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Preliminary Screening of *Cordia Mellenii* and their Antimicrobial and Antioxidant Activities

Nnanga NGA[1,2,3], Deli Vandi [3], Mboug Agne Flora [2], Victoire Ngalle [3], Lazare Sidjui Sidjui [1,4*], Sandrine Sikadeu[3], Rufin Marie Kouipou Toghueo[5], L Ndel Famen[3], Desiré Soh[6], Emmanuel Mpondo Mpondo [2,3]

[1]Institute of Medical Research and Medicinal Plants Studies, Yaoundé, Cameroon
[2]Department of Pharmacy Galenic and Legislation, Faculty of Medicine and Biomedical Science, University of Yaoundé I, Cameroon
[3]Department of Pharmacy, Faculty of Medicine and Pharmaceutical Sciences University of Douala, Cameroon.
[4]Departments of Organic Chemistry, University of Yaoundé I, Cameroon
[5]Departments of Biochemistry, University of Yaoundé I, Cameroon
[6]Departments of Chemistry, Higher Teacher's Training College, University of Bamenda Bambili, Cameroon
lazaresidjui@yahoo.fr

Abstract: *Present study was carried to investigate the antioxidant, antimicrobial extracts of Cordia millenii. Phytochemical screening was done. In vitro antimicrobial activity was studies by disc diffusion technique. The antioxidant activity was evaluated by the method of DPPH; FRAP method follow by quantification of total phenolic. The phytochemical screening showed the presence compounds, triterpenoïds, glycosides, resins, lipids, sugars, alkaloids. The total phenolic was higher in ethyl acetate extracts of stem bark compared to other extracts (21.74 ± 0.04µgEAG/mg of extract) while the lowers concentration was found in hydro-alcoholic extract of root bark (3.73 ± 0.30 µEAG/mg of extract). The radical scavenging activity was found to be extracts and concentrations dependent with IC50 ranging from 64.00± 0.58 to 477.67 ± 52.60µg/mL. The reducing activities is ranging from 20.90 ± 1.21to 33.64 ± 1.20meq/g Vitamin C. Hydro alcoholic extract of leaves exhibited moderate antimicrobial activity against Escherichia coli (17 and 14 mm) while ethyl acetate extracts of stem bark exhibited good activity (32 and 24 mm) against gram-positive bacteria Staphylococcus aureus. Water extract of root bark showed inhibitory activity against Klebsiella sp. (20 mm).*

These results suggest that extracts from Cordia millenii possess antimicrobial and antioxidant activities and therefore justifies their usage in traditional medicine for the treatment of various diseases.

Keywords: *Cordia millenii, Phytochemical screening, Antioxidant, Antimicrobial.*

1. INTRODUCTION

Infectious diseases are the second leading cause of death world-wide [1].Despite the progress made in the understanding of microbial infection and their control, their incidence have increase in the last two decades due to the emergence of drug resistant microorganisms and new bacteria pathogens [2]. The emergence of multidrug–resistant bacteria has created a situation in which there are few or no treatment options for infections with certain microorganisms [3].Among infectious diseases, bacterial and fungal infections, are responsible for a high morbidity and mortality rate despite the availability of new antimicrobial agents [4]. These increases of bacterial and fungal infection have stimulated the search for new antimicrobial agents that could be cost effective and nontoxic.

Traditional medicinal practice has been known for centuries in many parts of the world. Herbal medicines are gaining growing interest because of their cost effective and eco-friendly attributes. Plants generally produce many secondary metabolites which constitute an important source of many pharmaceutical drugs and remain the principal source bioactive ingredients used in traditional medicine in the treatment of infectious diseases [5, 6]. *Cordiamillenii* (Boraginaceae) is commonly known as African *Cordia*. Seed powder is usually mixed with palm oil and used as vermifuge and applied externally to ringworm and itching skin. Decoction of leaves is used against to dispel worms, asthma, cough and colds. The flowers provide nectar and pollen for honey bees [7].The present

investigation is directed at to evaluate antimicrobial and antioxidant activities of leaves, root bark, and stem barks extracts of *Cordiamillenii*.

