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Investigation of Anthelmintic Activity of *Caeselpinia decapetala (Roth)* Seed and Leaves Extracts

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ABSTRACT

The present work is an attempt to assess the in- vitro anthelmintic activity of the leaves and seed extracts of Caesalpinia decapetala (Roth). The crude drug was extracted in alcohol and water by using maceration extraction procedure. These extracts are used for assessment of in-vitro anthelmintic activity by using traditional earthworm technique. Doses of various concentration of extracts are prepared and earthworms are allowed to expose to them. Time of paralysis and death was observed and recorded as observations. In-vitro antihelmintic study of C. decepetala showed promising results. The perusal of the data reveals that the hydroalcoholic extract of the leaves at concentration of 10mg/ml, 20mg/ml, 40mg/ml, 50mg/ml and 100mg/ml showed paralysis and death time in 108, 63, 32, 15, 5& 138, 83, 48, 21, 11 mins. and the seed extract at same concentrations shows both paralysis and death at 63, 48, 25, 21, 4 and 87, 62, 32, 26, 9 mins respectively. Conclusion: The anthelmintic activity of leaves and seed plant extract of Caesalpinia decapetala (Roth) Alston. Was carried out on earth warm. Different concentrations of the hydroalcoholic extracts were used for the studies. The time taken for paralysis and death of earthworms were recorded. The extract showed paralysis followed by death of the worms at all tested dose levels.

Keywords: STH, Morbidity, Ayurveda, Anthelmintic, Earthworm method.

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INTRODUCTION

Soil transmitted helminth (STH) infections are the most prevalent neglected tropical diseases (NTDs) globally. India has the highest burden of STH infections globally. [1] According to the reports of WHO approximately 1.5 billion peoples are infected with STH worldwide. In India alone 241 million children are estimated to be at risk of STH.[2] The warm and moist climate of tropical and subtropical countries provides the ideal environment for the survival of parasite eggs or larvae of these four STH, roundworm (Ascaris lumbricoides), whipworm (Trichuris trichiura) and hookworm

(Necatoramericanus, Ancylostoma duodenale).[3]Although A. lumbricoides has been reported to be the most prevalent STH infection human hookworminfections are responsible for the majority of the morbidity.

In recent years, it has been realized that traditional herbal drugs are going to play a very significant role in curing certain acute and chronic diseases and disorders. For the treatment of STH various chemically synthetic drugs are present in market, but nowadays peoples are looking forward at the use of more and more natural origin drugs, as most of the modern synthetic drugs and medicines have attacked the targets blindly and thus badly affected several related metabolic processes. [4]As well the plant origin drugs are economic and easily available. Various parts of various plants can be used as a way of treatment for the STH.

Chillari (Caeselpenia decapetala Roth.) is very effective as a means of treatment for the STH. In Ayurveda, Caesalpenia decapetala is used as anti-inflammatory, anti-malarial, anti-histamine, anti-asthma, anti-aging agent and antipyretic properties. It is also used to cure diseases like skin diseases, medicinal paste for treating poisonous snake bite, treating liver stagnation type reflux oesophagities, treating ecthyma and headache, for rabies, treating hyperosteogeny. Different parts of it are used to prepared Chinese

medicines.[5]Local peoples usually use seeds of this plant for the treatment and relief form stomach ache and STH which is called as Jant in local language. Apart from this Chillari plant tobacco, walnut, clove, kalonji seed, garlic, malefern, pineapple are also used for treatment of STH.

This study mainly focuses on proving the anthelmintic activity of the given plant. The traditional earthworm method was used for the study of given activity. Hydroalcoholic extract which was extracted from seeds and leaves of fully matured well grown plant by maceration method was used for the study and the albendazole tablet was used as standard. Earthworms were allowed to expose to the different concentrations of test drug, paralyze and death time of earthworms was noted.

Plant [5]: -

Synonyms:

- Latin Name: Caesalpinia decapetala (Roth) Alston
- Marathi Name: Chillar, Chillhari, Chillati.
- English Name: Mysore thorn, Shoofly Black Bonduc.
- Sanskrit Name: Kantaki Karanja
- Hindi Name: Ralan, Alia, Arlu, Kingan.
- Gujrati Name: KirmichChilar
- Urdu Name: KanderRelan
- Kannada Name: Gajalige, Hotasige, Hunnula, Kurudu, Gejjuga, Kurutugajjika
- Malayalam Name: Inna

Geographical Distribution:

Caesalpinia decapetala (Roth) Alston is a climbing shrub and is widely distributed around the world. It is found out throughout warmer parts of India, Myanmar, China, and Japan. It is introduced in the tropical regions of India, Korea, Thailand, Laos, Vietnam, Malaysia, Philippines. All the parts root, bark, leaves, flowers and seeds are used as herbal medicines.

