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Assessment of Hepatic Lesions in Slaughtered One Humped Camel at Maiduguri Main Abattoir, Borno State, Nigeria

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ABSTRACT

The study examined the prevalence of hepatic gross and histopathological lesions of camels (*Camelus dromedarius*) slaughtered at Maiduguri Central abattoir. The study was carried out between the months of August and September 2024. A total of 100 liver samples from camels slaughtered were investigated for the presence of gross lesions through visual palpation and incision. Tissue samples were randomly taken from 20 livers (10 male and 10 female) and processed for histopathological examination using a standard procedure. Out of the 100 camels examined, there were no visible gross lesions recorded. However, out of the 20 tissues processed for histopathology, 16(80%) had various histopathologic lesions observed. The most frequently recorded microscopic lesions were centrilobular necrosis 2(7.1%), apoptotic hepatocytes 2(7.1%), hepatitis 3(10.7%), hepatic hemorrhage 4(14.3%) and fibrosis 7(25%) and lipid accumulation 10(35.7%). The sex specific prevalence of hepatic histopathologic lesions observed was 50% in males and 50% in females. Of the 28 histopathologic lesions recorded, 14(50%) were from the males comprising of centrilobular necrosis 1(3.6%), hepatic hemorrhage 2(7.1%), hepatitis 2(7.1%), fibrosis 3(10.7%), and lipid accumulation 6(21.5%). The remaining 14(50%) microscopic lesions were from the females and comprised of centrilobular necrosis 1(3.6%), hepatitis 1(3.6%), hepatic hemorrhage 2(7.1%) and apoptotic hepatocyte 2(7.1%), fibrosis 4(14.3%) and lipid accumulation 4(14.3%), respectively. In conclusion, the results of this study indicate an 80% prevalence of hepatic microscopic lesions in the absence of visible gross lesions in camels in the study area. Therefore, the design of effective prevention and treatment programs against conditions that affect the liver is very important.

Keywords: *Camels, Hepatic lesions, Maiduguri, Survey.*

INTRODUCTION

The genus *Camelus* contains three species: the one-humped camels or dromedary (*Camelus dromedarius*), the two-humped camels or Bactrian (*Camelus bactrianus*) (Dioli, 2022), and the recently identified, never-domesticated two-humped *Camelus ferus* located in the Mongolian Great Gobi, in the Chinese Lop Nur, Taklamakan Deserts (Kandeel and Al-Mubarak, 2022). Usually, the Bactrian inhabits colder northern areas, and the Dromedary is found in hotter southern areas of the Old World. The one-humped camels (*Camelus dromedarius*) are found in different African and Asian countries (Masebo et al., 2023), where they have primary economic, social, and cultural values (Majama et al., 2023). Dromedary camels are the main livestock species reared in arid and semi-arid regions of the world where other livestock cannot survive, and their biological and physiological characteristics enable them to withstand harsh environments with water and feed shortages (Gagaoua et al., 2022). In scientific research, camels are one of the most neglected domestic animal species and have not received adequate attention (Majama et al., 2023). This neglect could be linked to poor nutrition and husbandry in arid and tropical areas of Africa and Asia (Abu-Seida et al., 2024), as well as various diseases that affect various systems within the body.

The liver is considered the most important organ for animal health, production and reproduction as many of the metabolic activities of the body occur in the liver (Belina et al., 2015). The liver of the dromedary camel is situated in the intrathoracic part of the abdominal cavity, occupying most of the right hypochondriac and epigastric regions. The liver possesses considerable functional reserve and regenerative capacity. In healthy animals, including camels, more than two-thirds of the hepatocytes may be damaged by infectious and non-agents without significant impairment of hepatic function, while normal hepatocytes may regenerate in a matter of days (Radostits, 2000).

