

STUDY THE EFFECT OF PLANT EXTRACT ON ENDOPARASITE

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Abstract:

The present research studies detail anthelmintic activity of *Drynaria quercifolia* (L) J. Sm., a medicinal plant on *Capra hircus* (L). The present fern spp. was authenticated through taxonomic studies. Study also involved survey of endoparasites to understand prevalence of major endoparasites in different agroclimatic zones of Western Maharashtra, India. To facilitate invitro research studies, new methods have been experimentally tested and reported for indicating the efficacy of *D. quercifolia* (L) J. Sm., extracts on helminthes.

Survey conducted for assessing prevalence of endoparasites in goat's confirmed the prevalence of endoparasites (*Nematodirus spp.*, *Trichuris spp.*, *Eimeria spp.* and *Haemonchus contortus*) under Western Maharashtra condition of India. *H. contortus* was most prominent; therefore further *invitro* and *invivo* studies were restricted to these species as representative parasites in *C. hircus* for studying the anthelmintic activities of *D. quercifolia*.

The present investigation may form the basis for development of knowledge and formulation of drugs for preventing the endoparasites infection in *C. hircus* and can be used as a model for developing approach for livestock health improvement. Considering this usefulness of the same plant product having multipurpose medicinal values, *D. quercifolia* rhizome may be used as ecofriendly herbal low cost remedy available among the village people, a remedy for perennial problem of infections in *C. hircus* and to prevent the losses thereof.

Present work also opens up paths to many more studies for further exploration, for example- the extracts to be tested against spectrum of vectors and pathogens, active compounds to be isolated which will lead this research in finding active drug molecules.

Keywords: plant *D. quercifolia* (L) J. Sm., *C. hircus*, Endoparasites (*Nematodirus spp.*, *Trichuris spp.*, *Eimeria spp.* and *Haemonchus contortus*).

Introduction:

In India, most of the population of livestock dwells in the rural regions. It provides supplementary income to nearly 70 million rural families or approximately 75% of the rural population [1]. Helminthes infections in small ruminants are serious problems in the developing world, particularly where nutrition and sanitation are poor. Investigations have been carried out to find out burden and risk factors of gastrointestinal nematode parasite infections in sheep and goats reared in smallholder mixed farms [2]. Due to wide spread prevalence of anthelmintic resistance in goats, alternative, non – chemical control methodologies are needed to increase profitability of small ruminant industry [3]. Helminthes remain a major endoparasite for

small ruminants. High levels of infection have been recorded and helminthic diversity is always higher. Grazing management, as one of the methods in controlling infection in small ruminants is still not sufficient and conventional anthelmintic treatments are therefore resorted to. Alternative treatment therapies are required for decreasing the helminthes population at large [4].

On the above background, this study was undertaken with the following objectives

Studying prevalence of some of the endoparasites (*Nematodirus spp.*, *Trichuris spp.*, *Eimeria spp.*, and *Haemonchus contortus*) of goat under Semi Arid Dry (SAD) agroclimatic zone of Western Maharashtra of India and isolation, identification of selected vectors for experimental purpose. The efficacy of

different concentrations of *D. quercifolia* to check antihelminthic factors on endoparasite namely *H. contortus* under invitro and *in vivo* conditions with respect to *C. hircus*.

The results of the present investigation may lead to development of knowledge to prevent infection in *C. hircus* as a model of livestock population through ecofriendly herbal low cost remedy available among the village people within local community and try find remedy for perennial problem of infections in *C. hircus* and the losses thereof.

