INTERNATIONAL RESEARCH JOURNAL OF PHARMACY
www.irjponline.com ISSN 2230 – 8407
Research Article

ANTIMICROBIAL AND PHYTOCHEMICAL SCREENING OF DIFFERENT LEAF EXTRACTS OF *MEMECYLON UMBELLATUM* BURM

Suresh G. Killedar*, Harinath N. More
Bharati Vidyapeeth College of Pharmacy, Chitranagari Kolhapur-416013 Maharastra, India

Article Received on: 18/11/11 Revised on: 05/01/12 Approved for publication: 19/02/12

*Email- sureshgk_64@rediffmail.com

ABSTRACT
Nine different solvents based on extractive values were used for extraction. Extraction of air dried coarse leaf powder was carried out by maceration and soxhletion. Extracts were dried under reduced pressure and screened for phytoconsituents. Yield was found maximum with methanol extract (28.36g) followed by aqueous (15.72g) and minimum with solvent ether (0.375g). Dried extracts were tested for antimicrobial activity using doxycycline, ciprofloxacin and fluconazole as standards along with individual solvent as controls. Cylindrical cup plate method was used for activity using 8mm dia. borer. Zones of inhibition were measured by zone reader after 24h of incubation for bacteria and 48h for fungi. Acetone extracts showed maximum antimicrobial activity followed by n-butanol, ethyl acetate, methanol and ethanol. Aqueous and pet. ether extracts showed activity only against *S. aureus* while ether extracts showed activity only against *E. coli* and chloroform extract only against *B. subtilis*. All the organic solvent extracts failed to show antifungal activity. Ethanolic extract obtained by Soxhlet extraction showed maximum antibacterial activity against *Micrococcus luteus*. MIC for butanol, ethyl acetate and methanol was found 0.5mg while in other extracts it was more up to 15mg. Polar solvents showed presence of tannins, glycosides, proteins and organic acids while non polar solvents showed presence of steroids, triterpenes and polysaccharides.
Key words: Antimicrobial activity, *Memecylon umbellatum* leaf, Cup plate method, Phytochemical screening

INTRODUCTION

Efforts have been made to discover new promising antimicrobial compounds from various sources such as micro-organisms, animals, plants, folk medicines and synthesis. Systematic screening of them may result in the discovery of novel effective compounds[1]. The increasing prevalence of multidrug resistant strains of bacteria and the recent appearance of strains with reduced susceptibility to antibiotics raises the specter of untreatable bacterial infections and adds urgency to the search for new infection-fighting strategies[2]. Many microorganisms can cause several diseases and in spite of the tremendous advancement of medical science and technology, diseases are the leading health problem particularly in the under privileged population in the remote rural areas in the developing countries. Nature has been a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural sources, many based on their use in traditional medicine. Medicinal plants are used locally in the treatment of infections caused by fungi, bacteria, viruses and parasites and over 60% of people in Nigeria rural areas depend on the traditional medicine for the treatment of their ailments[3]. Different plants have been used as a source of inspiration in the development of novel drugs[4]. Plant derived medicines are widely used because they are relatively safer than the synthetic alternatives, they are easily available and cheaper[5]. Many plant species have been evaluated for their antimicrobial activity in the past 20 years[6]. Since then efficacy of many medicinal plants in the treatment of many diseases have been put to test in many laboratories[7].

Memecylon umbellatum Burm. (Family: Melastomataceae) is small evergreen shrub or tree having young terete branches and bears numerous umbellate cymes. The plant is known as "Anjani" in Sanskrit and "Ironwood tree" in English. Plants are distributed mostly in coastal regions of the Deccan peninsula, the eastern and southern part of India all along Western Ghats and in the Andaman islands.[8, 9] The leaves have been reported to possess astringent properties and are given to treat leucorrhoea and gonorrhoea. Lotion prepared from leaves is used to treat eye troubles. The decoction of the root is used in the treatment of excessive menstrual discharge.[10] Leaves are also reported to possess antiviral activity.[11] Bark is used in the treatment of bruises externally as lepa along with coconut kernels (Dymock).The literature survey reveal that leaves and roots of *Memecylon umbellatum* have been investigated for its hypoglycemic activity using alloxan induced hyperglycemic wistar albino rats.[12, 13] Wound healing activity of ethanolic extract of leaves has also been reported.[14] Root of the plant has been reported for antipyretic, analgesic and anti-inflammatory, hepatoprotective, anthelmintic and anti-insect activities.[15-18] Plant contains wide variety of phytoconstituents such as umbellactone, amyrine, oleanolic acid, ursolic acid, sitosterol and organic acids. [19, 20]

Antidiabetic, wound healing and antimicrobial activity of ethanolic extract of leaf is reported but no systematic study on the leaf drug with other solvent extracts for antimicrobial activity is studied. In the present work authors have tried to screen different extracts of leaf for antimicrobial activity along with phytochemical screening of these extracts.