2. MATERIAL AND METHODS

2.1. Plant Material

Cordiamillenii was harvested in Yaoundé-Cameroon, (June, 2014) and identified at the Cameroon National Herbarium (HNC), where a voucher specimens are deposited (35142/HNC).

2.1.1. Extraction of Plant Material

The powdered leaves (493g), root bark (500 g) and stem bark (500 g) of *C. millenii* were macerated successively in n-Hexan (n-Hex, 3 L), ethyl acetate (AcOEt, 3 L), ethanol-water (7:3, v/v)(EtOH-H_2O, 3 L) and distilled water (H_2O, 3L)rat room temperature for 72h.

2.2. Phytochemical Screening

The extracts were subjected to phytochemical screening to detect the presence of alkaloids, tannin, saponins, flavonoïds, glycosids, sterols, triterpens, anthraquinone, phenols, cardiac glycosids, sugars, lipids anthocyanins, coumarins and polyphenolsusing protocols described by Harbone (1973) [8].

2.3. Antioxidant Activity Phenol Content

The total phenolic compounds were determined as described by Ramde-Tiendrebeogo (2012) with slight modification [9]. The reaction mixture consisted of 0.02 mL of extracts and fractions (2µg/mL), 0.02 ml of 2N FCR (FolinCiocalteu Reagent) and 0.4 mL of a 20% sodium carbonate solution. After 20min of incubation at room temperature the absorbance was measured at 760 nm. Distilled water was used as control. A standard curve was plotted using Gallic acid (0-0.2 µg/mL).All measurements were performed in triplicate.

2.4. Free Radical Scavenging Activity: DPPH Test

Antioxidant activity of extracts was studied using 1, 1-diphenyl-2-picrylhydrazyl free radical (DPPH) as described by Mensor (2001)[10]. Briefly, 100 µL of extract/fraction prepared at 2000 µg/mL were serially diluted and mixed with 900 µL of 0.3 mM 2,2-diphenyl-1-picrylhydrazyl (DPPH) , to give five concentrations range from 12.5 - 200 µg/mL (12.5, 25, 50, 100 and 200 µg/mL). After an incubation period of 30 min at 25°C, the absorbances at 517 nm (the wavelength of maximum absorbance of DPPH) were recorded as $A_{(sample)}$. A blank experiment was also carried out applying the same procedure to a solution without the test material and the absorbance was recorded as $A_{(blank)}$. The free radical-scavenging activity of each solution was then calculated as percent inhibition according to the following equation:

IC50 was calculated from % inhibition. Ascorbic acid was used as a reference standard and dissolved in distilled water to make the stock solution with the same concentration of extracts of *Cordiamillenii*. Control sample was prepared containing the same volume without any extract and reference ascorbic acid; 95% methanol was used as blank and % scavenging of the DPPH free radical was measured using the following equation:

% inhibition = {(A control − A sample)/ (A control)} ×10

A control = absorbance of DPPH alone

A sample = absorbance of DPPH along with different concentrations of extracts.

2.5. Ferric Reducing/Antioxidant Power (FRAP) Assay

The ferric reducing power was determined as reported by Padmaja (2011) [11]. Briefly, 400, 200, 100, 50, and 25 µL of solution of methanolic extracts (2000 µg/mL) were mixed with 500 µL of phosphate buffer (pH 6.6) and 500 µL of 1% potassium ferricyanide and incubated at 50°C for 20 min. Then 500 µL of 10% trichloroacetic acid was added to the mixture and centrifuged at 3000 rpm for 10 min. Supernatant (500 µL) was diluted with 500 µL of water and shaken with 100 µL of freshly prepared 0.1% ferric chloride. The absorbance was measured at 700 nm. Vitamin C and BHT were used as a positive control.

2.6. Microorganisms Test

The microorganisms used in this study were isolates provided by Quintinie microbiology hospital. They includes: four Gram negative (: *Escherichia coli, Pseudomonas aeruginosa, Proteus mirabilis, Klebsiella sp.*), one Gram positive*(Staphylococcusaureu*s) and *Candida albicans.*

2.7. Stock Solutions and Disc Preparation

For the antimicrobial activity, stock solutions of plant extracts were prepared at 150 mg/mL in DMSO 10 %. Ciprofloxacin and Nystatin was prepared in the same conditions. For disc preparation, 15 µL of each stock solution was dropped onto sterilized paper disks (6 mm diameter) and dried at room temperature for a final concentration of 1500 µg / disc.

