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ANTHELMINTIC ACTIVITY OF *POLYPODIUM DECUMANUM*

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ABSTRACT

The results of this study indicate that the antimicrobial activity of ethyl acetate extract (EAE) of *Polypodium decumanum* is most active. The two Gram-positive, two Gram-negative bacterial strains and yeast were used. According to the results in the Table 25 and 26, only ethyl acetate, ethanolic and aqueous extracts of Polypodium samples showed antibacterial activity against *S. aureus, B. subtilis, S.aeruginosa, E.coli, A. fumigates and C. albicans*. From these results it may be concluded that Gram- positives bacteria are more susceptible to EAEPD antibacterial activity than Gram- negatives bacteria. Antibacterial activity of EAEPD may be due to the flavonoids, aromatic acids, and its esters. The mechanism of this activity is attributed to a synergism between phenolic and other compounds in the resin. The results of GC-MS analysis confirmed the presence of Polypodoside A, caffeic acid, 4-vinyl phenol, Polypodoside B, and Ferulic acid in ethanolic extract of polypodium. The strong antimicrobial activity of Gujarat polypodium may be due to high total phenolic and flavonoid contents. There are numerous questions yet to be answered concerning chemical compositions and antibacterial properties of Indian *Polypodium decumanum* and further research is required for clarification.

Kew word - Anthelmintic ,Antimorobial, Polypodium decumanum

1. INTRODUCTION

Polypodium is a genus of between 75-100 species of true ferns, widely distributed throughout the world, with the highest species diversity in the tropics. Polypodies have some use in herbalism, but are today most important in horticulture where several species, hybrids, and their cultivars like *Polypodium* 'Green Wave' are commonly used as ornamental plants for shady locations. There are 75 species of plants in the *Polypodium* genus, many of which have been used medicinally for centuries. The name is derived from *poly,* meaning “many,” and *podus,* meaning “foot,” for the many foot-like divisions of the root or rhizomes of polypody ferns. *Polypodium leucotomos* (also classified as *Polypodium aureum*) and *Polypodium decumanum* (also classified as *Phlebodium decumanum*) are indigenous to the Honduran rainforests but also can be found throughout the South American tropics and in parts of Latin America and the Caribbean.

Classification for genus *Polypodium*

Kingdom- Plantae

Sub-Kingdom- Tracheobionta

Division- Pteridophyta

Class- Pteridopsida

Subclass- Rosidae

Order- Polypodiales

Family- Polypodiaceae

Genus- Polypodium

1.1. *Polypodium decumanum*

Family: Polypodiaceae

Common names: Samambaia, Calaguala, Huayhuashi-shupa, Cotochupa, Mirane, Temakaje.

Description: *Polypodium* species are terrestrial or epiphytic ferns with a creeping. The creeping rhizomes are 8-15 mm in diameter with the golden brown scales.

MATERIALS AND METHODS

Collection of plants

The aerial parts of *Polypodium decumanum* were procured from the GBPUAT of Pantnagar Uttrakhand and was authenticated by Dr. Anju Pal. Deparment of Horticulture GBPUAT Pantnagar Uttrakhand.

Experimental Animals

The earthworms of species *Eisenia foetida* were purchased from GB pant University of Ag. And Technology, Pantnagar.The anthelmintic activity was performed on adult earthworm (*Eisenia foetida*) owing to its anatomical and physiological resemblance with the intestinal roundworm parasites of human beings.