MATERIALS AND METHODS

Leaf sample was collected in the month of February-March from Gaganbavada hilly region (altitude about 600m) of Kolhapur district. Sample was authenticated by Dr S. R. Yadav, Botany department, Shivaji University Kolhapur and herbarium sheet (Voucher no. SGK-3) was deposited in the department of Pharmacognosy Bharati Vidyapeeth College of Pharmacy Kolhapur. Test organisms were procured from NCIM, Pune and maintained at 4^0C. These organisms were freshly sub cultured on suitable culture media just before the experiment and fully developed cultures were used. Antimicrobial activity was carried out by cup plate method using 8mm dia. sterile borer and zone of inhibition was measured by zone reader. All the solvents and chemicals used were of analytical grade (Loba) and standard Culture media (Hi-media) was used.

Extraction

Maceration: Collected leaf sample was dried under shade for 15 days and powdered by using electric blender (Bajaj make). Coarse powder (#20) was used for extraction. For maceration 100g of sample was kept with 500 ml of each solvent in macerating bottle and capped. Bottles were kept in rotary orbital shaker (Remi-Ris-24BL) at room temperature and agitated at 60 rpm for first 3h and then at regular interval of 1h for 15min. up to 24h. All the extracts were filtered by vacuum filtration (Hi speed appliances-HSV 2) and filtrate was evaporated to dryness using rotary vacuum film evaporator (Dolphin).

Soxhletion[21-23]**:** Course powder (1kg) was packed in cotton bag previously washed with polar and non polar solvents and dried. Then pet. ether (60-80^{0}C) was poured from top and allowed to percolate from the bed of the packed powder in extractor. After pouring sufficient amount (3.5lts) of solvent, the assembly was closed and extraction was carried out at low temperature for 18h. The extract was filtered and powder was dried in hot air oven (Kumar make- Mumbai) at 45^{0}C for 24h and process was repeated for other solvents with increasing polarity. Finally the dried powder was macerated for 48h with 3.5 lit. of chloroform water IP (0.25% v/v) at room temperature in macerating bottle with frequent shaking. All the filtrates were evaluated for physical characters and evaporated using rotary vacuum film evaporator and % yields were determined using electronic balance (Shimadzo - AY120) as given in table no.1.

Phytochemical screening: All the dried extracts were dissolved in small quantity of respective solvents and tested for phytoconstituents using standard reagents[24]. The results are given in table no.2.

Antimicrobial activity[25-28]**:** standard bacterial test organisms were sub cultured on freshly prepared nutrient agar and fungal cultures on saboraud's dextrose agar media and incubated at 37^{0}C in incubator for 24h and 27^{0}C for 48h. respectively. Original cultures were further stored at 4^{0}C in the refrigerator to maintain stock culture. Fresh cultures were used for testing antimicrobial activity using cup plate method. The organisms, their ATCC code, are given in table No.3.

Preparation of media:

Nutrient agar: Accurately weighed 28 gm of Nutrient agar was dissolved in the 1000 ml of distilled water by heating with frequent agitation. The media was finally sterilized in autoclave at 121^{0}C for 15 min.

Preparation of test and standard drug solutions:

Preparation of test extracts: All the test extracts were prepared freshly by dissolving 50 mg of previously dried extract in the 10 ml of respective solvent in which they were extracted. This gives the 5 mg ml^{-1} of stock solution. From which 100µl was used for test.

Preparation of Normal saline solution: Accurately weighed 0.9g sodium chloride and dissolved in 100 ml of distilled water. Normal saline was sterilized before preparation of microbial suspension at 121^{0}C for 15 min. in autoclave.

Preparation of standard drug solutions:

Doxycyclin: Weighed accurately 100 mg doxycyclin, and dissolved in 100 ml of 0.1M hydrochloric acid to get 1000µg/ml stock solution. This was then diluted further with distilled water to get 10 µg/ml. of working standard

Ciprofloxacin: Weighed accurately 100 mg ciprofloxacin, and dissolved in 100 ml of 0.1M hydrochloric acid to get 1000 µg/ml stock solution. This was then diluted further with distilled water to get 10 µg / ml. of working standard solution.

