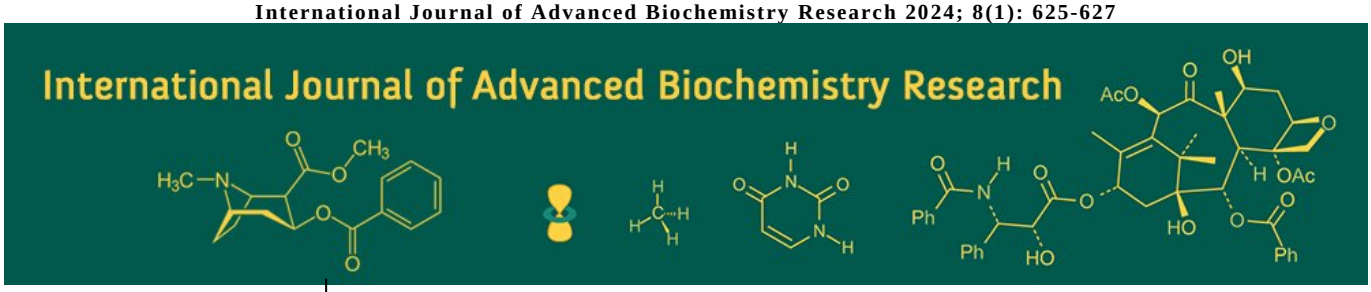

ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; 8(1): 625-627
www.biochemjournal.com
Received: 05-11-2023
Accepted: 07-12-2023

Seema Kumari Bishnoi
Ph.D. Scholar, Department of Veterinary Pathology, CVAS, Bikaner, Rajasthan, India

S Dariya
Ph.D. Scholar, Department of Veterinary Pathology, PGIVER, Jaipur, Rajasthan, India

M Mathur
Professor, Department of Veterinary Pathology, CVAS, Bikaner, Rajasthan, India

H Dadhich
Professor, Department of Veterinary Pathology, CVAS, Bikaner, Rajasthan, India

M Mehra
Assistant Professor, Department of Veterinary Pathology, CVAS, Bikaner, Rajasthan, India

S Asopa
Assistant Professor, Department of Veterinary Pathology, CVAS, Bikaner, Rajasthan, India

Jay K Desai
Ph.D. Scholar, Department of Veterinary Pathology, CVAS, Bikaner, Rajasthan, India

Corresponding Author:
Jay K Desai
Ph.D. Scholar, Department of Veterinary Pathology, CVAS, Bikaner, Rajasthan, India

Estimation of serum enzymes (AST, ALT, GGT and ALP) level in goat (*Capra hircus*) in various hepatic lesions

Seema Kumari Bishnoi, S Dariya, M Mathur, H Dadhich, M Mehra, S Asopa and Jay K Desai

DOI: https://doi.org/10.33545/26174693.2024.v8.i1i.459

Abstract
For study on estimation of serum enzyme (AST, ALT, GGT and ALP) was conducted on 67 serum samples (10 serum samples collected from healthy goat as control group and 57 serum samples from affected goat that were showing various hepatic lesion) in and around Bikaner district. In comparison with healthy control group of goat, the value of AST, ALT, GGT and ALP was highly significant (p<0.01) increase in various hepatic lesion. While highly significant increase (p<0.05) in GGT was observed in congestion as compared to liver of control group of healthy animal.

Keywords: Serum, hepatic lesion, enzyme

Introduction
With particular attention to the production of milk, meat, dung, and hides, goat husbandry has been a significant contributor to our nation's economy. Because it contains less fat and has beneficial therapeutic properties, goat meat (also known as chevon) is the most popular and extensively consumed meat in India. One of the most vital organs in the body, the liver performs many diverse functions that are mostly necessary for survival of the subject, including bile secretion and excretion, protein, carbohydrate, fat, hormone, and drug metabolism, detoxification of toxic substances, production of albumin, fibrinogen, prothrombin, and heparin, storage of copper, iron, and vitamins (A and B complex), control of blood volume, and reticuloendothelial activity. The production of goats is severely hampered by liver diseases, which result in significant financial losses and render the animal unfit for human consumption. Serum enzymatic tests, such as serum liver enzyme tests, are useful for determining the extent of hepatocellular damage and tracking the development of disease in ruminants.

Materials and Methods
In the current study, blood samples were taken from 10 serum samples taken from healthy goats as a control group and 57 serum samples taken from sick goats in and around the Bikaner district that were displaying various liver diseases. Before the goat was killed at the butcher, blood samples were extracted from its jugular vein in a vacutainers tube without an anticoagulant being proven. Based on the animal's lesion, the blood was then taken or rejected. By slanting the blood, serum was isolated from the blood and incubated at 37 °C for one hour. Blood clots were dislodged, and tubes were centrifuged for 30 minutes at 2500 rpm. One small Pyrex tube was used to pipette out the serum. For additional research, the centrifuged serum was kept in deep freezing at -20 °C. By using the IDEXX kit method, serum samples were examined for AST, ALT, GGT, and ALP. Students used the appropriate statistical procedure, the t-test, to assess the data from both the apparently healthy and the sick goats using SPSS software version 20.

