



An Evaluation of the Effects of the Herbal Supplements of Amla (*Emblica officinalis*) and Giloy (*Tinospora cordifolia*) on the Liver Function Parameters of Magra lambs Living in the Extensive System in Western Rajasthan's Arid Zone

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The aim of this study was to determine the effect of herbal feed additives amla (*Emblica officinalis*) and giloy (*Tinospora cordifolia*) on Liver Function Test parameters of Magra lambs in the extensive management system. The experiment was performed on twenty eight magra lambs of three to four months of age under the extensive system, which were randomly distributed into four experimental groups of seven lambs in each group in a randomized block design (RBD). Herbal feed additive amla (*Emblica officinalis*) fruit powder with seed and giloy (*Tinospora cordifolia*) stem powder were supplemented at level of 1.5g/kg body weight with concentrate as oral/feed supplemented in T₁ and T₂ group, respectively except control group (C) and T₃ in extensive management system. Group T₃ were supplemented with the combination of amla (*Emblica officinalis*) fruit powder and giloy (*Tinospora cordifolia*) stem powder at the level of 0.75g/kg body weight with concentrate as oral/feed. At the end of experiment it appears that supplementation of herbal feed additives amla and giloy do not effect liver activity during the experimental period. Therefore, it can be concluded that the experiment was safe and did not cause any damage to the liver.

Keywords: LFT; SGPT; SGOT; amla; giloy.

1. INTRODUCTION

Magra sheep is a native breed to Rajasthan, India. They are medium sized sheep with thick wool and are known for their docile temperament. They are also known for their ability to produce high-quality wool. Liver function tests (LFTs) play a crucial role in assessing the health and functionality of the liver, a vital organ with diverse metabolic, synthetic, and detoxification functions. This test measures the amount of enzymes and proteins in the liver. It is used to determine the health of the liver and whether it is functioning properly. It also helps to detect any underlying disorders or diseases. Liver enzymes, such as ALT (Alanine Aminotransferase) and AST (Aspartate Aminotransferase), are measured in LFTs to assess liver cell damage. Elevated levels of ALT and AST may indicate liver diseases such as hepatitis or cirrhosis. Alkaline Phosphatase (ALP) is another enzyme measured in LFTs, providing information about bile duct health and bone metabolism. Abnormal ALP levels can indicate liver diseases or issues with the biliary system. Total bilirubin levels are assessed to identify problems with the liver's ability to process bilirubin, a waste product from the breakdown of red blood cells. Elevated bilirubin levels can suggest conditions like jaundice or other liver disorders. Albumin and total protein levels are measured to evaluate the liver's synthetic capacity for producing proteins essential for various bodily functions. Reduced albumin levels may indicate chronic liver disease, malnutrition, or impaired synthetic function. Prothrombin time (PT) is a measure of blood clotting, and its assessment in LFTs helps gauge the liver's

ability to produce clotting factors. Prolonged PT may suggest liver dysfunction, impacting the blood's ability to coagulate. LFTs are crucial in monitoring and managing chronic liver diseases, such as hepatitis, fatty liver disease, and cirrhosis. These tests are also essential before certain medical procedures or surgeries to assess the patient's liver health and potential risks.

2. MATERIALS AND METHODS

The Magra lambs were divided into four experimental groups, each consisting of seven lambs, in an extensive system. The experimental lambs of Arid Region Campus, ICAR-CSWRI, Bikaner were used and reared under routine uniform management conditions followed by ARC. The allocation was conducted using a randomised block design (RBD) to guarantee that the baseline body weights were uniformly distributed across all groups. The herbal feed supplement, comprising of amla (*Emblica officinalis*) fruit powder with seed and Giloy (*Tinospora cordifolia*) stem powder, was given orally as a feed supplement at a dosage of 1.5g per kilogramme of body weight, along with concentrate, in the comprehensive management system. The supplements was administered to the T₁ and T₂ groups, but the control and T₃ groups adhered to a distinct routine. The T₃ group received an oral/feed supplement containing amla (*Emblica officinalis*) fruit powder and giloy (*Tinospora cordifolia*) stem powder at a dosage of 0.75g per kilogramme of body weight.