Fluconazole: Weighed accurately 100 mg fluconazole, and dissolved in 100 ml of dimethyl formamide (DMF) to give 1 mg/ml stock solution. This solution was further diluted with buffer (which was prepared by dissolving 2g dipotassium hydrogen phosphate and 8g potassium dihydrogen phosphate in distilled water to produce 100 ml) to get solution of 10 µg/ml.

Working solution of 100µl each was used in the well as positive control which will have test concentration each of 1µg for Doxycyclin, Ciprofloxacin and Fluconazole in the well.

Sterilization of equipments and media:

Dry heat sterilization: All the glass wares previously washed were sterilized in hot air oven. Petri-dishes, pipettes, test tubes were wrapped separately in the paper and kept in the hot air oven for sterilization at 180^{0}C for 1h.

Moist heat sterilization: Normal saline solution and nutrient media were sterilized in autoclave at 121^{0}C for 15 min.

Preparation of microbial suspension: Microbial suspensions were prepared by transferring one loop full of stock culture to the 10 ml of normal saline solution. All the procedure was conducted aseptically in the laminar air flow.

Cylinder-plate or cup-plate method: All the sterilized materials were kept in the aseptic area in the Ultra-Violet laminar air flow. Bacterial suspensions (3 ml) were then poured in the plates. As soon as nutrient agar attained 50^{0}C temperature, 20 ml of media was poured in to the petri plates containing bacterial suspension and plates were rotated to mix the suspension with media. When the agar got solidified bores were made in the plate with sterile borer of 8 mm diameter. In each plate six bores were made. Out of which one is meant for addition of standard, two for negative control of blank solvents of standard and sample and remaining three bores for addition of same concentrations of sample. 100µl of sample was added in each cylinder. The plates were kept to allow diffusion at room temperature for three hours and then incubated in the upright position in incubator at 37^{0}C for about 24h for bacterial growth. For fungus, Sabouraud dextrose agar was poured in the petri plates, allowed to solidify. The fungal suspensions were then sprayed uniformly over the surface of agar. All the procedure was same as that of antibacterial activity. Fungi were incubated at room temperature for 48h.The diameter of zone of inhibition was accurately measured by zone reader in each treated plate as shown (table No.4) and was compared with standard at tested concentrations.

Determination of MIC:

Promising extracts were tested for MIC using serial broth dilution technique[29]. 10 ml of sterile nutrient broth without agar was taken in a test tube and concentrations of 0.5, 1, 3, 7, 15mg of test samples were added aseptically. 1 ml of inoculums of each test organism in normal saline (10^5 CFU) was added in each sample. The tubes were incubated at 37°C for 24h (or 48h for the fungi) and then observed for the Minimum Inhibitory Concentration (MIC). The growth of organisms was observed as turbidity determined by a double beam spectrophotometer (Jasco V-530) at 620 nm. Control tubes without the tested extracts were assayed simultaneously. All samples were tested in triplicate and results are given in table no. 5.

RESULTS

The yield was found maximum for methanol and minimum for light petroleum. Polar extracts showed presence of tannins glycosides sugars and organic acids while non polar extracts showed steroids and triterpenes. Ethyl acetate, butanol and methanol extracts have shown better antimicrobial activity compare to other extracts. Solvent ether extract has shown activity only against *E. coli.* Petroleum ether and chloroform extracts exhibited activity only against *B. subtilis* and *S. aureus* compare to ethyl acetate and methanol. The activity shown by ethyl acetate was comparable with standards at tested concentrations. MIC for ethyl acetate, butanol and methanol was found to be 0.5mg for all the organisms compare to 3-15mg for other extracts.

DISCUSSION

Different extracts showed presence of tannins, glycosides, triterpenes and steroids as important constituents. These constituents may be responsible for antimicrobial activity as per the reported activities on *Camellia sinensis,*[30] *Rhizophora apiculata* bark,[31] blue and white flowering *Silybum marianum,*[32] roots of *Tecoma stans,*[33] punicalagin from the peel of *Punica granatum*, tannic acid from galls and prodelphinidin oligomers from the bark of *Elaeocarpus sylvestris* var. *ellipticus* etc[34]. From the above study it was confirmed that ethanol extract has shown maximum activity against *M. luteus*, acetone extract against *E.coli*. *B.subtilis* and *P. auruoginosa,* pet.ether against *S. aureus* while butanol against all the fungal strains tested. Further study is necessary to isolate the constituent responsible for activity from methanol, ethyl acetate and butanol extracts.

