Global Journal of Agriculture and Veterinary Science
ISSN: XXXX-XXXX (Online)
Abbreviated key title: Glob.J. Agri.Vet.Sci.
Frequency: Monthly
Published By GSAR Publishers
Journal Homepage Link- https://gsarpublishers.com/journal-gjavs-home/

USE OF *Eucalyptus camaldulensis* LEAF EXTRACTS AS ALTERNATIVE TO CONTROL OF HELMINTHS IN SHEEP

BY

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Article History

Received: 29/06/20223
Accepted: 08/07/2023
Published: 12/07/2023

Vol – 1 Issue – 1

PP: -01-04

Abstract

Various species of helminths parasitize sheep and result in considerable pathogenesis and economic losses in sheep farming with deleterious influences on sheep productivity. The problem to control these infections is further complicated due to the emergence of anthelmintic resistance against conventional anthelmintics. This study seek to reawaken interest in herbal medicine as an alternate source of anthelmintics. The anthelmintic activity of the crude leaf extracts of Eucalptus camaldulensis were determined using sheep naturally infected with helminth. The experiment was led on a randomized complete block design with 5 treatments replicated three times. All standard procedures were followed for phytochemical screening with fecal egg count for the determination of extracts efficacy on 3 helminth spp. Results on phytochemistry of E.camaldulensis had high presence of tannins followed by saponins, the least present were alkaloids and steroids. Fecal egg count result showed a high reduction when treated with high dosage; 800mg/kg body weight gave 98.4% with the lowest at 200 mg/kg (32%) compared to albendazole (99%). The result of this study indicates that E. camaldulensis possess anthelmintic properties.

Keywords: *Sheep; Eucalptus camaldulensis; Helminths; Anthelmintics; Feacal Egg Count*

INTRODUCTION

Sheep production plays a vital role in augmenting socio-economic status of the rural masses, particularly the small landholders and landless farmers who rely on this animals for their livelihood. However, mismanagement, poor hygiene, and precarious housing conditions all contributed to the incidence of disease and high mortality.

Parasitic diseases especially gastrointestinal (GI) helminths are among the factors that limit sheep production worldwide, accounting for the largest economic losses due to retarded growth, weight loss, reduced feed intake, lower milk production, impaired fertility. (Cavalcante *et al*, 2009). Routine anthelmintic treatments for the control of sheep helminths is the norm. Although evidence–based and targeted anthelmintic treatment remains the most effective strategy (Mavrogianni, 2017), the use of the commercially available anthelmintic drugs undergoes certain limitations, with the extended withdrawal periods during lactation and the development of resistance being the most significant (Kordalis *et al*;2019).

The floral biodiversity of Africa provides the African traditional medicinal practitioners and herdsmen with an impressive natural pharmacy from which plants are selected as remedies or ingredients to prepare herbal medicine for an array of human and animal disorders (Eguale etal; 2011). Traditionally, humans have used crude extracts of different parts of plants as curative agents.

Eucalyptus camaldulensis is an evergreen tree that has been widely used in traditional medicine for the treatment of various health disorders. It is the most important genera in the botanical family Myrtaceae, widely distributed in different region around the world, with more than 800 species. Possessing several biological and pharmacological activities (Hassine *et al*; 2013; Meshkani *et al*; 2014, Gakuubi; 2016). Eucalyptus trees are well known for the medicinal properties of their oil contained in their leaves (Sani *et al*; 2014).

In fact, herbal medicines have received much attention as sources of lead compounds, since they are considered to have stood the test of time, relatively safe for human use, and environmentally friendly (Oyewole, 2004). They are also economical, easily available, and affordable. Natural products are a treasure chest for new drug discovery because of their chemical diversity (Tarig, 2018). The emerging evolution of antibiotic and anthelmintic resistance and inefficiency of

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some synthetic drugs elicit the need to investigate new drug sources.

MATERIALS AND METHODS

Collection of Plant Materials

The fresh leaves of the plant *E. camaldulensis* were collected during December 2021 from mature tree around the Undergraduate hostel in Federal College of Education Pankshin. The plant was duly authenticated at the Department of Horticulture, Federal College of Forestry, Jos Plateau State, Nigeria.

Preparation of Plant Material

The fresh leaves were harvested, rinsed with tap water, and air dried under shade for fourteen days and reduced to coarse powder using pestle and mortar and then micronized to fine powder using the Kenwood electric blender (Kenwood LTD, Harvant, United Kingdom). The powder was stored in an airtight bottle until required.

