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RESEARCH ARTICLE

PHARMACOGNOSTICAL, PHYTOCHEMICAL AND ANTIBACTERIAL EVALUATION OF *MAHONIA LESCHENAULTII* TAKEDA. (ROOT WOOD, ROOT BARK, STEM WOOD, STEM BARK AND LEAVES)

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ABSTRACT

Objective: Pharmacognostical, Phytochemical and Antibacterial evaluation of *Mahonia leschenaultii* Takeda. (root wood, root bark, stem wood, stem bark and leaves.)
Methods: The present study has been undertaken to evolve the Pharmacognostical, Phytochemical and Antibacterial standard. In Pharmacognostical study determination of ash values and extractive values were carried out. In Phytochemical study Extraction procedure and Fluorescence analysis were carried out. In Antibacterial study the antibacterial activity of different methanolic extracts (root wood, root bark, stem wood, stem bark and leaves extracts.) of different concentration (50 µg/ml, 100 µg/ml, 150 µg/ml and 200 µg/ml) and standard drug (Ampicillin trihydrate) at the concentration of 100 µg/ml were carried out by cylinder-plate method.
Results and Discussion: Pharmacognostical studies such as ash values and extractive values were carried out to confirm the identity of plant and to ascertain the quality and purity of crude drug. Phytochemical study such as Fluorescence analysis shows fluorescence compound in the extracts. The antibacterial study shows the moderate antibacterial activity against *Staphylococcus aureus and Escherichia coli* in comparison to standard drug (Ampicillin trihydrate).
Conclusion: Pharmacognostical studies were carried out to confirm the identity and to ascertain the quality and purity of the crude drug. Phytochemical studies were carried out to confirm the presence, nature of the crude extracts. The extracts of (root wood, root bark, stem wood, stem bark and leaves) of different concentration (50 µg/ml, 100 µg/ml, 150 µg/ml and 200 µg/ml) evaluated for antibacterial activity and showed moderate antibacterial activity as compared to standard drug at the concentration of 100 µg/ml. The methanolic extract is more active against *Escherichia coli* in comparison to *Staphylococcus aureus*.
Keywords: *Mahonia leschenaultii* Takeda. Root wood, Root bark, Stem wood, Stem bark and leaves, Ampicillin trihydrate.

INTRODUCTION

Mahonia leschenaultii Takeda. (Family Berberidaceae), is found in Nilgiri and Pulney Hills of the Western Ghats at an altitude of about 6000ft[1] . It has been reported that the alcoholic extract of the aerial parts of the plant have effect on respiration[2] . Antimicrobial activity of the aqueous root paste has been reported by the native and tribes of Nilgiris[3]. A group of people called Todas use the paste of the stem bark of the plant for women in postnatal treatment[4]. The plant is reported to contain alkaloids, like berberine, berbamine, jatrorrhizine, neprotine, oxyacanthine and palmatine[5]. We report herein the Pharmacognostical, Phytochemical and Antibacterial studies.

MATERIAL AND METHODS

Collection and Treatment

The plant *Mahonia leschenaultii* Takeda. is found in various parts of Nilgiris, such as Ootacamund, Pykara and Kotagiri. For my work, the plant was collected from Doddabetta region of Ootacamund by peeling the root and stem in the month of June and was identified, confirmed and authenticated by botanist Dr. S. Rajan, MSc, DPIM, DCA, PhD, Field Botanist, Survey of Medicinal Plants & Collection Unit. (Central Council for Research in Homoeopathy), Department of AYUSH, Ministry of Health & Family Welfare, Govt. of India. The root wood, root bark, stem wood stem bark and leaves were washed with running tap water to remove adhering unwanted materials. The root wood, root bark, stem wood, stem bark and leaves were cut into small pieces with stainless steel knife and were dried at temperature not exceeding 40 °C and powdered.