2.8. In Vitro Antimicrobial Screening

In vitro antimicrobial activity was screened by disc diffusion method using Mueller Hinton Agar (MHA) obtained from Mast Group Ltd. The MHA plates were prepared by pouring 15 mL of molten media into sterile plates (90 mm). The plates were allowed to solidify for 5 min and 0.1 mL of inoculum suspension was swabbed uniformly and the inoculum allowed drying for 5 minutes. The different extracts and referents drugs loaded at 1.500 µg /discs were placed on the surface of the medium and allowed to diffuse for 5 min. The plates were incubated at 35°C for 24 hours for bacteria and for 48 hours for yeast. Negative control was prepared using 10 % DMSO. Ciprofluxacin, and miconazol were used as positive control. At the end of incubation, inhibition zones formed around the disc were measured with a Vernier Calliper in millimeter. Each experiment was performed in triplicate.

2.9. Statistical Analysis

Data were statistically analyzed using the software SPSS 12.0 for windows and variance analysis by ANOVA coupled with Waller-Duncan test where $P<0.05$ was considered as statistically significant.

3. RESULTS AND DISCUSSION

3.1. Phytochemical Contents

The phytochemical investigations of theleaves stem and root bark of *C. millenii* revealed the presence of as phenolic compounds, triterpenoids, glycosides, resins, lipids, sugars, alkaloids (Table 1). These secondary metabolites were previously found in some extracts of this plants species [12].

Table1. *Phytochemical constituents of C. millenii*

Chemical compounds			Extracts											
			CMFH	CMFAE	CMFHA	CMFAQ	CMEH	CMEAE	CMEHA	CMEAQ	CMRH	CMRAE	CMRHA	CMRAQ
Phenolic compounds	Tanins	Catechic	-	-	+	-	-	+	-	-	-	-	+	-
		gallic	-	-	-	-	-	-	+	-	-	-	-	-
	Flavonoids		-	-	+	+	+	+	+	+	-	+	+	+
	Anthocyans		-	-	-	-	-	-	-	-	-	-	-	-
	coumarins		-	-	-	-	-	-	-	-	-	-	-	-
Alkaloids			-	-	+	-	-	-	-	-	-	-	+	-
Steroids			-	+	+	-	-	-	-	-	+	-	-	-
Terpenoids			+	-	-	-	+	+	-	-	-	+	-	-
Saponins			-	+	+	-	-	-	-	-	-	-	-	+
Cardiac glycosides			-	-	+	-	-	-	+	-	-	-	+	-
Resins			-	-	-	+	-	-	+	+	-	-	+	+
Reductor compounds			-	-	-	-	-	-	-	-	-	-	-	-
Sugars			-	-	-	-	+	+	-	-	+	+	+	-
Lipids			+	+	-	-	+	+	-	-	+	+	-	-

Rootbark: *CMRH = n-hexane extract, CMRAE = ethylacetate extract, CMRHA = EtOH-H_2O extract, CMRAQ = aqueous extract; Stem back: CMEH = n-hexane extract, CMEAE = ethylacetate extract, CMEHA = EtOH-H_2O extract, CMEAQ = aqueousextract ; Leaves : CMFH = n-hexane extract, CMFAE = ethylacetate extract, CMFHA = EtOH-H_2O extract, CMFAQ = aqueous extract ; + = Present; - = Absent*

3.2. Antioxidant Activities

3.2.1. Total Phenolic Content

The total phenolic content extracts and fractions of *C. millenii* were determined as gallic acid equivalent of phenols (Table2 and Fig 1). The total phenolic was higher in ethyl acetate extracts of

stem bark compared to other extracts (21, 74 ± 0, 04µgEAG/mg of extract) while the lowers concentration was found in hydroalcoholic extract of root bark (3, 73 ± 0, 30µEAG/mg of extract). It is also noted that the ethyl acetate extracts contained more total phenol than hydro alcoholic extracts.