Results and Discussion

Table 1: Shows AST, ALT, GGT and ALP level in different pathological conditions

GROUP	AST (IU/L)	ALT (IU/L)	GGT (IU/L)	ALP (IU/L)
Control(10)	37.72±0.64	21±0.39	42.54±.64	57.33±0.68
Hydatidosis(4)	52.67±0.35**	31.14±0.14**	52.16±1.42**	71.46±2.04**
Congestion(12)	48.52±0.14**	32.6±0.27**	46.77±.82*	78.74±1.62**
Haemorrhage(6)	54.67±0.09**	28.4±0.21**	49.19±.74**	80.84±2.39**
Necrosis(7)	42.54±0.23**	40.34±0.06**	59.39±1.24**	74.52±3.46**
Abscess(12)	44.24±0.18**	38.87±0.26**	58.24±.55**	81.06±2.28**
Fatty Change(16)	40.43±0.27**	34.68±0.17**	58.76±.54**	75.26±1.21**

*Significant at $p<0.05$ and ** Significant at $p<0.01$

When compared to goats without lesions, those with lesions had considerably greater AST, ALT, ALP, and GGT activity. According to several studies, liver damage causes an increase in AST and ALT activity (Rosen and Keefe 2000; Ozer *et al*. 2008) [14, 10]. The hepatocytes' mitochondria and cytoplasm contain the aminotransferases (AST and ALT). Hepatocytes will be released into the systemic circulation because of injuries. According to Sherlock (1997) [15] and Ozer *et al*. (2008) [10], elevations in the serum activity of the two enzymes are signs of hepatocellular injury. ALP activity spikes are a sign of cholestasis and hepatobiliary dysfunction. GGT is a marker for hepatobiliary dysfunction as well. Hepatocytes and biliary epithelial cells contain this microsomal enzyme. The enzyme helps peptides move across cell membranes. It contributes to the metabolism of glutathione.

Aspartate Aminotransferase (AST, IU/L)

The mean ± S.E. value revealed that increase in mean values of serum AST was highly significant ($p<0.01$) from 37.72±0.64 IU/L in non-infected to 52.67±0.35, 48.52±0.14, 54.67±0.09, 42.54±0.23, 44.24±0.18, 40.43±0.27 IU/L in goats infected with hydatidosis, congestion, haemorrhage, necrosis, abscess, fatty changes respectively. A similar finding was observed in goats that were deemed to be apparently healthy, the mean AST activities of the latter group were considerably ($p<0.01$) higher. Therefore, it becomes sense to speculate that the goats' apparent ill health may be caused by a hepatic condition that raises AST activity.

Alanine Aminotransferase (ALT, IU/L)

The mean ± S.E. value revealed that increase in mean values of serum ALT was highly significant ($p<0.01$) from 21±0.39 IU/L in non-infected to 31.14±0.14, 32.6±0.27, 28.4±0.21, 40.34±0.06, 38.87±0.26, 34.68±0.17 IU/L in goats infected with hydatidosis, congestion, haemorrhage, necrosis, abscess, fatty changes respectively. This enzyme is found within the individual liver cells are damaged for any reason, an increased amount of the ALT enzyme is released into the blood stream. Similar finding was observed by Nath and pathak (1996) [9] and Aslam *et al.* (2020) [1].

Gamma-glutamyl transferase (GGT, IU/L)

The mean ± S.E. value revealed that increase in mean values of serum GGT was highly significant ($p<0.01$) from 42.54±.64 IU/L in non-infected to 52.16±1.42, 49.19±.74, 59.39±1.24, 58.24±.55, 58.76±.54 IU/L in goats infected with hydatidosis, haemorrhage, necrosis, abscess, fatty changes respectively. While significant increase ($p<0.05$) 46.77±.82 in GGT was observed in congestion. Similar results have also been recorded earlier by Ramazan *et al.* (2003) [12] and Dutta *et al.* (2004) [3]. GGT is considered as a serum marker primarily for diseases of the hepatobiliary system associated with cholestasis especially -in ruminants (Kaneko *et al*., 1997) [7]. GGT is an enzyme associated with the membranes of cells from the bile ducts. Increased GGT production, and therefore increased serum concentration of GGT, found in liver conditions that result in cholestasis (impaired bile flow), especially those conditions resulting in increased growth or proliferation of bile ducts Chronic hepatitis characterized by chronic cholangitis and biliary hyperplasia produced by migratory parasites and other pathogens causes fibrosis of bile duct and papillary projection of the biliary mucosa which interfere with normal flow of bile, resulting in solubilization of GGT and consequently increase in its serum level.