Preparation of the Extracts

The preparation of the leave extracts were performed following the methods described by Sofowara (1993) and Trease and Evans (2002). One hundred grams of the powdered leaves were extracted with 700ml of solvent (methanol) contained in a sterile conical flask and covered with cotton wool plug and wrapped with aluminum foil.

Extraction was allowed to proceed for 48 hours in a shaker water bath maintained at 40^0C. The extract was filtered using a clean muslin cloth and then Whatman No.1 filter paper. The filtrate was then evaporated to dryness by pouring into silver plate and kept in a hot air oven at 60^0C for 48 hours. The percentage extract yield was estimated according to Parekh and Chanda (2007) as;

Dry weight/Dry material weight X 100

The resultant extract was weighed into 100, 200, and 400 mg/kg and stored at -4^0c until ready for use. For the preparation of dilutions of crude extracts for anthelmintic assay, the extracts was reconstituted by redissolving in the extracting solvent and further diluted to obtain 800,400,200,100 mg/kg.

Phytochemical Screening of Crude Extracts

The phytochemical components of *Eucalyptus camaldulensis* leaves were screened using the method of Soforawa (1993) and Trease and Evans (2002). The components analysed for are saponons, tannins, glycosides, steroid, terpernoids, flavonoids, and anthraquinones.

RESULTS

The results on phytochemical constituents of lead plant is presented in table 1. The phytochemicals observed from the leaves of *E. camaldulensis* were tannins, saponins, alkaloids, and steroids. Flavonoids, glycosides, terpernoids, and anthraquinones were absent.

Table 1: Phytochemical constituents of *Eucalypus camaldulensis* methanolic leaf extract

Phytochemical	Plant section leaves
Terpernoids	-
Alkaloids	+
Flavonoids	-
Saponins	++
Anthraquinones	-
Tannins	+++
Steroids	+
Glycosides	-

Key: +++ = extremely present; ++ = Moderately present; + = Present; - = Absent

Table 2: Quantitative estimation of phytochemical constituents of *E. camaldulensis* methanolic leaf extract

Phytochemical	Plant section leaves
Tannins	0.34 ± 0.01
Saponins	12.50 ± 0.24
Alkaloids	0.20 ± 0.00
Flavonoids	-

Values are presented as mean ± standard deviation of triplicates. - = not quantified

Table 2 above showed the quantitative estimates of the secondary metabolites found in *E. camaldulensis* leaf extract. Other workers had reported similar result (Abdolmajid *et al.*, 2019, Sani *et al*, 2014). The variations could be attributed to geographical location (Chuku, et al., 2016).

Prevalence of Helminths within study animals were screened Pre-treatment to find out the type of helminths associated and result presented in table 3. Three helminthes: Strongyle, Coccidia, and Heamonchus spicies were found to be associated with experimental animals.

Table 3: Prevalence of Helminths in study animals

Helminths (Eggs/Ova)	Prevalence
Strongyle spp	++
Coccidian spp	++
Heamonchus spp	+++

+++ = Highly present; ++ = Moderately present, + = Present, - = absent

Thirty sheep were given five treatments (saline water, ivomectine, 200mg/kg, 400 mg/kg, and 800 mg/kg), and Helminth occurrence after treatment were collected, the result

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is presented in table 4 below which revealed the result of the methanolic extract on helminths per dosage.

Table 4: Helminths occurrence after treatment (Post-treatment)

Helminths	Salin water	Treatment albendezole	Regine	MLE 200mg/kg	MLE 400mg/kg	MLE 800 mg/kg
Strongyle spp	++	-		+	-	-
Coccidian spp	++	-		+	-	-
Heamonchus spp	++	-		+	-	-

++ = Moderately present; + = Present; - = Absent; MLE = Methanolic Leaf Extract

Feacal Egg count was undertaken to further ascertain the reductive effect of the methanolic leaf extract of *E. camaldulensis* on the helminths. The result is presented in table 5 below; showing the percentage reduction per treatment.

Table 5: Effect of methanoic leaf extract of *E. camaldulensis* on sheep helminthes

Treatment	Pre-treatment	Feacal Egg count	Percentage reduction (%)
Saline water	10,700	9,300	12
Albendazole	2160	20	99
200mg/kg (MLE)	2,090	1390	32
400mg/kg (MLE)	8980	500	76
800mg/kg (MLE)	2110	30	98.4

Values are mean average of 30 sheep per treatment; MLE = Methanolic Leaf Extract.

