



Assessment of Pulmonary Lesions in Slaughtered One Humped Camels (*Camelus Dromedarius*) in Maiduguri Main Abattoir, Borno State, Nigeria

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ABSTRACT

This study was designed to assess the types and frequency of gross and microscopic pulmonary lesions in camels slaughtered in Maiduguri, Borno State, Nigeria. A total of 400 slaughtered camels (139 males and 261 females) were grossly examined for pulmonary lesions. Tissue samples were taken from the affected lungs and processed for histopathological evaluation. The study showed that 111 (27.8%) lungs had one or more lesions. The most frequently recorded lesions were congestion (n = 45, 11.3%), emphysema (n = 26, 6.5%), atelectasis (n = 11, 2.8%) and nodules (7, 1.8%). Lungs from male camels had a 48 (34.5%) percentage frequency of lesions distributed as congestion in 14 (10.1%), emphysema in 8 (5.8%), pneumonia in 5 (3.6%), fibrosis in 3 (2.2%), nodules in 7 (5.1%), hemorrhage in 2 (1.4%), hematoma in 2 (1.4%), atelectasis in 6 (4.3%), and abscess in 1 (0.7%); while the female camels had 63 (24.1%) percentage frequency of pulmonary lesions distributed as congestion in 31 (11.9%), emphysema in 18 (6.9%), pneumonia in 4 (1.5%), nodules in 3 (1.2%), hemorrhage in 1 (0.4%), hematoma in 1 (0.4%) and atelectasis in 5 (1.9%), respectively. Microscopically, lesions observed were severe interstitial oedema, heavy infiltration of inflammatory cells in the interalveolar septa with collapse of the alveolar, and granulomas. In conclusion, the results of this study indicate that the occurrence of pulmonary lesions in slaughtered camels was 28.1% in the study area. This could cause considerable economic losses to the animal husbandry industry. Therefore, the design of effective prevention and treatment programs against conditions that affects the lungs is very important. Furthermore, this survey provides baseline data for future monitoring of lesions affecting camel lungs in Maiduguri and other parts of the country (Nigeria).

KEYWORDS: *Camelus dromedarius*; Pulmonary lesions; Maiduguri.

INTRODUCTION

The genus *Camelus* contains three species: the one-humped camels or dromedary (*Camelus dromedarius*), the two-humped camels or Bactrian (*Camelus bactrianus*) [1], and the recently identified, never-domesticated two-humped *Camelus ferus* located in the Mongolian Great Gobi, in the Chinese Lop Nur, Taklamakan Deserts [2]. Usually, the Bactrian inhabits colder northern areas, and 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 [3] where they have primary economic, social, and cultural values [4]. 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 [5, 6]. In scientific research, camels are one of the most neglected domestic animal species and have not received adequate attention [4]. This neglect could be linked to poor nutrition and husbandry in arid and tropical areas of Africa and Asia [7], as well as various diseases that affect various systems within the body.

In general, the respiratory system constitutes the most extensive surface and is directly exposed to the environment. Any sudden change in the environment precipitates the infection by interfering with local defense and rendering the system more susceptible to infections. Various infectious (bacteria, viruses, and parasites) and noninfectious agents can damage the lungs and produce significant lesions [8]. Of these, bacterial diseases have drawn attention due to variable clinical manifestations, disease severity, and re-emergence of strains resistant to a number of chemotherapeutic agents [9].

Although the primary factors are infectious agents, environmental and management factors are also important in clinical development and economic losses [10]. This implies that the respiratory tract is more prone to injurious agents, although the airways and lung parenchyma sometimes neutralize or remove infectious agents that are deposited [11].

Although camels are well adapted to their environment and seem to be spared from devastating epidemic diseases that threaten other livestock species in the same region, a number of economically important diseases affect camels [2]. Pulmonary diseases are among the emerging problems in camels that cause considerable production losses and even mortality [12, 13]. In view of the above, this study was designed to determine the prevalence of pulmonary lesions in one-humped camels slaughtered at Maiduguri Main Abattoir.

MATERIALS AND METHODS

Gross examination and Lung Sample Collection for Histopathology

A total of 400 slaughtered camels (male 139 and female 261) were examined for pulmonary lesions at the Maiduguri Main Abattoir between December 2012 and March 2013. Gross examination was done by physical evaluation and palpation of the lungs according to Taiwo [14]. The images of lungs with lesions were captured using a digital camera. Thereafter, sample of the affected lungs were cut and preserved in a universal sample bottle containing 10% buffered formalin before histological examination.

