Therapeutic Efficacies of *Fumaria parviflora*, *Caesalpinia crista* and Oxyclozanide against Fasciolosis in Naturally Infected Sheep in Rawalakot-Azad Jammu and Kashmir, Pakistan

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Abstract: Therapeutic trial was conducted to check the efficacies of *Fumaria parviflora*, *Caesalpinia crista* in comparison with oxyclozanide (Standard drug) against fasciolosis in sheep. Eighty sheep naturally infected with fasciolosis were randomly divided in to four groups viz A, B, C and D. Groups A and B were further divided in to three sub-groups viz A , A , A and B , B , B  comprised of 10 animals each. Groups C and D were also incorporated with 10 animals in each group. Group A (A , A , A was treated with dried leaves of *Fumaria parviflora* (Shahterah) while Group B (B , B , B  was treated with finely grinded seeds of *Caesalpinia crista* (Karanjwa). Group C was treated with oxyclozanide (Zanil-ICI Pakistan Pvt. Ltd), while group D was kept as infected untreated control. The efficacies of the applied materials were recorded on 3rd, 7th, 18th, 21st and 28th days post treatment. The efficacy of oxyclozanide in terms of reduction in faecal egg count was found 100% on 18th day post treatment. *Fumaria parviflora* and *Caesalpinia crista* showed 59.4%, 91.8% and 58.7%, 87.3% efficacy at the dose of 80 mg/kg on 18th and 28th day post treatment, respectively. It was concluded that *Fumaria parviflora* and *Caesalpinia crista* were comparable with that of standard drug oxyclozanide possessing significant (p<0.01) anthelmintic activity against ovine fasciolosis.

Key words: Sheep · Fasciolosis · *Fumaria parviflora* · *Caesalpinia crista* · Oxyclozanide

INTRODUCTION

Parasitic diseases are one of the major health constraints in production and development of sheep [1]. Fasciolosis is one of the major parasitic diseases of sheep. It can affect a wide range of hosts mainly sheep, goat, cattle and humans as well. The disease is caused by two species of liver flukes, *Fasciola hepatica* and *Fasciola gigantica*, with a major variance that *Fasciola hepatica* is preponderant in temperate zones and *Fasciola gigantica* being in tropical zones of Asia and Africa [2]. Major clinical signs in sheep affected with fasciolosis include anorexia, right upper quadrant pain, vomiting, hepatomegaly, jaundice, biliary obstructions, cholangitis, bottle jaw, fever, anemia, lethargy, weight loss and emaciation [3]. Wasted carcasses, reduction in milk revenue, growth retardation, abortions, hepatic dysfunction and huge mortalities are the direct results of fasciolosis [4] leading to huge economic losses [5]. Fasciolosis affect 250 million of sheep worldwide [2, 7] and is important disease from zoonotic point of view affecting a large human population as well [7, 8].

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Medicinal plants are a significant therapeutic aid for relieving the ailments of animals as well as human beings. Today, there is an increased interest in the use of medicinal plants primarily due to the fact that “green medicine” is safe and more reliable than the synthetic drugs which are costly and having untoward side effects [9]. *Fumaria parviflora* is widely used as an antipyretic, liver tonic, diuretic, expectorant, laxative, appetizer, antiscabies [10] and can also be used as hypoglycemic in Diabetes mellitus [11]. In traditional medication system, *Caesalpinia crista* leaves, stem, root and seeds are used as anthelmintic, febrifugal, tonic, vesicant and for the treatment of palsy, colic, convulsions and leprosy. The oil of *Caesalpinia crista* seed has the properties of being skin softener and pimple remover [12]. *Caesalpinia crista* is useful in maladies like dementia and various neurodegenerative ailments [13].

Livestock is a leading wing of an Agriculture sector of Pakistan. According to the economic survey of Pakistan 2013-14; livestock contribution to agriculture value added stood at 55.9% while it contributes 11.8% to the national Gross domestic product during 2013. The total sheep population of Pakistan is 29.1 million with 0.23 million sheep in Azad Jammu and Kashmir, Pakistan [14]. Keeping in view the importance of sheep and the impact of fasciolosis on the production and performance of sheep, the proposed study was designed to evaluate the therapeutic efficacies of *Fumaria parviflora* (Shahterah) and *Caesalpinia crista* (Karanjwa) in comparison with standard drug oxyclozanide against naturally infected sheep with fasciolosis.

**MATERIALS AND METHODS**

**Herbs and Standard Drug:** *Fumaria parviflora* and *Caesalpinia crista* were used in comparison with standard drug oxyclozanide against naturally infected sheep with fasciolosis.

