Chapter - 12

ANTIMICROBIAL AND ANTHELMENTIC STUDIES ON GLOCHIDIAN

ZEYLANICUM AND CANSJERA RHEEDII ROOT
12.1 INTRODUCTION

Medicinal plants and its constituents play an important role in the treatment of localized and generalized infections. The World Health organization says that majority of the people living in the developing countries depends on the traditional system of medicine for the treatment of various diseases. Medicinal plants are the active components of Ayurveda, Unani and Siddha systems of medicine. It has been estimated that 15-30% of higher plant species are used medicinally. Only 15% of angiosperms have been Pharmacologically and Phytochemically investigated. Fransworth et al 1991.

Many number of surveys have been carried out by different workers Skinner et al, 1955 all of which mentioned that the distribution of antibiotic principles active against the bacteria, protozoa and fungi. In higher plants particularly angiosperms, one of the approach that has been used for investigation of antimicrobial principles from higher plants is based on the phytochemical and microbiological screening of medicinal plant extract. The WHO at their meeting in 1985 specified some herbal drugs such as Alovera, ficus carica, lupinus mermis, fumara officinalis, santam album, nyphaea alba for the treatment of various skin problems.

Pharmacophores such as emitine, beriberine, quinine, sanguinarine were proved to possess significant antimicrobial activity Mitscher et al, 1987, other phytochemical constituents such as anethole kubo et al, 1992, polygodial Kubo et al,1988 and cryptotepine Paulo et al, 1994 were found that they have significant antimicrobial activity. Many antibiotics available in the market are more effective in destroying the bacteria as well as produce side effects. In order to reduce side effects of some medicines, the need of traditional medicines are increasing because naturally occurring medicines do not produce hazards to health. To solve such problems, investigations are required on
medicinal plants for the screening of antibiotic principles. Basing on this concept, the
author studied about antimicrobial and antihelmentic activities of Glochidian

12.2 SCREENING TECHNIQUES FOR ANTIMICROBIAL ACTIVITY

The need for the importance of antibacterial and antifungal drugs has been
realized with the emergence of acquired immunodeficiency syndrome (AIDS) and AIDS
Related Complex (ARC), which are often associates with opportunistic infection .The
effects are renewed in CDRI in the search of novel, more potent, safer and effective
antimicrobials from plants, flora, marine and synthetic sources .

Approximately 15,500 products (natural and synthetic) have been screened, so far, for
antimicrobial activity in the Medicinal Mycology Division. The evaluation of antimicrobial
agents comprises two phases. The invitro, where screening of products is done against
the organism under laboratory condition and invivo against the organismic animal
models (lagomorphs, rodents and non human primates etc) for the study. The techniques
employed routinely in CDRI for antimicrobial screening are illustrated as follows:

Invitro antimicrobial screening:

The aim of invitro screening is to find out the minimum inhibitory concentration
(MIC) of the test compound against the pathogens of various bacteria and fungi. The
MIC refers to the minimum amount of compound required to kill (tidal effect) or inhibit
(static effect) the growth of the organism .The factors which contribute to sensitivity are
solubility of test compounds, pH, media, temperature, time of incubation, the initial
inoculum etc.

a. Solubility of compounds: This is important to see the extract is completely soluble
   in an aqueous solution or in specific solvent (DMSO) otherwise the compound will not
give a correct information about the activity besides the sensitivity of the test product pH (for fungi 5.5-6, for bacteria 7.4), light and temperature.

b. **Media:** The selection of media depends on the type of organism and nature of the extract to be tested. For antibacterial sensitivity, nutrient agar/broth (pH 7.4), Muller–Hinton agar (pH-7.4) etc. for antifungal activity yeast nitrogen base (pH-5.4), Sabouraud’s dextrose agar/media (pH 5.5-6) are commonly used.

c. **Preparation of media:** Fresh inoculum is prepared for invitro tests. For bacteria, the test inoculum is obtained from 24hr old culture and for mycelia fungi 5-6 days old cultures. The colony forming units (CFU) of the test inoculum is about $10^5$ cells/ml.

d. **Temperature and time period of incubation:** Anti bacterial sensitivity test results read after 18-24 hr incubation at 37ºc. While for yeast is 24-48hr and for filaments fungi 72-96 hr incubation at temperature of 28ºc