Hepatocellular injury is one of the pathologic conditions affecting domestic animals, including camels (Hassan and Abu-Seida, 2024). Liver infection is an imperative disease that affects all kinds of meat-producing animals, leading to great losses to livestock production and national income due to condemnation of livers in the slaughterhouses, as it represents 2.8% to 5.7% of the dressed carcass weight (Sohair and Eman, 2009). Because of the functionality of the liver as an organ of metabolism of xenobiotic and the effect of toxins from infectious agents, the liver may be subjected to various physiological and structural changes that result in immune suppression with clinical signs such as anorexia, depression, weight loss and vomiting (Kandeel et al., 2023). Although hepatic diseases are relatively common in camels, most of them are misdiagnosed as a cause of illness because the signs may be subtle (*Tharwat, 2020)*. Therefore,

this study was designed to assess the gross and microscopic changes in a slaughtered one humped dromedary camel at Maiduguri main abattoir, Borno state, Nigeria.

MATERIALS AND METHODS

Sample collection

A total of 100 liver samples were studied between the months of August and September 2024, from camels slaughtered at Maiduguri Central Abattoir. The liver samples were examined grossly by visualization, palpation, and incision for possible lesions. Tissue sections from all the liver samples were cut and then placed in a clean sample bottle containing 10% formalin as a preservative. Among the 100 preserved liver samples, 20 samples were randomly selected based on sex and processed for histopathological examination.

Tissue Preparation for Histology

About 30-40 mm of tissue sections were collected from each of the 20 livers selected at random (10 male and female). The tissues were fixed in 10% buffered formalin for 72 hours, washed in running tap water to remove fixatives, and then treated with ascending grades of ethyl alcohol (70%, 90%, and 100%) for dehydration. After dehydrating the tissues, alcohol was removed, treated with xylene, and finally embedded in paraffin wax at 63 °C. Tissue blocks were then mounted on wooden chocks, cooled, and cut to 5µm thickness. The tissue sections were subsequently flattened in warm water at 45 °C, placed on glass slides, smeared with egg albumin, and dried in an oven at 45 °C. The sections were then stained with Hematoxylin and Eosin for histological examination under a light microscope (Drury et al., 1976).

RESULTS

The prevalence of hepatic lesions observed in one humped camels slaughtered at Maiduguri central abattoir is presented in Table 1. Among the 100 camels examined, no visible gross lesions were seen in the liver. However, 20 liver tissue samples were randomly collected and subjected to histopathological examination. The microscopic lesions observed were predominantly lipid accumulation, ranging from widespread vacuoles around the liver parenchyma to vacuoles around zone 3 of the hepatic acinus. There were other interstitial reactions characterized by neutrophil infiltration as well as infiltration of fibrous connective tissues, leading to fibrosis. Other liver segments show extensive areas of hepatic hemorrhage around the portal veins. The prevalence of microscopic lesions among the processed tissue slides was 16(80%). 28 lesions were observed and these lesions include; centrilobular necrosis 2(7.1%), fibrosis 7(25%), hepatitis 3(10.7%), lipid accumulation 10(35.7%), hepatic hemorrhage 4(14.3%) and apoptotic hepatocytes 2(7.1%) (Table 2)

The sex-specific prevalence of hepatic lesions in one humped camels slaughtered at Maiduguri abattoir is presented in Table 3. Of the 28

microscopic lesions recorded, 14(50%) were from the males comprising of centrilobular necrosis 1(3.6%), fibrosis 3(10.7%), hepatitis 2(7.1%), lipid accumulation 6(21.5%), and hepatic hemorrhage 2(7.1%) and 14(50%) from the females comprising of centrilobular necrosis 1(3.6%), fibrosis 4(14.3%), hepatitis 1(3.6%), lipid accumulation 4(14.3%), hepatic hemorrhage 2(7.1%) and apoptotic hepatocyte 2(7.1%) respectively.

