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IN-VITRO ANTIBACTERIAL ACTIVITY OF *ANACYCLUS PYRETHRUM* L. AND *JASMINUM GRANDIFLORUM* L.

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The petroleum ether, acetone, methanol and aqueous extracts of the root of *Anacyclus pyrethrum* and leaf of *Jasminum grandiflorum* were investigated for their antibacterial activity against the isolated and standard strains of *Staphylococcus aureus, Streptococcus mutans, S. sanguis, S. sobrinus, S. salivarius* and *Lactobacillus acidophilus* by using the agar well diffusion method. Amongst all the extracts tested, methanolic extract was comparably more effective to inhibit the growth of microbes than petroleum ether, acetone and aqueous extracts. The methanolic extract of *A. pyrethrum* and *J. grandiflorum* showed maximum antibacterial activity against *L. acidophilus* and *S. aureus* respectively. Phytochemical analysis of these extracts revealed the presence of antibacterial active agents such as alkaloids, flavonoids, glycosides, steroids, tannins, terpenoids, phenols and saponins.

Herbs are staging a comeback and herbal 'renaissance' is happening all over the globe. The herbal products today symbolize safety in contrast to the synthetics. Moreover, plants used in traditional medicine contain a vast array of substances that can be used to treat chronic and infectious diseases (Duraipandiyan *et al*. 2006). The present study was designed to evaluate *A. pyrethrum* (root) and *J. grandiflorum* (leaf) extracts against dental bacteria.

MATERIAL AND METHODS

Jasminum grandiflorum (chameli) were collected from the foot hills of Shivalik range of Himalayas in Hardwar and *A. pyrethrum* (akar-kara) was supplied by M/s Vijay Herbal Automation, Hardwar. These plants were further confirmed in the Department of Botany, Gurukula Kangri University, Hardwar and identified at Botanical Survey of India, Dehradun, Uttarakhand. The method of Alade and Irobi (1993) was adopted for the preparation of plant extracts with little modification. The pathogenic organisms were selected for the study on the basis of their clinical pharmaceutical importance as well as for their potential to cause infection. The pathogens were isolated from the patients with dental diseases at Aggarwal dental clinic and identified in the Department of Botany and Microbiology, Gurukula Kangri University, Hardwar. *Staphylococcus aureus* MTCC 1144*, Streptococcus mutans* MTCC 890*, S. sanguis* ATCC 10556*, S. sobrinus* ATCC 33478*, S. salivarius* MTCC 1938 and *Lactobacillus acidophilus* MTCC 447 were procured from IMTECH, Chandigarh and National Chemical Lab. (NCL), Pune. The phytochemical analysis of plant extracts were carried out by using standard qualitative methods (Scalbert 1991, Chukwuran 1997). The antibacterial activity was performed by agar well diffusion method of Perez *et al*. (1990). The MIC was determined by dilution method using serially diluted two folds plant extracts according to Islam, *et al.* (2008.)

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Table 1 : *In- Vitro* antimicrobial activity of *A. pyrethrum* and *J. grandiflorum* indicated by diameter of inhibition zones (mm) at 100mg/ml.

S.No.	Pathogens	*Anacyclus pyrethrum*				*Jasminum grandiflorum*				Antibiotic
		Pt.ether	Acetone	Methanol	Aqueous	Pt.ether	Acetone	Methanol	Aqueous	Ofloxacin
1.	*S. aureus*	10±0.36	12±0.28	17±0.32	18±0.22	14±0.44	13±0.36	24±0.27	17±0.33	34±0.44
2.	*S. aureus* MTCC	9±0.34	14±0.31	18±0.30	16±0.30	9±0.22	10±0.32	14±0.20	15±0.28	34±0.44
3.	*S. mutans*	11±0.27	15±0.29	12±0.24	19±0.28	10±0.11	15±0.21	19±0.23	16±0.29	32±0.28
4.	*S. mutans* MTCC	10±0.14	24±0.20	18±0.25	17±0.34	12±0.28	14±0.24	20±0.28	14±0.31	32±0.30
5.	*S. salivarius*	9±0.20	12±0.26	14±0.30	15±0.30	11±0.24	15±0.27	14±0.24	19±0.34	30±0.31
6.	*S.salivarius* MTCC	10±0.25	14±0.31	17±0.32	13±0.34	14±0.32	16±0.30	16±0.22	20±0.22	31±0.28
7.	*S. sanguis*	9±0.37	13±0.32	15±0.30	17±0.36	10±0.30	12±0.31	15±	17±0.27	35±0.28
8.	*S. sanguis* ATCC	11±0.52	13±0.42	14±0.38	16±0.26	12±0.25	14±0.28	14±0.28	15±0.30	36±0.28
9.	*S. sobrinus*	10±0.37	14±0.40	12±0.35	19±0.44	11±0.32	13±0.30	15±0.34	18±0.30	28±0.27
10.	*S. sobrinus* ATCC	12±0.46	15±0.38	14±0.37	17±0.16	9±0.31	15±0.28	13±0.33	17±0.24	28±0.24
11.	*L. acidophilus*	10±0.40	16±0.35	14±0.40	18±0.28	12±0.41	14±0.35	15±0.33	16±0.24	30±0.25
12.	*L.acidophilus* MTCC	9±0.30	15±0.30	20±0.24	16±0.34	15±0.32	18±0.35	19±0.29	20±0.26	30±0.25