**Methods of invitro testing:**

The antimicrobial activity of compounds are tested by several methods. Some methods are:

a. Disc diffusion method

b. Tube dilution method (both dilution)

c. Micro tube technique

The anti microbial protocol consists of bacteria: *staphylococcus aureus, streptococcus faecalis, klebsiella pnemoniee, pseudomonas aeruginosa and eseherichia coli and the fungi :* *viz: candida albicans, sporothrix schenelai, cryptococcus neoformans, trichophton menta grophites and aspergillus niger.*
a. **Disc diffusion method**: The test compound is impregnated in standard filter discs (8mm diameter). The media Sabouraud's dextrose agar or nutrient agar or Muller-Hinton agar 20ml per plate(90 mm diameter ) are flooded with 5-10ml of the test inoculum in broth followed by flotation method and then 20min for drying at room temperature. The antimicrobial discs are kept at least 15mm distance from each other. 4 to 5 discs can be placed in one petridish .The plates are incubated at 37ºc (bacteria) or 28ºc (fungi) and the zones of inhibition (in mm diameter) are measured.

b. **Tube Dilution method (Broth dilution) method**: Tube dilution or broth dilution technique is adopted for invitro testing of products. The test samples are dissolved usually in dimethyl sulfoxide (DMSO) to obtain 10mg/ml (natural product) stock solution. Appropriate seeded broths i.e nutrient broth (bacteria) and Sabouraud's broth (fungi) are prepared. 0.2ml solution of the test material is added to 1.8ml of the seeded broth and this forms first dilution. 1ml of this is diluted with 1ml of seeded broth to give second dilution and so on till 10-12 such dilutions are obtained. A set of tubes containing seeded broth and solvent controls maintained under identical conditions. The tubes are incubated either at 37ºc for (bacteria) or 28ºc (fungi) and the MICs of the test compounds (based on the growth appearance) are noted after 24h for bacteria 24-28h (for yeast) and 72-96h ( for mycelial fungi) incubation. The last tube with no test compound is expressed in µg/ml.

C. **Microlitre technique**:

This method is more sensitive, rapid, modern, economic, automated and quantitative compared to two-fold serial dilution technique.
Micro broth (270µg/well) with drug dilution (30ml) is made serially (transferred to 150 µg/ml) with a multi channel. Appendorf pipette in a microlitre plate with 96 (12 X 8) wells. Automated Elisa Reader (Flow labs makes observations, Scotland) based upon optical density (OD at 492nm). The test inoculum is added (20µg/l in each well) separately. Appropriate controls are set accordingly.

2.4 ANTIMICROBIAL STUDIES ON GLOCHIDION ZEYLANICUM ROOT

12.4.1 EXPERIMENTAL:

The plant material:

The plant material was used in this experiment was collected in the month of july 2008, from papanasanam forest A.P, India. Identification of the plant was carried out by Dr.Madhava Chetty, Asst.Professor, Dept of Botany, SRI VENKATESWARA UNIVERSITY, Tirupati, A.P, India.

Preparation of the extract:

The roots of Glochidion Zeylanicum were washed, air dried and then powdered well (40 mesh size), 25 grams of powdered drug K.M Pulok et al,1995 was soaked in petroleum ether, n-butanol, methanol, chloroform, water, ethylacetate and benzene separately for ten days. Then the extract was separated from the sample solution by the separating funnel and then concentrated A.caeres et al, 1995. Then extract thus obtained from the roots of Glochidion Zeylanicum was tested for its antimicrobial activity..

Preparation of sample solution:
Stock solutions of the different fractions of *Glochidion Zeylanicum* roots at the concentration of 1000 μg/ml were prepared using DMSO as an solvent. DMSO was sterilized by filtration using filter paper (pore size 0.2 microns). Further dilution was made by sterile DMSO to get concentration of 200 μg/ml of each extract. The diameter of the disc is 8mm. Ciprofloxacin and Griseofulvin were used as standard drugs for antibacterial and antifungal activities respectively.

**Micro organisms:**

The following strains were used as test organisms which are obtained from JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, Hyderabad, India. *Bacillus subtilis* NCIM2493, *Flavobacterium Tegeticola* NICIM7765, *E.coli*, NCIM2068, *Seretia rubidia*, *Steptomyces sp*, *Flavobacterium oxysporium*.