Extensive system of management of sheep farming involves monitoring the health of the

sheep, controlling their movements and breeding, and ensuring that they receive adequate feed and veterinary care. It also involves managing the pasture, predators, and other resources in order to ensure that the sheep are kept safe and healthy.

Blood samples from experimental lambs were collected in the morning hours before feeding and watering of lambs. Samples were collected at monthly interval by puncturing jugular vein following aseptic measures. The blood, so drawn was collected in sterilized test tubes containing adequate amount of anticoagulant. Biochemical studies were performed soon after collection of blood. For separation of serum, blood was collected in second tube, without anticoagulant, and kept in slanting position. These tubes were incubated for 1 h at 37°C. Blood clots were broken and tubes were centrifuged at 2500 rpm for 30 minutes. The serum was pipetted out in small pyrex tubes and kept for further analysis of serum albumin (ALB), serum globulin, total serum protein (TP), serum glucose, serum creatinine, serum cholesterol, serum triglyceride and blood urea nitrogen.

2.1 Liver Function Test

ALT, AST, ALP and ACP were determined by Clinical Chemical Analyzer Model AGD2020.

2.2 Alanine Aminotransferase (ALT) (IU/L) SGPT

The ALT (SGPT) test is a blood test used to measure the amount of the enzyme alanine transaminase (ALT) in the blood. This enzyme is found primarily in the liver, and high levels can indicate liver damage or disease.

2.3 Aspartate Aminotransferase (AST) (IU/L) SGOT

AST (SGOT) is an enzyme found in many organs, but primarily in the liver. It is released into the blood when the liver is damaged. High levels of AST in the blood can indicate liver disease or injury, and can be used to monitor the effectiveness of treatment.

2.4 Alkaline Phosphatase (ALP) (IU/L)

ALP is an enzyme that is primarily found in the liver and bones. It plays a crucial role in various

physiological processes, including the metabolism of proteins and fats. Elevated levels of ALP in the blood may indicate liver damage or disease, such as hepatitis or cirrhosis. Additionally, ALP levels can also be elevated during pregnancy or due to certain medications. Therefore, measuring ALP levels through a liver function test can provide valuable insights into the overall health and functioning of the liver.

2.5 Acid Phosphatase (ACP) IU/L

Acid phosphatase is an enzyme that is found in the livers of humans and other animals. It is used as an indicator of liver health, as its levels can indicate the presence of liver disease or inflammation. In a liver function test, acid phosphatase levels are measured to assess the functioning of the liver.

3. RESULTS AND DISCUSSION

3.1 Liver Function Test

3.1.1 Alanine aminotransferase (ALT) (IU/L) SGPT

The mean values of Alanine aminotransferase (IU/L) of lambs under various treatment groups at monthly intervals of experiment and overall mean for entire experimental period have been presented in Table 1.

The average values of ALT (IU/L) at 30 days in control, T₁, T₂ and T₃ treatment groups were found to be 10.61, 10.62, 10.82 and 10.91% respectively while at 60 days the values were found to be 10.62, 10.74, 10.71 and 10.33% for control, T₁, T₂ and T₃ treatment groups in the semi-intensive system. At the 90 ALT (IU/L) in control, T₁, T₂ and T₃ treatment groups were found to be 10.53, 10.69, 10.56 and 10.61%, respectively which differed non significantly with each other. The overall mean contents of Alanine aminotransferase (IU/L) were found to be 10.59, 10.68, 10.70 and 10.62 in lambs of control, T₁, T₂ and T₃ treatment groups, respectively in the extensive system [1].

The statistical analysis of variance revealed no significant effect of supplementation of herbal feed additives at each month of experimental period and also on overall mean Alanine aminotransferase (IU/L) concentration of experimental lambs in the extensive system.

Table 1. Average values of Alanine aminotransferase (IU/L) at different time intervals in different treatment groups in the extensive system

Treatment groups	Period (months)				Mean
	0	I	II	III	
C	10.93	10.61	10.62	10.53	10.59
T ₁	10.78	10.62	10.74	10.69	10.68
T ₂	10.71	10.82	10.71	10.56	10.70
T ₃	10.98	10.91	10.33	10.61	10.62
SEM	0.06	0.07	0.09	0.04	0.03

Note: Means with different superscripts in a column differ significantly

The results obtained in extensive management system for ALT (IU/L) in control, T₁, T₂ and T₃ group lies within the normal range of 26-34 (IU/L) ([2 and 3]).