ACKNOWLEDGMENT

Authors are very much thankful to Dr. S. R. Yadav sir for authentication of plant.

REFERENCES

1. Tomoko N, Takashi A, Hiromu T, Yuka I, Hiroko M, et al. Antibacterial activity of extracts prepared from tropical and subtropical plants on methicillin-resistant *Staphylococcus aureus*. J. Health Sci. 2002; 48: 273–276.
2. Sieradzki K, Roberts RB, Haber SW, Tomasz A. The development of vancomycin resistance in a patient with methicillin-resistant *Staphylococcus aureus* infection. N. Engl. J. Med. 1999; 340: 517–523.
3. Ghani A, Abdulrahman EM, Onaolapo JA. Chemical and microbiological evaluation of some Nigerian traditional preparations. The Rep. Oct. 7. 1989.
4. Robbers J, Speedie M, Tylor V. Pharmacognosy and Pharmacobiotechnology. Williams and Wilkins, Baltimore; 1996. p. 1-14.
5. Iwu MW, Duncan AR, Okunji CO. New antimicrobials of plant origin. In Janick J. (ed.): perspectives on new crops and new uses. ASHS Press, Alexandria VA: 1999. P.457-462.
6. Castello MC, Anita P, Naresh C, Madhuri S. Antimicrobial activity of crude extracts from plant parts and corresponding calyx of *Bixa orellina*. Ind. J. Exper. Biol. 2002; 40: 1378- 1381.
7. Shajahan A, Ramesh S. Antimicrobial activity of crude ectocarp extract of Pomegranate (*Punica granatum* L.) against some selected enteropathogenic bacteria. As. J. Microbiol. Biotech. Env. Sci. 2004; 6(4): 647-648.
8. Kirtikar KR and Basu BD. Indian Medicinal Plants. New Delhi: Popular Prakashan; 1996. p.1063-67.
9. Nadkarni KM, Indian Materia Medica. Bombay: Bombay Prakashan; 1982. p. 787.
10. Sastri BN, The Wealth of India, Publication and Information Directorate, CSIR, Hillside, New Delhi, India: 1962. p.336.
11. Dhar ML, et al. Screening of Indian plants for biological activity. Indian J. Exp. Biol. 1968; 2(1): 232-247.
12. Amalraj T and Ignacimuthu S. Evaluation of hypoglycemic effect of *Memecylon umbellatum* in normal and alloxan diabetic mice. J Ethanopharmacol. 1998; 62: 247-250.
13. Joshi H. et al. Hypoglycemic effect of *Memecylon umbellatum* root. PHCOG MAG. 2008; 15: 1-4.
14. Puratchikody and Naglakshmi G. Wound healing activity of *Memecylon umbellatum* Burm. J Plant Sci. 2007; 2: 179-186.
15. Joshi Himanshu et al. Evaluation of antipyretic potential of *Memecylon umbellatum* root extract. Indian J. Nat. Prod. 2009; 25 (1): 13.
16. Killedar SG, More HN. Analgesic and anti-Inflammatory studies of *Memecylon umbellatum* Burm roots in experimental animals. Research J. Pharm. and Tech. 2009; 2(4): 858-861.
17. Joshi Himanshu et al. Hepatoprotective activity of *Memecylon umbellatum* roots against acetaminophen induced hepatotoxicity in rats. J. Res. Educ. Indian Med. 2008; 14 (2): 49-54.
18. Killedar SG, More HN. Anthelmintic and anti-Insect activities of *Memecylon umbellatum* Burm root extracts. Research J. Pharmacology and Pharmacodynamics 2010; 2(1): 54-58.
19. Ram PR and Mehrotra BN, Compendium of Indian Medicinal Plants. (Drug Research Preparative: A CDRI Series), Vol. 2, Central Drug Research Institute, Lucknow and Publications and Information Directorate, New Delhi: 1993. p.453.
20. Asolkar LV, Kakkar KK and Chakre OJ. Glossary of Indian Medicinal Plants with active principal, part-I, Publications and Information Directorate, Council of Scientific and Industrial Research Publ; New Delhi: 1956. p.165.
21. Peach EK, Tracy MV. Modern Methods of Plant Analysis, Springer Verlag Publication; Vol-III, 1915.p. 332-350.
22. Harborne JB. A guide to Modern Techniques of Plant Analysis. Chapman and Hall; London:1973.
23. British Pharmacopoeia. Appendix XID A153 Vol. II London HMSO 1993.
24. Khandelwal KR. Practical Pharmacognosy -Techniques and Experiments. Pune:18th ed. Nirali Prakashan; 2007. p. 149-156.
25. Mahmood AM and Ameh JM. African Journal of Biotechnology. 2007; 6(11): 1272-1275.
26. Manish BT and Rema Subhash. Tropical Journal of Pharmaceutical Research. 2006; 5(1): 557-560.
27. Jigna Parekh and Sumitra Chanda. Brazilian Journal of Microbiology. 2007; 38: 204-207.
28. Govt. of India Ministry of Health and family welfare, Indian Pharmacopoeia, vol. II, 1996; A-100-124.
29. Dagmar Janovska, Katerina Kubikova and Ladislav Kokoska. Screening for antimicrobial activity of some medicinal plants species of traditional Chinese medicine. Czech J. Food Sci. 2008; 21(3): 107-110.
30. Hamilton-Miller JMT. Antimicrobial properties of Tea (*Camellia sinensis* L.). Antimicrobial Agents and Chemotherapy, London (United Kingdom): Nov. 1995; p. 2375–2377.
31. Lim SH, Darah I & Jain K. Antimicrobial activities of tannins extracted from *Rhizophora Apiculata* bark. Journal of Tropical Forest Science Malaysia. 2006; 18(1): 59-65.
32. Muhammad Syed, Shah Mukarram, Khan Farhat Ali et al. Evaluation of phytochemicals and antimicrobial activity of white and blue capitulum and whole pant of *Silybum marianum*. World Applied Sciences Journal Peshawar. Pakistan. IDOSI Publications. 2011; 12 (8): 1139-1144.
33. Govindappa M, Sadananda TS, Channabasava R, Jeevitha MK et al. Antimicrobial and antioxidant activity and phytochemical screening of *Tecoma stans*. Journal of Phytology Phytopharmacology. 2011; 68-76.
34. Toshitsugu Taguri, Takashi Tanaka, and Isao Kouno. Antimicrobial activity of 10 different plant polyphenols against bacteria causing food-borne disease. Biol. Pharm. Bull. 2004; 1965-1969.

