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PHYTOCHEMICAL AND ANTIMICROBIAL SCREENING OF SOME PLANTS USED IN SAUDI FOLK MEDICINE

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ABSTRACT

Thirty-two plants species belonging to 22 families commonly used in Saudi folk medicine were subjected to phytochemical and antimicrobial screening. The results showed that sterols/triterpenes, flavonoids and tannins were the most common constituents. Volatile oils, volatile bases, coumarins, anthraquinones and cardiac glycosides were also detected.

A variable range of antimicrobial activity was observed by the extracts and MICs were determined wherever activity was noticed.

Introduction

An intensive work has been done during the past few decades to discover clinically useful antibiotics. Thousands of such drugs have been synthesized in the laboratories, from which only a few could get a place in the clinical use. Since the dawn of history, plants have played an important role in the treatment of human ailments. For various reasons, the search for new antibiotics has been most intensive among the lower plants. During the large screening studies on several lower and higher plants, it has become clear that antibiosis is not uncommon among the higher plants and the potential for finding useful chemotherapeutic agents is obvious (Abidov et al., 1963, Mier et al. 1964, Al-Meshal et al. 1982, Al-Shamma and Mitscher 1979, Atkinson and Ramsford 1946, Aynehchi et al. 1982).

In continuation of our work on the experimental evaluation of Saudi folk medicine (Tanira et al. 1987) here we wish to present our results on the antimicrobial studies undertaken on some of these plants.

Materials and Methods

Plant material:

Plant materials were identified by Dr. S. Abedin, Plant Taxonomist of our Research Centre and the herbarium specimens were deposited to our College herbarium for record. The shade dried plant materials were crushed and extracted with 95% ethanol. The solvent was evaporated in vacuum low temperature. The remained aqueous residue was used.

Phytochemical screening:

The presence or absence of alkaloids, nationals, tannins. cardiac glycosides, saponins, coumarins, anthraquinones, glucosinolates, cyanogenic glycosides, sterols and/or triterpenes, volatile oils and volatile bases was checked according to the method described earlier (Farnsforth, 1966, Al-Yahya 1985).

Selection of plants:

The plants used for the following properties in the folk medicine of Saudi Arabia were selected for antimicrobial studies.

Antidiarrheal
Antidysentric
Antiseptic
Antisyphylitic
Antigonorrhoeal
Plants used for the dressing of wounds and skin ulcers.

Antimicrobial screening:

The extracts of plants were tested by agar dilution method at a concentration of 3 mg, 2 mg and 1 mg for antibacterial and antifungal activity against the organisms mentioned in Table 1. Preparation of the samples was done as described earlier (Al-Meshal et al. 1982). Plants showing activity at 1 mg/ml concentration were further studied on lower dilutions to determine their MICs and the results are presented in Table 2.

Results and Discussion

The results of the preliminary phytochemical screening revealed that the 32 plants belonging to 22 families selected for the present antimicrobial activity study, are rich in different active phytochemical constituents. Most of the plants were found to contain sterols/triterpenes, tannins and flavonoids. Volatile oils were detected in about 44%, saponins in 29%, anthraquinone in about 19% and cardiac glycosides in 12% of these plants.

The results presented in Table 2 are encouraging as about 69% of the extracts examined showed antimicrobial activity. The antimicrobial activity does not appear to be confined to any particular family. Out of 32 extracts tested, 22 exhibited inhibitory effect against at least one organism. Of these, 6 plant extracts namely, *L. nudicalis*, *T. vulgaris*, *A. arabica*, *E. caryophyllata*, *F. sahicifolia* and *C Limon* were very promising,

Table 1: Organisms used in the screening of the samples for antimicrobial activity

No. Organism	NCTC No.*	Classification
1. <i>Staphylococcus aureus</i>	6571	Gram positive
2. <i>Bacillus subtilis</i>	10400	-do-
3. <i>Pseudomonas aeruginosa</i>	10662	Gram negative
4. <i>Proteus vulgaris</i>	4635	-do-
5. <i>Escherichia coli</i>	10413	-do-
6. <i>Candida albicans</i>	3153	Yeast
Mycological reference Laboratory School of Tropical Medicine & Hygiene, London.		
7. <i>Shigella flexneri</i>	Lab. stains, King Khalid University Hospital	Gram negative
8. <i>Shigella sonnei</i>	-do-	-do-
9. <i>Shigella boydii</i>	-do-	-do-

