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Research Article

**QUALITATIVE, QUANTITATIVE AND IN-VITRO
ANTIMICROBIAL ACTIVITY OF BOSWELLIA SERRATA
EXTRACT****Shankar Lal Kushwaha, Dr. Vivekanand Katare*¹, Ms. Nisha Kalme¹,
Dr. Prabhat Kumar Jain²**¹Vivekanand College of Pharmacy, Bhopal (M.P.), ²Scan Research Laboratories, Bhopal (M.P.)**Article Received:** December 2022 **Accepted:** December 2022 **Published:** January 2023**Abstract**

Herbal medicines are those with active ingredients made from plant parts, such as leaves, roots or flowers. Boswellia serrata (Salai/Salai guggul), is a moderate to large sized branching tree of family Burseraceae (Genus Boswellia), grows in dry mountainous regions of India, Northern Africa and Middle East. This study investigates the qualitative, quantitative and in vitro antimicrobial activity of Boswellia serrata plant extract. The roots of Boswellia serrata was collected and was treated by maceration process using Hydroalcoholic solvent (methanol: water 80:20). The percentage yield of Hydroalcoholic extract of Boswellia serrata was found to 5.12% by using maceration method. The results of phytochemical reveals that the all polar and aqueous soluble compound was found to be present in Boswellia serrata roots extract. The total alkaloid content was found to be 0.215 AT mg/100mg. The results of antimicrobial study shows that the aqueous extract of roots of Boswellia serrata have promising antibacterial effect. The results of antimicrobial activity showed that the plant extract is effective against bacteria as well as fungi. Hence it is concluded that the roots of Boswellia serrata can be used in pharmaceutical industry for the formulation of antimicrobial drug for the treatment of various fungal and bacterial infections.

Key Words: *Boswellia serrata, Antimicrobial Activity, Phytochemical analysis, Pharmaceutics***Corresponding author:****Vivekanand Katare,**

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INTRODUCTION:

The traditional herbal medicines (HM) and their preparations have been widely used for thousands of years in many oriental countries, such as in China, Korea, Japan, etc. However, one of the characteristics of oriental herbal medicine preparations is that all the herbal medicines, either presenting as single herbs or as collections of herbs in composite formulae, are extracted with boiling water during the decoction process [1].

Herbal medicines usually contain a range of pharmacologically active compounds; in some cases it is not known which ingredients are important for the therapeutic effect [2]. Many herbalists believe that isolated ingredients have weaker clinical effects than whole plant extracts, a notion that would obviously require proof in each case. The multi-ingredient character of herbal medicines can render efficacy testing more complex than with synthetic drugs.

Boswellia serrata (*Salai/Salai guggul*) (Family: Burseraceae; Genus: *Boswellia*) is a moderate to large sized branching tree that grows in dry mountainous regions of India, Northern Africa and the Middle East. The family of Burseraceae is represented in the plant kingdom with 17 genera and 600 species wide-spread in all tropical regions. There are about 25 known species belonging to Genus *Boswellia*, most of them occur in Arabia, northeastern coast of Africa and India [3,4].

Today's, microbial infections, resistance to antibiotic drugs, have been the biggest challenges, which threaten the health of societies. Microbial infections are responsible for millions of deaths every year worldwide. In 2013, 9.2 million deaths have been reported because of infections i.e. about 17% of total deaths. The occurrence of the evolution of resistance has caused the existing antibacterial drugs to become less effective or even ineffective. In recent years, various strategies have been suggested to overcome the resistance of antibiotics. One of the recommended strategies to achieve this goal has involved the combination of other molecules with the failing antibiotics, which apparently restores the desirable antibacterial activity [5,6]. Antimicrobial susceptibility testing can be used for drug discovery, epidemiology and prediction of therapeutic outcome. Thus this paper investigates on the qualitative, quantitative and *in vitro* anti microbial activity of plant *Boswellia serrata*.

MATERIAL AND METHODS:

Collection of plant materials:

The roots of *Boswellia serrata* were purchased from Akshat Nursery, Bhopal in the month of August 2022, considering the seasonal conditions for obtaining maximum phytoconstituents.

Extraction (By Maceration Method) [7]:

Collected plant namely *Boswellia serrata* roots were cleaned properly and washed with distilled water to remove any kind of dust particles. Cleaned and dried plant were converted into moderately coarse powder in hand grinder. Powdered plant drugs were weighed (50 gm) and packed in (1 liter) air tight glass Bottle. The plant drugs were subjected to extraction by Hydroalcoholic (methanol: water; 80:20) as solvent for about 24 hrs. The liquid extracts were collected in a tarred conical flask. The solvent removed from the extract by evaporation method using hot plate.

Phytochemical Screening:

In order to detect the various constituents present in the different extracts of roots of *Boswellia serrata*, were subjected to the phytochemical tests as per standard methods.