DISCUSSION

Phytochemical screening yielded saponins, tannins, alkaloids, and steroids. The result of this study is in agreement with the work of others (Naeimeh *et al*., 2014; Muhammed *et al*., 2015; Azza *et al*., 2015). They maintained that the type and quality of compounds depends on the species and preparation methods of extracts. Toxicological and cytotoxicity effects of extract *of E. camaldulensis* leaves are time and dose-dependent. They reported that extract also has efficient antioxidant compounds with potential benefit in treatment (Rasooli *et al*., 2009; Naeimeh *et al*., 2014).

Helminths either live as parasites or free of a host, in aquatic or terrestrial environments. Helminth infestation causes morbidity and mortality, it comprises nutritional status, affects cognitive processes, and induces tissue reactions. Animals experience stunted growth (McCann *et al.*, 2005; Tarig, 2018; Cadahia *et al.*, 1997). In order to know how best to prevent future problems with parasites and control current infestations, it is necessary to understand the general life cycle of the parasites most common to sheep.

Individual sheep vary in their degree of susceptibility to parasites. Some by means of their genetics, are much more resistant or resilient to parasite infections and can survive parasite levels without showing any symptoms. This genetic resistance can be used when selecting breeding stock since a herd that exhibits more innate resistance to parasites will cost less to maintain and will ultimately be more profitable to the producer. Animal age and stage of development also have a significant impact on its susceptibility to parasites

The result from this study revealed the presence of some secondary methabolites such as tannins agreeing with other workers (Chalchat *et al.*,1995; Naeimeh *et al.*, 2014; Azza *et al*, 2015) who had earlier reported that *E. camaldulensis* leaves contains tannins as much as 11% and attributed to several activities including antimutagenic, antioxidant, antiviral, hepatoprotective, antidysenteric and anthelmintic properties.

Other workers (Babaji *et al*., 2004; Ayepola and Adeniyi, 2008; and Chuku *et al*.,2016) had confirmed presence of tannins, saponins, etc. They similarly reported extracts in Nigeria to contain in moderate to high amount secondary metabolites: alkaloids, saponins, tannins, flavonoids, steroid, carbohydrates, and not anthraquinones. Cadahia *et al.* (1997) reported that *E. camaldulensis* extracts are generally rich in tannins which vary qualitatively and quantitatively influenced by samples geographical origin.

From the results above, (table 4 & 5), it revealed that the group that were treated with a higher dose/body weight, the extracts eliminates the egg and ova of the helminths with near similar effect to that of the conventional dewormer except that of strongyles seen at lower dosage despite a reduction. Which revealed that the effectiveness of the plant extract is dose-dependent. *E. camaldulensis* methanolic extract were active against helminths. The mainstay medication for sheep helminths are drugs (conventional anthelminthics), however, some resistant strains to this treatment have been detected making these results of *E. camaldulensis* anthemintic activity very promosing as an anthelmintic agent. The anthelmintic activity of *E. camaldulensis* were evaluated in this study by Feacal Egg Count reduction test as the most significant in vivo test

CONCLUSION

This study concludes that worm control is a vital part of health and production management in sheep flocks and good control is highly dependent on effective anthelmintics. We

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proposed that a holistic approach is required to evaluate the potential of *E. camaldulensis* in parasite control and maximize their benefits on parasitized hosts. More controlled experimental studies aim to verify, validate and quantify in a scientific matter such plant activity be undertaken.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to Tetfund for providing fund and other logistic support for the research. We are also grateful for the support and cooperation we received from management of federal college of education Pankshin for accepting our proposal as an Institutional Based Research

Reference(s)

