World Journal of Pharmaceutical Sciences
ISSN (Print): 2321-3310; ISSN (Online): 2321-3086
Published by Atom and Cell Publishers
Available online at: http://www.wjpsonline.org/
Original Article

Comparative efficacy evaluation of polyherbal liver tonics as a co-therapy in clinical helminthiasis of Cattle

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Received: 28-11-2014 / Revised: 29-12-2014 / Accepted: 09-01-2015

ABSTRACT

40 cattle irrespective of sex, age and breed were screened coprologically and found moderately positive for naturally acquired helminthes (mean EPG = 1050 ± 112.02 to 1225 ± 165.78). Cattle were randomly assigned to 5 groups (n=8). Treatment Group T_0 animals were treated with Albidol @7.5mg/Kg B.wt. Treatment Group T_1, T_2, T_3, and T_4, were treated with Albidol + AV/SYL/12@50 ml per day; Albidol + Yakrifit Liquid@50ml per day; Albidol + Liver tonic Brand A @50ml per day; and Albidol + Liver tonic Brand B @15ml per day, respectively, bid for 5 days in cattle. Blood samples were collected for haemato-biochemical study. A significant decrease ($P<0.05$) in mean EPG was observed in T_4 (21 ± 8.42), T_2 (23 ± 13.33), T_3 (24 ±11.09), and T_1 (25 ± 11.09) in comparison to T_0 (125 ± 184.76) on 14th day. The hematological profile, serum total protein, and A:G ratio were significantly ($P<0.05$) improved in all liver tonic supplemented groups. While biochemical parameters in liver tonic supplemented groups decreased ($P<0.05$) after 5th and 14th day of treatment. In conclusion cattle treated with co-therapy of herbal liver tonic products along with anthelmintic drug recovered more rapidly as compared to T_0 group.

Key words: Helminthiasis, liver tonic, haemato-biochemical profile, EPG, herbal liver tonic

INTRODUCTION

Gastrointestinal parasitic infections are world-wide problem for both small and large-scale farmers and a serious threat to the livestock economy worldwide [1]. Helminthiasis is the gastrointestinal parasitic infection and more prevalent in the very young and the very old or immuno-deficient animals [2]. Helminth infections lead to production losses through a reduction of feed intake or feed conversion efficiency, loss of blood and even death of livestock worldwide often needed antihelminthic treatment which result in serious economic losses to the farmer [3] [4] [5]. The liver is one of the vital organs of the body, susceptible to various parasites and disease conditions which affect the total health status of the animal [6]. Good nutritional status of host cattle can positively influence the pathogenesis of helminth infections [7]. Good managemental practices and balanced nutrition helps in reducing potential health risks to infection and diseases; improving appetite, feed efficiency, better body weight gain and general appearance of animals [8]. In the absence of reliable liver protecting drugs in modern medicine, there are number of medicinal preparations in Ayurveda recommended for the treatment of liver disorders as a adjunct therapy [9]. AV/SYL/12 and Yakrifit (Ayurvet Limited, India) are polyherbal products containing ingredients *Andrographis paniculata [10], Eclipta alba [11], Picrorhiza kurroa [12], Phyllanthus niruri [13], Tephrosia purpurea [14], Boerhaavia diffusa* [15] etc. documented for their hepatoprotective, hepatoregenrative, hepatostimulant properties and well evident for growth enhancing activity. So the trial was designed to study the antihelminthic activity of different poly herbal preparations.

MATERIALS AND METHODS

Forty cattle irrespective of sex, age and breed, exhibiting clinical signs were screened coprologically and found moderately positive for naturally acquired helminthes (mean EPG = 1050 ± 112.02 to 1225 ± 165.78). Cattle were randomly

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assigned to 5 groups (n=8). Treatment Group T_0 animals were treated with Albidol @7.5mg/Kg B.wt. Treatment Group T_1, T_2, T_3, and T_4, were treated with Albidol + AV/SYL/12@50 ml per day; Albidol + Yakrifit Liquid@50ml per day; Albidol + Liver tonic Brand A @50ml per day (*Liv 52*); and Albidol + Liver tonic Brand B @15ml per day (*Tefroli Syrup*), respectively, bid for 5 days in cattle. From coprologically positive animals, blood samples were collected in sterile tubes containing anti-coagulant (EDTA) by jugular puncture while observing all aseptic precautions, for generating haematological data using standard techniques, Jain [16]. For biochemical studies, blood was collected in other sterile tubes having no anticoagulant. The blood slants were made and incubated for 1 hour at 37 °C. Blood clots were broken and tubes were centrifuged at 2,500 rpm for 30 min. The serum was pipette out & stored in serological pyrex glass tube until further use for generating data on biochemical profile.