Each groups consisted of six adult earthworms (*Eisenia foetida*):

1st group - Vehicle (Normal saline)

2nd group - Standard drug (Piperazine citrate)

3rd group - Ethyl acetate extract of *Polypodium decumanum* (30 mg/ml)

4th group - Ethyl acetate extract of *Polypodium decumanum* (40 mg/ml)

5th group - Ethanol extract of *Polypodium decumanum* (30 mg/ml)

6th group - Ethanol extract of *Polypodium decumanum* (40 mg/ml)

7th group - Aqueous extract extract of *Polypodium decumanum* (30 mg/ml)

8th group - Aqueous extract of *Polypodium decumanum* (40 mg/ml)

Procedure

Test samples of three extracts (ethyl acetate, ethanol and aqueous) were prepared at the concentrations of 30 mg/ml and 40 mg/ml in 25 ml of normal saline. Six worms of approximately equal size were placed in petridish containing above solution of extracts. Piperazine citrate (10 mg/ml) was used as reference standard and normal saline as control. Time of paralysis was noted when no movement was observed except when the worms were shaken vigorously. Time of death of worms were recorded after ascertaining that worms neither moved when shaken vigorously nor when dipped in warm water (50°C). All the readings were taken in triplicate. Then all the extracts were compared with the standard by observing the paralysis time and death time of earthworms on different extracts (Aswar *et al.*, 2008, Kosalge *et al.*, 2009).

RESULT AND DISSCUSSION

Plant authentication

Plant materials were authenticated at G.B.P.U.A.T., Pantnagar, Uttarakhand..

Experimental animal's approval

The experimental procedure was approved by SARC (Scientific and Applied Research Center), Meerut,U.P.

Earthworm's authentication

The earthworms of species *Eisenia foetida* were obtain from G.B.P.U.A.T., Pantnagar, Uttarakhand.

Anthelmintic Activity

Table 24 Evaluation of Anthelmintic activity

Treatment Dose (mg/ml) ***Polypodium decumanum*** **Extract Paralysis Time Death Time (Mean±SEM) (Mean±SEM) Control** Normal Saline (25ml) _ _ **Piperazine** 10 21.66±0.88 61.33±1.33 **citrate Ethyl acetate** 30 8.42±0.81** 11.9±0.20** **extract** 40 3.43±0.29** 7.16±0.12** **Ethanol extract** 30 12.70±0.35** 17.23±0.11** 40 10.36±0.08** 15.9±0.20** **Aqueous extract** 30 54.2±0.11** 66.85±0.20** 40 22.23±0.11 28.16±0.12**Each value represent Mean±SEM, n=5. One-way ANOVA followed by Dunnet test through Instat software, compare all vs. standard applied. Statisticallysignificant at **P<0.01, *P<0.05.

Anthelmintic activity was observed on different extracts of *Polypodiumdecumanum* after studying the acute toxicity on the plant. Two doses 30 mg/ml and 40 mg/ml of ethyl acetate, ethanolic and water extracts were taken to observe the paralysis time (PT) and death time (DT) of earthworms with these doses. It was observed that all the extracts of exhibited dose dependent anthelmintic activity against earthworms. Ethyl acetate extract was more significant followed by ethanol and water extract in causing paralysis and death of earthworms when compared with the standard drug (piperazine citrate, 10 mg/ml). It had been reported that phenolics, flavonoid, diterpenoid, phytosterol are responsible for anthelmintic activity of many plants. So, on the basis of constituents present in Polypodium species, it can be concluded that anthelmintic activity of plants was due to the following constituents present in them.

CONCLUSION

The finding shows that *Polypodium decumanum* contains long chain fatty acid, terpenoids, saponins and flavonoids. The literature revealed the rhizome and leaves are used for treatment of disease like cancer, psoriasis, peptic ulcers, kidney problems, diarrhoea, arthritis, and pains in joints and tendons Anthelmintic activity was observed on different extracts of *Polypodiumdecumanum* after studying the acute toxicity on the plant. Two doses 30 mg/ml and 40 mg/ml of ethyl acetate, ethanolic and water extracts were taken to observe the paralysis time (PT) and death time (DT) of earthworms with these doses. It was observed that all the extracts of exhibited dose dependent anthelmintic activity against earthworms. Ethyl acetate extract was more significant followed by ethanol and water extract in causing paralysis and death of earthworms when compared with the standard drug (piperazine citrate, 10 mg/ml). It had been reported that phenolics, flavonoid, diterpenoid, phytosterol are responsible for anthelmintic activity of many plants.

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