Materials and Methods:

Since the study included identification, authentication and exploring efficacy of the fern *D. quercifolia* (*L*) *J. Sm.*, to check factors like antihelminthic activity in goat study as a model, the approach to material and methods is described as below

Plant material (fern)

The interest fern of present study was collected from Konkan region (Western Ghats of India) where they naturally grow, and processed in laboratory for morphological, anatomical and biochemical analysis and also herbarium was prepared to be maintained at Central Research Station (CRS), BAIF Development Research Foundation, Uruli kanchan Pune, while second set was sent for authentication to Botanical Survey of India Office, Pune. The specimen of present study was collected and identified using taxonomic key characters according to the Global Biodiversity Information Facility (GBIF) and International Plant Names Index (IPNI) and taxonomically classified as

Name: *Drynaria quercifolia* (*L.*) *J.Sm*

Kingdom: Plantae; **Phylum:** Pteridophyta;

Class: Filicopsida; **Order:** Polypodiales;

Family: Polypodiaceae; **Genus:** *Drynaria*

Species: *quercifolia*

D. quercifolia (*L*) *J. Sm.* was found maximum in density and abundance in Per Humid (PH) zone of Western Maharashtra and was totally absent in Semi Arid Dry (SAD) and Semi Arid Moist (SAM) agro-climatic zones.

The identification and classification studies of fern of present research subject was further

authenticated and confirmed as *Drynaria quercifolia* (*L*) *J. Sm.*, by the Office of Joint Director, Western Circle, Botanical Survey of India, Pune, India.

The present plant is distinguishably different from its two close members – *Drynaria rigidula* and *Drynaria sparsisora*. Though these ferns are also called as bird's nest fern or oak leaf ferns, their morphology and anatomy differs. The two ferns mentioned above are morphologically smaller in size than *D. quercifolia* and many times mistaken to be either species.

Bioactivity studies of *Drynaria quercifolia* (*L*) *J. Sm.*,

Identification of helminthes

The endoparasites (helminthes) namely *Nematodirus spp.*, *Trichuris spp.*, *Eimeria spp.*, and *H. contortus* on *C. hircus* were identified using key to the characters of helminthes [5], and further authenticated from Bombay Veterinary College, Parel.

Among endoparasites *Haemonchus contortus* Rudolphi was selected for further studies. The taxonomical classification is as follows:

Kingdom: Animalia; Phylum: Nemata ; Class: Secernentea; Order: Ascaridida; Family: Trichostrongylidae;

Genus: *Haemonchus* **Species:** *contortus*

Field survey of endoparasites:

The survey was taken in two parts. During the first part, initial preliminary survey was carried out in SAD zone only for a year on prevalence of endoparasites (helminthes) namely *Nematodirus spp.*, *Trichuris spp.*, *Eimeria spp.* and *H. contortus* on *C. hircus* to find the seasonal and month wise variations. The survey was confined to 16 goats owned by single goat keeper (irrespective of sex and ages) in rural area (village Ralewadi, in SAD zone) during the year 2005.

During the second part, survey to confirm the observed status, during the first part of the survey of one prominent endoparasite was undertaken on 60 goats each (irrespective of sex and ages) from SAD, SAM and PH zones during the year 2006 – 2007 (**Table 1**). The goats selected belonged to 3 – 5 goat keepers in

each zone having similar habitat and rearing pens. The goat keepers were interviewed and only those were selected who agreed to participate in the experiment and retain the goats for the experimental period or for one year whichever was longer. These studies however, were confined to prevalence of *H. contortus* as a representative species of helminthes because in earlier study it was observed that the species of *H. contortus* was found to be more dominant and of economic importance under Indian rural conditions. Also *H. contortus* is reported to have developed resistance to chemical medicines [6]. All the sampling methods remained same as described above for endo parasite.

***In vivo* antihelminthic and hematological studies on *C. hircus* (L). drenched with *D. quercifolia* (L) J. Sm.,**

In the present experiment 12 goats per group were selected from one herd of single goat keeper in SAD zone (Uruli Kanchan) so that food habitat and keeping quality does not affect the experiment through out the study during the month of December 08. One group was administered 1gm of dry sample powder orally (*D. quercifolia*) daily, and second group was given 1 gm twice daily for 14 consecutive days respectively (two weeks) while the third group was used as control and was kept on natural diet. After fourteen day both the treated groups were allowed to feed without the test product. For studying the efficacy of *D. quercifolia* on the endoparasite namely *H. contortus* the fecal count was undertaken at an interval of one week consequently for three weeks (0 day before treatment, 7th day after treatment and 14th day of treatment).