Table 1: Fluorescence Analysis of Methanolic Extracts of Root **wood, Root bark, Stem wood Stem bark & Leaves**

Type of extracts	Day Light	UV Light	
		Long UV (365nm)	Short UV (254nm)
Methanolic extract (root wood)	Brownish yellow	Green	Yellow
Methanolic extract (root bark)	Brownish yellow	Green	Yellow
Methanolic extract (stem wood)	Brownish yellow	Green	Yellow
Methanolic extract (stem bark)	Brownish yellow	Green	Yellow
Methanolic extract (leaves)	Brown	Green	yellow

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The powdered drugs were extracted by methanol by soxhlet apparatus for six hours[6] and the fluorescence character of the different extracts were studied both in day light and UV light[7]. The observation is shown in **(Table-1).**

Determination of Ash Values and Extractive Values [8, 9]

Total ash, acid insoluble ash, water soluble ash and sulphated ash for the root wood, root bark, stem wood, stem bark were determined **(Table - 2)**

Table 2: The ash values of different parts of *Mahonia Leschenaultii* Takeda

Sl. No.	Types of Ash values	Ash values (%w/w)				
		Root wood	Root bark	Stem wood	Stem bark	Leaves
1.	Total ash	2.63	4.76	2.52	4.38	1.57
2.	Acid insoluble ash	1.61	2.48	1.50	2.23	1.10
3.	Water soluble ash	0.85	1.82	0.89	1.69	0.45
4.	Sulphated ash	3.69	6.89	3.19	6.68	2.10

Extractive values such as alcohol soluble, water soluble and ether soluble extractive values were also determined **(Table - 3).**

Table 3: The extractive values of different parts of *Mahonia leschenaultii* Takeda

Sl. No.	Types of Extractive values	Extractive values (%w/w)				
		Root wood	Root bark	Stem wood	Stem bark	Leaves
1.	Alcohol soluble extractive	8.55	8.63	7.98	8.43	4.95
2.	Water soluble extractive	5.48	5.52	4.28	4.36	2.95
3.	Ether soluble extractive	0.43	0.53	0.69	0.38	2.10

Antibacterial Studies

Both gram - positive and gram - negative strains (*Staphylococcus aureus* (MMTC- 96) and *Escherichia coli* (MMTC- 739) obtained from MMTC Chandigarh, separately have been used for the studies. Nutrient agar media was used for the growth of bacterias for cylinder - plate method[10]. The Different methanolic extracts and the standard drug (Ampicillin trihydrate) were prepared by dissolving in dimethysulphoxide (DMSO) at the concentration of 50 µg/ml, 100µg/ml, 150 µg/ml and 200 µg/ml and 100µg/ml respectively.

Preparation of culture media:

Culture media was prepared according to standard procedure.

Table 4: Formula for the preparation of culture media

Sr. No.	Ingredients	Grams/ liter
1.	Peptic digest of animal tissue	5.0
2.	Sodium chloride	5.0
3.	Beef extracts	1.5
4.	Yeast extracts	1.5
5.	Agar	15

All ingredients were dissolved in distilled water. Adjusted the pH to 8.0 - 8.4 with 5 M sodium hydroxide solution and boil for 10-15 minute. Filtered the solution. Adjust the pH of the medium up to 7.4 ± 0.2 by the addition of dilute hydrochloric acid.

- Suspend 28 gm of the above mentioned medium in 1000 ml of distilled water.
- Boil to dissolve the medium completely.
- Sterilized the medium by autoclaving at 15 lb and at 121 °C.
- Mix the different strains (*Staphylococcus aureus* (MMTC- 96) and *Escherichia coli* (MMTC- 739) obtained from MMTC Chandigarh, separately.

Preparation of stock solution and different concentration of Test and Standard solution

Weight 10 mg of test (dried root wood, root bark, stem wood, stem bark and leaves extract) and diluted to 10 ml to form 1000µg/ml of solution. From this stock solution, took 0.5 ml, 1 ml, 1.5 ml and 2 ml and diluted to 10 ml to form 50 µg/ml, 100µg/ml, 150 µg/ml and 200 µg/ml, of test solution.