Morphological Characteristic:

Caesalpinia decapetala is originally from Asia and Malaysia. It is a large sprawling shrub (growing up to 7m) with prickly branches; it can climb on large tree up to 20m high. Young branches are densely covered by tiny brownish or golden colour hairs having sharp thorns. Older stem is thick with large thorns.

The leaves are bipinnate, alternately arranged and have a pair of small leafy stipules at their base. The stipules are 4-20 mm long, egg shaped in outline with broad end at base but taper to a point. The leaves are borne on stalk 3-8 cm long. Each stalk has 4-10 pair of branchlets called pinnae. Each branchlets has 8-12 pairs of leaflet called pinnules. The leaflets are 7-20 mm long and 2-8 mm wide. They are oblong or ovate form outer side and narrower end toward base. The flowers are usually pale yellow or yellow in colour sometimes whitish. It has five petals

with 10-15 mm long, five sepals with 9-10 mm long, ten stamens with 10-16 mm long and a style with 15-20 mm long topped with a cup-shaped stigma. Four petals are circular in shape but upper petal is smaller and narrower than the others. The flower are borne on stalks 15-25 mm long and arranged in erect position. The fruits are flattened, pods, oblong with small beak at one end.

These woody pods are 6-10 cm long and 25mm wide with hairs and turns from green to brown as they mature. After maturity they split to release 4-9 rounded seeds. These seeds are 6-10 mm in diameter with brown to black in colour. The seeds get scattered after breaking of pods. The seed surface is smooth, outer coating of seed is too thick and hard hence it required several months to years for its germination.

The genus caesalpinia contains cassanediterpeniod in it. From the leaves of C. decapetala eight known compound are isolated namely spathulenol, 4,5 epoxy-8(14)caryophylene, squalene, lupeol, trans-resveratrol, quercetin, astragalin and stigmasterol. Apart from this new cassane diterpenoid, caesaldecan also present.

MATERIALS AND METHOD

Material

Plant collection:

The leaves and seeds were collected from Tulsan and Shewalewadi-Yenape, tehsil- Karad, Dist. -Satara, Mahaarashtra, India 4151111. Fully matured plant were collected and authenticated by Dr. B. J. Patil Head of Dept. of Botany, S. G. M. College, Karad. Leaves and seeds where dried by sun drying and powdered by grinding.

Earthworm collection:

Earthworms having same length and fully grown were collected from a local farmer at Shewalewadi-Yenpe, Tehsil- Karad, Dist. – Satara, Maharashtra, India, 415111 having earthworm biofertilizer scheme.

Methods

Extraction method: Hydroalcoholic extract was prepared by using maceration[6-8] technique. Solvent is usedin 3 times more quantity than the weight of the powders. 50gm of powder obtained from leaves and 150ml solvent (75ml water and 75ml ethanol) used for extraction of leaves whereas, 15gm of seed powder and 50ml solvent (25ml water and 25ml ethanol) was used for the seed extract. Solution is kept in two different flasks covered with aluminium foil and properly closed with cotton swab. This was kept for one week. Then the mixture was removed from the flask and filtered to get clear solution. This clear extract was then evaporated to get final extract. These extracts were used for further studies.

- Weight of leaves extract obtained: 14.98gm

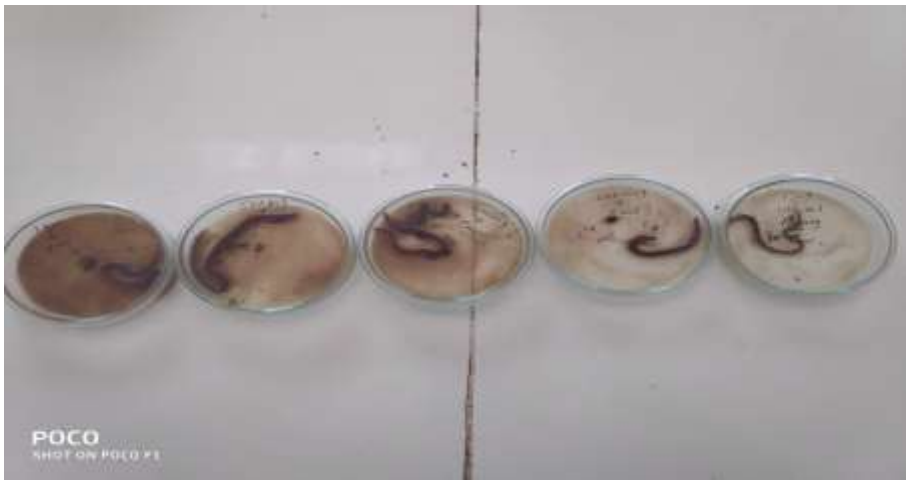
- Weight of seed extract obtained: 4.96gm