**Medium used:**

For the evaluation of antibacterial activity the following media was used.

Peptone : 0.6g
Tryptone : 0.4g
Yeast extract : 0.30g
Beef extract : 0.15g
Dextrose : 0.10g
Agar : 1.75g
Distilled water q.s to 100ml

The above constituents were dissolved by heating the medium, and the pH was adjusted to 6.8 to 7.2. The above medium was sterilized to 120°C (15 lb/sq in) for 20 minutes.
**Preparation of inoculum:**

The test microorganism were maintained in slant tubes having 5ml of media. The organism were sub cultured in tubes containing broth media (the same composition without agar), Then the tubes were incubated at 37°C for 24 hr.

**Composition of the medium used for antifungal assay:**

Peeled potatoes : 200gm
Dextrose : 20gm
Agar agar : 25gm
Distilled water up to 1litre

**Procedure:**

Peeled potatoes made into small chips and than boiled with 250ml of water for 30 minutes. The chips were crushed during boiling and the pulp was removed by filtration using muslin, after cooling to the room temperature. Agar and dextrose were added slowly by stirring and the volume was made into 1000ml. It was distributed in 40ml quantities into 100ml conical flasks and the flasks were sterilized in an autoclave at 12°C (15lbs/sq.m) for 20 minutes.

**Planting the media:**

Molten media was poured into the petridish (pre sterilized in oven for 3 hr at 110°C and plated petridishes were kept on a plane area to avoid non -uniform solidification . All the operations were performed in a sterile room, which was fitted with laminar airflow.
Assay Procedure:

The antimicrobial activity was studied by employing disc paper method (A.S Mathero, 2002). A day old cultures were used for the determination of antimicrobial activity of test compounds (extracts) and then were seeded into sterile nutrient agar medium by uniformly mixing 1ml of inoculum with 20ml of sterile melted nutrient agar (48-50ºc), in a sterile petridish. When the agar is solidified, discs were placed. Sterile Whatman filter paper discs (8mm diameter) which were thoroughly moistened with different solvent extracts 200µg/ml and with standard drugs Ciprofloxacin and Griseofulvin 10 µg/ml discs used as standard drugs. These two drugs used as standards for antibacterial and antifungal activities respectively. The paper discs were previously sterilized in an autoclave by moist heat sterilization. The discs were placed on the plate with help of fine pointed, previously sterilized forceps. Then the plates were incubated at 37ºc for 24hr. After incubation the antimicrobial activity was determined by zone of inhibition method, where the diameter was measured by using millimeter scale Mariam et al, 1993. The media prepared for the antifungal activity is inoculated with 1ml of aqueous suspension of organism (fungi) which was prepared from 48hr culture. Then inoculated agar medium was poured into petridish and allowed to set for 15 minutes. Sterile Whatman filter paper discs (8mm diameter) were thoroughly moistened with different extracts (200 µg/ml). Griseofulvin was used as standard with 10 µg/ml concentration .Plate incubated at room temperature. After 48 hr the plate was examined and incubation zone was measured. The results were given in Table 29.
### Table 29:

**ANTIMICROBIAL ACTIVITY OF GLOCHIDION ZEYLANICUM ROOT EXTRACT**

(The values represent zone of inhibition in mm)

<table>
<thead>
<tr>
<th>Name of the bacteria</th>
<th>Solvent Extracts</th>
<th>Standard drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bacillus subtilis</strong></td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td><strong>Flavobacterium tegecticola</strong></td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td><strong>Seretia rubidiae</strong></td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td><strong>Streptomyces sp.</strong></td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td><strong>E. coli</strong></td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td><strong>Flavobacterium oxysporium</strong></td>
<td>10</td>
<td>11</td>
</tr>
</tbody>
</table>
The disc diameter 8 mm. is subtracted from readings, NA denotes no activity, Cpr. and Gri. Indicate Ciprofloxacin and Griseofulvin.

12.4.2 RESULTS

The results of the antimicrobial activity was tabulated in Table. The antibacterial activity was observed maximum in aqueous extract against *Flavobacterium tegecticola*, *E. coli* (zone of inhibition, 18mm) and the maximum antifungal activity was observed in ethyl acetate and aqueous alcohol extract (zone of inhibition, 11mm)

12.4.3 CONCLUSION

From the above investigation it is concluded that the *Glohidion Zeylanicum* root extract posses significant antimicrobial activity.