Estimation of total Alkaloids content [8]:

Atropine standard solution was made by dissolving 1 mg of pure Atropine (AR-grade procured from Sigma Company) in 10 ml distilled water. Separation of Alkaloid A part of extract residue was dissolved in 2N HCL and then filtered. 1 ml of this solution was transferred to separatory funnel and washed with 10 ml chloroform (3 times). The pH of this solution was adjusted to neutral with 0.1 N NaOH. Then 5 ml of BCG solution and 5 ml of phosphate buffer were added to this solution. The mixture was shaken and complex extracted with 1, 2, 3 and 4 ml chloroform by vigorous shaking, the extract was then collected in a 10 ml volumetric flask and diluted with chloroform. Preparation of standard curve accurately measured aliquots (0.4, 0.6, 0.8, 1 and 1.2 ml) of Atropine standard solution was transferred to different separatory funnels. Then 5 ml of pH 4.7 phosphate buffer and 5 ml of BCG solution was taken and the mixture was shaken with extract with 1, 2, 3, and 4 ml of chloroform.

Antimicrobial Activity of *Boswellia serrata*:

The antimicrobial activity of a hydroalcoholic extract produced from the leaves of *Boswellia serrata* was determined using a conventional approach utilizing the well diffusion method. In antibiogram experiments, three concentrations of extracted phytochemicals were used: 25, 50 and 100 mg/ml. The placement of wells containing antibiotics on the surfaces of agar soon after inoculation with the organism examined is a key aspect. Inoculums made

from undiluted overnight broth cultures should never be utilized. After a 24-hour incubation period at 37°C, the plates were inspected for distinct zones of inhibition surrounding the wells impregnated with a specific drug concentration.

RESULTS AND DISCUSSION:

The percentage yield of Hydroalcoholic extract of *Boswellia serrata* was found to 5.12% by using maceration method. The percentage yield was found to be slight higher due to polar nature of solvent. Results of Phytochemical test showed the presence of

Carbohydrates, Diterpenes, Saponins and Alkaloid. The results for total alkaloid content (TAC) in the Hydroalcoholic extract of *Boswellia serrata* roots were presented in the table (3.) TAC was expressed in milligram atropine equivalent (AE mg /100g). The results of antimicrobial study shows that the aqueous extract of roots of *Boswellia serrata* have promising antibacterial effect. The results of antimicrobial activity showed that the plant extract is effective against bacteria as well as fungi and the zone of inhibition is shown in table 5.

Table 1: Extractive values obtained from *Boswellia serrata*

S. No.	Solvent	% Yield
1.	Hydroalcoholic	5.12%

Table 2: Preliminary phytochemical screening of *Boswellia serrata*

S.N.	Phytoconstituents	Test Name	Hydroalcoholic Extract
1	Alkaloids	Wagner's Test	Present
2	Carbohydrates	Fehling's Test	Present
3	Flavonoids	Lead acetate	Absent
		Alkaline reagent test	Absent
4	Proteins & Amino acids	Precipitation test	Absent
5	Phenols	Ferric chloride test	Absent
6	Diterpenes	Copper acetate test	Present
7	Saponins	Foam test	Present

Table 3: Absorbance of standard compound at 470 nm

Standard	Concentration (µg/ml)	Mean Absorbance
Atropine	0.4	0.183
	0.6	0.286
	0.8	0.394
	1	0.517
	1.2	0.624

n= 3, values are given in SEM

Table 4: Total Alkaloid Content of Hydroalcoholic extract of *Boswellia serrata*

Sample	Total Alkaloid content AT mg/100mg
Hydroalcoholic extract 100µg/ml	0.215

n=3, values are given in SEM

Table 5: Antimicrobial activity of hydroalcoholic extract of *Boswellia serrata* against selected microbes

S. No.	Name of microbes	Zone of inhibition		
		25mg/ml	50 mg/ml	100mg/ml
1.	<i>Bacillus subtilis</i>			
	Extract	11±0.5	16±0.74	18±0.86
2.	<i>Candida albicans</i>			
	Extract	15±0.47	17±0.5	20±0.57

CONCLUSION:

In the present study, we have found that the plant *Boswellia serrata* is rich in Diterpenes, Saponins and Alkaloid compounds. It shows that the presence of such bioactive compounds have medicinal importance. As a promising source of bioactive compounds, it can be an excellent source of useful drugs. It will obviously be due to high contents of the alkaloids in the aqueous extract. The results of antimicrobial study shows that the aqueous extract of roots of *Boswellia serrata* have promising antibacterial effect. It is concluded that the roots of *Boswellia serrata* can be used in pharmaceutical industry for the formulation of antimicrobial drug for the treatment of various fungal and bacterial infections.

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