Table 1: Prevalence of hepatic lesions in one humped camel slaughtered at Maiduguri central abattoir

Lesions	Number of samples	Positive	Prevalence (%)
Gross	100	0	0
Microscopic	20	16	80

Table 2: Prevalence of microscopic hepatic lesions in one humped camel slaughtered at Maiduguri central abattoir

Lesions	**Number of samples**	**Prevalence (%)**
Centrilobular necrosis	2	7.1
Fibrosis	7	25.1
Hepatitis	3	10.7
Lipid accumulation	10	35.7
Hepatic haemorrhage	4	14.3
Apoptotic hepatocytes	2	7.1
Total	28	100

Table 3: Sex specific prevalence of microscopic hepatic lesions in one humped camel slaughtered at Maiduguri abattoir

Types of Lesions	No of samples (percentage)	
	Female	Male
Centrilobular necrosis	1(03.6)	1(03.6)
Fibrosis	4(14.3)	3(10.7)
Hepatitis	1(03.6)	2(07.1)
Lipid accumulation	4(14.3)	6(21.5)
Hepatic hemorrhage	2(07.1)	2(07.1)
Apoptotic hepatocytes	2(07.1)	0(00.0)

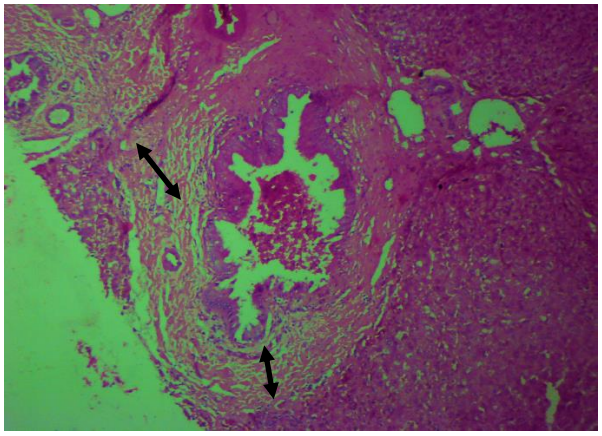

Figure 1: Photomicrograph of the camel liver with a fibrous ring around the portal vein at ×40 H&E

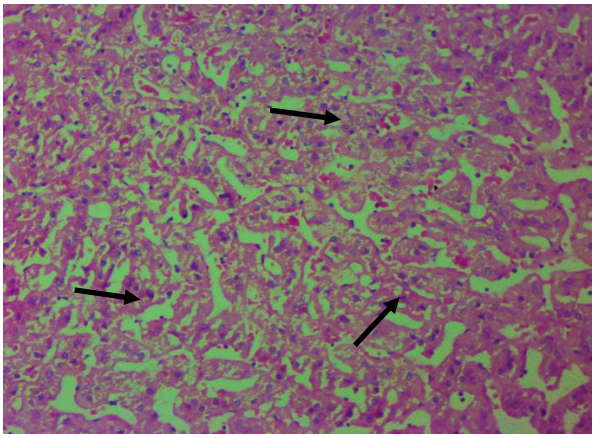

Figure 2: Photomicrograph of the camel liver showing hepatocellular necrosis at ×100 H&E

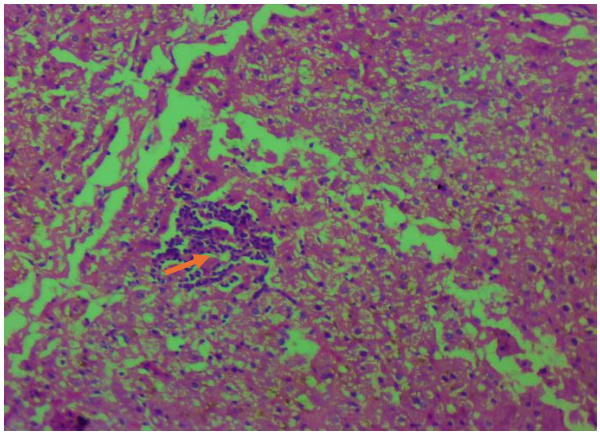

Figure 3a: Photomicrograph of the camel liver showing leukocyte infiltration at ×100 H&E

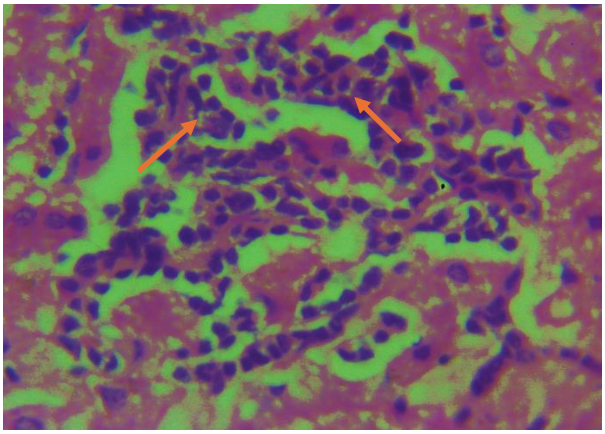

Figure 3b: Photomicrograph of the camel liver showing leukocyte infiltration at ×400 H&E