12.4.3 PUBLICATION


12.4.4 REFERENCES

12.5 ANTIMICROBIAL STUDIES ON CANSJERA RHEEDI ROOT EXTRACT
(FAMILY: OPILIACEAE)

12.5.1 EXPERIMENTAL

Plant material: The plant material was used in this experiment was collected in the month of July 2008, from Japalitheertham area (Tirumala) A.P, India. Identification of the plant was carried out by Dr. Madhava Chetty, Asst. Professor, Dept of Botany, SRI VENKATEASWARA UNIVERSITY, Tirupati, A.P, India.

Preparation of the extract:

The roots of *Cansjera rheedi* were washed, air dried, and then powdered well (40 mesh size), 25 grams of powdered drug K.M Pulok et al., 1995 was soaked in petroleum ether, n-butanol, methanol, chloroform, water, ethyl acetate and benzene separately for ten days. Then the extract was separated from the sample solution by the separating funnel and then concentrated A.Caereres et al, 1995. The extract thus obtained from the roots of *Cansjera rheedi* was tested for its antimicrobial activity.

Preparation of sample solution:
Stock solutions of the different fractions of *Cansjera rheedii* roots at a concentration of 1000µg/ml were prepared using DMSO as an solvent. DMSO was sterilized by filtration using filter paper (pore size 0.2 microns). Further dilution was made by sterile DMSO to get concentration of 200 µg/ml of each extract. The diameter of the disc is 8mm. Ciprofloxacin and Griseofulvin were used as standard drugs for antibacterial and antifungal activities respectively.

**Micro organisms:**

The following stains were used as test organisms obtained from JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, Hyderabad, India. *Bacillus subtilis* NCIM2493, *Flavobacterium tegecticola* NICIM7765, *E.coli*, NCIM2068, *Serratia rubidiae*, *Steptomyces* sp, *Flavobacterium oxysporium*.

**Medium used:**

For the evaluation of antibacterial activity the following media was used.

- Peptone : 0.6g
- Tryptone : 0.4g
- Yeast extract : 0.30g
- Beef extract : 0.15g
- Dextrose : 0.10g
- Agar : 1.75g
- Distilled water q.s to 100ml

The above constituents were dissolved by heating the medium and the pH of medium was adjusted to 6.8 to 7.2. The above medium was sterilized to 120°C (15lb/sq lb) for 20 minutes.
Composition of the medium used for antifungal assay:

Peeled potatoes : 200gm
Dextrose : 20gm
Agar agar : 25gm
Distilled water up to 1 litre

Procedure:

   Peeled potatoes made into small chips and than boiled with 250ml of water for 30minutes. The chips were crushed and then boiled. The pulp was removed by filtration after cooling to the room temperature by using musilin. Agar and dextrose were added slowly by stirring and the volume was made into 1000ml. It was distributed in 40ml quantities into 100ml conical flasks and the flasks were sterilized in an autoclave at 121°C(15lbs/sq.in) for 20minutes

Preparation of inoculum:

   The test microorganism were maintained in slant tubes having 5ml of media. The organism were subcultured in tubes containing broth media (the same composition without agar). Then the tubes were incubated at 37°C for 24 hr.

Planting the media:

   Molten media was poured into the petridish (pre sterilized in oven for 3 hr at 110°C) and plated petridishes were kept on a plane area to avoid non-uniform solidification. All the operations were performed in a sterile room, which was fitted with laminar airflow.