Similarly weight 10 mg of Standard drug (Ampicillin trihydrate) and diluted to 10 ml to form 1000 µg/ml of solution. From this stock solution, took 1 ml and diluted to 10 ml to form 100 µg/ml of standard solution. The dilution were made using DMSO Solvent. Test extracts of different parts with different concentration i.e. 50

µg/ml, 100 µg/ml, 150 µg/ml and 200 µg/ml. were evaluated for antibacterial activity against two strains of bacteria, *Staphylococcus aureus*, *Escherichia coli* using standard drug, Ampicillin trihydrate of concentration 100 µg/ml. The zone of inhibition is the area on the agar plates that remains free from bacterial growth. Zone of inhibition was calculated by measuring the diameter of inhibition of zone around the well. The diameter of zone of inhibition was determined for the different extracts of different concentration and standard and is shown in **Table-5.**

Observation:

Table 5: Antibacterial Study of Methanolic Extracts of *Mahonia leschenaultii* Takeda. by Cylinder - Plate Method

Sr. No	Extract and Drug	Test Extract concentration (µg/ml)	Zone of inhibition (Diameter in mm)	
			Staphylococcus aureus	*Escherichia coli*
1.	**Root wood extract**	50	00	04
		100	05	09
		150	07	10
		200	10	12
2.	**Root bark extract**	50	03	05
		100	06	10
		150	10	12
		200	12	14
3.	**Stem wood extract**	50	00	00
		100	04	09
		150	06	10
		200	10	11
4.	**Stem bark extract**	50	00	04
		100	07	10
		150	09	11
		200	11	12
5.	**Leaf extract**	50	00	00
		100	02	04
		150	04	05
		200	07	08
6.	**Ampicillin trihydrate**	100	16	19

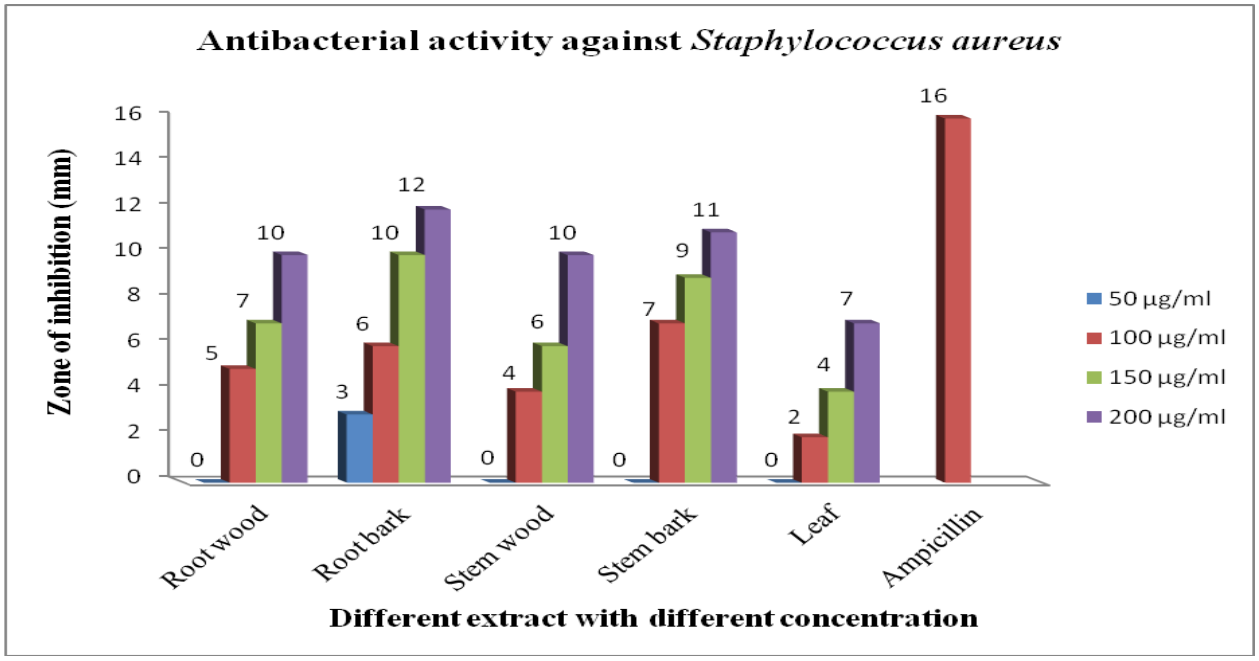

Figure 1: The graphical presentation of Antibacterial activity of different parts of *Mahonia leschenaultii* Takeda. extracts against *S. aureus*