Statistical analysis: The data so generated were statistically analyzed, were compared with standard values while following statistical procedures suggested by Sendecor and Cochran [17] and significance of mean difference were tested by Duncan's new multiple range.

RESULTS AND DISCUSSION

Eggs per gram of faeces: Identification of helminth species was done by only examining eggs and 3rd stage larvae [18]. The pretreatment faecal eggs count (on day-0) in animals, randomly assigned to different groups, ranged between 1050 ± 112.02 to 1225 ± 165.78. Evidently, the animal acquired moderate infection of helminthes. However, after giving treatment with antiparasitic drug alongwith a liver tonic product on 14th day of treatment the mean EPG ranged between 21 ± 8.42 to 125 ± 184.76 (Table-4). The decrease in faecal eggs count varies non significantly among the liver tonic supplemented groups T_4 (21 ± 8.42), T_2 (23 ± 13.33), T_3 (24 ±11.09) and T_1 (25 ± 11.09) though significantly ($p<0.05$) lower then group T_0 (125 ± 184.76). In liver tonic preparation AV/SYL/12 and Yakrifit Liquid contain herbs viz. *Azadirachta indica, Tinospora cordifolia* proposed to effective on worms [19], [20].

Hematological profile

Haemoglobin (g%), Packed cell volume (%) and Total erythrocyte counts (10^6/µl): In present investigation mean values of hemoglobin, pack cell volume and total erythrocyte count were found significantly low in all infected group than the apparently healthy animals at 0 day. The value in all the groups varies non significantly ($p<0.05$) at 0th day (Table-1). The decrease values of Hb (g %), PCV (%) and TEC (10^6/µl) could be accounted to direct loss of whole blood due to blood sucking activities and concurrent hemorrhages produced by these gastrointestinal nematodes in animals [21] [22]. At 5th day of treatment a significantly ($p<0.05$) increase in hematological profile (Table-2) was observed in all adjunct therapy groups in comparison to group T_0. Significantly ($p<0.05$) maximum increase in Hb (10.01 ± 1.17^b), PCV (37.80 ± 0.69^b), and TEC (5.69 ± 0.39^b 10^6/µl) was observed in group T_1 and the hematological values of group T_2, T_3 and T_4 varies non significantly ($p<0.05$) from each other. At 14th day of treatment a significant ($p<0.05$) increase in hematological profile (Table-3) was observed in all adjunct therapy groups in comparison to group T_0. Significantly ($p<0.05$) maximum increase in Hb (13.50 ± 0.20^b), and TEC (6.59 ± 0.11^b 10^6/µl) was observed in group T_1. The hematological value of values of group T_2, T_3 and T_4 varies non significantly ($p<0.05$) from each other but varies significantly ($p<0.05$) from group T_0. The improved levels of haemoglobin and PCV could be due to effect of given herbal liver tonic products causing elimination of worm burden from GI tract which resulted in stoppage of blood loss [23].

***Total leucocytes count* (10^3/ µl):** In present investigation at 0 day mean values of total leucocyte count were found higher in all infected group than the apparently healthy animals. The high values of total leukocyte count in helminthes infested cattle could be due to localized helminthes infestations and secondary bacterial infection of gastrointestinal tract of cattle as stated by Benzamin [24]. This may also be due to increase in number of eosinophil which has resulted from local immune response [25]. After 14th day of treatment (Table-3) significantly ($p<0.05$) maximum decrease in Total leucocytes count was observed in AV/SYL/12 supplemented group T_1 (7.12 ± 0.13^b 10^3/ µl) in comparison to group T_0 (12.59 ± 0.54^a). The total leucocyte count values in group T_2 (9.01 ± 0.35^c 10^3/ µl), T_3 (9.23 ± 0.17^c 10^3/ µl) and T_4 (9.69 ± 0.11^c 10^3/ µl) varies non significantly from each other but were significantly ($p<0.05$) lower then the group T_0 (12.59 ± 0.54^a 10^3/ µl). The improvement in blood profile of the Cattles supplemented with in AV/SYL/12 because of the herbs viz *Tinospora cordifolia* [26], *Azadirachta indica* [27] [28] which has been reported effective in increasing packed cell volume (PCV), hemoglobin concentration (Hb), red blood cell (RBC).

