The prevalence of Ttrichostrongyloids among camels in Charsada district was measured and trials conducted to determine the efficacy of Saussurea lappa and Fumaria parviflora and Albendazole. 500 camels were examined, and trichostrongyloids were observed in 175 (35%). Haemonchus longisteps was the most predominant specie with the prevalence of (52.57%), followed by Trichostrongylus probolurus, Ostertagia Ostertagi, Dictyocaulus and Nematodirus dromedari being 10.85%, 9.71%, 9.14% and 9.14% respectively. Cooperia was found to be the least prevalent 8.57% parasite. Young animals were found to be at higher risk of infection than adult animals. The efficacy of Saussurea lappa was 65.85%, Fumaria parviflora was 46.34, and albendazole was (66.66%) at one dose. Whereas the efficacy after second dose was of Saussurea lappa (85.36%), Fumaria parviflora was (82.92 %), and albendazole was (97.4 3%). Making albendazole is the most effective treatment against trichostrongyloids in camels.

Key words: Trichostrongyloids, prevalence, chemotherapy, camel.

INTRODUCTION
Camels play an important role in the socio-economic system of Asia and Africa. Pakistan being the third one among the camel rearing countries in the world having 1.2 million Dromedary camels (FAO 2000), with an annual increase of 1.62% (Ashraf et al., 2014). In camel, parasitic diseases causes huge economic losses, in terms of low production and medication cost. The camels are infected by a large number of internal parasites including, Heamonchus and Trichostrongylus. The Heamonchus causes Haemonchosis which is the most common pathogenic infection with almost 100% morbidity. Symptoms include emaciation, anemia, and oedema of lower limbs, eosinophilia, hypoproteinemina and hypoalbuminemia. Pica is associated with haemonchosis and worm infections in camels. Trichostrongylus spp. may contribute to the debilitating effects. Anemia is one of the pathogenic effects of gastrointestinal parasites (Soulsby, 2006). These Helminths produces lesions which could reduce the productivity of the infected dromedary through disturbance of intestinal absorption (McGavin and Zachary 2007). Diseasestates of infestation results in reduce production of wool and meat by losing appeptite and poor consumption of nutritional substances, which may lead to low fertility, abortion and death (Windsor et al., 1992). Ethnoveterinary practice includes all the traditional methods and indigenous knowledge usefull for the maintenance of livestock health and production (Wanzala et al., 2005). Modern allopathic drugs are usually expensive and unavailable in far flung areas of many communities and people mostly depend on ethnoveterinary practice to solve such problems (Kumar, 2007 and Chafe et al., 2008). The present study was therefore launched aiming to evade the prevalence of Trychostrongyloids in camels of Charsadda as there is very scanty information available on helminthes infection in camels (Bekele2002) and the comparative efficacy of two medicinal plants (saussurea lappa and Fumaria parviflora) and an allopathic drug (Albendazole).

MATERIALS AND METHODS

Experimental Design
500 fecal samples were collected from camels in and around Charsada for trichostrongyloids. The samples were examined at Veterinary Research Institute Peshawar. All animals were kept under similar conditions at the Research Institute.
feeding and management conditions throughout the course of treatment. The studies were conducted during late summer months. A detailed history of each individual animal was recorded.

**Animal utilized**

Animals were casually arranged into 4 groups i.e. A, B, C and D with 15 camels in each group. In group A and B animals were treated with *Sussurea lappa* (Qust-e-shireen) @60mg/kg body weight, and *Fumaria parviflora* (shahtra) @60mg/kg body weight respectively. While the animals in group C was treated with Albendazole at dose rate of 10 mg/kg body weight and group D was kept as negative control. Efficacy of drug was calculated as described by Varady et al. (2004).

**Preparation and administration of drugs**

The herbal preparations were dried, finely ground to powder form and stored in sealed 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 treatment, a calculated amount of herbal drugs were weighed according to recommended dosages and suspended in 100 ml of 2% gum solution given P.O. *Saussurea lappa* and *Fumaria parviflora* were suspended in gum solution due to their lower solubility.