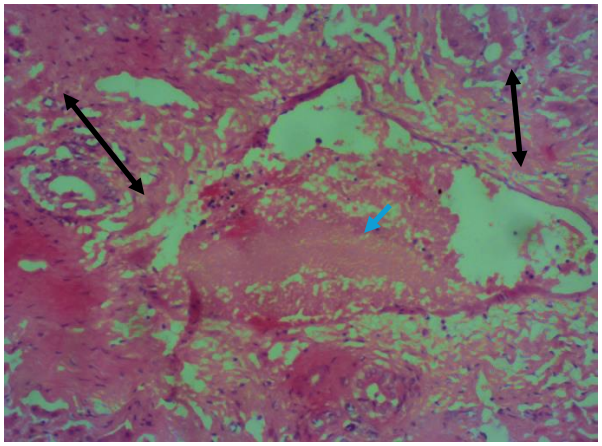

Figure 4: Photomicrograph of the camel liver showing hepatic congestion and fibroplasia (black arrow) at ×100 H&E

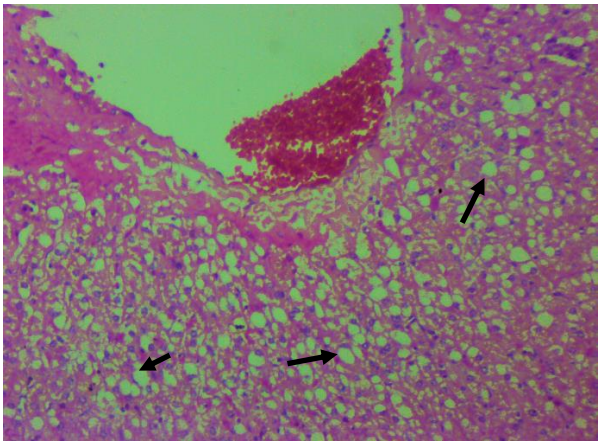

Figure 5: Photomicrograph of the camel liver showing areas of lipid accumulation at ×100 H&E

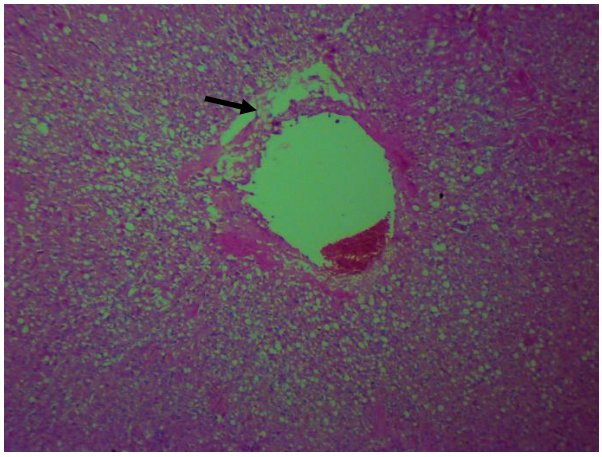

Figure 6: Photomicrograph of the camel liver showing area of centrilobular necrosis with area of lipid accumulation at ×40 H&E

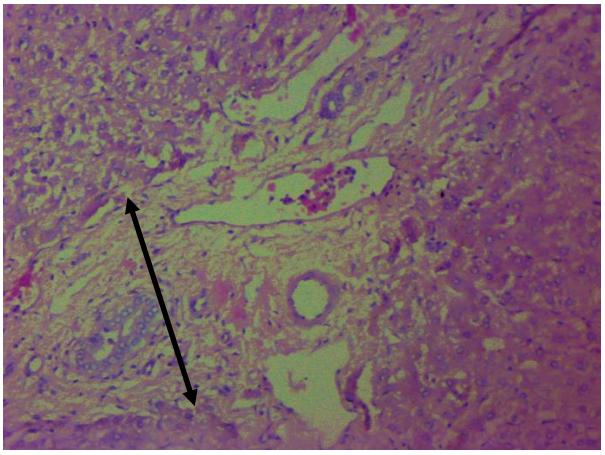

Figure 7: Photomicrograph of the camel liver showing Fibrosis around the portal triad at ×100 H&E