Assay Procedure:
The antimicrobial activity was studied by employing disc paper method (A.S Mathero, 2002). A day old cultures were used for the determination of antimicrobial activity of the test compounds (extracts) were seeded into sterile nutrient agar medium by uniformly mixing 1ml of inoculum with 20ml of sterile melted nutrient agar (48-50ºc), in a sterile petridish. When the agar is solidified, sterile Whatman filter paper discs were placed. The sterile paper discs (8mm diameter) were thoroughly moistened with different solvent extracts 200 µg/ml and with standard drugs Ciprofloxacin and Griseofulvin (10 µg/ml each) discs. These two drugs used as standards for antibacterial and antifungal activities respectively. The paper discs were previously sterilized in an autoclave by moist heat sterilization. The discs were placed on the plate with help of fine pointed previously sterilized forceps. Then the plates were incubated at 37ºc for 24hr. After incubation the antimicrobial activity was determined by zone of inhibition method, where the diameter was measured by using millimeter scale. Mariam et al, 1993. The media prepared for the antifungal activity is inoculated with 1ml of aqueous suspension of organism (fungi) which was prepared from 48hr culture. Then inoculated agar medium was poured into petridish and allowed to set for 15 minutes. Sterile Whatman filter paper discs (8mm diameter) were thoroughly moistened with different extracts (200 µg/ml). Griseofulvin was used as standard drug with 10 µg/ml concentration. Plate was incubated at room temperature. After 48 hours the plate was examined and inhibition zone was measured. The results were given in Table 30.
TABLE 30: ANTIMICROBIAL ACTIVITY OF CANSJERA RHEEDII ROOT EXTRACT

(The values represent zone of inhibition in mm)

<table>
<thead>
<tr>
<th>Microorganisms</th>
<th>Zone of inhibition (mm)</th>
<th>Solvent Extracts</th>
<th>Standard Drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Petroleum ether</td>
<td>n-butanol</td>
</tr>
<tr>
<td>Bacillus subtilis</td>
<td>17</td>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>Flavobacterium tegecticola</td>
<td>7</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Seretia rubidiae</td>
<td>14</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Streptomyces sp.</td>
<td>7</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>E. coli</td>
<td>9</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Flavobacterium oxysporium</td>
<td>8</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>
The disc diameter 8 mm. is subtracted from readings, NA denotes no activity, Cpr. and Gri. Indicate Ciprofloxacin and Griseofulvin

12.5.2 RESULTS

The results of the antimicrobial activity was tabulated in Table. The antimicrobial activity was determined based on the inhibitory zones around the colonies. Petroleum ether extract and n-butanol extract exhibited good antibacterial activity by showing high inhibitory zone against *Bacillus subtilis*.

12.5.3 CONCLUSION

From the above investigation it is concluded that the *Cansjera rheedii* root extract posses significant antibacterial activity against *Bacillus subtilis*. 
12.6 ANTHELMINTIC ACTIVITY OF CANSJERA RHEEDI ROOT EXTRACT
(FAMILY: OPILIAEAE)

12.6.1 INTRODUCTION:

Parasitic infestations are caused by worms or protozoa in the human body. These organisms cause infections by entered in the form of larvae or eggs through the contaminated food, while others get entry through skin abrasions. Common parasitic infestations include *amebiasis, giardiasis, malaria, pinworm, hookworm thread worm, tape worm* and *whip worm* infestations. Once the worm entered into the body it may not produce severe symptoms. But they multiply rapidly and spread to a major organ, then they can cause very serious problems even life-threatening conditions. Anthelmintic drugs are prescribed to treat these serious infestations. Their function either by destroying the worms on contact or by paralyzing them, or by changing the permeability of their plasma membranes. The dead worms are eliminated from the body through the feces.

*Pheretima posthuma* belongs to the class Oligochaeta which is represented by about 1000 species. They are cosmopolitan in distribution except Antarctic and Arctic regions. There are several genera of earthworms including North America and Lumbricus of Europe.

The common species of India is *pheretima posthuma*. It is found in south – East Asia, Sri Lanka, Japan and Australia. Chief genus of South India is Drawida. Megascolex found in South India, Sri Lanka, North New Zealand, Australia and Tasmania. The genus of Pheretima consists of nearly 500 species which are exclusively present in India. The
mature earth worm, Pheretima posthuma having size up to 150mm in length and 4 to 6 mm in thickness. The colour is dark brown, the dorsal surface is more darker than the ventral surface.

**Annelida Systematic Position:**

- **Phylum:** Annelida
- **Class:** Oligocheata
- **Order:** Opisthopora
- **Genus:** Pheretima
- **Species:** Posthuma

### 12.6.2 CLASSIFICATION OF ANTHELMINTIC DRUGS

Anthelmintic drugs are available as liquids, capsules and tablets by prescription. Some of them commonly used anthelmintics include mebendazole, albendazole, oxamniquine, praziquantel, niclosamide, pyrentel-pamoate and thiabendazole. Some types of parasitic infections are rarely seen in United States. So corresponding drugs are not widely distributed. Whenever their need is there, they can be obtained from the United States Center (CDC). For example Ivermectin, used to treat onchocerciasis infestations. Other anthelmintic drugs like diethyl carbamazine citrate, used for the treatment of round worms.