**Parasitological techniques**

The qualitative examination of faecal sample was done by light microscopy, sedimentation and flotation methods. While quantitative faecal inspection was done using Mac -Master (egg counting) technique as described by Souls by, 2006. Faeces were examined on day zero day and on day 3rd, 7th, and 18th post treatment (Maqbool et al., 2004). The effect of drugs on pregnancy, milk yield and body mass were also recorded along with side effect of drugs. Efficacy of drug was evaluated as described by Varady et al. (2004).

**RESULTS**

**Efficacy of Saussurea lappa**

In clinical cases EPG count of trichostrongyloids in camels treated with *saussurea lappa* show an accumulative tendency in control (untreated) animals. A single dose of 60mg/kg body weight of *Saussurea lappa* show a decrease of 14.63%, 41.46% and 65.85% in EPG counts on the 3rd, 7th, and 18th day respectively.

**Efficacy of Fumaria parviflora**

*Fumaria parviflora* at 60 mg/kg dose cause a decrease of 12.19%, 31.70% and 46.34% in EPG counts on the 3rd, 7th, and 18th day, respectively.

**Efficacy of Albendazole**

Allopathic drug, i.e. *albendazole*, at the recommended dose of 10 mg/kg caused 12.82% reduction on the 3rd, 34.46% on 7th, and 66.66% on 18th day.

Relative efficacy of all three drugs at their optimum levels on various days as compared with (day zero) showed that all drugs had a significant anti-trichostrongyloids efficacy effect. The highest efficacy was shown by Albendazole and *Saussurea lappa* were 66.66% and 65.85% respectively, while efficacy of *Fumaria parviflora* was 46.34%.

**Table: 1: Overall Prevalence of Trichostrongyloids in camels.**

<table>
<thead>
<tr>
<th>No of camels examined.</th>
<th>Name of parasites</th>
<th>No of positive</th>
<th>% of infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>Haemonchus longisteps</td>
<td>92</td>
<td>52.57%</td>
</tr>
<tr>
<td></td>
<td>Trichstrongylus probolus</td>
<td>19</td>
<td>10.85%</td>
</tr>
<tr>
<td></td>
<td>Ostertagia ostertagi</td>
<td>17</td>
<td>9.71%</td>
</tr>
<tr>
<td></td>
<td>Dictyocaulus</td>
<td>16</td>
<td>9.14%</td>
</tr>
<tr>
<td></td>
<td>Nematodirus</td>
<td>16</td>
<td>9.14%</td>
</tr>
<tr>
<td></td>
<td>Cooperia</td>
<td>15</td>
<td>8.57%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>175</td>
<td>35%</td>
</tr>
</tbody>
</table>

**Table: 2: Efficacy in Percentage of various drugs against trichostrongyloids in camels at different days.**

<table>
<thead>
<tr>
<th>Drugs</th>
<th>No of Animals</th>
<th>Efficacy in percentage on different days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>First treatment (%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3rd</td>
</tr>
<tr>
<td><em>Saussurea lappa</em></td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>14.63</td>
</tr>
<tr>
<td><em>Fumaria parviflora</em></td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.19</td>
</tr>
<tr>
<td>Albendazole</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.82</td>
</tr>
</tbody>
</table>
DISCUSSION

Prevalence of Trichostrongyloids
The overall results among camels in district Charsada Kpk, showed that among 500 (Total) 175 (35%), were found positive. Six species which were identified are in order of intensity are Haemonchus longistipes, Trichostrongylus probolurus, Ostertagia ostertagi, Dicyocaulus, Nematothirus dromedari, and Cooperia. The high incidence of Haemonchus longistipes occur due to changes in grazing behaviour from feeding on upper bushes, to feeding on grasses, as a results of removal of bushes, shrubs and trees for rain fed mechanized crop production schemes. Thus increasing the chances of pitching up of ova and larvae from pasture was also reported by El Khoully and El-Khawad (2011). Abdul Salam and Farah (1988), Anwar (1987), Burji et al. (2010), Tajik et al. (2011). It was also noted that the overall incidence of endoparasites was higher in younger animals than adults this was supported by Swai et al. (2011). They reported that younger animals can act as source of infection for adults. It was reported that overall infection was higher in females than males; this was in line with Steward (1950), Raisin ghani (1992) and Sharrif et al. (1997). It has shown that rate of infection in the present study was nearly similar to the above stated workers in various regions throughout the world. However Abu-Bakr et al. (2000), Arzoun et al. (1984), Burji (2010), Bamaiyi and Kaliu (2012), Banaja and Ghandur (1994), Bakele (2002), Bhari and Kawasme (1980), Kayum et al. (1992), Parsani et al. (2008) and Raza et al. (2007) recorded diverse prevalence in different countries of the world. These findings are somewhat in consistency with the results of the present study; the change may be due to diverse geographical regions and varied environmental conditions.

