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IN-VITRO ANTIMICROBIAL ACTIVITY OF *PSIDIUM GUAJAVA L.* LEAF EXTRACTS AGAINST CLINICALLY IMPORTANT PATHOGENIC MICROBIAL STRAINS

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ABSTRACT

The methanol, acetone and N, N-dimethylformamide (DMF) fractions of leaves of *Psidium guajava L.* were evaluated for antibacterial and antifungal activity. Piperacillin and gentamicin were used as standards for antibacterial assay, while nystatin and flucanazole were used as standards for antifungal assay. 91 clinically important strains were used for the study which were both clinical isolates as well as identified strains. The antibacterial activity was more pronounced against gram-positive bacterial and fungal strains. Moderate activity was shown against the gram-negative bacterial strains studied.

Key words: Antibacterial, antifungal, *Psidium guajava* extracts, clinical isolates

INTRODUCTION

Since ancient times, plants have been a veritable source of drugs; man tends to ignore the importance of herbal medicine (1). Research work on medicinal plants is intensified and information on these plants be exchanged. This thought will go a long way in the scientific exploration of medicinal plants for the benefit of man and is likely to decrease the dependence or importance of drugs (2). The boiled water extract of guava plant leaves and bark are used in medicinal preparations which are utilized as remedies for dysentery, diarrhoea and upper respiratory tract infections while guava fruit paste and cheese are popular dishes in Florida, the West Indies and parts of South America (3) In Malaysia, *Psidium gujava* is used for stomach ache and gastroenteritis (4-6); Leaf, root, and bark extracts are used for treatment of diarrhoea, leukorrhea, cholera, external ulcers, and skin diseases (7). *Guajava* leaf extract contains guajava polyphenol (8) that has an anti-oxidation action (9). The flower and leaf of the plant have been reported to have antibiotic activity (10). In the present study antimicrobial potentiality of the *P. guajava* leaves was investigated against a few clinically isolated as well as standard microbial cultures.

MATERIALS AND METHODS

Plant material

Psidium guajava L. (Myrtaceae) leaves were collected in February, 2005 from Rajkot in the State of Gujarat (Western India). The taxonomic identification of the plant was confirmed by Dr. P. S. Nagar of the Department of Biosciences, Saurashtra University, Rajkot.

Extraction

Leaves of *P. guajava* were collected air dried and then powdered in a homogenizer and 10 grams were used for different solvent extraction (Methanol, Acetone, N, N-dimethylformamide). In solvent extraction, the sample was extracted in solvent kept on a rotary shaker overnight, and then the filtrate was collected and centrifuged at 5000 rpm. The solvent was then evaporated to dryness under reduced pressure and the extracted compound was used for the antimicrobial assay. The percentage yield of methanol, acetone and N, N-dimethylformamide (DMF) are 14.92, 9.38 and 23.07 respectively.

Microorganisms Studied

Gram-positive and Gram-negative bacteria and fungi (listed in Table 1) were obtained from National Chemical Laboratory

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(NCL), Pune and Spandan diagnostic and Microcare diagnostic laboratory, Rajkot.

Preparation of samples

Methanol, acetone and DMF extracts were dissolved in DMSO at a concentration of 25 mg/ml and 12.5 mg/ml respectively and used as working stocks. Sterile discs (Hi-media Labs) were impregnated with 20 µl of the stock solution. Gentamicin and piperacillin for bacteria; nystatin and fluconazole (Himedia Labs) for fungus were used as standards for comparative studies.

Antimicrobial study

Antimicrobial activity was performed by disc diffusion method (11). The bacterial strains were grown in nutrient broth while fungal strains were grown in MGYP (Malt glucose yeast peptone) broth. Mueller Hinton agar no. 2 was the media used to study the antibacterial susceptibility while Sabroaud agar was used to study the antifungal susceptibility test. The cultures were grown for 24 hours, and the turbidity of the culture was maintained according to the 0.5 MacFarland standards. The inoculum's size was 1 X 10^8 cells.

