

## Comparative efficacy of various indigenous and allopathic drugs against fasciolosis in buffaloes

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### ABSTRACT

One hundred and eighty buffaloes were used in 18 controlled experiments to compare the efficacy of certain indigenous drugs, including *Nigella sativa* seeds, *Fumaria parviflora* aerial parts, *Caesalpinia crista* seeds, and *Saussurea lappa* roots with triclabendazole against fasciolosis. Efficacy was quantified by determining the difference of eggs per gram faeces (EPG) pre- and post-treatment. *Nigella sativa* seeds, after a single dose of 30, 40 and 50 mg/kg body mass, reduced EPG by 54.16, 57.4 and 58.33 per cent, respectively. After the second dose the respective reduction in EPG was 79.16, 80.85 and 81.25 per cent. *Fumaria parviflora* aerial parts at a rate of 40, 50 and 60 mg/kg body mass were 50.0, 57.44 and 78.72 per cent, respectively, whereas efficacy at two dose levels with the same dose rate was 82.6, 89.36 and 95.74 per cent, respectively. *Caesalpinia crista* seeds at 30, 40 and 50 mg/kg body mass were 48.9, 50.0 and 57.7 per cent effective, respectively, whereas efficacy at two dose levels was 80.0, 84.09 and 86.6 per cent, respectively. *Saussurea lappa* at a rate of 50, 100 and 200 mg/kg body mass was 46.6, 57.4 and 61.7 per cent effective, respectively, at one dose level and was 62.2, 72.3 and 78.7 per cent effective at two dose levels. Triclabendazole at one dose level at a rate of 10 mg/kg body mass was 82.6 per cent effective and at two dose levels it was 95.7 per cent effective. The efficacy order was triclabendazole, *Fumaria parviflora*, *Caesalpinia crista*, *Nigella sativa*, and *Saussurea lappa*. No side effects were noted due to the use of any of these plant-origin drugs.

**Key words:** indigenous and allopathic drugs, fasciolosis, buffaloes

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## Introduction

Bovine fasciolosis is an important cause of liver condemnation in abattoirs and lowered productivity in herds in many areas of the world. Control of the infection may be achieved by control of snail (intermediate host) and by use of anthelmintic treatment of infected animals.

Snail control is both difficult and expensive to undertake, involving improved drainage, fencing and the possible use of copper compounds, which are lethal to snails and other non-target poikilothermic animals. Anthelmintic treatment of buffaloes is a regular practice in enzootic areas, but fails to eradicate the parasite. Allopathic anthelmintics are neither completely effective against common flukes, nor do they retain their efficacy by their continuous administration due to the development of resistance. In addition, almost all adversely affect milk and meat production of animals during the course of their treatment, and even for long after their use (BRANDER et al., 1991).

Herbal (indigenous) drugs have been used since ancient times to cure diseases, and several medicinal plants have been used to treat fasciolosis (SATYAVATI et al., 1987). Among these, *Nigella sativa*, *Fumaria parviflora*, *Caesalpinia crista* and *Saussurea lappa* have been used to treat worm infestation (NADKARNI, 1954; SAID, 1969; AKHTAR, 1988). As far as can be ascertained, little systematic work has been conducted to prove their efficacy against fasciolosis in animals. The present work was designed to study the fasciolicide activity in buffaloes of the above mentioned indigenous products under field conditions.

## Materials and methods

*Animal utilised.* A total of 180 buffaloes naturally infected with fasciolosis at Wakil Khan and Chaudhry Livestock Farm, Kamoke District, Gujranwala, were utilised in these studies. The buffaloes were of various ages (4 to 10 years), of both sexes and of the Nili Ravi breed. All animals were kept under similar feeding and managerial conditions throughout the course of treatment. The studies were conducted during late summer months. A detailed history of each individual animal was recorded.