Experimentation

Anthelmintic activity:

Earthworms, each of average length of 15cm, were placed in Petri dishes containing 10mL of various drug concentrations, 10mg/mL, 20mg/mL, 40mg/mL, 50mg/mL, and 100mg/mL, of solutions (both leaves and seed extracts are taken in same concentration.). Albendazole solution was used as reference standard drug and distilled water as control. The worms were observed for the motility after incubating at 37◦C. This was done after pouring the Petri dishes content in the wash basin and allowing the worms to move freely.

By tapping the end of each worm with the index finger and applying a bit of pressure, the worms that were alive showed motility and those dead were nonmotile. The motile worms were returned to the respective Petri dishes containing drug solutions, and the incubation process was carried out again. In the control, the worms were viable for at least twelve days. The time taken for paralysis, motility activity of any sort, and death time of worms were observed and recorded after ascertaining that the worms did not move neither when shaken vigorously nor when dipped in warm water (50◦C).[9-10]



RESULTS AND DISCUSSION

Leaves extract:

Table 1: Anthelmintic activity of C. decapetala leaves extracts

Name of drug	Earthworms	Concentrations	Time of paralysis	Time of death
Albendazole	1	40mg/ml	14min 10sec	20min 25sec
C. decapetala	2	10mg/ml	108min 54sec	138min 55sec
C. decapetala	3	20mg/ml	63min 32sec	83min 50sec
C. decapetala	4	40mg/ml	32min 38sec	48min 18sec
C. decapetala	5	50mg/ml	15min 49sec	21min 17sec
C. decapetala	6	100mg/ml	5min 50sec	11min 22sec

Seed extract: -

Table 2: - Anthelmintic activity of C. decapetala seed extracts

Name of drug	Earthworms	Concentrations	Time of paralysis	Time of death
Albendazole	1	40mg/ml	14min 10sec	20min 25sec
C. decapetala	2	10mg/ml	63min 18sec	87min 7sec
C. decapetala	3	20mg/ml	48min 58sec	62min 23sec
C. decapetala	4	40mg/ml	25min 27sec	32min 18sec
C. decapetala	5	50mg/ml	21 min 49sec	26min 37sec
C. decapetala	6	100mg/ml	4min 53sec	9min 11sec

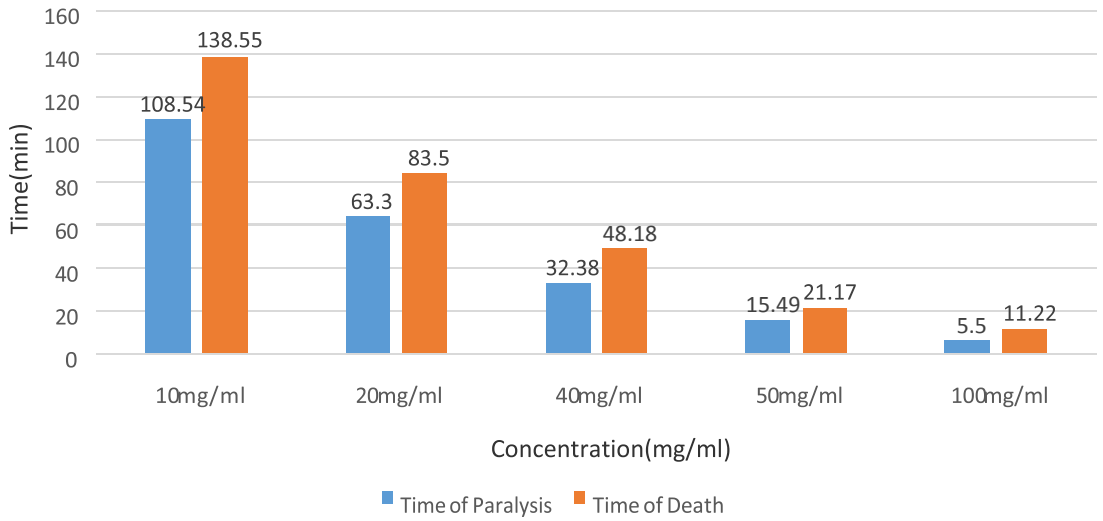


Figure 1: Comparative study of time of paralysis and time of death achieved by leaves extract of C. decapetala