RESULTS

In the present study *P. guajava* leaf extracts extracted in methanol (PME), acetone (PAE) and N, N-dimethylformamide (DMF) (PDE) were investigated at two different concentrations for their antimicrobial potentiality against 91 clinically important microbial strains. PME-500 was active against 70% of the total gram-positive bacteria studied, while PAE-500 and PDE-500 were active against 80 and 50 percent of the studied gram-positive bacteria respectively. All the three extracts showed similar activity profiles against gram-negative bacterial strains studied. They were active against 76.36% of the total gram-negative bacteria studied which included 73.68% *Pseudomonas spps*., 93.75% *E. coli*, 83.33% *Klebsiella spps*. and 66.66% of *Proteus spps*. All of the extracts were inactive against one of the three *Citrobacter spps*. and *Alcaligenes fecalis*, while they were active against *Salmonella typhimurium*. The three extracts showed varying results against the fungal strains. PME-500 was active against 37.5%, PAE-500 was active against 56.25% and PDE-500 was active against 31.25% of the total fungal strains studied. All the extracts were inactive against the three *Aspergillus spps*. studied. Details of the result are shown in Table 2.

CONCLUSIONS

All the three extracts of *P. guajava* showed dose dependent activity. Acetone extract was highly active against gram positive and fungal strains while all of the extracts were equally active against gram-negative strains. From the results, it is concluded

Table 1. List of bacterial and fungal strains.

Sr. Strain	Gram Positive bacteria	Specimen
1	*Staphylococcus spps. [10]*	Sputum
2	*Staphylococcus aureus [11]*	Pus
3	*Staphylococcus aureus [13]*	Urine
4	*Staphylococcus aureus [23]*	Pus
5	*Staphylococcus spps [26]*	Pus
6	*Staphylococcus aureus [34]*	Sputum
7	*Staphylococcus aureus [35]*	Tracheal
8	*Staphylococcus aureus [36]*	Tracheal
9	*Staphylococcus spps [44]*	Sputum
10	*Staphylococcus aureus [47]*	Ear swab
11	*Staphylococcus aureus [48]*	Sputum
12	*Staphylococcus aureus [55]*	Pus
13	*Staphylococcus aureus [56]*	Pus
14	*Staphylococcus aureus ATCC 25923*	-
15	*Staphylococcus epidermidis ATCC 12228*	-
16	*Staphylococcus subfava NCIM 2178*	-
17	*Bacillus cereus ATCC 11778*	-
18	*Bacillus subtilis ATCC 6633*	-
19	*Bacillus megaterium ATCC 9885*	-
20	*Micrococcus flavus ATCC 10240*	-
Gram negative bacteria		
21	*Pseudomonas spps. [15]*	Sputum
22	*Pseudomonas spps. [17]*	Pus
23	*Pseudomonas fluorescence [18]*	Pus
24	*Pseudomonas spps. [25]*	Urine
25	*Pseudomonas spps. [27]*	Pus
26	*Pseudomonas aeruginosa [30]*	Sputum
27	*Pseudomonas spps. [37]*	Tracheal
28	*Pseudomonas aeruginosa [38]*	Pus
29	*Pseudomonas spps. [39]*	Wound swab
30	*Pseudomonas fluorescence [40]*	Tracheal
31	*Pseudomonas spps. [42]*	Pus
32	*Pseudomonas spps. [43]*	Pus
33	*Pseudomonas spps. [46]*	Sputum
34	*Pseudomonas spps. [49]*	Sputum
35	*Pseudomonas spps. [50]*	Tracheal secretion
36	*Pseuodmonas fluorescence [59]*	Urine
37	*Pseudomonas aeruginosa ATCC 27853*	-
38	*Pseudomonas testosteroni NCIM 5098*	-
39	*Pseudomonas pseudoalcaligenes ATCC 17440*	-
40	*E.coli [14]*	Pus
41	*E.coli [16]*	Urine
42	*E.coli [21]*	Urine
43	*E.coli [22]*	Urine
44	*E.coli [24]*	Urine
45	*E.coli [28]*	Pus