1. Abdolmajid Ghasemian, Majid Eslami, Fatemeh Hasanvand, Hooman Bozorgi, Hiba R.; Al-abodi (2019). *Eucalptus camaldulensis* properties for use in the eradication of infections. *Comparative Immunology, Microbiology and Infection Diseases* 65:234-237
2. Ayepola, O.O. and Adeniyi, B.A. (2008). The antibacterial activity of leaf extracts of *Eucalptus camaldulensis* (Myrtaceae). *Journal of Applied Science Research 4* (ii): 1410-1413.
3. Azza, D.H; Dawoud.; El Hassan, S. and Sara,M. (2015). Acute Toxicity Studies of Ethanolic Extract of *Eucalyptus camaldulensis* Dehnh leaves. *Journal of Network Communications and Emerging Technology*. 2(2): 18-23.
4. Babayi, H., Kolo, I., Okogun, J.I & Ijah, U.J.J. (2004). The antimicrobial activities of methanolic extracts of *Eucalyptus camaldulensis* and *Terminalia catappa* against some pathogenic microorganisms. *Biokemistri* 16(2): 106-111
5. Cadahia, E., Cadahia E.; Diez-Barra, R.; Gacia-Vallejo, M.C (1997). Tannin composition of *Eucalptus camaldulensis; E. globulus and E. rudis.* Part 1 wood. *Holzforschung* 51(2): 119-124
6. Cavalcante, C.R.; Vieira, L.S.; Chagas, A.C.S. and Molento, M.B. (2009). *Parasitic Diseases of Goats and Sheep: Epidemiology and control*. 1st ed. Brasilia: Embrapa Information Technology; P. 603
7. Chuku, A.; Ogbonna, A.I., Obande, G.A.; Namang, A.; Ahmad, I.R. (2016). Antimicrobial effects of leaves of *Eucalptus camaldulensis* on some microbial Pathogens. *European Journal of Medicinal Plants.* 14(2): 1-8.
8. Eguale, T.; Tadesse, D. & Giday, M. (2011). Invitro anthelmintic activity or crude extracts of five medicinal plant against egg-hatching and larval development of *Haemonchus contortus*. *Journal of Ethnopharmacology*. 137(1): 108-113
9. Gakuubi, M.M (2016). Steam distillation extraction and chemical composition of essential oils of *Toddalia asiatica L*. and *Eucalyptus camadulensis* Dehnh. *Journal of Pharmacological Phytochemistry* 5:99
10. Hassine, D.B.; Abderrabbaba, M.; Cazaux, S. and Bouajila, J. (2013). Contribution to the chemical and biological study of *Eucalyptus* leaves extracts: effect on frying oil. *Journal of Medical Bioengineering* 2:242-247.
11. Kordalis, N.G.; Arsenopoulos, K.; Vasileiou, N.G.C.; Mavrogianni, V.S.; Lianou, D.T.; Papadopoulos, E.; & Fthenakis, G.C. (2019). Field evidence for association between increased gastrointestinal nematode burden and subclinical mastitis in dairy sheep. *Veterinary Parasitology.* 265:56-62.
12. Mavrogianni. V.S.; Papadopoulos, E.; Gougoulis, D.A; Gallidis, E.; Ptochos, S.; Fragkou, I.A, Orfanou, D.C. & Fthenakis, G.C.; (2017). Gastrointestinal trichostrongylosis can predispose ewes to clinical mastitis after experimental mammary infection. *Veterinary Parasitology.* 245:71-77.
13. Meshkani, N.; Naghsh, N and Ranjbar, M. (2014). Study of cytotoxic effects of ethanolic extract of *Eucalyptus camaldulensis* leaf on the cells K.562 of human chronic Myelogenous leukemia (CLM) under in vitro conditions. *Bull Enviromental Pharmachology of Life Science*. 3:186-190.
14. Rasooli, I.; Shayegh, S. & Astaneh, S. (2009). The effect of *Mentha spicata* and *Eucalyptus camaldulensis* essential oils on dental biofilm. *International Journal of Dental Hygiene:* 7(3):196-203.
15. Sani, I.; Abdulhamid, A.; & Bello, F. (2014). *Eucalyptus camaldulensis:* Phytochemical composition of ethanolic and aqueous extracts of the leaves, stembark, root, fruits and seeds. *Journal of Scientific & Innovative Research.* 3 (5):523-526.
16. Sofowara, A. (1993). *Medicinal Plants and Traditional Medicine in Africa* Spectrum Books LTD, Ibadan, Nigeria. P. 289.
17. Tarig, K.A. (2018). Use of plant Anthelmintics as an alternative control of Helminthic infections in sheep. *Research Journal of Zoology* 1(1): 1000102
18. Trease, G. E & Evans, W.C. (2002). *Pharmacognosy*. 15th Edition. Ed Saunder Publisher, London Press. Pp 42-

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