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Gross Morphological Studies on Liver of Barbari Goat

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ABSTRACT: Current study was conducted on the gross morphology of the liver of 6 Barbari goats of either sex. Barbari goat is also known as "city breed" and have highest milk fat percentage among all the goat breeds. Liver being the largest gland of the body, helps in different metabolic functions of body. To gather sufficient information from the gross anatomic perspective was the moto for the present study. Current study revealed that liver was found to be situated obliquely downward and forward from lumbocostal angle to level of 7th or 8th rib. The colour of liver was reddish to dark brown, having two surfaces and four borders. The average length of liver was found to be 8.12 inches, average width of left, right and caudate lobe was found to be 3.48, 3.47 and 2.47 inches respectively. While thickness of left, right and caudate lobe was 1.65, 1.53, 0.73 inches. The average volume of liver was found to be 294 ml. The gall bladder is attached to the right lobe of liver on visceral surface just above the omasal impression.

Keywords: Liver, largest gland, Barbari goat, gall bladder, Gross morphology.

INTRODUCTION

The importance of goat in animal husbandry is very high as it is compared to cow for poor farmer, in Europe it is known as the "wet nurse" of new born (Iqbal *et al*., 2008). The Barbari goat is widely distributed in the regions of Haryana, Panjab, Uttar Pradesh and Rajasthan. It is a short haired breed and also known as Bari. Its total population in world is about 2.4 million. The Liver is the largest gland of the body involved in several physiological activities which includes the digestion, absorption, portal circulation formation and storage of vitamin D (Frappier, 2006), it also includes the synthesis of several factors involved in the clotting metabolism such as prothrombin, fibrinogen etc. It also helps in the metabolism of drugs. Liver is also known as dual gland as it does both endocrine and exocrine function (Dawood and Khamas 2017). The weight of liver in ruminants was 1-1.5% (Dyce *et al*., 2002), 2% in omnivores (Mccuskey *et al*., 2012) and 3-4% in carnivores (Hihye *et al.*, 2013) of body weight. The gall bladder is attached to the liver and helps in storage of bile which is helpful in digestion. Thakur and Kapadnis (2020) studied the biometry of liver of buffalo, Singh *et al.* (2012) did the work on prenatal goat liver and as the work in field of anatomy regarding the liver and gall bladder of Barbari goat was scanty so this study was done.

MATERIAL AND METHODS

For this current study the liver from 6 apparently healthy goats were collected from local mutton shop. Their length, width, volume and attachments and correlation with the surround organs were measured. The length and width of gall bladder was also measured. The lengths, width and thickness were measured with the help of vernier calliper and scale while the weight and volume were measured by using weighing balance and displacement of water in volumetric beaker technique. The colour was also observed.

In this the total length of liver along the midline, width of dorsal lobe, width of ventral lobe and width of caudate lobe along with thickness of dorsal, thickness

of ventral lobe and thickness of caudate lobe were calculated.

RESULTS AND DISCUSSION

Colour: The colour of all the livers was found to be dark reddish brown similar findings were noticed by Dyce *et al.*(2002) in domestic animals, (Getty, 1975), (Konig and Liebich 2006); (Dawood and Khamas 2017) in indigenous Gazelle. While (Al-Aamery *et al.*, 2020) noted that colour of liver in Wessel was bright red to brown and colour of liver in Squirrel was dark red brown.

Length: The average length of liver of was 8.12 inches and (Bamaniya *et al*., 2016) in Marwari goats found that length of liver was 8.31 inches and 8.97 inches was the average length of liver was the finding of (Pareek, 2000) in Sheep.

Position: The liver was found to be extended from sixth intercostal space to upper part of last rib, the gall bladder is found attached to right lobe at visceral surface, similar observations were made by Thakur and Kapadnis (2021) in buffalo, (Sethi *et al*., 2021) in Bakerwali and Non-descript goat, (Pareek, 2000) in sheep.

Weight: The average weight of liverwas 402 g, similar findings were noticed by Bamaniya *et al.* (2016) in Marwari goats. (Sethi *et al*., 2021) in Bakerwali goat found that mean weight of liver was 434.01 ± 44.23, 610 ± 56.15 and 692.08 ± 40.61 g in different age groups while (Miller, 1965) noted that in dog the mean weight was 450g.

Width: Separate width of each lobe of liver in both males and females were calculated and found that average width of left lobewas found to be 3.48 inches. The width of right lobe was found to be 3.47 inches. The width of quadrate lobe was found to be 2.34 inches.

Thickness: The thickness of each lobe of the liver was recorded in all the animals and results were like thickness of left lobe was 1.65. Thickness of right lobe was 1.53 inches while thickness of quadrate lobe was found to be 0.73 inches.