DISCUSSION

The finding of no gross lesions, yet a high prevalence of microscopic hepatic lesions, highlights the importance of histopathological examination in detecting tissue abnormalities that may not be apparent through visual (gross) inspection alone. Also, the absence of gross lesions suggests that these camels were not showing advanced signs of liver disease, yet the microscopic lesions indicate underlying hepatic issues that may not be present clinically until further progression. Our findings are partly consistent with the earlier reports of Elmadfa et al. (2013) and Shomari et al. (2020) in camel liver observed with subclinical liver disease with no visible gross but microscopic lesions.

The most frequent lesion of lipid accumulation (35.7%) observed could be attributed to nutritional imbalances or metabolic disturbances, such as excessive fat deposition in the liver. According to Hassan et al. (2016) and Shomari et al. (2020), lipid accumulation can result from nutritional imbalances, poor feeding practices, or diseases such as fatty liver syndrome, especially in animals that are kept in poor or suboptimal conditions. This finding of high prevalence of lipid accumulation in the present study is in agreement with the findings of Elmadfa et al. (2013) and Shomari et al. (2020), thus suggesting that these animals may be prone to metabolic disorders that affect liver function.

Similarly, the lesions of hepatic fibrosis observed are indicative of chronic liver damage, where repeated injury or inflammation leads to the formation of scar tissue. This condition is often seen in cases of chronic infection, toxin exposure, or metabolic disturbances (Patel et al., 2018; Zhang et al., 2019). Also, the finding of hepatic fibrosis in a significant proportion of camels in the current study suggests that chronic liver injury might be an important factor affecting camel health in the region. The slightly higher prevalence of fibrosis in hepatic tissues

from female camels may be due to hormonal differences or possibly sex-based variations in immune response, as female animals have been shown to have different immune system characteristics that might influence the progression of liver disease (Amaral et al., 2015).

The hepatic hemorrhage observed in 14.3% of the tissue could result from trauma during handling, transport, or slaughter. Previous studies have reported similar findings in livestock, where mechanical injury during post-slaughter processing can lead to hepatic hemorrhages (Alaoui et al., 2017). More so, the lesions of hepatitis (10.7%) and centrilobular necrosis (7.1%) observed in this study are both indicative of inflammatory or ischemic damage. These lesions may be a result of infectious diseases, such as bacterial or viral infections, or other conditions like parasitic infestations, which are common in livestock. Hepatitis in camels, particularly in regions with poor sanitation and veterinary care, has been reported in several studies (Shomari et al., 2020). Centrilobular necrosis is often linked to hypoxia or toxic substances, which could be caused by environmental factors or systemic diseases (Hassan et al., 2021).

The presence of apoptotic hepatocytes (7.1%) suggests that there is cellular injury leading to programmed cell death, a feature often observed in various liver diseases, including viral infections and chronic toxic exposures (Zhang et al., 2019). Apoptosis of liver cells could contribute to further liver dysfunction and may be indicative of ongoing liver damage (Zhang et al., 2019).

CONCLUSION

In conclusion, while no gross hepatic lesions were observed in the camels slaughtered at Maiduguri abattoir, the high prevalence (80%) of microscopic lesions indicates subclinical liver disease, which could have significant implications for the health of camels and the safety of camel products. The findings of various hepatic lesions underscore the need for improved health management practices (including better handling, transportation) and disease prevention strategies. Given the similarities with findings from other regions, it is evident that subclinical liver histopathological lesions in camels are a widespread concern that deserves more attention in veterinary health programs.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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All technologists of the Department of Veterinary Pathology, Faculty of Veterinary Medicine, University of Maiduguri, Nigeria.

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