Acta Parasitologica
https://doi.org/10.1007/s11686-024-00837-8

ORIGINAL PAPER

Anthelmintic Activity of *Saussurea costus* (Falc.) Lipsch. Against *Ascaridia galli*, a Pathogenic Nematode in Poultry: *In Vitro* and *In Vivo* Studies

Fayaz Hussain Mir[1] · Syed Tanveer[1] · Pooja Bharti[1] · Bilal Ahmad Para[2]

Received: 16 August 2023 / Accepted: 8 March 2024

Abstract

Aim of the study The growing resistance of helminth parasites to currently available commercial anthelmintic drugs, combined with apprehensions regarding detrimental chemical residues in livestock products, has sparked an interest in exploring medicinal plants as an alternative strategy for treating helminthiasis. As a result, this study was designed to investigate the anthelmintic activity of crude methanolic extracts (CME) of *Saussurea costus* root on *Ascaridia.galli*, a pathogenic nematode of poultry.

Materials and methods *In vitro,* the anthelmintic effect of *Saussurea costus* root was evaluated in comparison to commercial anthelmintic, levamisole on the adult nematode parasites, *A.galli* using worm motility inhibition (WMI) test. The CME of *S.costus* was also evaluated for *in vivo* anthelmintic activity in chickens experimentally infected with *Ascaridia galli*. For the *in vivo* study, one hundred-day-old chickens were orally infected with embryonated eggs of *A. galli* worms. The efficacy of the plant extract as an anthelmintic was assessed through two tests: faecal egg count reduction (FECR) test and worm count reduction (WCR) test. The study investigated three distinct doses of plant extract under *in vivo* setup: 500 mg kg^{-1} body weight (bw), 1000 mg kg^{-1} bw, and 2000 mg kg^{-1} bw.

Results *In vitro*, all the tested concentrations of *S.costus* (25 mg/ml, 50 mg/ml, and 100 mg/ml) showed a significant ($P < 0.001$) anthelmintic effects on live adult *A. galli* worms in terms of inhibition of worm motility at different hours post-treatment. At the highest concentration of the extract, we observed worm motility inhibition of 100% at 24 h post-exposure. On day 14 post-treatment, all birds were slaughtered, and adult *A. galli* worms were subsequently retrieved from their small intestines. Birds treated with CME extract of *S. costus* root exhibited a significant ($P < 0.001$) reduction in faecal egg count. However, the administration of the extract at the dosage of 500 mg kg^{-1}bw to the birds did not reveal any significant ($P > 0.05$) differences in the worm count compared to the negative control group. The CME of *S. costus* at a dose of 2000 mg kg^{-1}bw showed the highest anthelmintic activity by inducing 83.10% FECR and 76.47% WCR.

Conclusion In conclusion, the root extract of *S. costus* has a promising anthelmintic activity on *A. galli* as demonstrated by the results of the present experiment.

Keywords *Saussurea costus* · Anthelmintic · *Ascaridia gall* · Chicken · *In vivo* · *In vitro*

Introduction

Helminth infections continue to be a significant factor leading to decreased productivity of poultry especially in deep-litter and free-range production systems [1, 2]. Among the various helminths affecting poultry, *Ascaridia galli* stands out as the most prevalent species worldwide [3–5]. This can be largely attributed to its direct life cycle, which facilitates its transmission within poultry birds [6]. This nematode primarily inhabits the small intestines of domestic chickens and other birds, causing detrimental effects on their health and performance. Infection with *Ascaridia galli* results in

✉ Fayaz Hussain Mir
fmir03@gmail.com

[1] Department of Zoology, University of Kashmir, Srinagar 190006, Jammu and Kashmir, India

[2] Department of Mathematical Sciences, Islamic University of Science and Technology, Awantipora, Kashmir, India

Published online: 11 April 2024