Alkaline Phosphatase (ALP, IU/L)

The mean ± S.E. value revealed that increase in mean values of serum ALP was highly significant ($p<0.01$) from 57.33±0.68 IU/L in non-infected to 71.46±2.04, 78.74±1.62, 80.84±2.39 74.52±3.46, 81.06±2.28, 75.26±1.21 IU/L in goats infected with hydatidosis, congestion, haemorrhage, necrosis, abscess, fatty changes respectively. In the present study, the values of serum alkaline phosphatase (ALP) increased significantly ($p<0.01$) in goat with different hepatic lesion. Increase in serum ALP values in goat with hepatic lesions was also recorded earlier by Nath and Pathak (1996) [9] in their experimental Ipomoea cornea toxicity in goats, Ramazan *et al.* (2003) [12] in subclinical fatty liver syndrome in goats. Increase in serum ALP activity as observed in the present study may be due to the presence of helminthes and other pathogens that produced severe inflammatory changes in liver and bile duct. Serum ALP activity may be elevate in both acute and chronic liver diseases, but marked elevations are indicative of cholestasis, with highest plasma concentrations observed in cholangitis or extrahepatic bile-duct obstruction, in which terminal branches of the biliary tree are obstructed, as well as in the regenerative process that occur in the liver following injury (Kaneko *et al*., 1997) [7]. Increased bile-acid concentrations associated with cholestasis are believed to be necessary for the releases and transport of solubilized hepatic ALP to the serum. As a result of cellular degeneration and necrosis, cytoplasmic and mitochondrial enzymes escaped out and come into circulation, which ultimately increased the circulating serum ALP level.

Conclusion

Increase AST and AL Tactivity are associated with liver damage. ALT is found within the individual liver cells. are damaged for any reason, an increased amount of the ALT enzyme is released into the blood stream. GGT is considered

as a serum marker primarily for diseases of the hepatobiliary system associated with cholestasis especially in ruminants. Increase in serum ALP activity as observed in the present study may be due to the presence of helminthes and other pathogens that produced severe inflammatory changes in liver and bile duct. Serum ALP activity may be elevate in both acute and chronic liver diseases, but marked elevations are indicative of cholestasis.

Reference

1. Aslam A, Khan SA, Tunio MT, Shehzad M. Hematobiochemical alterations and gross pathology of liver fluke infestation in goat (*Capra hircus*) in Poonch Azad Kashmir. Pure appl boil. 2020;9(1):595-608.
2. Dutta KJ, Upadhyaya TN, Borah B, Dewry R, Sonowal S. Bacteriological and biochemical examination of liver lesions of slaughtered goats (*Capra hircus*) in and around Guwahati, Assam. Int. J chem Stud. 2018;6(2):17333-17.
3. Dutta A, Ray N, Deb P. Prevalence and Pathology of hepatic disorders of black Bengal goat (*capra hircus bengalensis*) in West Bengal with special reference to liver function test. National symposium on Advances m Pathological Techniques in Diagnosis of Animal, Bird and Fish Diseases, held at Kolkata; c2004.
4. Gaherwal S, Solanki S, Shrivastava C. Studies on Biochemical alteration in Fasciola hepatica infected *Capra hircus* (goats). J ZoolBiosci Res. 2016;3:1-10.
5. Gonenci R, Durgut R, Erdagan S, Bal R, Celik S. Subclinical fatty liver syndrome in Damascuas Goats. Indian J Vet Pathol. 2003;80(8):739-742.
6. Gwaze R, Chimonyo M, Dzama K. Effect of season and age of blood minerals, liver enzyme levels, and faecal egg counts in Nguni goats of South Africa. F. Czech j Anim Sci. 2012;57:443-453.
7. Kaneko JJ, Harvey JW, Bruss ML. Clinical Biochemistry of Domestic Animals, 5th edition, Academic Press, New York; c1997.
8. Kataria N, Kataria AK, Chaturvedi M, Sharma A. Changes in serum enzymes levels associated with liver functions in stressed Marwari Goat. J Stress Physiol Biochem. 2011;7:13-19.
9. Nath l, Pathak DC. Haematobiochemical Alteration in Ipomoea cornea toxicity in goats. Indian J Vet Pathol. 1996;20(1):50-52.
10. Ozer J, Ratweb M, Shawe M, Fastre R, Declercq JP, Van M. The current state of serum biomarker of hepatotoxicity. Toxicity. 2008;245:194-205.
11. Pathak KML, Gaur SNS. Serum levels of GOT, GPT and OCT enzyme in goats infected with Cysticercus tenuicollis. Vet Parasitol. 1981;8:95-97.
12. Ramazan G, Ramazan D, Suat E, Ramazan B, Sefa C. Subclinica1 fatty liver syndrome in *Damascuas* Goats. Indian Journal of Veterinary Pathology. 2003;80(8):739-742.
13. Rosalki SB, Mcintyre N. Biochemical investigations in the management of liver disease. In: Oxford textbook of clinical hepatology, 2nd edn. Oxford University press, New York; c1999. p. 503-521.
14. Rosen HR, Keefe EB. Evaluation of abnormal liver enzymes, use of liver tests and the serology of viral hepatitis. In: Liver disease, diagnosis and management, 1st edn. Churchill livingstone publishers, New York; c2000. p. 24-35.
15. Sherlock S. Assessment of liver function disease of liver and biliary system. In: Sheila Sherlock, 10th edn. BSL London; c1997. p. 17-32.
16. Swarup D, Upadhyay DS, Pachauri SP. Some biochemical indices in naturally occurring fascioliasis in goats. Res Vet Sci. 1986;40(2):276-277.