The data correspond to mean values ± SE (n=3).

Results and Discussion: The present study showed significant antimicrobial activity of plant extracts against all the microorganisms (table-1). The methanol extract of *A. pyrethrum* showed the maximum antibacterial activity against the *L. acidophilus* MTCC (20mm) followed by petroleum ether, acetone and aqueous extract and minimum activity against isolated strain of *Streptococcus sobrinus* (12mm). In *Jasminum grandiflorum* the maximum antibacterial activity was shown by methanol extract against isolated strain of *Staphylococcus aureus* (24mm) followed by petroleum ether, acetone and aqueous extract and minimum activity against *Streptococcus sobrinus* ATCC (13mm). In general alcoholic extracts exhibited the highest degree of antibacterial activity as compared to aqueous extract (Ahmad *et al.,* 1998). The Minimum Inhibition Concentration (MIC) value of *A. pyrethrum* was ≥ 8 µg/ml active against *S. sanguis* and the *J. grandiflorum* was ≥ 16 µg/ml active against *S. aureus* followed by *Streptococcus mutans, S. sobrinus, S. salivarius* and *Lactobacillus acidophilus.* The phytochemical screening of methanol extract of plants showed that they contain alkaloids, flavonoids, glycosides, steroids, tannins, terpenoids, phenols and saponins. Tannins were absent in *A. pyrethrum* (roots) while amino acids, tannins and saponins were absent in *J. grandiflorum* (leaves). Plant compounds with antibacterial properties can be used as antibacterial agents in new drugs for the therapy of infectious diseases (table-2).

The *J. grandiflorum* is known to contain methyl anthranilate, benzyl alcohol

Table 2: Phytochemical analysis of the plants extracts in methanol.

S.No.	Phytochemical	*Anacyclus pyrethrum*	*Jasminum grandiflorum.*
1.	Alkaloids	+	+
2.	Flavonoids	+	+
3.	Glycosides	+	+
4.	Amino acid	+	-
5.	Steroids	+	+
6.	Tannins	-	-
7.	Terpenoids	+	+
8.	Saponins	+	-

+ : Present, -: Absent

and linalyl acetate. Our preliminary phytochemical study confirmed the presence of triterpenoids. The flavonoids (Villegas, 1997) and triterpenoids (Tsuchiya *et al.* 1996) are known to promote the wound- healing process mainly due to their astringent and antibacterial properties, which seems to be responsible for wound contraction and increased rate of epithelialisation. The anti-inflammatory action of triterpene alcohols present in the composite flowers have been well documented (Scortichini and Rossi 1991). The chloroform extract of the *A. pyrethrum* (root) at 1mg/ plate produced inhibition of tobacco induced mutagenesis, using Ames *Salmonella*/ microsome assay. The extract also inhibited the nitrosation of methylurea in a dose dependent manner (Sukumaran and Kuttan 1992). The results support the traditional usage of the studied plants and suggests that the plant extracts possess compounds with antimicrobial properties that can be used as antibacterial agents in new drugs for the therapy of infectious diseases caused by pathogens. The most active extracts can be subjected to isolation of the therapeutic antibacterial compounds and carry out further pharmacological evaluation.

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