Table2. *Total phenolic content of extracts of C. millenii leaves, stem back and root bark*

Extraits	Concentration en polyphénols (µeqgAG/mL)
CMFAE	$9,98 \pm 0,32^{d}$
CMFHA	$3,74 \pm 0,02^{a}$
CMEAE	$21,74 \pm 0,04^{i}$
CMEHA	$13,90 \pm 0,37^{f}$
CMRAE	$17,24 \pm 0,03^{g}$
CMRHA	$3,73 \pm 0,30^{a}$

Rootbark: *CMRAE = ethylacetat eextract, CMR HA =EtOH-H_2O extract; Stem back: CMEAE = ethylacetate extract, CME HA =EtOH-H_2O; Leaves: CMFAE = ethylacetate extract, CMF HA =EtOH-H_2O.*

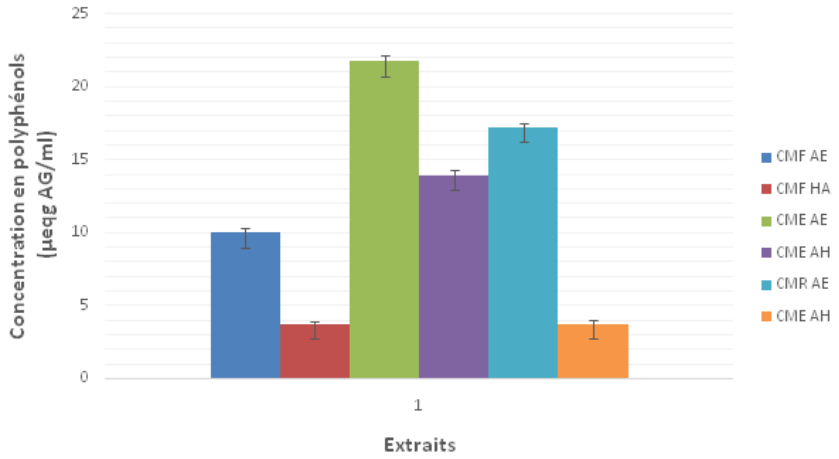

Fig1. *Total phenolic content of extracts of C. millenii leaves stem back and root bark*

Rootbark: CMRAE = ethyl acetate extract, CMR HA =EtOH-H_2O extract; Stem back: CMEAE = ethyl acetate extract, CME HA =EtOH-H_2O; Leaves: CMFAE = ethyl acetate extract, CMF HA =EtOH-H_2O.

3.3. DPPH Radical Scavenging Activity

The DPPH radical scavenging activity of different extracts was studies (Table3 and Fig 2). From these results, the radical scavenging activity was found to be extracts and concentrations dependent with IC50 ranging from 64.00± 0.58 to 477.67± 52.60µg/mL. The hydroalcoholic extract room root was the most active while the less active was extract of stem bark. However, this activity was higher than activity of Vitamin C.

Table3. *DPPH radical scavenging activity of extracts*

Extraits	IC50 (µg/mL)
Vit C	$36,48 \pm 0,51^{a}$
CMFAE	$266,33 \pm 21,83^{b}$
CMFHA	$102,00 \pm 1,15^{a}$
CMEAE	$120,00 \pm 2,08^{a}$
CMEHA	$64,00 \pm 0,58^{a}$
CMRAE	$115,67 \pm 5,67^{a}$
CMRHA	$477,67 \pm 52,60^{c}$

Rootbark: *CMRAE = ethyl acetate extract, CMR HA =EtOH-H_2O extract; Stem back: CMEAE = ethyl acetate extract, CME HA =EtOH-H_2O; Leaves: CMFAE = ethyl acetate extract, CMF HA =EtOH-H_2O. Positive control: Vit C = Vitamin C.*

3.4. In Vitro Antibacterial Activities

3.4.1. Inhibition Zone Diameters of Extracts and Reference Antibiotic and Antifungal

The results of the antimicrobial activities are presented in Tables 4, 5 and 6. From these results, hydro alcoholic extract of leaves exhibited moderate antimicrobial activity against *Escherichia coli*(17 and

14 mm) while ethyl acetate extracts of stem bark exhibited good activity (32 and 24 mm) against gram-positive bacteria *Staphylococcus aureus*. Aqueous extract of root bark showed inhibitory activity against *Klebsiella sp*. (20 mm). In general, ethyl acetate and hydroalcoholic extracts were more potent than leaves extracts against *Candida albicans*.