Table 1: Physical analysis of liquid leaf soxhlet extracts

Name of extract	Color	pH	Fluorescence			Sp.gr.	Density	Viscosity	yield of solids (g)	Nature of solid extract
			D	S	L					
PEEL	DG	6.8	R	O	DB	0.6908	0.8231	0.6124	8.810	Waxy
ChEL	G	6.2	G	R	YG	1.2990	1.5480	1.0290	2.062	Lumpy
SEEL	YG	6.5	Y	P	G	0.6582	0.7850	0.3474	0.375	Powder
EAEL	RB	5.4	-	R	BR	0.6437	0.7265	1.8547	3.065	Powder
ButEL	WR	5.8	-	MG	-	0.6760	0.8058	2.5793	4.604	Powder
AEL	BR	7.2	Y	MW	-	0.6994	0.7801	0.4835	2.243	Powder
EthEL	RB	7.1	-	G	-	0.7902	0.8185	0.9625	8.544	Powder
MEL	RB	6.0	BR	DG	YW	0.8240	0.8848	0.8556	28.36	Waxy
AqEL	RB	5.2	YG	B	G	1.0080	1.0124	1.0210	15.72	Powder

PEEL-Petroleum Ether extract leaf, ChEL-Chloroform Extract Leaf, SEEL- Solvent Ether Extract Leaf, EAEL- Ethyl Acetate Extract Leaf, ButEL - n-Butanol Extract Leaf, AEL- Acetone Extract Leaf, EthEL-Ethanol Extract Leaf, MEL-Methanol Extract Leaf, AqEL-Aqueous Extract Leaf, DG -Dark Green, G-Green, YG – Yellowish Green, RB-Reddish Brown, WR-Wine Red, BR-Brownish Red, RB-Reddish Brown, R-Red, G-Green, MG-Milky Green, MW-Milky White, B-Blue, DB-Dark Blue, YW- Yellowish White,