*Animal groups.* Positive cases were randomly divided into five main groups: A, B, C, D and E. The first four groups were further subdivided into four sub-groups of 10 animals each. The first three-sub groups, A<sub>1</sub>, A<sub>2</sub>, and A<sub>3</sub>, received the test drug *Nigella sativa* in 3 different doses, i.e. at rates of 30, 40 and 50 mg/kg body mass, while the fourth group, A<sub>4</sub>, served as untreated control. Sub-groups of B, i.e. B<sub>1</sub>, B<sub>2</sub>, and B<sub>3</sub>, received *Fumaria parviflora* orally at rates of 40, 50 and 60 mg/kg body mass, while sub-group B<sub>4</sub> acted as untreated control. Animals in sub-groups C i.e. C<sub>1</sub>, C<sub>2</sub> and C<sub>3</sub> were given *Caesalpinia crista* orally at rates of 30, 40 and 50 mg/kg body mass, while no treatment was given to animals in sub-group C<sub>4</sub>. Similarly, animals in sub-groups D<sub>1</sub>, D<sub>2</sub> and D<sub>3</sub> were treated with *Saussurea lappa* at three different dose rates, i.e. 50, 100 and 200 mg/kg body mass, while sub-group D<sub>4</sub> acted as control. No treatment was given to animals in the latter group. The remaining twenty animals in group E were randomly divided into two groups, i.e. E<sub>1</sub> and E<sub>2</sub>. Animals in sub-group E<sub>1</sub> were given triclabendazole at the recommended dose rate, i.e. 10mg/kg body mass, while animals in-sub group E<sub>2</sub>, acting as control, received no treatment.

*Preparation and administration of herbal drugs.* The previously mentioned herbal products were dried, finely ground into powder form and were stored in airtight glass bottles at 4 °C. Gum tragacanth was also finely powdered and a 2% w/v aqueous solution was prepared and stored in a refrigerator at 4 °C. At the time of medication, a calculated amount of powdered drugs was weighed according to dosage level and suspended in 100 ml of 2% gum solution and was given orally. Additionally, *Saussurea lappa* and *Fumaria parviflora* were suspended in 300-500 ml of gum solution due to their low solubility and higher dosage level.

*Parasitological techniques.* Faecal samples were collected separately from animals in clean plastic bottles and were properly labelled. Samples were examined by the direct smear, sedimentation technique and zinc sulphate floatation technique for the presence of fluke eggs (SOULSBY, 1982). Counting of eggs was carried out using the McMaster egg counting technique (KELLY, 1974).

Faeces were examined on day zero and on the 1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup>, 7<sup>th</sup>, 10<sup>th</sup> and 18<sup>th</sup> day post-treatment. Animals found positive for fasciolosis were given a second dose of the respective drug on day 18 and their faecal examination

was made on the 21<sup>st</sup> and 28<sup>th</sup> days post-treatment. The effects of drugs on pregnancy, milk yield and body mass were also recorded. Side effects of drugs, if any, were also recorded.

### Results

Efficacy of drugs was calculated on the basis of reduction in egg counts after treatment. The mean percentage in the number of fluke eggs for each treatment group was compared with the corresponding control group (Table 1).

*Efficacy of Nigella sativa seeds.* Efficacy of *Nigella sativa* at a dose rate of 30 mg/kg body mass was 54.16% and 79.16% at one dose level and two dose levels, respectively. Higher doses of 40 mg/kg and 50 mg/kg were 57.44% and 58.33% effective at one dose level, and 80.85% and 81.25% effective at two dose levels, respectively (Table 1). EPG count increased in untreated control group.

Table 1. Efficacy of various indigenous and allopathic drugs against fasciolosis in buffaloes

Drug used	Dose level mg/kg	Efficacy (%) on different days	
		18 <sup>th</sup> day	28 <sup>th</sup> day
<i>Nigella sativa</i>	30	54.16	79.16
	40	57.4	80.8
	50	58.33	81.25
<i>Fumaria parviflora</i>	40	50	82.6
	50	57.4	89.36
	60	78.7	95.74
<i>Caesalpinia crista</i>	30	48.9	80.8
	40	50	84.09
	50	57.7	86.6
<i>Saussurea lappa</i>	50	46.6	62.2
	100	57.4	72.3
	200	61.7	78.7
Triclabendazole	10	82.6	95.6

*Efficacy of Fumaria parviflora aerial parts.* Table 1 shows that *Fumaria parviflora* at 40 mg/kg dose caused a 50% and 82.60% decrease in EPG counts on day 18 and day 28, respectively. At the dose rate of 50 mg/kg and 60 mg/kg the figure was 57.44% and 78.72% effective, respectively, at one dose level, whereas at two dose levels the drug was 89.36% and 95.74% effective.