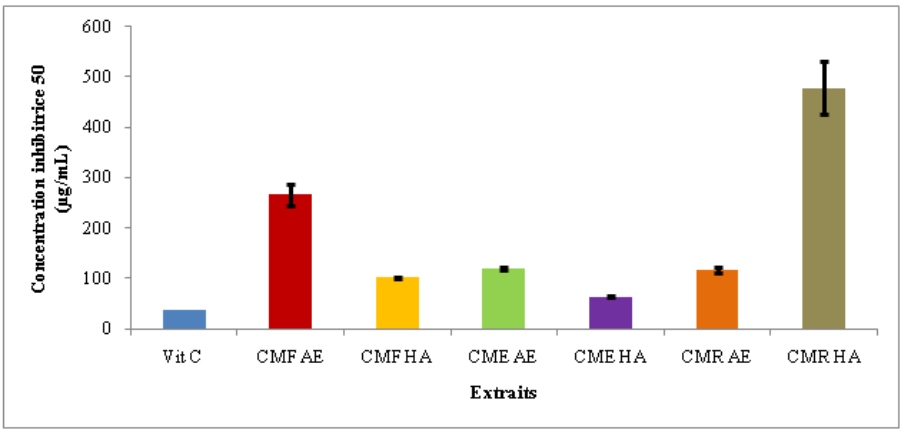

Fig2. *DPPH radical scavenging activity of extracts*

Root Bark: *CMRAE = ethyl acetate extract, CMR HA =EtOH-H_2O extract; Stem back: CMEAE = ethyl acetate extract, CME HA =EtOH-H_2O; Leaves: CMFAE = ethyl acetate extract, CMF HA =EtOH-H_2O. Positive control: Vit C = Vitamin C.*

Table4. *Bacteria inhibition zone diameters of crude extract of leaves of C. millenii*

Concentration mg/mL	Extract	Microorganisms and inhibition zone diameter ± S.D (mm) Bacteria strain Fungal					
		E. coli	*K. sp*	*P. mirabilis*	*S. aureus*	*P. aeruginosa*	*C.albican*
25	CMFH	0.00±0.00	10.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00
	CMFAE	9.00±0.00	12.00±0.00	14.00±0.00	20.00±0.00	10.00±0.00	10.00±0.00
	CMFHA	11.00±0.00	16.00±0.00	11.00±0.00	16.00±0.00	11.00±0.00	10.00±0.00
	CMFAQ	11.00±0.00	0.00±0.00	9.00±0.00	12.00±0.00	0.00±0.00	9.00±0.00
50	CMFH	9.00±0.00	17.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00
	CMFAE	13.00±0.00	18.00±0.00	18.00±0.00	24.00±0.00	16.00±0.00	16.00±0.00
	CMFHA	17.00±0.00	20.00±0.00	11.00±0.00	16.00±0.00	14.00±0.00	14.00±0.00
	CMFAQ	14.00±0.00	000±0.00	11.00±0.00	12.00±0.00	0.00±0.00	11.00±0.00
References							
Ceftriazone		0.00±0.00	0.00±0.00	38.00±0.00	NA	20.00±0.00	NA
Cefotaxime		0.00±0.00	6.00±0.00	36.00±0.00	NA	24.00±0.00	NA
Tobramycine		0.00±0.00	14.00±0.00	16.00±0.00	NA	18.00±0.00	NA
Amikacine		22.00±0.00	20.00±0.00	24.00±0.00	NA	22.00±0.00	NA
Ciprofloxacine		14.00±0.00	20.00±0.00	16.00±0.00	NA	36.00±0.00	NA
Oxacilline		0.00±0.00	0.00±0.00	28.00±0.00	28.00±0.00	0.00±0.00	NA
Amoxicilline		0.00±0.00	0.00±0.00	28.00±0.00	NA	0.00±0.00	NA
Fluconazole		NA	NA	NA	NA	NA	38.00±0.00
Econazole		NA	NA	NA	NA	NA	42.00±0.00