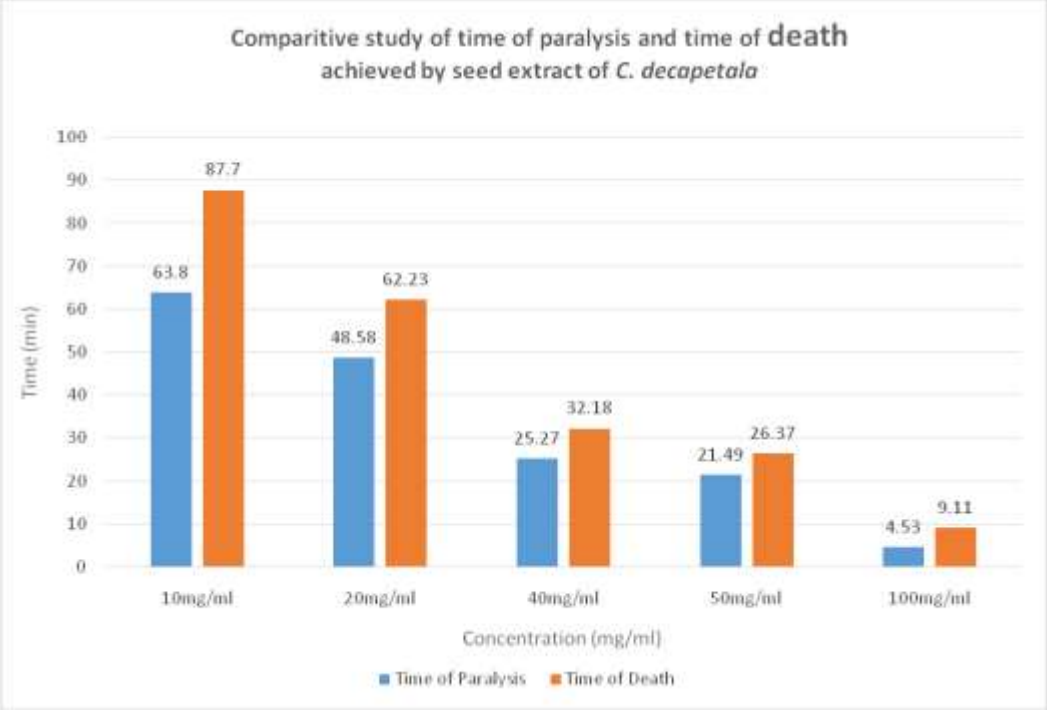


Figure 2

Anthelmintics or antihelminthics are a group of antiparasitic drugs that expel parasitic worms and other internal parasites from the body by either stunning or killing them and without causing significant damage to the host.

The anthelmintic activity of Caeselpenia decapetala leaves and seed extract was carried out on earth worm. Different concentrations of the hydroalcoholic extracts were used for the studies. The time taken for paralysis and death of earthworms were recorded in Table – I and II. The perusal of the data reveals that the hydro-alcoholic extract of the leaves at concentration of 10mg/ml, 20mg/ml, 40mg/ml, 50mg/ml and 100mg/ml showed both paralysis and death time in 108, 63, 32, 15, 5& 138, 83, 48, 21, 11 mins. and that of the seed extract at same concentrations shows both paralysis and death at 63, 48, 25, 21, 4 and 87, 62, 32, 26, 9mins respectively. The effect increased with increase in concentration. The extract showed paralysis followed by death of the worms at all tested dose levels.

CONCLUSION

Various concentrations of all extracts were tested and results were expressed in terms of time for paralysis and time for death of worms. Albendazole (40 mg/ml) was used as a reference standard and distilled water as a control group. Dose dependent activity was observed in both extracts but leaves shows more activity as compared to seeds extract of Caeselpenia decapetala. The wormicidal activity of hydro-alcoholic extracts suggests that it is effective against parasitic infections of humans. Further, in future it is necessary to identify and isolate the possible active phytoconstitutents responsible for the anthelmintic activity and study its pharmacological actions.

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