Tissue Preparation for Histology

The 10% buffered formalin fixed lungs were dehydrated in graded alcohol (70, 80, 90 and 100 %); while Xylene and Paraffin wax were

used for clearing and embedding respectively. Serial sections of 5 μ thick were obtained using a rotator microtome. Deparaffinised sections were stained with haematoxylin and eosin as described by Bancroft and Gamble, [15]. Slides were examined using light microscope at different magnifications. Photomicrographs of lesions were taken using Amscope digital camera for microscope version (3.0 China)

RESULTS

Occurrence of Pulmonary Lesions in Camels

The occurrence of pulmonary lesions in camels slaughtered in Maiduguri Main Abattoir is shown in Table 1. Convenience sampling

technique was use to arrive at a sample size of 400 used in this study. Of the 400 (139 male and 261 female) lung samples examined for pulmonary lesions, an overall frequency of 28.1% (111 lungs) lesions were observed and distributed as: congestion 45 (11.3%), emphysema 26 (6.5%), abscesses 1 (0.3%), fibrosis 3 (0.8%), pneumonia 9 (2.3%), atelectasis 11 (2.8%), nodules 10 (2.5%), hematoma 3 (0.8%), and hemorrhage 3 (0.8%).

Table 1: Occurrence of pulmonary lesions in slaughtered camels in Maiduguri Main Abattoir

Lesion	Number of Samples (%)
Congestion	45 (11.3)
Emphysema	26 (6.5)
Pulmonary abscess	01 (0.3)
Fibrosis	03 (0.8)
Pneumonia	09 (2.3)
Atelectasis	11 (2.8)
Nodules	10 (2.5)
Hematoma	03 (0.8)
Haemorrhages	03 (0.8)

Sex Distribution of Pulmonary Lesions in Camels

The sex-specific distribution of pulmonary lesions in slaughtered camels is shown in Table 2. Of the 400 lungs examined, 139 (34.8%) were from male camels, in which congestion was seen in 14 (10.1%), emphysema in 8 (5.8%), pneumonia in 5 (3.6%), fibrosis in 3 (2.2%), nodules in 7 (5.0%), haemorrhage in 2 (1.4%),

and hematoma in 2 (1.4%), respectively. The remaining 261 lungs (65.3%) were from female camels, in which congestion were seen in 31 (11.9%), emphysema in 18 (6.9%), atelectasis in 5 (1.9%), pneumonia in 4 (1.5%), nodules 3 (1.2%) haemorrhages 1 (0.4%) and hematoma 1 (0.4%).

Table 2: Sex distribution of pulmonary lesions in camels slaughtered in Maiduguri Main Abattoir

Lesions	Male (139)	Female (261)
	Frequency (%)	Frequency (%)
Congestion	14 (10.1)	31 (11.9)
Emphysema	08 (05.8)	18 (6.9)
Abscess	01 (00.7)	00 (0.0)
Atelectasis	06 (04.3)	05 (1.9)
Pneumonia	05 (03.6)	04 (1.5)
Fibrosis	03 (02.2)	00 (0.0)
Nodules	07 (05.0)	03 (1.2)
Haemorrhage	02 (01.4)	01 (0.4)
Hematoma	02 (01.4)	01 (0.4)

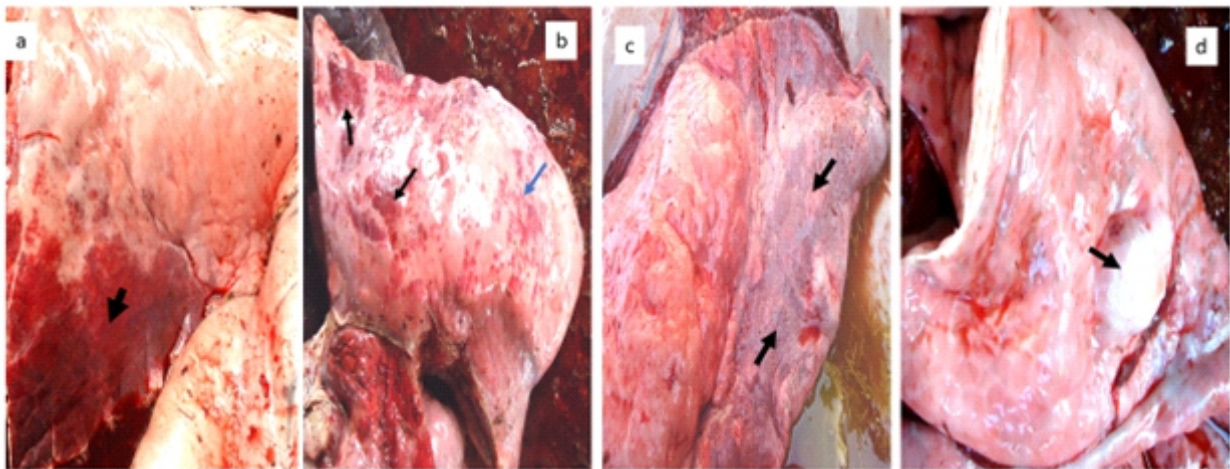


Plate 1a-d: The lung of one humped camel (*Camelus dromedarius*) slaughtered in Maiduguri Main Abattoir showing area of congestion (arrow) (a), petechial haemorrhages (blue arrow) and ecchymotic haemorrhages (black arrows) in the pulmonary parenchyma (b), areas of atelectasis (arrows) (c) and a nodule within the pulmonary parenchyma (arrow) (d).