**Source of Samples:** A total of 300 faecal samples from sheep of various age groups and both sexes were collected and examined for fasciolosis. Samples were collected from various private and public sheep farms located in and around Rawalakot, Azad Jammu and Kashmir (Pakistan). Moreover sheep from the Livestock Research Station, Khaigala (Faculty of Veterinary and Animal Sciences, The University of Poonch, Rawalakot) were also incorporated in this study.

**Collection of Faecal Samples:** Fresh faecal samples were collected directly from the rectum of each animal. Faecal samples were collected in separate clean sterilized plastic bags and were labeled properly. Collected faecal samples were then transported to Parasitology laboratory (Faculty of Veterinary and Animal Sciences, The University of Poonch, Rawalakot) for further studies.

**Faecal Examination:** Faecal samples were processed for the presence of trematode eggs using direct smear technique. Samples found positive for *Fasciola* spp. were further subjected to McMaster egg counting technique for counting the number of eggs per gram (EPG) of the faeces [15].

**Therapeutical Trials:** Eighty positive animals were randomly divided into four groups viz, A, B, C and D. Groups A and B were further divided into three sub-groups viz A<sub>i</sub>, A<sub>j</sub> and A<sub>k</sub>, B<sub>i</sub>, B<sub>j</sub> and B<sub>k</sub>. A total of 30 animals were kept in group A with each sub-group comprised of 10 sheep while the same pattern was also followed in group B. Groups C and D also comprised 10 affected sheep in each group.

**Group A:** Sheep in Group A were treated with oral dosing of dried grinded leaves of *Fumaria parviflora* mixed with wheat bran at the rates of 60, 70 and 80 mg/kg B.W to A<sub>i</sub>, A<sub>j</sub> and A<sub>k</sub> respectively. The mean EPG were noted on 3<sup>rd</sup>, 7<sup>th</sup> and 18<sup>th</sup> day post treatment. Animals still found positive on 18<sup>th</sup> day were given the second dose and EPG was noted again on 21<sup>st</sup> and 28<sup>th</sup> day.

**Group B:** Sheep in Group B were treated with oral dosing of finely grinded seeds of *Caesalpinia crista* mixed with wheat bran at the rates of 60, 70 and 80 mg/kg B.W to B<sub>i</sub>, B<sub>j</sub> and B<sub>k</sub> respectively. The mean EPG were noted on 3<sup>rd</sup>, 7<sup>th</sup> and 18<sup>th</sup> day post treatment. Animals still found positive on 18<sup>th</sup> day were given the second dose and EPG was noted again on 21<sup>st</sup> and 28<sup>th</sup> day.

**Group C:** Sheep in this group were treated with oral drench of Oxyclozanide (Zanil, ICI-Pakistan Limited, Animal Health division) at the dose rate of 10 mg/kg B.W.

**Group D:** This group was kept as positive control (Infected-Utreated).

**Drug Efficacy:** The efficacies of herbs and standard drug were calculated in treated groups A, B and C on the basis of reduction in egg per gram (EPG) of faeces [16].
Efficacy (%) = $\frac{EPG_{\text{before treatment}} - EPG_{\text{after treatment}}}{EPG_{\text{before treatment}}} \times 100$

Obtained mean EPG of treated groups were compared with control Group D (Infected-untreated).

**Statistical Analysis:** One way ANOVA was used to analyze the data obtained from the therapeutic trials using Statistical Package for Social Sciences (SPSS) considering $p<0.01$ being significant.

**RESULTS**

**Group A**

**Group A:** Group A was treated with *Fumaria parviflora* at the dose rate of 60 mg/kg body weight. The mean EPG recorded on day 0 was 310 and then on 3rd, 7th and 18th day, it was 275, 225 and 150, respectively. The mean EPG on 21st and 28th day post treatment was 65 and 50, respectively (Table 1). The efficacy of *Fumaria parviflora* at 60 mg/kg BW on 3rd, 7th, 18th, 21st and 28th day was given in Table 2.

**Group A:** Group A was treated with *Fumaria parviflora* at the dose rate of 70 mg/kg. The mean EPG recorded on day 0 was 320 and then 3rd, 7th and 18th day, it was 275, 220 and 145, respectively. The mean EPG on 21st and 28th day was 55 and 40 (Table 1). The efficacy of *Fumaria parviflora* at the dose rate of 70 mg/kg BW on 3rd, 7th, 18th, 21st and 28th day was given in Table 2.