Biochemical parameters

Serum total protein (g/dl): The lowered values of serum total protein (g/dl) were recorded in treated

groups (3.05 ± 1.89 [a] to 3.79 ± 1.89[a] g/dl) on 0th day. After 14th day post treatment (Table-3) significant (p<0.05) differences in serum total protein values (4.89±0.59[a] to 6.93±0.19[c] g/dl) were observed. Significantly (p<0.05) maximum increase in serum total protein (g/dl) was observed in Yakrifit supplemented group T_2 (6.93±0.19[c] g/dl) in comparison of group T_0 (4.89±0.59[a] g/dl) but varies non significantly from group T_3 (6.87±0.67[c] g/dl) and T_4 6.79±0.73[c] g/dl). The results are in accordance with Ramteke et. al [29] and Jain and Sahni [30] who reported increase in serum total protein after treatment with herbal formulations.

A: G ratio: The lower albumin and globulin ratio was recorded in treated groups (0.41 ± 1.12 [a] ton 0.50 ± 1.72 [a]) on 0th day. On 14th day post treatment (Table-3) a significantly (p<0.05) maximum increase in A: G ratio was observed in Group T_4 (0.90±0.17[c]) varies non significantly from the Yakrifit supplemented group T_2 (0.89±0.33[c]). Overall in all adjunct therapy groups significant (p<0.05) increase in A: G ratio was observed in comparison to group T_0 (0.67±0.66[a]).

SGOT, SGPT (IU/liter), BUN (mg/dl) and Serum bilirubin (mg/dl): The extent of liver damage is assessed by histopathological evaluation and levels of hepatic enzymes such as SGOT, SGPT and also bilirubin release in circulation [31, 32]. In present investigation mean values of SGOT and SGPT were found significantly higher in all infected group than the apparently healthy animals at 0th day. On 5th and 14th day post treatment (Table-2 and Table-3) the SGOT (IU/liter) and SGPT (IU/liter) levels were significantly (p<0.05) reduced in all adjunct therapy groups. On 14th day in AV/SYL/12 supplemented group T_1 significantly (p<0.05) maximum reduction in the levels of SGOT (IU/liter) (85 ± 0.21[b]) and SGPT (IU/liter) (21± 0.13[b]) was observed among all the adjunct therapy groups when compared to group T_0. No significant difference was observed between groups T_2, T_3, and T_4 but varied significantly (p<0.05) from the group T_0. Significantly maximum decrease in blood urea nitrogen level (mg/dl) was observed in group T_1 (20.5 ± 0.18[b]) varies significantly (p<0.05) from group T_0 (33.07±0.67[a]). The decrease in SGOT and SGPT levels was because of herbal content of these preparations. Herbs viz. *Tinospora cordifolia* [33], *Andrographis paniculata* [34] were previously reported to be effective in reducing in serum levels of SGOT, SGPT, ALP and bilirubin. Evaluation of serum bilirubin (direct and indirect) concentration is useful to determine hepatic dysfunction in horses and ruminants [35]. Increased bilirubin result from haemolysis, hepatocellular disease, cholestasis, or physiologic causes [36]. In present investigation mean values of serum bilirubin were found higher in all infected group than the apparently healthy animals at 0th day. After 5th and 14th post treatment there was a significant (p<0.05) difference in group T_1 to T_4 was observed when compared to group T_0. After 14th day post-treatment significantly (p<0.05) minimum level of serum bilirubin was observed in AV/SYL/12 supplemented group T1, 0.01 ± 0.10[b] (mg/dl). The serum bilirubin (mg/dl) level in group T_2 (0.32±0.03[c]), T_3 (0.28±0.07[c]), and T_4 (0.31±0.01[c]) was also significantly (p<0.05) lower than the group T_0 (0.57±0.37[a]). Decrease in level of serum bilirubin indicates the restoration of normal liver functions.