Most anthelmintic drugs are only active against specific parasites. Some are toxic. Before going to the treatment, the parasites must be identified using test that looks for parasites, larvae or egg in urine, faeces sputum, blood or tissues.

Niclosamide is used to treat against tape worms but not effective to treat against round worms or pin worms. Thiabendazole is the drug usually prescribed for the
treatment against thread worm. Mebanadazole works better on whip worm, praziquantel is the another drug that acts by changing the cell membrane permeability of the worms.

**Ideal Anthelmintic drug should:**

- Have a broad spectrum of action
- High percentage of efficacy by using single dose
- Should be free from the toxic
- No need of giving purgative drug before and after the anthelmintic drug
- It should be cheap

### 12.6.3 EXPERIMENTAL

**Collection and extraction of roots:**

The plant roots were collected in July 2008 from japalitheertham area (Tirumala), A.P. India and the plant was authenticated by Dr. Madhavachetty, Asst. Professor, Botany department, SRI VENKATESWARA UNIVERSITY, Tirupati. A.P, India

The roots of the plant were removed, dried under shade and powdered in a mechanical grinder. 25gm of the powdered extract KM Pulok et al, 1995 were soaked in ethanol and distilled water separately for ten days. Then the extract was separated from the sample solution by using separating funnel and then concentrated A Caceres et al, 1995. All the chemicals and reagents used for the study of anthelmintic activity is analytic grade.
**Procedure:**

The anthelmintic activity was studied on adult Indian earth worms, Pheretima Posthuma collected from Dilshuknagar, Hyderabad. The earth worms first collected from moist soil and then washed with normal saline to remove all the mud and fecal matter Pheretima Posthuma was selected due to its anatomical and physiological resemblance with intestinal round worms of human being.

Six to seven groups of worms were made consisting of 4 to 5 worms in each group. Each group was released into 10ml of 2% gum acacia of plant extract (*Cansjera rheedii*) and standard drug in petridishes at room temperature. Each group of earthworms were treated with different concentrations of ethanolic and aqueous extracts (dissolved in DMSO), one concentration of standard drug and other with distilled water.

The time taken by worms to paralysis and death was noted. Death was ascertained by applying external stimuli, which stimulate and induce movements in worms and body color was changed. The results were given in the Table 31.
Table 31. ANTHelmINTIC ACTIVITY OF CANSJERA RHEEDII ROOT EXTRACT

<table>
<thead>
<tr>
<th>Type of extract</th>
<th>Dose mg/ml</th>
<th>Time taken for paralysis (min)</th>
<th>Time taken for death (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanolic</td>
<td>5</td>
<td>70 ± 0.35</td>
<td>120 ± 0.50</td>
</tr>
<tr>
<td>Ethanolic</td>
<td>10</td>
<td>38 ± 0.75</td>
<td>85 ± 0.32</td>
</tr>
<tr>
<td>Ethanolic</td>
<td>20</td>
<td>30 ± 0.45</td>
<td>52 ± 0.50</td>
</tr>
<tr>
<td>Aqueous</td>
<td>10</td>
<td>63 ± 1.2</td>
<td>120 ± 0.40</td>
</tr>
<tr>
<td>Aqueous</td>
<td>20</td>
<td>40 ±0.50</td>
<td>68 ± 0.50</td>
</tr>
<tr>
<td>Albendazole</td>
<td>10</td>
<td>30 ± 0.50</td>
<td>65 ± 0.92</td>
</tr>
</tbody>
</table>

Albendazole (Standard Drug)

Vehicle (Distilled Water)  

12.6.4 RESULT

Anthelmintic activity of aqueous and alcoholic extracts were evaluated. Aqueous extract showed good anthelmintic activity and this activity was compared with the effect produce by reference standard drug albendazole. The data Table reveals a significant anthelmintic activity of *cansjere rheedii* root extract.

12.6.5 CONCLUSION

The present study revealed that the root of the plant *Cansjere rheedii* posses good anthelmintic activity. Further work is still under progress to explore chemical nature of the active constituents.