Each experiment was performed three times, and the data were averaged (n = 3). Values are means of three replication ± SD. Leaves: CMFH = n-hexane extract, CMFAE = ethyl acetate extract, CMFHA = EtOH-H_2O extract, CMFAQ = aqueous extract. Microorganisms: E. coli = Escherichia coli, P. aeruginosa = Pseudomonas aeruginosa, P. mirabilis = Proteus mirabilis, P. sp = Klebsiellasp, S. aureus = Staphylococcus aureus and C. albican = Candida albicans

Table5. *Bacteria inhibition zone diameters of crude extract of root back of C. millenii*

Concentration mg/mL	Extract	Microorganisms and inhibition zone diameter ± S.D (mm) Bacteria strain Fungal					
		E. coli	*K. sp*	*P. mirabilis*	*S. aureus*	*P. aeruginosa*	*C.albican*
25	CMRH	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00
	CMRAE	11.00±0.00	11.00±0.00	0.00±0.00	16.00±0.00	0.00±0.00	18.00±0.00
	CMRHA	13.00±0.00	11.00±0.00	0.00±0.00	11.00±0.00	10.00±0.00	18.00±0.00

	CMRAQ	10.00±0.00	16.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	16.00±0.00
50	CMRH	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00
	CMRAE	11.00±0.00	14.00±0.00	0.00±0.00	18.00±0.00	0.00±0.00	14.00±0.00
	CMRHA	9.00±0.00	15.00±0.00	0.00±0.00	14.00±0.00	0.00±0.00	17.00±0.00
	CMRAQ	8.00±0.00	20.00±0.00	0.00±0.00	0.00±0.00	13.00±0.00	13.00±0.00
References							
Ceftriazone		0.00±0.00	0.00±0.00	38.00±0.00	NA	20.00±0.00	NA
Cefotaxime		0.00±0.00	6.00±0.00	36.00±0.00	NA	24.00±0.00	NA
Tobramycine		0.00±0.00	14.00±0.00	16.00±0.00	NA	18.00±0.00	NA
Amikacine		22.00±0.00	20.00±0.00	24.00±0.00	NA	22.00±0.00	NA
Ciprofloxacine		14.00±0.00	20.00±0.00	16.00±0.00	NA	36.00±0.00	NA
Oxacilline		0.00±0.00	0.00±0.00	28.00±0.00	28.00±0.00	0.00±0.00	NA
Amoxicilline		0.00±0.00	0.00±0.00	28.00±0.00	NA	0.00±0.00	NA
Fluconazole		NA	NA	NA	NA	NA	38.00±0.00
Econazole		NA	NA	NA	NA	NA	42.00±0.00

Each experiment was performed three times, and the data were averaged (n = 3). Values are means of three replication ± SD. Root back: CMRH = n-hexane extract, CMRAE = ethyl acetate extract, CMRHA = EtOH-H_2O extract, CMRAQ = aqueous extract. Microorganisms: E. coli = Escherichia coli, P. aeruginosa = Pseudomonas aeruginosa, P. mirabilis = Proteus mirabilis, P. sp = Klebsiellasp, S. aureus = Staphylococcus aureus and C. albican = Candida albicans

Table6. *Bacteria inhibition zone diameters of crude extract of stem back of C. millenii*

