978
0.125	0.1931	0.1882	0.1542	0.1232	0.0933
0.25	0.1662	0.1714	0.1354	0.1225	0.0911
0.5	0.1431	0.1508	0.1313	0.1156	0.0868

Table 6: Absorbance of *Coronilla valentina* Stem Extracts and Standard at 517 nm

Concentration (mg/mL)	Absorbance				
	CVSH	CVSEA	CVSA	CVSM	Vitamin C
0.0313	0.1112	0.1015	0.11985	0.1368	0.1021
0.0625	0.1064	0.0922	0.1072	0.1081	0.0978
0.125	0.1049	0.0861	0.1058	0.1028	0.0933
0.25	0.1011	0.0807	0.1048	0.0930	0.0911
0.5	0.0967	0.0806	0.1036	0.0928	0.0868

Table 7 and 8 shows the antioxidant activities of *Coronilla valentina* leaf and stem extracts of different solvents. The result showed that the extracts exhibited various degrees of antioxidant activities as compared with Vitamin C - the Standard.

Table 7: Antioxidant activity of *Coronilla valentina* Leaf Extracts

Concentration (mg/mL)	% Inhibition				
	CVLH	CVLEA	CVLA	CVLM	Vitamin C
0.0313	34.20	42.45	45.17	50.34	68.78
0.0625	28.18	47.60	58.61	59.46	70.09
0.125	40.96	47.60	58.61	61.22	71.48
0.25	49.17	49.78	59.86	62.54	72.14
0.5	56.24	53.88	60.84	64.76	73.47

Table 8: Antioxidant activity of *Coronilla valentina* Stem Extracts

Concentration (mg/mL)	% Inhibition				
	CVSH	CVSEA	CVSA	CVSM	Vitamin C
0.0313	65.99	68.96	63.35	58.17	68.78
0.0625	67.49	71.82	67.22	66.70	70.09
0.125	67.92	73.69	67.64	68.56	71.48
0.25	68.82	75.34	67.97	71.56	72.14
0.5	70.43	75.35	68.32	71.64	73.47

Table 9: Half Maximal Inhibitory Concentration (IC_{50}) of *Coronilla valentina* Extracts with Standard (Vitamin C)

Sample	$IC_{50(mg/mL)}$	
	Leaf	Stem
CVH	0.29	0.173
CVEA	0.215	0.068
CVA	0.24	0.074
CVM	0.069	0.069
Vitamin C	0.062	0.062

The antioxidant capabilities of *Coronilla valentina* extracts and standard were assessed using the DPPH radical scavenging method, which determines their ability to neutralize free radicals implicated in biological damage caused by oxidative stress (Gülçin *et al.,* 2010). The results as presented in Tables 5, 6,7 and 8 indicated a decrease in absorbance as the concentration increased from 0.313 to 0.500 mg/mL (Table 5), while the percentage inhibition showed an increase with rising concentration (Table 7). Similarly, the stem extracts of *Coronilla valentina* displayed a decrease in absorbance with increasing concentration (Table 6) and an increase in percentage inhibition (Table 8). Methanol extracts of both the leaf and stem demonstrated higher radical scavenging activity with percentage inhibition of 64.76% and 71.64% respectively. Therefore, percentage inhibition of both the leaf and stem extracts indicates high antioxidant activity.

The half maximal inhibitory concentration (IC_{50}) was determined through linear regression analysis for both leaf and stem extracts with the standard (Table 9). The results obtained from the half maximal inhibitory concentration of the leaf extract revealed that methanol

extract exhibited lower IC_{50} value (0.069 mg/mL) which is comparable to that of standard (0.062 mg/mL) indicating highest antioxidant activity followed by acetone extract (0.24 mg/mL), ethyl acetate extract (0.251 mg/mL) lastly hexane extract (0.29 mg/mL) which shows higher IC_{50} value indicating lower antioxidant activity. While the stem extracts indicated that methanol extract shows lower IC_{50} value (0.069 mg/mL) which is comparable to that of the standard (0.062 mg/mL) revealing strong antioxidant activity followed by ethyl acetate extract (0.068 mg/mL), acetone extract (0.074 mg/mL) and hexane extract (0.173mg/mL) having the higher IC_{50} value which shows weak antioxidant activity. The potent antioxidant activity of the methanol extract may be due to the existence of flavonoids and phenolics. The variation in scavenging abilities may be attributed to the types and concentrations of phytochemicals extracted by each solvent, as suggested by Bernard *et al.* (2014). Polar compounds, responsible for scavenging free radicals (antioxidants), are predominantly extracted by polar solvents.

CONCLUSION

A thorough investigation of *Coronilla valentina* has shown that the plant has a great deal of potential as a source of bioactive chemicals with important medical uses. The phytochemical screening confirmed the presence of several classes of bioactive compounds, including phenols, alkaloids, flavonoids, tannins, terpenoids, and steroids in both leaf and stem extracts. The quantitative analysis revealed that phenols, alkaloids, and flavonoids were particularly abundant, which are known for their strong antioxidant and antimicrobial activities. This diverse array of compounds suggests multiple therapeutic applications, ranging from antioxidant to antimicrobial and anti-inflammatory effects. The antioxidant evaluation using the DPPH assay demonstrated that the ethyl acetate stem extract exhibited comparable activity to the standard, ascorbic acid, while other extracts showed lower, yet significant, antioxidant activities. The increasing percentage inhibition with rising extract concentrations indicates that higher doses of the extracts could provide more potent antioxidant effects. Additional research should be done on the isolated compounds from this plant since one or more of them could offer a fresh pharmacological strategy for the creation of innovative adjuvant therapies for a variety of illnesses. The findings derived from this study highlight the potential of *Coronilla valentina* as a source of

natural antioxidant and a precursor for the formulation of antioxidant drugs in the pharmaceutical industry.

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