46	*E.coli [31]*	Urine
47	*E.coli [32]*	Stool
48	*E.coli [33]*	Pus
49	*E.coli [41]*	Urine
50	*E.coli [45]*	Pus
51	*E. coli [51]*	Urine
52	*E. coli [58]*	Vaginal swab
53	*E. coli [60]*	Urine
54	*E. coli [61]*	Blood
55	*E. coli ATCC 25922*	-
56	*Enterobacter spps. [1]*	Tracheal
57	*Enterobacter spps. [8]*	Tracheal
58	*Enterobacter aerogenes ATCC 13048*	-
59	*Klebsiella spps [6]*	Urine
60	*Klebsiella spps [19]*	Sputum
61	*Klebsiella aerogenes [52]*	Pus
62	*Klebsiella spps. [54]*	Urine
63	*Klebsiella aerogenes [57]*	Urine
64	*Klebsiella pneumoniae NCIM 2719*	-
65	*Proteus mirabilis [4]*	Wound swab
66	*Proteus spps. [53]*	Pus
67	*Proteus mirabilis NCIM 2241*	-
68	*Proteus vulgaris NCTC 8313*	-
69	*Proteus morganii NCIM 2040*	-
70	*Providencia rettgeri [5]*	Pus
71	*Citrobactor spps [20]*	Pus
72	*Citrobactor freundii [29]*	Pus
73	*Citrobactor freundii ATCC 10787*	-
74	*Alcaligenes fecalis ATCC 8750*	-
75	*Salmonella typhimurium ATCC 23564*	-
Fungus		
76	*Candida albicans [1]*	Urine
77	*Candida albicans [2]*	Sputum
78	*Candida spps. [3]*	Sputum
79	*Candida spps. [4]*	Sputum
80	*Candida spps. [5]*	Urine
81	*Candida albicans ATCC 2091*	-
82	*Candida albicans ATCC 18804*	-
83	*Candida glabrata NCIM 3448*	-
84	*Candida tropicalis ATCC 4563*	-
85	*Candida apicola NCIM 3367*	-
86	*Cryptococcus neoformans ATCC 34664*	-
87	*Cryptococcus luteolus ATCC 32044*	-
88	*Trichosporan beigelii NCIM 3404*	-
89	*Aspergillus flavus NCIM 538*	-
90	*Aspergillus candidus NCIM 883*	-
91	*Aspergillus niger ATCC 6275*	-

Table 2. Antimicrobial activity of *Psidium guajava* against 91 clinically important microbial strains (inhibition zone in mm)

Sr. No.	Strain	Control	Extracts						Antibiotics		
		DMSO	PME-500	PAE-500	PDE-500	PME-250	PAE-250	PDE-250	G	Pc	Fu	Ns
1	*Staphylococcus spps. [10]*	-	13.67 ± 0.88	18 ± 0.58	11.67 ± 1.45	8.667 ± 0.88	11.67 ± 0.88	8 ± 0.58		-	NT	NT
2	*Staphylococcus aureus [11]*	-	14 ± 0.58	13 ± 0.58	14 ± 0.58	11 ± 0.58	11 ± 0.58	11.67 ± 0.33	18.67 ± 0.33	17.33 ± 0.33	NT	NT
3	*Staphylococcus aureus [13]*	-	8 ± 0.58	12 ± 0.58	13 ± 1.15	-	-	-	-	-	NT	NT
4	*Staphylococcus aureus [23]*	-	-	14 ± 1.73	-	-	-	-	-	-	NT	NT
5	*Staphylococcus spps [26]*	-	11 ± 0.58	14 ± 1.15	-	-	10 ± 1.73	10 ± 1.15	-	-	NT	NT
6	*Staphylococcus aureus [34]*	-	-	-	-	-	-	-	-	-	NT	NT
7	*Staphylococcus aureus [35]*	-	10 ± 0.58	15 ± 1.15	12.33 ± 0.66	9 ± 0.58	13.67 ± 2.03	-	-	-	NT	NT
8	*Staphylococcus aureus [36]*	-	8.66 ± 0.88	-	-	8.67 ± 0.88	-	-	-	-	NT	NT
9	*Staphylococcus spps [44]*	-	-	10.33 ± 0.88	-	-	10 ± 0.58	-	14.67 ± 0.33	-	NT	NT
10	*Staphylococcus aureus [47]*	-	17 ± 1.15	15.67 ± 1.45	16 ± 2.31	11.67 ± 2.6	14 ± 1.15	14.67 ± 0.33	-	-	NT	NT
11	*Staphylococcus aureus [48]*	-	16.67 ± 0.88	15.67 ± 0.33	17 ± 0.46	14.67 ± 0.33	14.67 ± 0.33	15.67 ± 0.33	20.67 ± 0.33	-	NT	NT
12	*Staphylococcus aureus [55]*	-	-	-	-	-	-	-	10 ± 1.73	-	NT	NT