In the extensive system, the present findings are similar to the findings of [4] who reported nonsignificant changes in ALT (IU/L) of han lambs supplemented with dried *Allium mongolicum* Regel (AMR) powder.

These findings are not in agreement with [5] in which herb treated groups have significant improvement in ALT (IU/L). Niwas et al. [6] for herbal additives, who also reported limited ALT activity in calves by feed additive supplementation. It could be concluded that supplementation of the herbal feed additives Amla (*Emblica officinalis*) and Giloy (*Tinospora cordifolia*) in the diets of Magra lambs had no adverse effect ALT (IU/L) in different management systems.

3.1.2 Aspartate aminotransferase (AST) (IU/L) SGOT

The mean values of Aspartate aminotransferase (AST) (IU/L) of lambs under various treatment groups at monthly intervals of experiment and overall mean for entire experimental period have been presented in Table 2.

The average values of AST (IU/L) at 30 days in control, T₁, T₂ and T₃ treatment groups were found to be 69.69, 70.47, 70.32 and 70.05% respectively while at 60 days the values were found to be 70.52, 70.08, 70.30 and 70.18% for control, T₁, T₂ and T₃ treatment groups in the semi-intensive system. At the 90 AST (IU/L) in control, T₁, T₂ and T₃ treatment groups were found to be 69.95, 69.86, 69.86 and 70.16%, respectively which differed non significantly with each other.

The overall mean contents of Aspartate aminotransferase (AST) (IU/L) were found to be 70.05, 70.14, 70.16 and 70.13 in lambs of control, T₁, T₂ and T₃ treatment groups, respectively in the extensive system. The statistical analysis of variance revealed no significant effect of supplementation of herbal feed additives at each month of experimental period and also on overall mean Aspartate aminotransferase (AST) (IU/L) concentration of experimental lambs in the extensive system. The results obtained in extensive management system for AST (IU/L) in control, T₁, T₂ and T₃ group lies within the normal range of 60-280 (IU/L) ([2 and 3]). It could be concluded that supplementation of the herbal feed additives amla (*Emblica officinalis*) and giloy (*Tinospora cordifolia*) in the diets of Magra lambs had no adverse effect AST (IU/L) in different management systems.

Table 2. Average values of Aspartate aminotransferase (IU/L) at different time intervals in different treatment groups of magra lambs in the extensive system

Treatment groups	Period (months)				Mean
	0	I	II	III	
C	70.87	69.69	70.52	69.95	70.05
T ₁	69.26	70.47	70.08	69.86	70.14
T ₂	68.16	70.32	70.30	69.86	70.16
T ₃	70.94	70.05	70.18	70.16	70.13
SEM	0.67	0.17	0.09	0.07	0.02

Note: Means with different superscripts in a column differ significantly

3.1.3 Alkaline phosphatase (ALP) (IU/L)

The mean values of Alkaline phosphatase (ALP) (IU/L) of lambs under different treatment groups at monthly intervals of experiment and overall mean for entire experimental period have been presented in Table 3.

The average values of ALP (IU/L) at 30 days in control, T₁, T₂ and T₃ treatment groups were found to be 70.11, 70.10, 70.03 and 70.21% respectively while at 60 days the values were found to be 71.29, 72.56, 73.33 and 71.83% for control, T₁, T₂ and T₃ treatment groups in the semi-intensive system.

At the 90 ALP (IU/L) in control, T₁, T₂ and T₃ treatment groups were found to be 71.75, 72.15, 72.40 and 72.72%, respectively which differed non significantly with each other. The overall mean contents of Alkaline phosphatase (ALP) (IU/L) were found to be 71.05, 71.60, 71.92 and 71.58 in lambs of control, T₁, T₂ and T₃ treatment groups, respectively in the extensive system.