The behavior of the animals, throughout the study was observed daily for 14 days. The indirect evidence like body coat of each goat was also observed before feeding *per os* the *D. quercifolia* (rhizome) in powder form and after completion of the treatment.

For hematological study (hemoglobin, PCV, TLC, RBC, Neutophil, Eosinophil, Lymphocyte and Monocyte), blood was drawn from the neck region of goats in all the three

groups before powder administration 0th day, at 7th day and after completion of treatment [7]. The blood samples were examined and analyzed at BAIF Development Research Foundation, Community Health Research Centre, Uruli kanchan, Pune.

Table 1: Details of study zones

Zone	SAD	SAM	PH
Population	680 60% of the families own goats from 2 – 10 numbers	700 and 64% of the families own goats from 2 – 25 numbers.	1500 and 78% of the families own goats from 2 – 30 numbers
Place / Villages / Hamlets	Donje hamlet, Sinhgad (Pune District)	Pasure village, Bhor (Pune District)	Murtawade village (Ratnagiri District)
Latitude	18° 24' 23.44" N	18° 24' 23.44" N	17° 19' 24.78" N
Longitude	73° 46' 07.84" E	73° 46' 49.19" E	73° 24' 03.34" E
Vegetation	Natural pasture, major feed resource of livestock, is composed of predominantly grasses, legumes and acacia tree species.	Natural pasture, major feed resource of livestock, is composed of predominantly grasses, shrubs, legumes and some woody tree species	Natural pasture, major feed resource of livestock, is composed of predominantly grasses, legumes, and shrub species. Rich with trees, i.e., <i>Mango</i> , <i>jackfruit</i> , where the selected fern was found in abundance.
Goat identity	Non descript	Non descript	Non descript

Results

Bioactivity studies of *Drynaria quercifolia* (L) J. Sm.,

Field survey on endoparasites in SAD zone.

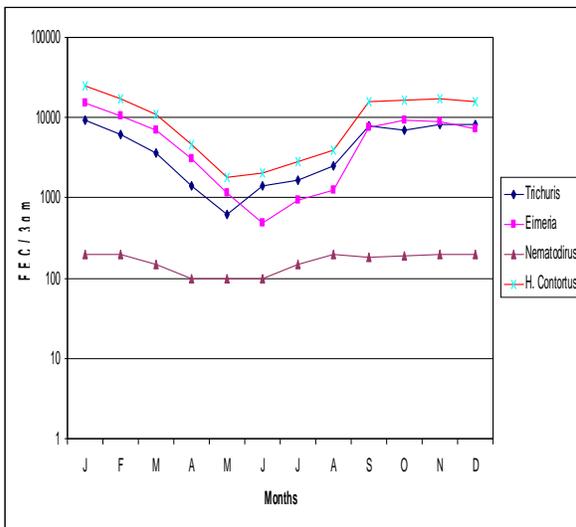
Initial survey revealed the presence and prevalence of selected endoparasites (*Nematodirus*, *Trichuris*, *Eimeria*, *H. contortus*) on the host animal *C. hircus* in the study area of SAD zone only. The population for endoparasites was found to be fluctuating.

Among endoparasites significantly high count (above 12000 F.E.C) of *H. contortus* and the significantly least count were of *Nematodirus spp.* (above 200 F.E.C). The highest peak was observed in the month of January among all the endoparasites and population started coming down during May to June. *Eimeria spp.* and *Trichuris spp.* an endoparasites, too showed

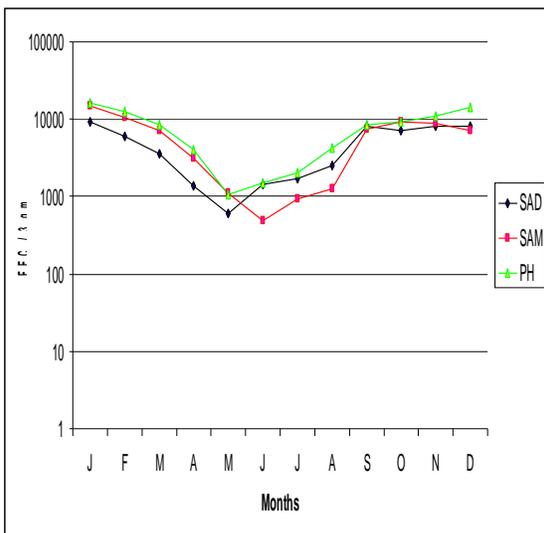
higher counts but lesser than *H. contortus* (Table 2 and Graph 1a).