13	*Staphylococcus aureus [56]*	-	-	9.66 ± 0.33	-	-	-	-	-	-	NT	NT
14	*Staphylococcus aureus ATCC 25923*	-	10 ± 1.73	11.5 ± 2.60	13 ± 0.58	9.5 ± 0.28	10 ± 0.58	9 ±	-	-	NT	NT
15	*Staphylococcus epidermidis ATCC 12228*	-	9 ± 1.15	15.5 ± 2.02	14 ± 1.73	8.5 ± 0.86	9 ± 1.15	10 ± 1.73	-	-	NT	NT
16	*Staphylococcus subfava NCIM 2178*	-	-	10.5 ± 28	-	9.5 ± 0.28	10.5 ± 0.28	-	-	20.17 ± 0.44	NT	NT
17	*Bacillus cereus ATCC 11778*	-	10 ± 0.58	14.5 ± 0.28	11 ± 0.58	13 ± 0.58	20.17 ± 0.16	18.83 ± 0.16			NT	NT
18	*Bacillus subtilis ATCC 6633*	-	8.5 ± 0.86	8.5 ± 0.86	8.5 ± 0.86	14.5 ± 2.02	13.5 ± 1.44	-	18.33 ± 0.33	17.83 ± 0.93	NT	NT
19	*Bacillus megaterium ATCC 9885*	-	9.5 ± 1.44	-	-	9 ± 15	-	-	-	-	NT	NT
20	*Micrococcus flavus ATCC 10240*	-	11.5 ± 0.28	10.5 ± 0.28	-	-	10 ± 0.58	14.5 ± 2.02	27.67 ± 0.33		NT	NT
Gram negative bacteria												
21	*Pseudomonas spps. [15]*	-	-	-	-	-	11 ± 2.31	10.67 ± 2.03	14 ± 0.58	-	NT	NT
22	*Pseudomonas spps. [17]*	-	10 ± 1.73	14.67 ± 0.33	19 ± 1.15	14.67 ± 0.33	18.67 ± 0.33	13 ± 3.46	-	-	NT	NT
23	*Pseudomonas fluorescence [18]*	-	10 ± 1.73	14.67 ± 0.33	19 ± 1.15	14.67 ± 0.33	18.67 ± 0.33	13 ± 3.46	-	-	NT	NT
24	*Pseudomonas spps. [25]*	-	12.67 ± 0.33	12 ± 0.58	11 ± 0.58	11 ± 0.58	13 ± 0.58	14 ± 1.15	-	-	NT	NT
25	*Pseudomonas spps. [27]*	-	9.667 ± 0.33	13.33 ± 0.33	9.33 ± 1.203	-	-	-	-	-	NT	NT
26	*Pseudomonas aeruginosa [30]*	-	9 ± 1.15	12.67 ± 0.33	12 ± 0.58	-	-	-	16.67 ± 0.67	-	NT	NT
27	*Pseudomonas spps. [37]*	-	18 ± 0.58	18 ± 0.33	17 ± 0.88	15 ± 0.33	15 ± 1.15	15 ± 0.33	-	-	NT	NT
28	*Pseudomonas aeruginosa [38]*	-	-	-	-	-	-	-	19.67 ± 0.33	-	NT	NT
29	*Pseudomonas spps. [39]*	-	12 ± 0.58	13.67 ± 0.33	13.67 ± 0.33	12.67 ± 0.33	11.67 ± 0.33	13 ± 0.58	-	-	NT	NT
30	*Pseudomonas fluorescence [40]*	-	-	-	-	-	-	-	-	-	NT	NT
31	*Pseudomonas spps. [42]*	-	13 ± 0.57	15.33 ± 0.33	14.33 ± 0.33	12.33 ± 0.88	11.33 ± 0.66	13 ± 1.001	-	-	NT	NT
32	*Pseudomonas spps. [43]*	-	8.66 ± 0.88	13 ± 0.58	10.33 ± 0.33	9.33 ± 1.20	8.66 ± 0.88	8.33 ± 0.88	-	-	NT	NT
33	*Pseudomonas spps. [46]*	-	12.67 ± 0.33	14.67 ± 0.88	14.67 ± 0.88	11.67 ± 1.33	12 ± 0.58	11 ± 0.58	-	-	NT	NT
34	*Pseudomonas spps. [49]*	-	18.33 ± 0.33	18 ± 0.58	19.67 ± 0.33	15 ± 0.58	15.33 ± 0.33	14.33 ± 0.33	20 ± 0.58	-	NT	NT
35	*Pseudomonas spps. [50]*	-	16 ± 0.58	17.67 ± 0.88	16 ± 0.58	11.33 ± 0.88	13 ± 0.58	13.67 ± 0.33	-	-	NT	NT
36	*Pseuodmonas fluorescence [59]*	-	-	-	-	-	-	-	-	-	NT	NT
37	*Pesudomonas aeruginosa ATCC 27853*	-	14.33 ± 0.88	16.67 ± 0.66	14 ± 1.00	10 ± 0.58	11.67 ± 0.88	11.67 ± 0.88	17 ± 1.15	12.33 ± 0.66	NT	NT
38	*Pseudomonas testosteroni NCIM 5098*	-	-	-	-	-	-	-	22.33 ± 0.66	-	NT	NT
39	*Pseudomonas pseudoalcaligenes ATCC 17440*	-	14.5 ± 0.28	15 ± 0.58	13.5 ± 0.28	14.33 ± 0.28	12.5 ± 0.28	11 ± 0.58	19.33 ± 0.6	-	NT	NT
40	*E.coli [14]*	-	12 ± 0.88	13 ± 0.57	9 ± 1.15	8.33 ± 0.88	9.33 ± 1.20	8.66 ± 0.88	-	-	NT	NT
41	*E.coli [16]*	-	11.67 ± 2.60	11.33 ± 2.60	11 ± 2.64	13.67 ± 0.33	13 ± 0.57	13 ± 0.33	-	-	NT	NT
42	*E.coli [21]*	-	13.67 ± 1.85	14 ± 0.33	13 ± 0.58	12.67 ± 0.88	14 ± 0.33	14 ± 0.58	-	-	NT	NT