*Efficacy of Caesalpinia crista seeds.* *Caesalpinia crista* seeds at a rate of 30 mg/kg body mass caused a 48.9% decrease in EPG counts at a one-dose level on post-treatment day 18, whereas this figure was 80.8% effective at a two-dose level on the 28<sup>th</sup> day post treatment. At a dose rate of 40 mg/kg body mass this figure was 50% and 84.09% effective at one- and two-dose levels, respectively. At 50 mg/kg the drug caused 57.7% and 86.5% reduction on day 18 and day 28 post-treatment at one- and two-dose levels, respectively.

*Efficacy of Saussurea lappa roots.* *Saussurea lappa* roots at 50 mg/kg body mass dose caused a 46.6% and 62.2% decrease in EPG counts on the 18<sup>th</sup> day and 28<sup>th</sup> day post-treatment, respectively. With a dose rate of 100 mg/kg it caused a 57.4% and 72.3% reduction in EPG of faeces on the 18<sup>th</sup> day and 28<sup>th</sup> day post-treatment, respectively, and at a rate of 200 mg the drug showed a 61.7% and 78.7% reduction on the 18<sup>th</sup> day and 28<sup>th</sup> day post-treatment.

*Efficacy of triclabendazole.* Allopathic fasciolicide, i.e. triclabendazole, at the recommended dose of 10 mg/kg caused an 82.6% reduction on the 18<sup>th</sup> day, and after administration the dose on the 18<sup>th</sup> day caused a 95.6% reduction in EPG count on the 28<sup>th</sup> day post-treatment. It was also evident that an increase (30 to 60%) occurred in the egg count of all control groups: A<sub>4</sub>, B<sub>4</sub>, C<sub>4</sub>, D<sub>4</sub> and E<sub>2</sub>.

Relative efficacy of all five drugs at their optimum levels of L<sub>3</sub> on various days as compared with L<sub>0</sub> (day zero) showed that at L<sub>3</sub> all drugs had a significant anti-fasciolic efficacy effect. The highest efficacy was shown by Triclabendazole and *Fumaria parviflora*, i.e. 95.7% and 95.74%, respectively, while efficacies of *Caesalpinia crista*, *Nigella sativa* and *Saussurea lappa* were 86.6%, 81.25% and 78.8%. Thus, they rank in second, third and fourth position, respectively.

No side effects of these drugs on pregnancy, milk yield and body mass were noted.

### Discussion

Modern allopathic fasciolicides are efficacious, but most cause several adverse effects. Hence the development of newer, safer, curative and economical anti-fasciolic drugs has remained an active area of research. Therefore, antifasciolic activities of indigenous drugs, including *Nigella sativa*, *Fumaria parviflora*, *Caesalpinia crista* and *Saussurea lappa* were evaluated.

*Nigella sativa* at different dose rates, i.e. 30, 40 and 50 mg/kg body mass. Respectively, caused 54.16, 57.4 and 58.33 per cent reduction on the 18<sup>th</sup> day at a one-dose level, whereas its efficacy was 79.16, 80.5 and 81.25 per cent, respectively, at two-dose levels on the 28<sup>th</sup> day. KAILANI et al. (1995) also reported almost similar results. NATH (1983) has reported that this drug contains negelline, metarbin, melanthin, melanthiginin and sappingin, etc. In addition, it contains fixed oils (37.5%) and volatile oil (1.5%), which delay its passage and ultimately onset of action (GHAZANVI, 1988). Therefore, maximum efficacy of the drug was recorded on post-treatment day 28.

*Fumaria parviflora* aerial parts, at dose rates of 40, 50 and 60 mg/kg body mass, respectively, caused a 50, 57.44 and 78.72 per cent reduction in EPG on the 18<sup>th</sup> day post-treatment at a one-dose level, whereas at a two-dose level the drug showed an efficacy of 82.6, 89.36 and 95.74 per cent, respectively. *Fumaria parviflora* proved to be the most effective herbal drug for removing liver fluke infection. AKHTAR and FARAH (1998) have reported that this drug contains a dry-matter basis of 4% alkaloids, which are possibly its active principles. Similar efficacy rates of this drug against fasciolosis have been reported by KAILANI et al. (1995), and against nematodes by AKHTAR and JAVED (1985).