CONCLUSION

On the basis of all finding, it can be concluded that the use of different herbal liver tonics at different dose rate can improve the haemato-biochemical parameters up to certain extant but overall the efficacy of AV/SYL/12 was greater than other herbal liver tonic however, the efficacy of Yakrifit was comparable with herbal liver tonics of other brands.

ACKNOWLEDGEMENT

The authors are grateful to the Dean, Apollo college of Veterinary Medicine, Jaipur and Ayurvet Limited, Solan, H.P. for providing the requisite facilities.

Table 1. Mean with SE of haematobiochemical parameters of cattle at 0 day of treatment.

Groups / Parameters	T_0	T_1	T_2	T_3	T_4
Hb (g %)	6.85±1.59[a]	7.29± 2.23 [a]	7.05 ± 3.56 [a]	7.26 ± 2.56 [a]	7.05 ± 2.36 [a]
PCV (%)	19.75 ± 1.62 [a]	22.80± 2.19 [a]	22.69 ± 2.61 [a]	22.56 ± 1.89 [a]	21.36 ± 2.33 [a]
TEC (10^6/µl)	3.56±1.11 [a]	3.69±0.25 [a]	3.55±1.23 [a]	3.09± 1.09 [a]	3.61± 1.89 [a]
TLC (10^3/ µl)	16.23± 1.19 [a]	15.56 ± 2.25 [a]	15.23 ± 2.19 [a]	16.01 ± 2.11 [a]	16.52 ± 2.22 [a]
Total Serum protein (g/dl)	3.10 ± 1.19 [a]	3.19 ± 1.58 [a]	3.05 ± 1.89 [a]	3.79 ± 1.89 [a]	3.65 ± 1.88 [a]
Serum Albumin:Globulin	0.41 ± 1.12 [a]	0.45± 1.19 [a]	0.50 ± 1.72 [a]	0.49 ± 1.99 [a]	0.42 ± 1.89 [a]
SGOT (IU/L)	155.11 ± 2.02 [a]	156.12 ± 2.12 [a]	155.6 ± 2.27 [a]	152.21 ± 1.83 [a]	151.19 ± 1.87 [a]
SGPT (IU/L)	46.23 ± 2.02 [a]	43.10±2.10 [a]	44.98±1.89 [a]	43.25 ±2.56 [a]	44.59±2.20 [a]
ALP (IU/L)	385.25±0.19	368.25 ± 0.81	389.13 ± 0.89	369.19 ± 1.01	359.29 ± 0.89
BUN (mg/ dl)	36.15±1.09 [a]	36.09±2.09 [a]	35.26±1.97 [a]	35.96 ± 1.73 [a]	35.43± 2.19 [a]
Serum bilirubin (mg/ dl)	0.89± 0.89 [a]	0.88 ± 0.76 [a]	0.87±1.02 [a]	0.96 ± 1.56 [a]	0.89 ± 1.33 [a]

Values are expressed as mean ± SE, Different letters in the same row refers to the significant differences at level of P<0.05

Table 2. Mean with SE of haematobiochemical parameters of cattle at 5th day of treatment.