Chemotherapy
For the operative chemotherapy and intentional chemoprophylaxis of parasites of camels, a safe drug is required with high activity against all stages of parasites. Modern drugs are efficacious but most of them possess adverse effects, Rewatkar (2008), thus marketing of new, highly therapeutic and cheap drug can contribute to the field of research. The antiparasitic activity of indigenous drugs including Saussurea lappa and Fumaria parviflora were evaluated for their comparative efficacies with each other and with modern allopathic drug i.e. Albendazole.

Saussurea lappa (Qust-e-shireen) at 60 mg/kg body weight was 65.85 percent effective at single dose. Similar findings were also reported by Kailani et al. (1995), Itty et al. (1997), Waller and Prichard (2001), Maqbool et al. (2004) and Stafford and Coles (2007).

Efficacy of Fumaria parviflora at 60 mg/kg body weight was 46.34% effective at one dose level. Nearly similar results were recorded by Akhter and Javed (1985). Akhter and Farah (1986), and Waller and Prichard (2001), Maqbool et al. (2004), Stafford and Coles (2007) reported that this drug contain 40% alkaloid which might be its active ingredient the high efficacy or reduction in the parasite burden may be due to its active ingredient. It was concluded that Fumaria parviflora at dose rate of 60 mg/kg body weight give good result for the treatment of various endoparasitic infections in camels.

Albendazole was given to camels at recommended dose rate i.e. 10 mg/kg body weight and caused 66.66 percent reduction in EPG count. Similar results were also showed by various workers in various parts of the world as Al Qudah et al. (1998), Akhter and Javed (1991), and Varady et al. (2004).

Conflict of interest
The authors have no conflict of interest regarding this research work.

Ethical Statement
The animals and human rights were not violated or ignored. All the participants were assigned on their well with signing consent before inclusion into the study.

REFERENCES


FAO (2000): FAO production Year Book VOL. 54 Food and Agriculture Organization of United Nations, Rome, Italy.


Varady, M.; Konigova, A. and Corba, J. (2004): A field study to evaluate the efficacy of


مدى انتشار وعلاج طفيل التريكوسترنجليوس في الابل
محمد قاسم، أزهر مقبل، محمود الجزار، ابرار أحمد، أحمد نجيب

Email: Ahmdsaf2001@yahoo.com Assiut University web-site: www.aun.edu.eg

لقد قبض مدى انتشار طفل التريكوسترنجليوس في الابل منطقه تشاريدا بأخطان وكان كل قبض مدى فاعليه نبات القسط ونوات دخان الأرض والبنطازول في علاج تلك الديدان. ثم قبض 500 ابل ولاحظ ان نسبه اصابه بالتركوسترنجليوس بالواعد المختلفة تصل الى 0.5% منها الهاونكوس وهي الاكثر انتشارا بنسبة 2.75% ثم التريكوسترنجليوس والاستراتيجيا ودكتوكليس بنسبة 1.75% ووجد أيضا ان الحيوان الصغير انتصاعا أكثر عرضه لأصابه من الحيوان البالغ وعلى مدى العلاج ووجد ان فاعليه نبات القسط حوالي 36.85% ونوات دخان الأرض وبنطازول وبنطازول بجرعه واحدة فقط. في حين أنه كانت فاعليه الجرعة الثانى كالاتي 36.36% ليات القسط 0.07% نبات دخان الأرض بينما للبنطازول كانت 97.39% وبذلك يكون البنطازول هو الأكثر فاعليه لعلاج التريكوسترنجليوس في الابل.