Volume: The volume of liver was measured by using the water displacement technique was recorded as 290 ml similar kind of observations were made by Bamaniya *et al*. (2020).

Surfaces and Borders: The liver was having two surfaces, visceral and parietal. Parietal surface was found to be convex and visceral surface was related with other abdominal structures like omasum, reticulum, diaphragm, rumen, abomasum and impressions of these structures were found on this surface. The Gall bladder was found to be attached to the visceral surface on right lobe of liver, similar observations were made by Modekar *et al*. (2003) in Osmanabadi goats.

Liver was found to have 4 borders dorsal, ventral, lateral, medial. Dorsal border was thick and having a caudate lobe. Ventral border was found to be convex, medial border was having the oesophageal notch and lateral border was having the umbilical fissure, similar observations were made by (Getty, 1975); (Adibmoradi, 2007) in Caspian miniature horse.

Ligaments of liver: Liver was found to have 5 ligaments, which holds the liver in position and connects it to the different structures.

1. Falciform ligament: Which connects parietal surface of liver to the diaphragm

2. Right lateral ligament: This connects the dorsal part of liver to the diaphragm.

3. Round ligament: It was found that it extends from umbilical fissure to umbilicus

4. Caudate ligament: It found that it connects the caudate lobe of liver to the right kidney.

5. Lesser omentum: It connects the liver to the omasum and lesser curvature of abomasum.

Similar types of ligaments were found by Sethi *et al.* (2021) in Bakerwali goat and non-descript goat, (Dyce *et al*., 2002) in domestic animals, (Konig and Liebich 2006) in goats, while (Siddig, 2002) in Camel and (Bamaniya *et al*., 2016) in Marwari goats noticed presence of seven ligaments.

Fig. 1. Measuring the weight of liver.

Fig. 2. Measuring the volume of liver.

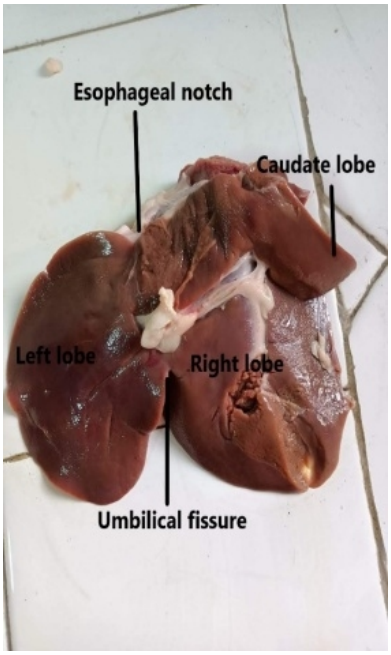

Fig. 3. Visceral surface of liver.

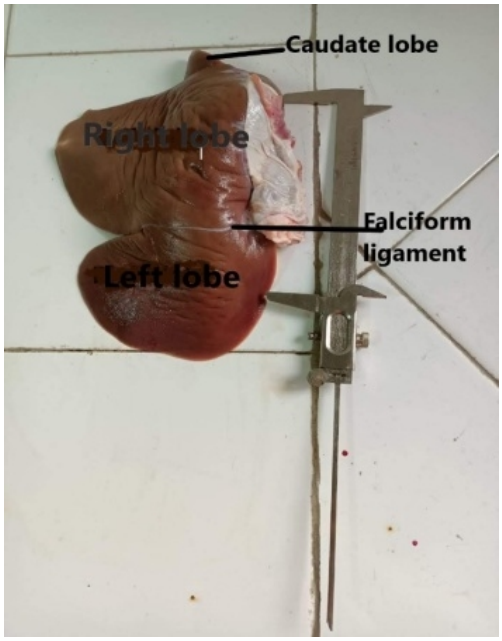

Fig. 4. Parietal surface of liver.

CONCLUSION

The liver is the largest gland of the body and is situated in the abdominal cavity obliquely downward and forward extending from lumbocostal angle to level of 7th or 8th rib and having reddish brown colour. It is kept in position by the five ligaments. It has 2 surfaces parietal and visceral, parietal surface is convex and attached to the diaphragm which visceral surface was found to have impressions of different related organs like omasum, abomasum, reticulum, right kidney etc, while liver was having four borders. It was found that liver is having 3 lobes namely left, right and caudate, gall bladder was found attached on the right lobe on visceral surface.

FUTURE SCOPE

Since liver is the largest gland of the body and helps in different functions of body like absorption of food, excretion of toxic substances, etc. so is very important to do the separate study of the gross morphology of liver in males and females to known any structural changes. Also,the age group wise study of different physical parameters can be done to know the growth pattern.

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