Groups / Parameters	T_0	T_1	T_2	T_3	T_4
Hb (g %)	8.25±1.09[a]	10.01 ± 1.17[b]	9.69 ± 0.73[c]	9.55± 1.01[c]	9.77 ± 0.57[c]
PCV (%)	24.75 ± 1.02[a]	37.80± 0.69[b]	28.34 ± 0.67[c]	28.67 ± 0.89[c]	23.34 ± 0.79[c]
TEC (10^6/µl)	4.50±1.01[a]	5.69±0.39[b]	5.58±0.83[c]	5.23± 0.39[c]	5.01± 0.59[c]
TLC (10^3/ µl)	13.23± 0.79[a]	12.56 ± 1.05[b]	13.51 ±1.01[c]	13.29 ± 0.69[c]	13.25 ± 0.98[c]
Total Serum protein (g/dl)	4.18 ± 0.99[a]	6.89 ± 0.88[b]	5.65 ± 1.09[c]	5.29 ± 0.66[c]	5.25 ± 0.88[c]
Serum Albumin/ Globulin	0.58 ± 1.04[a]	0.8± 0.23[b]	0.63 ± 0.81[c]	0.64± 0.61[c]	0.67 ± 0.57[c]
SGOT (IU/L)	140.11 ± 1.08[a]	133.12 ± 0.58[b]	135.8 ± 0.89[c]	134.81 ± 0.83[c]	134.59± 0.78[c]
SGPT (IU/L)	44.32 ± 1.09[a]	42.18±0.19[b]	43.98±1.09[c]	43.85 ±1.16[c]	43.89±1.02[c]
ALP (IU/L)	395.25±0.79[a]	378.25 ± 0.81[b]	401.31 ± 0.80[c]	377.23 ± 0.67[c]	369.21± 0.73[c]
BUN (mg/ dl)	33.05±0.79[a]	28.69±0.89[b]	31.86±0.97[c]	31.69 ± 0.78[c]	31.38± 0.79[c]
Serum bilirubin (mg/ dl)	0.79± 0.78[a]	0.50 ± 0.66[b]	0.53±0.82[c]	0.66 ± 0.57[c]	0.59 ± 0.83[c]

Values are expressed as mean ± SE, Different letters in the same row refers to the significant differences at level of P<0.05

Table 3. Mean with SE of haematobiochemical parameters of cattle at 14th day of treatment.

Groups / Parameters	T_0	T_1	T_2	T_3	T_4
Hb (g %)	9.67±0.19[a]	13.50 ± 0.20[b]	12.63±0.33[c]	12.09±0.34[c]	12.87±0.29[c]
PCV (%)	29.07±0.11[a]	34.50 ±0.13[b]	36.11±0.53[c]	36.27±0.42[c]	37.61±0.35[c]
TEC (10^6/µl)	5.05±0.31[a]	6.59 ± 0.11[b]	6.01±0.49[c]	5.93±0.71[c]	6.19±0.53[c]
TLC (10^3/ µl)	12.59±0.54[a]	7.12 ± 0.13[b]	9.01±0.35[c]	9.23±0.17[c]	9.69±0.11[c]
Total Serum protein (g/dl)	4.89±0.59[a]	6.80 ± 0.14[b]	6.93±0.19[c]	6.87±0.67[c]	6.79±0.73[c]
Serum Albumin/ Globulin	0.67±0.66[a]	0.85 ± 0.17[b]	0.89±0.33[c]	0.87±0.21[c]	0.90±0.17[c]
SGOT (IU/L)	140.17±0.3[a]	85 ± 0.21[b]	99.11±0.71[c]	92.69±0.43[c]	90.02±0.39[c]
SGPT (IU/L)	43.13±0.53[a]	21± 0.13[b]	25.43±0.65[c]	23.69±0.81[c]	24.01±0.57[c]
ALP (IU/L)	39.21±0.69[a]	225 ± 0.13[b]	381.21±0.11[c]	366.17±0.17[c]	355.20±0.23[c]
BUN (mg/ dl)	33.07±0.67[a]	20.5 ± 0.18[b]	23.06±0.19[c]	22.43±0.17[c]	33.01±0.33[c]
Serum bilirubin (mg/ dl)	0.57±0.37[a]	0.01 ± 0.10[b]	0.32±0.03[c]	0.28±0.07[c]	0.31±0.01[c]

Values are expressed as mean ± SE, Different letters in the same row refers to the significant differences at level of P<0.05

Table 4. Mean faecal egg count (EPG: eggs per gram of faeces) before and after treatment.

Groups / Parameters	T_0	T_1	T_2	T_3	T_4
EPG before treatment	1125 ± 105.78	1151 ± 124.82	1050 ± 112.02	1225 ± 165.78	1203 ± 156.12
EPG after treatment	125 ± 184.76	25 ± 11.09	23 ± 13.33	24 ±11.09	21 ± 8.42

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