43	*E.coli [22]*	-	13 ± 0.33	14 ± 0.33	15 ± 0.33	13 ± 0.58	14 ± 0.58	13 ± 1.15	-	-	NT	NT
44	*E.coli [24]*	-	13 ± 0.58	15 ± 0.88	15 ± 0.33	14 ± 0.58	14 ± 0.33	13 ± 0.88	-	-	NT	NT
45	*E.coli [28]*	-	16 ± 0.33	15 ± 0.58	15 ± 0.33	- -	14 ± 0.58	14 ± 0.88	-	-	NT	NT
46	*E.coli [31]*	-	15 ± 0.33	17 ± 0.58	15 ± 0.58	13 ± 0.33	14 ± 0.33	15 ± 0.88	-	-	NT	NT
47	*E.coli [32]*	-	13 ± 0.58	15 ± 0.58	14 ± 0.58	13 ± 0.33	14 ± 0.58	13 ± 0.33	21 ± 0.58	-	NT	NT
48	*E.coli [33]*	-	14 ± 0.58	15 ± 0.58	14 ± 0.58	12.67 ± 0.33	13.33 ± 0.88	13.33 ± 0.88	-	-	NT	NT
49	*E.coli [41]*	-	14 ± 0.58	13.33 ± 0.33	13 ± 0.58	12 ± 0.58	13 ± 0.33	11 ± 0.58	18.67 ± 0.33	-	NT	NT
50	*E.coli [45]*	-	13.33 ± 0.33	15.33 ± 0.33	13.67 ± 0.33	13.67 ± 0.66	14 ± 1.001	12 ± 0.58	-	-	NT	NT
51	*E. coli [51]*	-	14.33 ± 0.33	14.67 ± 0.33	14.33 ± 0.33	12 ± 1.15	12.33 ± 0.33	12.67 ± 0.33	20.33 ± 0.33	-	NT	NT
52	*E. coli [58]*	-	13.5 ± 0.29	14 ± 0.58	14.5 ± 0.28	13 ± 0.58	13.33 ± 0.88	12.5 ± 0.28	-	-	NT	NT
53	*E. coli [60]*	-	-	-	-	-	-	-	-	-	NT	NT
54	*E. coli [61]*	-	14.33 ± 0.88	15.5 ± 0.86	17.5 ± 0.28	13.5 ± 0.28	10.5 ± 2.02	14 ± 0.58	-	-	NT	NT
55	*E. coli ATCC 25922*	-	14.5 ± 0.28	16 ± 0.58	16.5 ± 0.58	14 ± 0.58	12.5 ± 0.28	13.5 ± 0.28	17.83 ± 0.16	14.5 ± 0.50	NT	NT
56	*Enterobacter spps. [1]*	-	9 ± 0.58	9 ± 0.58	9 ± 0.58	-	-	-	-	-	NT	NT
57	*Enterobacter spps. [8]*	-	11 ± 0.58	12.67 ± 0.33	11 ± 0.58	10 ± 0.58	10 ± 0.58	10 ± 1.15	19.67 ± 0.88	-	NT	NT
58	*Enterobacter aerogenes ATCC 13048*	-	-	-	-	-	-	-	-	-	NT	NT
59	*Klebsiella spps [6]*	-	16 ± 0.58	14.33 ± 1.67	14.33 ± 1.20	14 ± 0.58	12.67 ± 0.88	12.33 ± 1.20	22 ± 0.58	-	NT	NT
60	*Klebsiella spps [19]*	-	15 ± 1.15	16 ± 0.58	15.67 ± 0.88	13 ± 0.58	13.67 ± 0.33	13.67 ± 0.33	-	-	NT	NT
61	*Klebsiella aerogenes [52]*	-	9 ± 1.15	12.67 ± 0.33	13.67 ± 0.33	11 ± 0.58	9.33 ± 1.20	9.66 ± 1.45	-	-	NT	NT
62	*Klebsiella spps. [54]*	-	14.67 ± 0.33	13.67 ± 0.33	14.33 ± 0.66	12.67 ± 0.33	12.67 ± 0.66	13.33 ± 0.88	-	-	NT	NT
63	*Klebsiella aerogenes [57]*	-	13.33 ± 0.33	14.33 ± 0.33	12.67 ± 0.33	11 ± 0.58	11 ± 0.58	11 ± 0.58	-	-	NT	NT
64	*Klebsiella pneumoniae NCIM 2719*	-	-	-	-	-	-	-	-	24.67 ± 0.33	NT	NT
65	*Proteus mirabilis [4]*	-	16 ± 1.001	17 ± 1.001	16 ± 2.002	15 ± 0.58	14.67 ± 0.33	15 ± 0.58	-	14 ± 0.58	NT	NT
66	*Proteus spps. [53]*	-	14 ± 0.58	15 ± 0.58	15.33 ± 0.33	13.33 ± 0.66	12.33 ± 0.66	12.33 ± 0.33	-	-	NT	NT
67	*Proteus mirabilis NCIM 2241*	-	-	-	-	-	-	-	18.67 ± 0.33	-	NT	NT
68	*Proteus vulgaris NCTC 8313*	-	10 ± 1.73	11 ± 2.31	11.5 ± 2.60	-	13.5 ± 0.28	13.5 ± 0.28	18 ± 1.00	-	NT	NT
69	*Proteus morganii NCIM 2040*	-	-	11.5 ± 0.86	-	-	10 ± 0.58	-	-	-	NT	NT
70	*Providencia rettgeri [5]*	-	16.67 ± 0.33	17 ± 0.58	15 ± 0.58	14 ± 0.58	14.33 ± 0.33	13.67 ± 0.33	-	-	NT	NT
71	*Citrobactor spps [20]*	-	13 ± 0.58	12 ± 0.58	11.67 ± 0.88	10 ± 0.58	11 ± 1.15	10.67 ± 0.88	-	-	NT	NT
72	*Citrobactor freundii [29]*	-	-	-	-	-	-	-	12.33 ± 0.33	-	NT	NT