Concentration mg/mL		Microorganisms and inhibition zone diameter ± S.D (mm)					
		Bacteria strain					
		Fungal					
	Extract	*E. coli*	*K. sp*	*P. mirabilis*	*S. aureus*	*P. aeruginosa*	*C.albican*
25	CMRH	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	10.00±0.00	0.00±0.00
	CMRAE	14.00±0.00	16.00±0.00	14.00±0.00	19.00±0.00	13.00±0.00	16.00±0.00
	CMRHA	0.00±0.00	20.00±0.00	12.00±0.00	16.00±0.00	11.00±0.00	12.00±0.00
	CMRAQ	0.00±0.00	10.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00
50	CMRH	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	12.00±0.00	0.00±0.00
	CMRAE	19.00±0.00	18.00±0.00	20.00±0.00	32.00±0.00	13.00±0.00	16.00±0.00
	CMRHA	10.00±0.00	22.00±0.00	0.00±0.00	20.00±0.00	10.00±0.00	14.00±0.00
	CMRAQ	9.00±0.00	11.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	12.00±0.00
References							
Ceftriazone		0.00±0.00	0.00±0.00	38.00±0.00	NA	20.00±0.00	NA
Cefotaxime		0.00±0.00	6.00±0.00	36.00±0.00	NA	24.00±0.00	NA
Tobramycine		0.00±0.00	14.00±0.00	16.00±0.00	NA	18.00±0.00	NA
Amikacine		22.00±0.00	20.00±0.00	24.00±0.00	NA	22.00±0.00	NA
Ciprofloxacine		14.00±0.00	20.00±0.00	16.00±0.00	NA	36.00±0.00	NA
Oxacilline		0.00±0.00	0.00±0.00	28.00±0.00	28.00±0.00	0.00±0.00	NA
Amoxicilline		0.00±0.00	0.00±0.00	28.00±0.00	NA	0.00±0.00	NA
Fluconazole		NA	NA	NA	NA	NA	38.00±0.00
Econazole		NA	NA	NA	NA	NA	42.00±0.00

Each experiment was performed three times, and the data were averaged (n = 3). Values are means of three replication ± SD. Root back: CMRH = n-hexane extract, CMRAE = ethyl acetate extract, CMRHA = EtOH-H_2O extract, CMRAQ = aqueous extract. Microorganisms: E. coli = Escherichia coli, P. aeruginosa = Pseudomonas aeruginosa, P. mirabilis = Proteus mirabilis, P. sp = Klebsiellasp, S. aureus = Staphylococcus aureus and C. albican = Candida albicans.

4. DISCUSSION

Antimicrobial properties of medicinal plants are being increasingly reported from different parts of the world. World Health Organization estimates that plant extract or their active constituents are used as folk medicine in traditional therapies. In the present work, ethyl acetate and ethanol-water (70/30) extract obtained from stem bark shown remarkable activity against most of the tested bacterial and fungal strains. The results were compared with standard drugs. The hydro alcoholic extract of leaves, inhibited the growth of the *E. coli* better than Ciprofloxacin. Deep kumar (2014) showed that ethyl acetate, hydro alcoholic and aqueous extracts of leaves of *C. macleodii* have an excellent diameter of

inhibition on *E. coli* and *B. subtilis* strains [13]. Moreover, ethyl acetate extract of the stem bark had a inhibition diameter greater than Oxacillin against *S. aureus*. Aqueous extract of root back showed an inhibition diameter Cefotaxim and Tobramycin against *Klebsiella sp*. These antimicrobial activities of plant extracts can be explain by their phytochemical content. In fact, these extracts were found to contain phenolic compounds, triterpenoïds, glycosides, resins, lipids, sugars, alkaloids. These secondary metabolites obtained exert antimicrobial activity through different mechanisms. Tannins exert its antimicrobial activity by binding with proteins and adhesins, inhibiting enzymes, complexation with the cell wall and metal ions, or disruption of the plasmatic membrane [14]. Saponins have ability to cause leakage of proteins and certain enzymes from the cell [15]. Flavonoïds have the ability to complex with proteins and bacterial cells forming irreversible complexes mainly with nucleophilic amino acids. This complex often leads to inactivation of the protein and loss of its function [12, 16].The presence of the classes of secondary metabolites in the majority of the extracts tested in the context of this study corroborate with the work of Deep kumar (2014) showed the same extracts from *C. millenii*. This could be explained by the fact that these constituents are soluble in this solvent [13]. Moreover, all these extracts have showed good total polyphenols content, and Sham (2007) showed that polyphenols are antimicrobial substances [17]. In addition, the strong radical scavenging activity and ferric chelating antioxidant power observed with these extracts are due to this chemical composition. These results corroborate the founding of Okusa (2012) which showed the antioxidant activity of methanolic extract of trunk bark of *C. gilletii* trunk [18].

5. CONCLUSION

The results of this study provided an insight into the antimicrobial and antioxidant properties of the extracts of *Cordiamillenii* used traditionally for the prevention and treatment of various infectious and non infectious problems, as well as opportunity for selection of bioactive extracts for initial fractionation and isolation of natural bioactive compounds.

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