**Group A:** Group A was treated with *Fumaria parviflora* at the dose rate of 80 mg/kg. The mean EPG recorded on day 0 was 345 and then on 3rd, 7th and 18th day post-medication was 280, 225 and 140, respectively. The mean EPG on 21st and 28th day post treatment was 45 and 30 (Table 1). The efficacy of *Fumaria parviflora* at 80 mg/kg BW on 3rd, 7th, 18th, 21st and 28th day was given in Table 2.

**Group B**

**Group B:** Group B was treated with *Caesalpinia crista* at the dose rate of 60 mg/kg body weight. The mean EPG recorded on day 0 was 380 and then on 3rd, 7th and 18th day, it was 355, 315 and 260, respectively. The mean EPG on 21st and 28th day was 200 and 185 (Table 1). The efficacy of *Caesalpinia crista* at the dose rate of 60 mg/kg BW on 3rd, 7th, 18th, 21st and 28th day was given in Table 2.

**Group B:** Group B was treated with *Caesalpinia crista* at the dose rate of 70 mg/kg. The mean EPG recorded on day 0 was 350 and then 3rd, 7th and 18th day, it was 315, 270 and 205, respectively. The mean EPG on 21st and 28th day was 140 and 125 (Table 1). The efficacy of *Caesalpinia crista* at the dose rate of 70 mg/kg body weight on 3rd, 7th, 18th, 21st and 28th day was given in Table 2.

**Group B:** Group B was treated with *Caesalpinia crista* at the dose rate of 80 mg/kg. The mean EPG on day 0 was 315 and then on 3rd, 7th and 18th day it was 260, 210 and...

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**Table 1: Mean EPG for Groups A, B, C and D on different days**

<table>
<thead>
<tr>
<th>Drug used</th>
<th>Dose (mg/kg)</th>
<th>Day 0</th>
<th>EPG after 1st dose</th>
<th>After 2nd dose</th>
<th>SE of mean</th>
<th>SE of difference between two means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Day 3</td>
<td>Day 7</td>
<td>Day 18</td>
<td>Day 21</td>
</tr>
<tr>
<td>Fumaria</td>
<td>60</td>
<td>310 A</td>
<td>275</td>
<td>225</td>
<td>150 C</td>
<td>65 D</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>320 A</td>
<td>275</td>
<td>220</td>
<td>145 D</td>
<td>55 E</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>345 A</td>
<td>280</td>
<td>225</td>
<td>140 D</td>
<td>45 E</td>
</tr>
<tr>
<td>Caesalpinia</td>
<td>60</td>
<td>380 A</td>
<td>355</td>
<td>315</td>
<td>260D</td>
<td>200 E</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>350 A</td>
<td>315</td>
<td>270</td>
<td>205 D</td>
<td>140 E</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>315 A</td>
<td>260</td>
<td>210</td>
<td>130 D</td>
<td>55 E</td>
</tr>
<tr>
<td>Oxyclozanide</td>
<td>10</td>
<td>280 A</td>
<td>205</td>
<td>65</td>
<td>0 D</td>
<td>-</td>
</tr>
<tr>
<td>Control group</td>
<td>-</td>
<td>235 C</td>
<td>240</td>
<td>250</td>
<td>265 BC</td>
<td>275 AB</td>
</tr>
</tbody>
</table>

Means followed by same letters do not differ significantly ($p$ value 0.0001)

EPG= Egg per gram, SE= Standard Error
Table 2: Efficacy (%) of *Fumaria parviflora*, *Caesalpinia crista* and Oxyclozanide against fascioliasis on different days

<table>
<thead>
<tr>
<th>Drug used</th>
<th>Dose mg/kg</th>
<th>After 1st dose</th>
<th></th>
<th>After 2nd dose</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3rd day</td>
<td>7th day</td>
<td>18th day</td>
<td>21st day</td>
</tr>
<tr>
<td><em>Fumaria parviflora</em></td>
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<td>11.2</td>
<td>27.4</td>
<td>51.6</td>
<td>79.6</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>14</td>
<td>31.2</td>
<td>54.6</td>
<td>82.8</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>18.8</td>
<td>34.7</td>
<td>59.4</td>
<td>86.9</td>
</tr>
<tr>
<td><em>Caesalpinia crista</em></td>
<td>60</td>
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<td>17.1</td>
<td>31</td>
<td>47.3</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>10</td>
<td>22.8</td>
<td>41.42</td>
<td>58.8</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>17.4</td>
<td>33.3</td>
<td>58.7</td>
<td>82.5</td>
</tr>
<tr>
<td>Oxyclozanide</td>
<td>10</td>
<td>32.1</td>
<td>76.7</td>
<td>100</td>
<td>-</td>
</tr>
</tbody>
</table>

130, respectively. The mean EPG on 21st and 28th day was 55 and 40 (Table 1). The efficacy of *Caesalpinia crista* 80 mg/kg body weight on 3rd, 7th, 18th, 21st and 28th day is given was Table-2.