*National collection type culture (NCTC)

as they showed a broad spectrum of activity. It is noticed that the gram positive organism *aureus* and *B. subtilis* showed higher sensitivity to most of the extracts. The growth of gram negative organisms *S. aureus* and *B. subtilis* showed higher sensitivity to most of the extracts. The growth of gram negative organisms *P. aeruginosa* was inhibited by *vulgaris*, *E. caryophyllata*, *Z. spina-christi* and *C. Union*, while *P. vulgaris* and *E. coli* were affected by the extract of *L. nudicalis*, *T. vulgaris*, *A. arabica*, *E. caryophyllata*, *E. salicifolia* and *C. limn*. It is interesting to note that the growth of all the three *Shigella* strains was inhibited by *L. nudicalis* and *E. caryophyllata*. The extract of *A. arabica* inhibited the growth of *Sh. flexneri* and *Sh. sonnei* while *F. Salicifolia* and *C. Limon* effected *Sh. flexneri* and *Sh. boydii*. On the other hand the growth of *C. albicans* was inhibited by *T. vulgaris*, *C. camphora* and *E. caryophyllata*.

These results add support to some of the claimed antimicrobial properties for these plants justifying their use in, atleast, some of the above mentioned therapeutic purposes. However, detailed fractionation, characterization of the active constituents and further more specific experimental investigations would be necessary before drawing final conclusion for recommending the effective and safe use of these plants.

Table 2:

S. No.	Botanical source	Part used	Use	Chemical constituents	S. a.	B. s.	P. s. a.	Anti-microbial activity					
								Pr. v.	E. c.	Sh. f.	Sh. s.	Sh. b.	C. a.
<i>Apocynaceae</i>													
1.	<i>Rhazya stricta</i> Decne.	AP	Syphilis	AL, FD, SL/TP, CN.	2	2	0	0	0	0	0	0	0
<i>Caesalpinaceae</i>													
2.	<i>Ceratonia siliqua</i> L.	Pods	Dysentery	TN, AQ, FD, SL/TP	0	0	0	0	0	0	0	0	0
<i>Compositae</i>													
3.	<i>Anacyclus pyrethrum</i> DC	Rt.	Gargles Diarrhoea	FD, TN, SL/TP	0	2	0	0	0	0	0	0	0
4.	<i>Artemisia abyssinica</i> Sch. Bip.	AP	Constipation, cold.	AL, FD, TN, SL/TP, VO	3	1	0	0	0	0	0	0	0
5.	<i>Artemisia inculta</i> Del.	AP	Anthelmintic, skin diseases	AL, F, TN, SL/TP, CN, SP	0	2	0	0	0	0	0	0	0
6.	<i>Carthamus tinctorius</i> L.	Flr.	Purgative, eczema	FD, TN, SL/T	0	0	0	0	0	0	0	0	0
7.	<i>Launea nudicalis</i> (L.) Hook F.	Rt.	Children ailments	FD, TN, CN, SL/TP	0.5	0.5	0	2	3	3	3	3	0
<i>Cruciferae</i>													
8.	<i>Lepidium sativum</i> L.	Sd.	Syphilis, cough, diarrhoea, skin diseases	VO, AL, FD, CG, TN, SL/TP	0	0	0	0	0	0	0	0	0
<i>Cupressaceae</i>													
9.	<i>Juniperus polycarpus</i> C. Koch.	Sd. & L.	Skin diseases	VO, AL, FD, CG, TN, SL/TP	0.08	0.02	0	0	0	0	0	0	0

<i>Cyperaceae</i>												
10.	<i>Cyperus rotundus</i> L.	St.	Diarrhoea	AL, TN, SL/TP, VO	2	1	0	0	0	0	0	0
<i>Frankeniaceae</i>												
11.	<i>Frankenia pulverulenta</i> L.	AP	Sore throat	FD, TN, AQ, SP, SL/TP	2	1	0	0	0	0	0	0
<i>Labiatae</i>												
12.	<i>Thymus vulgaris</i> L.	AP	Antiseptic, antifungal, cold, bronchitis	FD, TN, VO, AQ, CN, SL/TP	0.25	0.25	3	1	1	1	2	0.75
<i>Leuraceae</i>												
13.	<i>Cinnamomum camphore</i> Nees & Eberm.	Wood	Antiseptic, diarrhoea, cough, skin diseases	FD, VO, TN, SL/TP	0	3	0	0	0	0	0	2
<i>Leguminosae</i>												
14.	<i>Acacia arabica</i> Willd.	Pods	Gonorrhoea, gargles, wounds	AL, FD, TN, CN, SP, SL/TP	1	0.5	0	2	3	0.5	3	0
15.	<i>Alhagi maurorum</i> Medic.	AP	Skin diseases	FD, TN, AQ, SP, SL/TP	0	0	0	0	0	0	0	0
16.	<i>Anagaris foetida</i> L.	AP	Indigestion	AL, FD, TN, SL/TP, AQ, SP	0	2	0	0	0	0	0	0
17.	<i>Lygos ractam</i> (Forssk.) Sd. Keywood	Sd.	Skin diseases	AL, CG, FD, TN, SL/TP, VB	3	3	0	0	0	0	0	0
18.	<i>Trigonella foenum-graceum</i> L.	Sd.	Dysentery	AL, CG, SP, FD, TN, SL/TP	0	0	0	0	0	0	0	0
<i>Molluginaceae</i>												
19.	<i>Glinus lotoides</i> L.	Seeds	Diarrhoea eczema	AL, FD, CN, TN, SL/TP	1	0.5	0	0	0	0	0	0