Year round prevalence was observed for population of *H. contortus* in goats in all the three agroclimatic study areas. PH zone showed marginally higher but not significant infection than the other two zones. As compared to SAD agroclimatic region, goats from SAM and PH regions had high level of parasitism of *H. contortus*. It was observed that after July the endoparasites population rises much faster than the ectoparasite population (Graph 2 a).

Graph 1a: Month wise Fecal Egg Count of endoparasites from SAD zone



Graph 2a: Month wise variation of *H. contortus* eggs from three study zones.



Discussion

India is a vast subcontinent with about 124 million goats [8] and goat keeping being a means of livelihood especially for the poorer sections of the community. Parasitism in goats is a major menace for these goat keepers [9]. In past, health care, preventive measures and control of diseases were dependent on plant based medicine for animals as well as humans. Herbal medicines still support 75 to 80% of the world population, mainly in the developing countries, because of better cultural acceptability and compatibility with the animal and human body and lesser side effects [10].

One way to overcome or prevent the vector borne parasitic diseases is to use locally available herbs or their products. Out of more than 25000 plants of medicinal value, only 10 % are reportedly used for preventive, protective, nutritive and curative aspects [11]. Medicinal plants to treat ruminants are used mainly for internal parasites, internal and external injuries and pregnancy-related conditions.

Conclusion

The present investigation also gives direction for future studies required on isolation of biocompound and studying their efficacy singularly or synergistically on antihelminthus properties of rhizome of *D. quercifolia*. Since many of the endoparasites and diseases of goat also common to sheep and large ruminants, proven efficacies of this medicinal plant can be also be tested and effectively used. The present study form the base for preparing an effective repellency dose which is to be administered by the goat keeper to keep away the endoparasites.

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Month	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Species Name	Nematode (endoparasite)											
<i>Nematodirus spp</i>	118.75 ± 62.729	96.19 ± 57.027	49.38 ± 33.258	44.44 ± 36.936	51.44 ± 39.126	69.00 ± 65.614	575.94 ± 359.397	141.06 ± 125.09	223.69 ± 221.277	44.63 ± 34.552	836.88 ± 382.112	2.75 ± 1.881
<i>H. contortus</i>	4343.75 ± 1265.569	3972.19 ± 1209.339	1431.63 ± 463.281	1800.44 ± 536.008	1137.56 ± 304.006	8299.94 ± 5272.139	5203.63 ± 2210.523	5629.44 ± 2613.611	3253.69 ± 1342.052	1945.69 ± 732.322	2221.38 ± 647.299	1274. 50 ± 303.991
<i>Trichouris spp.</i>	3381.25 ± 1290.259	2909.06 ± 1217.948	1283.75 ± 310.823	2249.44 ± 581.845	1049.88 ± 365.461	4030.13 ± 3381.181	3908.38 ± 2041.059	3465.56 ± 1291.969	2749.06 ± 624.007	1754.38 ± 666.788	1246.38 ± 642.241	1233.13 ± 428.502
<i>Eimeria spp.</i>	2462.50 ± 875.208	1570.56 ± 572.061	1330.88 ± 459.339	1121.50 ± 423.125	948.38 ± 353.988	1144.81 ± 484.071	5708.31 ± 4085.758	5021.75 ± 3333.271	3391.63 ± 2181.784	975.56 ± 417.489	391.06 ± 338.442	824.38 ± 374.457

Table 2: Month and species wise Means & Standard Errors of nematode egg counts and number of ticks from SAD zone.

Means ± S.E of 16 observation

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