**Group C:** Sheep in Group C were treated with oxyclozanide at the dose rate of 10 mg/kg BW. The mean EPG on day 0 was 280 and then on 3rd, 7th and 18th day post-medication, it was 205, 65 and 0 (Table 1). The efficacy of oxyclozanide on 3rd, 7th and 18th day was given in Table 2. A single dose of oxyclozanide was much more effective against fascioliasis with a 100% reduction in EPG on 18th day post-medication.

**Group D:** The mean EPG of control group recorded on 0, 3rd, 7th, 18th, 21st and 28th days was 235, 240, 250, 265, 275 and 290, respectively (Table 1). There was a gradual increase in EPG on different days as this group was kept as infected untreated control group.

No side effects were observed in each of the treated groups during treatment trials.

**DISCUSSION**

*Fumaria parviflora* and *Caesalpinia crista* were used in comparison with Oxyclozanide. The active constituents of *Caesalpinia crista* include carbohydrates, alkaloids, Glycosides, tannins, flavonoids and Coumarins [9]. Ten new furanocassane-type diterpenes [caesalpinins H-P (1-9) and norcaesalpinin F (10)], along with 13 known diterpenes have been isolated from the CHCl₃ extract of the seed kernels of *Caesalpinia crista* [17]. *Fumaria parviflora* possesses alkaloids, saponins, tannins and anthraquinones [18].

Sheep in Group A were treated with *Fumaria parviflora*. Results of groups A₁, A₂, A₃ indicated that the efficacies of a single dose of *Fumaria parviflora* at the dose rate of 60, 70 and 80 mg/kg BW on 18th day post-medication were 51.6%, 54.6% and 59.4%, respectively. After the administration of 2nd dose of *Fumaria parviflora* on 18th day, the efficacies were 79.6%, 82.8% and 86.9%, respectively, on 21st day post treatment and 83.8%, 87.5% and 91.8%, respectively, on 28th day post treatment. These results were comparable to the previous studies which stated that *Fumaria parviflora* was more effective drug with high antifasciolic properties against fascioliasis as compared to *Nigella sativa*, *Caesalpinia crista* and *Saussurea lappa* [19, 20]. Different herbal extracts for treatment of fascioliasis had been used; among them the efficacy of *Fumaria parviflora* was slightly more at different dose rates [21]. Furthermore, in one of the previous study, *Fumaria parviflora* at the same dose levels was used with nearly the same results obtained with the efficacy to be 41.66%, 45.71%, 63.88% and 83.33%, 91.42% and 97.22% after first and second doses [22].

Sheep in Group B were treated with *Caesalpinia crista* at the dose rate of 60, 70 and 80 mg/kg BW. Results of groups B₁, B₂, B₃ indicated that the efficacies of a single dose of *Caesalpinia crista* at the same dosages were 51.42% effective [22].
Group C was treated with oxyclozanide at the dose rate of 10 mg/kg BW. It was found that oxyclozanide was more effective drug against *Fasciola* infection at single dose of 10 mg/kg body weight as animals showed complete recovery after 18th day post treatment with 100 percent reduction in faecal egg count. Previous studies stated that oxyclozanide was effective against the adult fluke [24]. Oxyclozanide treated sheep showed lower E.P.G up to 0 percent at 28th day post treatment [25]. Oxyclozanide against fasciolosis in hill sheep flock was highly effective drug at a single dose [26, 27]. Similarly a single dose of Oxyclozanide was effective against all bovine helminthes [28]. One previous study reported the same results that oxyclozanide with single dose was most effective anthelmintic against fascioliasis as treated animals recovered completely [29].

**CONCLUSION**

It is concluded that *Fumaria parviflora* and *Caesalpinia crista* possess significant therapeutic efficacies against ovine fasciolosis comparable with that of standard oxyclozanide. Furthermore, it can be concluded that *Fumaria parviflora* and *Caesalpinia crista* can be used as alternate therapeutic agents against ovine fasciolosis. However, studies pertaining clinical trials on larger scale are recommended to further explore their efficacies on scientific basis.

**REFERENCES**