73	*Citrobacter freundii ATCC 10787*	-	-	-	-	-	-	-	-	-	NT	NT
74	*Alcaligenes fecalis ATCC 8750*	-	-	-	-	-	-	-	18.33 ± 0.66	-	NT	NT
75	*Salmonella typhimurium ATCC 23564*	-	11.5 ± 0.28	11.33 ± 0.33	12.33 ± 0.33	12 ± 0.58	13 ± 0.58	12 ± 0.58	18.5 ± 0.28	-	NT	NT
Fungus												
76	*Candida albicans [1]*	-	-	-	-	-	-	-	0.33 ± 11.33	-	NT	NT
77	*Candida albicans [2]*	-	8 ± 0.58	9 ± 0.58	9 ± 1.15	-	-	-	18 ± 0.58	-	NT	NT
78	*Candida spps. [3]*	-	8 ± 0.58	8 ± 0.58	-	-	-	-	14 ± 0.58	-	NT	NT
79	*Candida spps. [4]*	-	8.5 ± 0.86	9 ± 1.15	-	-	9 ± 1.15	-	14 ± 0.58	-	NT	NT
80	*Candida spps. [5]*	-	-	7.5 ± 0.29	-	-	-	-	10 ± 0.58	-	NT	NT
81	*Candida albicans ATCC 2091*	-							13 ± 0.58	17.67 ± 0.33	NT	NT
82	*Candida albicans ATCC 18804*	-	10 ± 1.15	8.33 ± 0.88	8.5 ± 0.29	8 ± 0.58	-		0.33 ± 14.33	-	NT	NT
83	*Candida glabrata NCIM 3448*	-	-	-	-	-	-	-	22 ± 0.58	39.67 ± 0.88	NT	NT
84	*Candida tropicalis ATCC 4563*	-	8.5 ± 0.29	8 ± 0.58	9 ± 0.58	8.5 ± 0.29	8.5 ± 0.29	8 ± 0.58	-	8.33 ± 0.33	NT	NT
85	*Candida apicola NCIM 3367*	-	18.33 ± 0.33	18.66 ± 0.88	-	-	-	-	-	21.33 ± 0.88	NT	NT
86	*Cryptococcus neoformans ATCC 34664*	-	-	9 ± 1.15	7.5 ± 0.29	-	-	-	17 ± 0.58	21.33 ± 0.33	NT	NT
87	*Cryptococcus luteolus ATCC 32044*	-	-	-	-	-	-	-	17.66 ± 0.88	23.66 ± 0.88	NT	NT
88	*Trichosporan beigelii NCIM 3404*	-	-	8.5 ± 0.88	7.5 ± 0.29	7.5 ± 0.29	-	-	-	-	NT	NT
89	*Aspergillus flavus NCIM 538*	-	-	-	-	-	-	-	-	-	NT	NT
90	*Aspergillus candidus NCIM 883*	-	-	-	-	-	-	-	-	-	NT	NT
91	*Aspergillus niger ATCC 6275*	-	-	-	-	-	-	-	-	-	NT	NT

