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EVALUATION OF *INVITRO* ANTHELMINTHIC ACTIVITY OF LEAF AND BARK AQUEOUS EXTRACTS OF *SANTALUM ALBUM Linn.*

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ABSTRACT

Santalum album Linn is the most significant genus in the family *Santalaceae*, which is commonly known as *Sri gandham* in India. This study evaluates anthelmintic activity of Aqueous leaf and bark extracts of *Santalum album Linn* on Indian adult earthworms, Pheretima posthuma (annelid). Leaves and barks were extracted by using soxhlet apparatus. Photochemical screening of crude extracts showed the presence of Alkaloids, Glycosides, Carbohydrates, Flavonoids, Phenols and Tannins. Various concentrations (25, 50 & 100mg/ml) of crude extracts were tested on anthelminthic activity when involved the determination of the time of paralysis and time of death of worms. The activity was compared with standard Albendazole. The aqueous extract shows significant activity when compared to the standard Albendazole. The paralysis and death time is 64, 60, 55 and 78, 75, 70 minutes respectively at concentrations 25, 50 and 100mg/ml for the bark extract and 80, 74, 69 and 85, 82, 75 minutes respectively at concentrations 20, 50 and 100mg/ml for the leaf extract. Whereas these are 46, 40, 34 min and 62, 58, 50 minutes for Albendazole. In order to confirm the studies *in vivo* studies have to be conducted.

INTRODUCTION:

Medicinal plants have been continuously used for thousands of years to treat various disorders and to prevent a number of animal and human diseases [1,2]. For the last 20 years, lot of work was done on many medicinal plant products with description of their chemical constituents in the form of primary and secondary metabolites. Helminthic problems are highest in countries with warm, moist climate with poor sanitation . Number of cases is seen in Asia (72%), Africa (12%) and South America (8%). Around as many as 1.5 to 2 billion people worldwide have been infected with helminthes and associated complications. Hence there is a necessity to study Anthelminthic activity[3]. *Santalum album Linn*. is a tropical woody, perinneal and essential oil yielding tree belongs to the family *Santalaceae*. It is the most important economical species due to its sandal wood. Sandalwood is commonly known as East Indian sandal wood and the oil is East Indian sandal wood oil. The fragrance is due to the presence of α and β santalols in sandal wood oil. The oil is used in Ayurveda, Chinese and Tibetan medicinal systems. Sun et.al: (2004) have isolated and identified 25 fungal endophytes associated with roots of *Santalum album*. It is usually found in india,

china, Indonesia and Philippines [4,5,6]. Amith *et al*; (2016) has proved the aqueous root extract of santalum album has immunopharmacological activity[7].

MATERIALS AND METHODS

Collection of Plant materials:

The fresh leaves and bark were collected in the month of June 2017 from the medicinal garden of Mother Teresa pharmacy college, Sathupalli, Khammam district, Telangana. They are washed with water to remove extraneous materials.

Plant authentication:

The plant was taxonomically identified and authenticated as per the standard literature.

Extraction of drug:

The separated leaves and bark were air dried in shade at room temperature. Then they were crushed in a blender separately and subjected to extraction by using Soxhlet's extractor. After exhaustive extraction the collected aqueous extract was subjected to evaporation to obtain the pure drug of extract. The extract was dried at low temperature under reduced pressure.

Phytochemical screening:

The phytochemical study was carried out by using standard procedures [8-10].

Collection of worms:

Indian Adult earth worm (Pheretima posthuma) was used to study anthelminthic activity. The earth worms were purchased locally from sathupally. The worms are 7-8 cms length and 0.2 to 0.3cms width. Pheretima posthuma resemble the intestinal round worm parasites of human beings both anatomically and physiologically

Drugs and chemicals:

Albendazole, saline water, Tween 80 were used for the work.

Preparation of test drug and reference drugs:

The stored dried plant extracts were redissolved at concentrations of 25, 50 and 100mg/ml were suspended in 2% v/v tween80 in normal saline solution and used for screening the anthelminthic activity. Standard Albendazole was used with the same concentrations and used as a reference drug. All the solvents are freshly prepared before commencement of the experiment.

Anthelminthic activity:

The anthelmintic activity was evaluated on adult Indian earthworms by *Mathew et.al* method. For preliminary evaluation of anthelmintic activity test samples of the extracts were prepared at the concentration of 25, 50 and 100 mg/ml in 2% v/v tween80 in normal saline solution, 6 worms *Pheretima posthuma* of 5-7cm were placed in petridish containing 30 ml of above test solutions of extracts. Albendazole (25, 50 and 100mg/ml) was used as reference standard and normal saline with Tween80 (2%) is used as negative control. All the test solutions and standard solutions were prepared freshly before starting the experiment. Observations are made for the time taken for paralysis when movement was lost or no movement. Time for death of worms were recorded after ascertaining that worms neither moved when shaken vigorously nor when dipped in warm water at 50^0c and fading of color of worms [11].

DISCUSSION:

The work states that the presence of Alkaloids, Glycosides, Carbohydrates, Flavonoids, Phenols and Tannins in the leaf and bark extracts of Santalum *album* were responsible for its anthelmintic activity. Aqueous extract was shown significant values with respective to paralysis and death time of earth worms. It is interesting to observe the results of anthelmintic effect of aqueous extract. But further investigations on the isolation of active compounds present in the extracts and *in vivo* studies are necessary to identify a potential chemical entity for clinical use.

Table 1: Phytochemical screening:

Name of the phytoconstituents	SAALE	SAABE
Alkaloids	+	+
Carbohydrates	+	+
Aminoacids	-	-
Tannins	+	+
Saponnins	+	+
Flavonoids	+	+
Glycosides	+	+
Mucilages	-	-

SAALE: Santalum album aqueous leaf extract
SAABE: Santalum album Aqueous Bark extract

Table 2: Anti-helminthic activity (Paralysis) (Death) of *Santalum album linn* leaf and bark aqueous extracts

Type of extract	Dose (mg/ml)	Time taken (min) Paralysis	Time taken (min) Death
Normal Saline	-	-	-
Albendazole	25	45	61
	50	40	60
	100	35	52
SAALE	25	80	86
	50	75	82
	100	70	74
SAABE	25	65	79
	50	61	76
	100	55	72

Fig 1: Anthelminthic activity of Albendazole and *Santalum album*

Fig 2: Anthelminthic activity of control (Normal saline with tween)

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