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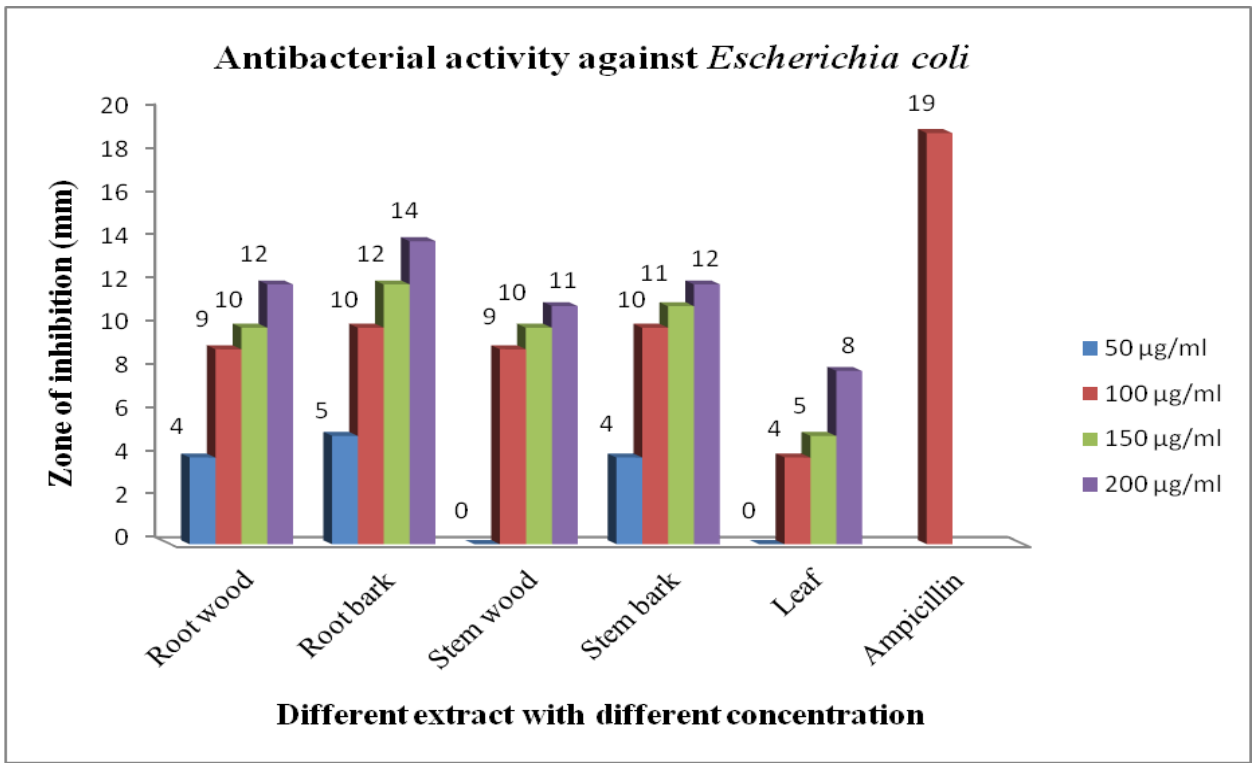

Figure 2: The graphical presentation of Antibacterial activity of different parts of *Mahonia leschenaultii* Takeda. extracts against *E. coli*

RESULT AND DISCUSSION

The methanolic extraction was done by taking root wood, root bark, stem wood, stem bark and leaves. The fluorescence analysis of the extracts showed the presence of fluorescent compounds in all the extract. The ash values and extractive value of root wood, root bark, stem wood, stem bark and leave were determined. It was found that the sulphated ahs value of root bark was found to be maximum than other ash value. It was also found that alcohol soluble extractive value of root bark was found to be maximum than other extractive value (water soluble, and Ether soluble extractive value). Antibacterial activity of the different part extracts and standard drugs (Ampicillin trihydrate) of different concentration 50 µg/ml, 100 µg/ml, 150 µg/ml, 200 µg/ml and 100 µg/ml reapeectively were determined by Cylinder-plate method. It was found that the maximum activity was shown by root bark extract. The minimum antibacterial activity was shown by leaves extract. The results represents that the antibacterial activity is found to be moderated as compared to standard drug (Ampicillin trihydrate). The extract is more active against *Escherichia coli* in comparison to *Staphylococcus aureus.*

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