<i>Moraceae</i>												
20.	<i>Ficus salicifolia</i> Vahl.	AP.	Antiseptic, eye wash, leucoderma	FD, CN, TN, SL/TP, AL	0.5	0.5	0	3	3	0	3	0
<i>Myrtaceae</i>												
21.	<i>Eugenia caryophyllata</i> Thunberg.	Fruit	Antimicrobial	VO, SL/TP, TN, FD	1	1	3	1	1	2	1	1
<i>Oleaceae</i>												
22.	<i>Olea europea</i> L.	L	Eye diseases	FD, TN, SL/TP	0	0	0	0	0	0	0	0
<i>Palmae</i>												
23.	<i>Phoenix dactylefera</i> L.	AP	Gonorrhoea, Chest diseases	FD, TN, CN, SP, VO, SL/TP	0	0	0	0	0	0	0	0
<i>Phandanaceae</i>												
24.	<i>Pandanus tinctorius</i> Sol.		Syphilis	TN, VO, SL/TP	0	0	0	0	0	0	0	0
<i>Piperaceae</i>												
25.	<i>Piper nigrum</i> L.	Sd.	Mouth and throat infection, gonorrhoea.	AL, FD, TN, VO, SL/TP	0	3	0	0	0	0	0	0

<i>Ranunculaceae</i>											
26.	<i>Nigella sativa</i> L.	Sd.	Diarrhoea	AL, TN, SP, SL/TP, FD	2	1	0	0	0	0	0
<i>Rhamnaceae</i>											
27.	<i>Zizyphus spinachristi</i> (L.) Willd.	Bark	Diarrhoea, wounds.	AL, FD, SP, SL/TP, TN	1	1	3	0	0	0	0
<i>Rubiaceae</i>											
28.	<i>Rubia cardifolia</i> L.	AP.	Antidysentric leucoderma	FD, AQ, SP, SL/TP	3	3	0	0	0	0	0
<i>Rutaceae</i>											
29.	<i>Citrus limon</i> L.	Fruit	Antimicrobial	FD, TN, VO, SL/TP	2	1	2	1	2	2	0
<i>Umbelliferae</i>											
30.	<i>Carum carvi</i> L.	Fruit	Children's ailments	VO, FD, TN, CN, SL/TP	0	0	0	0	0	0	0
31.	<i>Coriandrum sativum</i> L.	Fruit	Measles	FD, CG, TN, SL/TP, VO, CN	0	0	0	0	0	0	0
32.	<i>Pimpinella anisum</i> L.	Seeds	Children's ailments	FD, VO, CN, SL/TP	0	1	0	0	0	0	0

AP = Aerial part; Rt. = root; Flr = Flowers; Sd = Seeds; St = Stem; L = Leaves; Wd = Weed; Frt = Fruit; Al = Alkaloids; FD = Flavonoids; SL/TP = Sterols/triterpenes; CN = Coumarins; AQ = Anthraquinones; VO = Volatile oils; TN = Tannins; SP = Saponins; CG = Cardiac glycosides; VB = Volatile bases. S. a. = *Staphylococcus aureus*; B. s. = *Bacillus subtilis*; Ps. a. = *Pseudomonas aeruginosa*; Pr. v. = *Proteus vulgaris*; E. c. = *Escherichia coli*; Sh. f. = *Shigella flexneri*; Sh. s. = *Shigella sonnei*; Sh. b. = *Shigella boydii* and C. a. = *Candida albicans*.

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