Ⅱ-47

Evaluation of the antimicrobial activity of medicinal plants against Methicillin-Resistant Staphylococcus aureus and Salmonella

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약용식물이 항생제 내성균주의 항균 활성에 대한 평가

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Objectives

The plant species reported here are used by traditional healers in Gabon for different ailments such as wounds, malaria, fever, gonorrhea or diareah. The aim of this study was to evaluate their antimicrobial activities against different strains of both Methicillin-Resistant *Staphylococcus aureus*(MRSA) and *Salmonella*.

Materials

Plants material : The Plants were collected from different regions of Gabon by the technicians of the Institute of Traditional Pharmacopoeia and Medicine. Botanical determination was performed by taxonomists from the Herbier National du Gabon (HNG).

Plants Extraction : The leaves and stem barks were washed with water, air dried and powdered in an electric blender. The mixture was filtered using a filter paper. The ethanol was there after removed from sample using a rotary evaporator (Eyela). The resulting extracts were subsequently weighed to different yielding percentage specific to the plant and the part used.

Bacterial strains : For the *S.aureus* strains used in this study, the 6 clinical isolates(MRSA) were obtained from six different patients at the Wonkwang University Hospital. The other two strains were *S.aureus* ATCC33591(methicillin-resistant strain) and *S.aureus* ATCC25923(methicillin-susceptible strain). ATCC25923 and ATCC33591 were commercially purchased.

Methods

Determination of antibacterial activity using the disc diffusion method : The paper disc diffusion method was used to determine antibacterial activity (Joung *etal*.,2010). The plates were placed in a plant growth chamber at 37°C for 24 h. The inhibition zone diameter around each of the discs was measured and recorded at the end of the incubation period.

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Results

This article describes the antimicrobial activities of a number of plants used in Gabonese traditional medicine. A total of 7 extracts belonging to 7 different families were investigated. Table 1 shows the scientific name, plant family, part used, traditional uses, and voucher specimen of the medicinal plants. Some plants have no clear medicinal characterizations as they are classified based on the report of the traditional doctors. The agar disc diffusion was used to qualitatively determine the antimicrobial agent. As shown in table 2, all extracts are not diffusing against *Salmonella* compared to MRSA and MSSA. *Manniophytum fulvum*

Table 1. Ethnobotanical data of medicinal plants

Species	Family[a]	Part	Traditional uses [a]	Yield (%)
Strombosiopsis tetrandra	Olacaceae	L	Kidney and dysentery	0.27
Tetraberlinia bifoliolata	Fabaceae	S	unknown	12.6
Dichapetalum barbatum	Dichapetalaceae	L	unknown	2.03
Guibourtia demeusii	Caesalpiniaceae	L	wounds	0.39
Dacryodes normandii	Burseraceae	L	Wounds, burns and diareah	30.6
Manniophytum fulvum	Euphorbiaceae	L	Wounds, diarhrea and dysentery	1.65
Paropsia grewoides	Passifloraceae	L	Malaria, fever	3.45

L : Leaves, S : Stem barks

Table 2. Antimicrobial Activity of Ethanolic Extracts of screened plants

		Diameter of Zone of Inhibition (mm)[a]			
Species	Part	MRSA	MSSA	*S. typhi*	*S. paratyphi*
Strombosiopsis tetrandra	Leaves	[a]ND	ND	ND	ND
Tetraberlinia bifoliolata	Stem barks	16	12	ND	ND
Dichapetalum barbatum	Leaves	8	ND	ND	ND
Guibourtia demeusii	Leaves	16	14	ND	ND
Dacryodes normandii	Leaves	25	12	ND	ND
Manniophytum fulvum	Leaves	20	8	ND	ND
Paropsia grewoide	Leaves	10	ND	ND	ND
Ampicillin[a]		14	43	14	20

[a:] 200 μg g per disc was used for the plants and 50 μg per disc for ampicillin, [b]ND: Not detected

Table 3. Minimum inhibitory concentrations of screened plants and Ampicillin (AC) against 6 strains of *Staphylococcus aureus* and *Salmonell*a

		MICs (μg/ml)[b]							
S.aureus strains	Class	523H[a]	556H[a]	566H[a]	515H[a]	524H[a]	567H[a]	590H[a]	AC
ATCC 33591	MRSA	>1000	>1000	>1000	**500**	**500**	**500**		500
ATCC 25923	MSSA	>1000	>1000	>1000	**250**	**250**	**250**		0.06
Clinical isolates									
DPS-1	MRSA	>1000	>1000	>1000	>1000	>1000	>1000	>1000	250
DPS-2	MRSA	>1000	**500**	**1000**	**250**	**500**	**1000**	**250**	62.5
DPS-3	MRSA	>1000	**500**	**1000**	**250**	**500**	**1000**	**250**	250
DPS-4	MRSA	>1000	**500**	**1000**	**250**	**250**	**1000**	**250**	62.5
Slamonella									
JOL 380	S.typhi ATCC 19943	>1000	>1000	>1000	>1000	**1000**	**1000**	>1000	0.97
JOL 381	S.paratyphi A	>1000	>1000	>1000	>1000	**250**	**500**	>1000	1.95
JOL 386	S.enteritidis	>1000	>1000	>1000	>1000	>1000	1000	>1000	1.95
JOL 387	S.typhimurium	>1000	>1000	>1000	>1000	**500**	1000	>1000	1.95
JOL 388	S.typhimurium	>1000	>1000	>1000	>1000	**500**	1000	**1000**	0.97
JOL 389	S.typhimurium	**1000**	>1000	**1000**	**1000**	**250**	**500**	**500**	>2000

[a]**523H** ; **556H** ;**566H** ;**515H** ; **524H** ;**567H** ;**590H** ; [b] Values boldly written are considered very active (1000 μg/ml or lower)