Table 2: Phytochemical screening of leaf extracts

Extract	Sugars		Alk.	Tannins		Glycosides					steroids		proteins	Org. acids		
	R	NR		HT	CT	a	c	s	f	co	ST	TT		C	O	T
AqEL	+	+	-	+	-	-	+	+	+	+	-	-	+	+	+	-
MEL	+	+	-	+	+	-	+	+	+	+	+	-	+	+	+	+
EthEL	+	+	-	+	+	+	-	+	+	-	-	-	+	+	+	+
ButEL	+	+	-	+	+	-	+	-	+	-	+	-	+	+	+	+
AEL	+	+	-	+	+	+	+	+	+	-	+	-	+	+	+	+
EAEL	+	+	-	+	+	+	-	-	+	-	-	+	+	+	+	-
ChEL	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-
SEEL	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-
PEEL	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-

Alk-Alkaloids, Gly-Glycosides, Org.acids-Organic acids, R-Reducing sugars, NR-Non Reducing sugars, HT-Hydrolysable Tannins, CT-Condensed Tannins, a-anthracene glycosides, c-Cardiac glycosides, s-saponin glycosides, f-flavanoidal glycosides, co-coumarin glycosides, + Positive, - Negative.

Table 3: Microorganisms with their ATCC Codes

Sr. No	Name of microorganism	ATCC Code
1.	*Escherichia coli*	8739
2.	*Bacillus subtilus*	6633
3.	*Micrococcus luteus*	9341
4.	*Pseudomonas aruginosa*	27853
5.	*Staphylococcus aureus*	25923
6.	*Aspergillus niger*	16404
7	*Candida albicans*	10231
8.	*Penicillium notatum*	28682

Table 4: Antimicrobial Activity of *Memecylon umbellatum* Leaf Extracts

Extracts	Zone of inhibition(mm) *							
	E. c.	***B .s.***	***S. a.***	***P. a.***	***M. l.***	***A. n.***	***P. n.***	***C. a.***
CHW (S)	-	-	20	-	-	-	-	-
CHW (M)	-	-	13	-	-	-	-	-
ME (S)	12	11	13	11	14	-	-	-
ME (M)	11	10	10	09	13	-	-	-
ET (S)	13	13	-	11	32	10	11	12
ET (M)	12	12	-	10	28	09	10	11
AC (S)	18	22	22	25	23	12	14	18
AC (M)	16	20	19	22	20	10	12	15
BU (S)	16	15	18	19	17	15	16	20
BU (M)	13	13	16	16	15	12	13	17
EA (S)	12	10	23	11	14	12	12	13
EA (M)	10	09	19	10	12	10	10	11
CH (S)	-	10	-	-	-	-	-	-
CH (M)	-	09	-	-	-	-	-	-
SE (S)	-	-	-	-	-	-	-	-
SE (M)	15	-	-	-	-	-	-	-
PE (S)	-	-	24	-	-	-	-	-
PE (M)	-	-	18	-	-	-	-	-
Doxycyclin	25	25	23	24	23	NT	NT	NT
Ciprofloxacin	30	30	26	26	27	NT	NT	NT
Fluconazole	NT	NT	NT	NT	NT	16	15	15
Sol. control	-	-	-	-	-	-	-	-
Std. control	-	-	-	-	-	-	-	-

*mean of three replicates, *E.c.- Eschertia coli, B.s.- Bacillus subtilis, S.a-. Staphalococcus aureus, P.a.- Psudomonos auruoginosa, M.l- Micrococcus luteus. A. n.- Aspergillus niger, P. n- Penicillium notatum, C.a- Candida albicans,* (S)-soxlation, (M)- Maceration, CHW- Chloroform water, ME-Methanol, ET- Ethanol, AC- Acetone, BU-Butanol, EA- Ethyl acetate, CH- Chloroform, SE- Solvent ether, BE-Benzene, PE-Pet. ether

Table 5: MIC for promising extracts of *Memecylon umbellatum* leaf

Test organisms	*MIC in mg for promising extracts					
	Pet. ether	Chloroform	Ethyl acetate	Acetone	Methanol	Aqueous
E.coli	15	15	0.5	0.5	0.5	3
P. aeruginosa	15	15	0.5	0.5	1.0	15
M. luteus	3	3	0.5	0.5	0.5	7
B. subtilus	15	0.5	0.5	0.5	0.5	15
S. aureus	0.5	3	0.5	0.5	0.5	0.5
A. niger	15	15	0.5	0.5	1.0	15
C. albicans	15	15	0.5	0.5	3	7
P. notatum	7	7	0.5	0.5	3	7

* Average of three readings

Source of support: Nil, Conflict of interest: None Declared