The statistical analysis of variance revealed no significant effect of supplementation of herbal feed additives at each month of experimental period and also on overall mean ALP (IU/L) concentration of experimental lambs in the extensive system. The results obtained in extensive management system for ALP (IU/L) in control, T₁, T₂ and T₃ group lies within the normal range of 68-387 (IU/L) ([2 and 3]).

It could be concluded that supplementation of the herbal feed additives Amla (*Emblica officinalis*) and Giloy (*Tinospora cordifolia*) in the diets of Magra lambs had no adverse effect ALP (IU/L) in different management systems.

3.1.4 Acid phosphatase (ACP) IU/L

The mean values of Acid phosphatase (ACP) (IU/L) of lambs under different treatment groups

at monthly intervals of experiment and overall mean for entire experimental period have been presented in Table 4.

The average values of ACP (IU/L) at 30 days in control, T₁, T₂ and T₃ treatment groups were found to be 1.26, 1.27, 1.27 and 1.25% respectively while at 60 days the values were found to be 1.23, 1.24, 1.26 and 1.23% for control, T₁, T₂ and T₃ treatment groups in the semi-intensive system. At the 90 ACP (IU/L) in control, T₁, T₂ and T₃ treatment groups were found to be 1.22, 1.23, 1.28 and 1.25%, respectively which differed non significantly with each other. The overall mean contents of Acid phosphatase (ACP) (IU/L) were found to be 1.23, 1.25, 1.27 and 1.24 in lambs of control, T₁, T₂ and T₃ treatment groups, respectively in the extensive system.

The statistical analysis of variance revealed no significant effect of supplementation of herbal feed additives at each month of experimental period and also on overall mean Acid phosphatase (ACP) (IU/L) concentration of experimental lambs in the extensive system.

The results obtained in extensive management system for ACP (IU/L) in control, T₁, T₂ and T₃ group lies within the normal range of 0-12 (IU/L) ([4 and 5]). It could be concluded that supplementation of the herbal feed additives Amla (*Emblica officinalis*) and Giloy (*Tinospora cordifolia*) in the diets of Magra lambs had no adverse effect ACP (IU/L) in different management systems.

These findings of Liver function test are not in agreement with [3] who reported that the supplementation of feed additives had a significant impact on mean A:G ratio (P<0.01) and ALT levels (P<0.05), while a significant effect on total mean total serum proteins was recorded in the T₂ and T₃ groups.

Table 3. Average values of Alkaline phosphatase (ALP) (IU/L) at different time intervals in different treatment groups of magra lambs in the extensive system

Treatment groups	Period (months)				Mean
	0	I	II	III	
C	70.68	70.11	71.29	71.75	71.05
T ₁	69.58	70.10	72.56	72.15	71.60
T ₂	69.28	70.03	73.33	72.40	71.92
T ₃	71.83	70.21	71.83	72.72	71.58
SEM	0.58	0.04	0.44	0.21	0.18

Note: Means with different superscripts in a column differ significantly

Table 4. Average values of Acid phosphatase (ACP) (IU/L) at different time intervals in different treatment groups of magra lambs in the extensive system

Treatment groups	Period (months)				Mean
	0	I	II	III	
C	1.29	1.26	1.23	1.22	1.23
T ₁	1.24	1.27	1.24	1.23	1.25
T ₂	1.22	1.27	1.26	1.28	1.27
T ₃	1.31	1.25	1.23	1.25	1.24
SEM	0.021	0.005	0.007	0.014	0.008

Note: Means with different superscripts in a column differ significantly

Moreover, the results of our study also indicated that the serum enzymes AST, ALT, ALP and ACP were within the ranges of normal physiological ranges, indicating that the serous enzymes are functioning normally. Because of this, no gastrointestinal issues or pathological organ lesions were noted ([7,8]). In the finding of our study no significant differences in activities of AST and ALT in all treatment groups, indicating no damage to liver tissue or function [9].

4. CONCLUSION

It could be concluded that supplementation of the herbal feed additives Amla (*Emblica officinalis*) and Giloy (*Tinospora cordifolia*) in the diets of Magra lambs had no adverse effect on LFT parameters in the extensive management system. Liver function test in sheep revealed no abnormalities, suggesting that sheep are tolerant to the toxic compounds of the herbs.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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