Mean ± SEM, n = 3, zone includes disc diameter 7mm; G – Gentamicin (10 µg/disc), Pc – Piperacillin (100 µg/disc), Ns – Nystatin (100 units/disc), Fu – Fluconazole (10 µg/disc); TME – Methanol extract, TAE – Acetone extract, TDE – N, N-dimethylformamide (DMF) extract, DMSO – Dimethylsulphoxide.

that acetone extract of *Psidium guajava* is highly active against 74.72% of the total 91 microbial strains studied. The acetone extract of *P. guajava* should further be studied for its phytochemical constituents in order to elucidate the active principle within the extract which can turn out to be a novel antimicrobial agent of the future.

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RESUMO

Atividade antimicrobiana *in vitro* de extratos de folhas de *Psidium guajava L.* contra cepas patogênicas de importância clínica

Os extratos de folhas de *Psidium guajava L.* preparados com metanol, acetona e N,N-formamida foram avaliados quanto

a sua atividade antibacteriana e antifúngica. Piperacilina e gentamicina foram empregadas como padrões de atividade antibacteriana e nistatina e fluoconazol com padrões de atividade antifúngica. O estudo foi desenvolvido com noventa e uma cepas de importância clínica, incluindo isolados clínicos e cepas identificadas. A atividade antibacteriana foi mais intensa contra as cepas de bactérias Gram positivas e de fungos. A atividade contra bactérias Gram negativas foi moderada.

Palavras-chave: antibacteriano, antifúngico, extrato de *Psidium guajava*, isolados clínicos

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