The efficacy of *Caesalpinia crista* at 30, 40 and 50 mg/kg body mass was 48.9, 50 and 57.7 per cent, respectively, at a one-dose level, whereas at two-dose levels the drug was 80.8, 84.09 and 86.6 per cent effective, respectively, on the 28<sup>th</sup> day post-treatment. These results are in agreement

with KAILANI et al. (1995) who have also reported its efficacy against fasciolosis in buffaloes.

*Saussurea lappa* at different dose levels, i.e. 50, 100 and 200 mg/kg body mass, proved to be 46.6, 57.4 and 61.7 per cent effective, respectively, on the 18<sup>th</sup> day post-treatment at a one-dose level, whereas their efficacies were 62.2, 72.3 and 78.7 per cent, respectively, at a two-dose level on the 28<sup>th</sup> day post-treatment. AKHTAR and MAKHDOOM (1988) reported its efficacy against nematode infection. No work has been carried out to date on its use against fasciolosis.

The allopathic drug Triclabendazole was 82.6 and 95.7 per cent effective at a one- and two-dose level, respectively. Almost similar results were also reported by RICHARDS et al. (1990) and CRAIG and HUEY (1984).

From the results obtained in this study it was indicated that all drugs, except *Saussurea lappa*, were effective at one- and two-dose levels. Triclabendazole and *Fumaria parviflora* proved to be the most effective drugs in removing liver fluke infection, while *Caesalpinia crista* and *Nigella sativa* were the second and third most effective, respectively.

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**MAQBOOL, A., C. S. HAYAT, A. TANVEER: Usporedba djelotvornosti različitih biljnih i alopatskih pripravaka protiv fasciole u bivola. Vet. arhiv 74, 107-114, 2004.**

**SAŽETAK**

U osamnaest nadziranih pokusa bilo je uključeno 180 bivola, radi usporedbe djelotvornosti nekih biljnih pripravaka protiv fasciole i triklabendazola. Od biljnih lijekova istražena je djelotvornost sjemenki biljke *Nigella sativa*, zračnih dijelova *Fumaria parviflora*, sjemenki *Caesalpinia crista* i korijenja *Saussurea lappa*. Djelotvornost je bila procijenjena na osnovi razlike u broju jajašaca po gramu fecesa (JGF) prije i poslije liječenja. Sjemenke *Nigella sativa* smanjile su JGF za 54,16% nakon jedne doze od 30 mg/kg tjelesne mase, za 57,4% nakon jedne doze od 40 mg/kg te za 58,33% nakon jedne doze od 50 mg/kg tjelesne mase. Nakon druge doze od 30, 40, ili 50 mg/kg tjelesne mase uočeno je smanjenje JGF za 79,16%, 80,85% i 81,25%. Zračni dijelovi *Fumaria parviflora* u količini od 40, 50 odnosno 60 mg/kg tjelesne mase smanjili su JGF za 50,0%, 57,44% odnosno 78,72%, dok je primjenom dvije doze u istim količinama smanjen JGF za 82,6%, 89,36% i 95,74%. Sjemenke *Caesalpinia crista* smanjile su JGF za 48,9% nakon jedne doze od 30 mg/kg tjelesne mase, za 50,0% nakon jedne doze od 40 mg/kg tjelesne mase te za 57,7% nakon jedne doze od 50 mg/kg tjelesne mase dok je smanjenje JGF nakon dvije doze od 30, 40 i 50 mg/kg tjelesne mase bilo za 80,0%, 84,09% i 86,6%. Primjena *Saussurea lappa* u količini od 50, 100 i 200 mg/kg tjelesne mase smanjila je JGF za 46,6%, 57,4% i 61,7% nakon jedne doze, a nakon dvije doze za 62,6%, 72,3% i 78,7%. Primjena jedne doze triklabendazola od 10 mg/kg tjelesne mase smanjila je JGF za 82,6%, a primjena dviju doza za 95,7%. Redoslijed učinkovitosti pretraženih pripravaka je sljedeći: triklabendazol, *Fumaria parviflora*, *Caesalpinia crista*, *Nigella sativa* i *Saussurea lappa*. Nikakve nuspojave nisu zapažene kod primjene biljnih pripravaka.

**Ključne riječi:** biljni i alopatski pripravci, fasciole, bivoli

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