

**An evaluation of the effects of the herbal supplements of amla (*Emblica officinalis*) and giloy (*Tinosporacordifolia*) on the liver function parameters of Magra lambs living in the extensive system in western Rajasthan's arid zone**

**Abstract**

The aim of this study was to determine the effect of herbal feed additives amla (*Emblica officinalis*) and giloy (*Tinosporacordifolia*) 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 (*Tinosporacordifolia*) stem powder were supplemented at level of 1.5g/kg body weight with concentrate as oral/feed supplemented in T<sub>1</sub> and T<sub>2</sub> group, respectively except control group (C) and T<sub>3</sub> in extensive management system. Group T<sub>3</sub> were supplemented with the combination of amla (*Emblica officinalis*) fruit powder and giloy (*Tinosporacordifolia*) 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

**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.

## 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 (*Tinosporacordifolia*) 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 T<sub>1</sub> and T<sub>2</sub> groups, but the control and T<sub>3</sub> groups adhered to a distinct routine. The T<sub>3</sub> group received an oral/feed supplement containing amla (*Emblica officinalis*) fruit powder and giloy (*Tinosporacordifolia*) 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.

### **Liver Function Test**

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

#### **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.

#### **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.

#### **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.

#### **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.

## RESULTS AND DISCUSSION

### Liver Function Test

#### 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 01.

“The average values of ALT (IU/L) at 30 days in control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> 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, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups in the semi-intensive system. At the 90 ALT (IU/L) in control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> 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, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups, respectively in the extensive system”. [9]

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 01: Average values of Alanine aminotransferase (IU/L) at different time intervals in different treatment groups in the extensive system**

Treatment groups	Period (months)				
	0	I	II	III	Mean
C	10.93	10.61	10.62	10.53	10.59
T <sub>1</sub>	10.78	10.62	10.74	10.69	10.68

<b>T<sub>2</sub></b>	10.71	10.82	10.71	10.56	10.70
<b>T<sub>3</sub></b>	10.98	10.91	10.33	10.61	10.62
<b>SEM</b>	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, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> group lies within the normal range of 26-34 (IU/L) ([04] and [05]).

In the extensive system, the present findings are similar to the findings of [03] 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 [02] in which herb treated groups have significant improvement in ALT (IU/L). Niwas *et al.* (2012) [06] 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 (*Tinosporacordifolia*) in the diets of Magra lambs had no adverse effect ALT (IU/L) in different management systems.

#### 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 02.

The average values of AST (IU/L) at 30 days in control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> 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, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups in the semi-intensive system. At the 90 AST (IU/L) in control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups were found to be 69.95, 69.86, 69.86 and 70.16%, respectively which differed non significantly with each other.

**Table 02: 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)				
	0	I	II	III	Mean
C	70.87	69.69	70.52	69.95	70.05

<b>T<sub>1</sub></b>	69.26	70.47	70.08	69.86	70.14
<b>T<sub>2</sub></b>	68.16	70.32	70.30	69.86	70.16
<b>T<sub>3</sub></b>	70.94	70.05	70.18	70.16	70.13
<b>SEM</b>	0.67	0.17	0.09	0.07	0.02
<b>Note: Means with different superscripts in a column differ significantly</b>					

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, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> 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, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> group lies within the normal range of 60-280 (IU/L) ([04] and [05]). It could be concluded that supplementation of the herbal feed additives amla (*Emblicaofficinalis*) and giloy (*Tinosporacordifolia*) in the diets of Magra lambs had no adverse effect AST (IU/L) in different management systems.

#### **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 03.

The average values of ALP (IU/L) at 30 days in control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> 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, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups in the semi-intensive system.

At the 90 ALP (IU/L) in control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> 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, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups, respectively in the extensive system.

**Table 03: 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)				
	0	I	II	III	Mean
C	70.68	70.11	71.29	71.75	71.05
T <sub>1</sub>	69.58	70.10	72.56	72.15	71.60
T <sub>2</sub>	69.28	70.03	73.33	72.40	71.92
T <sub>3</sub>	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

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, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> group lies within the normal range of 68-387 (IU/L) ([04] and [05]).

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

#### **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 04.

The average values of ACP (IU/L) at 30 days in control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> 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, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups in the semi-intensive system. At the 90 ACP (IU/L) in control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> 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, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> 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, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> group lies within the normal range of 0-12 (IU/L) ([04] and [05]). It could be concluded that supplementation of the herbal feed additives Amla (*Emblicaofficinalis*) and Giloy (*Tinosporacordifolia*) in the diets of Magra lambs had no adverse effect ACP (IU/L) in different management systems.

**Table 04: 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)				
	0	I	II	III	Mean
C	1.29	1.26	1.23	1.22	1.23
T <sub>1</sub>	1.24	1.27	1.24	1.23	1.25
T <sub>2</sub>	1.22	1.27	1.26	1.28	1.27
T <sub>3</sub>	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

These findings of Liver function test are not in agreement with [02] 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 T<sub>2</sub> and T<sub>3</sub> groups.

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. ([08]; [01]). 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 [07].

## CONCLUSION

It could be concluded that supplementation of the herbal feed additives Amla (*Emblicaofficinalis*) and Giloy (*Tinosporacordifolia*) 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.

## REFERENCES

1. Al-Hadithy, H. A. H. (2013). Estimation of serum liver enzymes activities in Awassi sheep. The Iraqi Journal of Veterinary Medicine, 37(1), 115-120.
2. Beigh, Y. A., Ganai, A. M., Sheikh, G. G., Ahmad, H. A., Bilal, S., Amin, U., & Mir, M. S. (2017). Effect of feeding complete diet supplemented with feed additives alone and in combination on nutritional and hepatorenal function test profile in crossbred lambs. Haryana Veterinary, 56(1), 58-62.
3. Ding, H., Liu, W., Erdene, K., Du, H., & Ao, C. (2021). Effects of dietary supplementation with Alliummongolicum Regel extracts on growth performance, serum metabolites, immune responses, antioxidant status, and meat quality of lambs. Animal Nutrition, 7(2), 530-538. <https://doi.org/10.1016/j.aninu.2021.04.001>.
4. Kahan, C.M. (2005). The Merck veterinary manual. 9<sup>th</sup> edition Whitehouse Station, N.J.; (Great Britain): Merck and Company.
5. Kaneko, J.J., Harvey, J.W. and Bruss, M.L. (1997). Clinical Biochemistry of Domestic Animals, (5<sup>th</sup> edition), Academic Press, San Diego, California, USA.
6. Niwas, R., Singh, D.P., Paswan, V.K., Bisen, B. and Albial, M.A. (2012). Herbal drugs and their effect on biochemical attributes of crossbred calves. Bioscan 7(4): 665-667.
7. Thapa, B. R., & Walia, A. (2007). Liver function tests and their interpretation. The Indian Journal of Pediatrics, 74, 663-671.
8. Van Putten, M., Hulsker, M., Young, C., Nadarajah, V. D., Heemskerk, H., van der Weerd, L., and Aartsma-Rus, A. M. (2013). Low dystrophin levels increase survival and improve muscle pathology and function in dystrophin/utrophin double-knockout mice. The FASEB Journal, 27(6), 2484.
9. Joshi A, Saini N, Jhirwal AK, Prajapat UK, Goswami SC. Effect of herbal additives amla (*Emblicaofficinalis*) and giloy (*Tinosporacordifolia*) on physiological parameters of Magra lambs under semi-intensive management system in the arid zone of Rajasthan.