Microscopic Lesions

Microscopic lesions observed included heavy infiltration of inflammatory cells in the interalveolar septa with alveolar collapse (Plate IIa), granuloma (Plate IIb) and peribronchiolar mononuclear cell infiltration (Plate Iic)

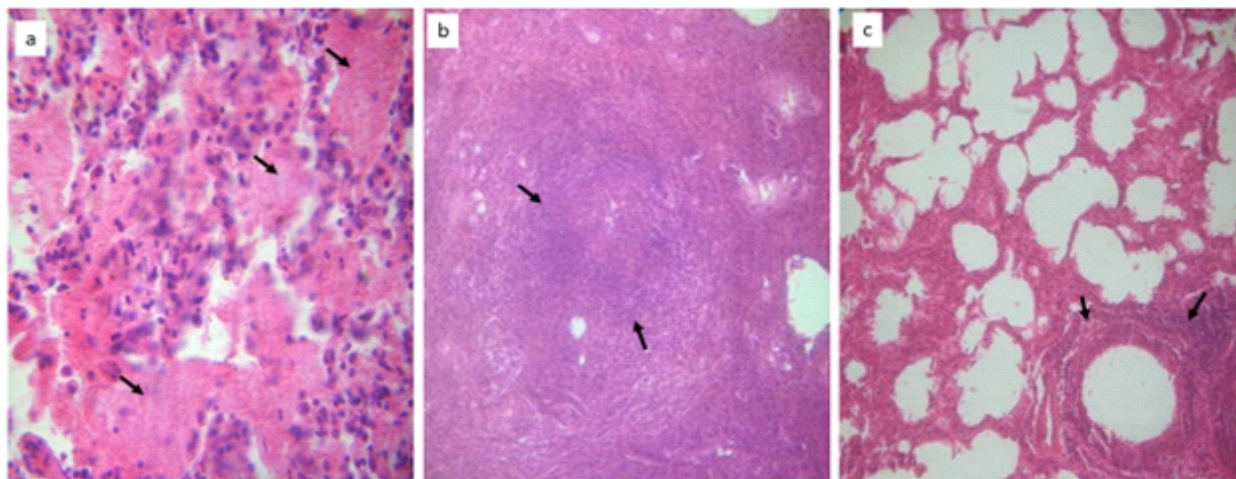


Plate IIa-c: Photomicrograph of the lungs of the one humped camel (*Camelus dromedarius*) showing severe interstitial oedema within the alveolar spaces (arrows) (a) H&E x 400, granuloma within the lung parenchyma (arrows) (b) H&E x 10 and peribronchiolar mononuclear cell infiltration (arrows) (c) H&E x 100.

DISCUSSION

Pulmonary haemorrhage in the present study had the lowest occurrence of 0.8% in the slaughtered camels. This lesion may be associated with conditions affecting the blood vessels and blood, like severe septicemia or traumatic lesion to the lung [16].

The 0.3% occurrence of pulmonary emphysema observed in this study could be secondary to some primary lesions which effectively trap an excessive amount of air in the alveoli [10]. This finding is in contrast with the report of Mellau *et al.* [17] who observed emphysema in 17.9% of sheep lungs examined. Pulmonary emphysema is a common pathological finding in many diseases of the lungs of several species and is characterized clinically by dyspnea, hyperpnea, poor exercise tolerance and forced expiration [18]. The lesion in animals is often seen secondary to some respiratory disorders like hydatidosis, pneumonic pasteurellosis, mycoplasma infection, leptospirosis, septicaemia and endocarditis [19, 20]. Sometimes, emphysema is recorded in slaughtered animals due to extensive gasping especially when animals are slaughtered without stunning, and in slaughtered old animals [21].

Abscess was observed in 0.3% of the camel lungs examined. This rate is much lower than those reported by Azizi *et al.* [22] and Mellau *et al.* [17] who observed presence of abscesses in 11.9% and 14.3% of sheep lungs, respectively. Pulmonary abscesses may arise from focal residues of severe suppurative lesions, lobar bronchopneumonia or from septic emboli lodging in the pulmonary vascular bed. It is documented that *Pasteurella spp.* and *A. pyogenes* are the main causes of lung abscesses in ruminants [21, 19]. The atelectasis observed in this study could be due to decreased lung compliance, impairment of oxygenation, increased pulmonary vascular resistance, and development of lung injury [23] caused by infections such as *Mycoplasma* and *Pasteurella species*.

In this study, pneumonia was seen in 2.3% of lungs examined. This result confirmed that pneumonia continues to be one of the most important causes of morbidity and mortality in domestic animals [22, 24]. Pneumonia in ruminants is a complex condition involving interaction between the host (i.e.

immunological and physiological), agent(s) (e.g. bacteria, viruses, mycoplasma) and environmental factors [25]. A number of stress factors such as exposure to dust from the environment or exhaustion during long treks of pastoral livestock in search of pasture and water, parasitism, poor housing and overcrowding [26, 20] may explain the 2.3% frequency of occurrence of pneumonic lungs in this study. Pneumoconiosis was reported as a common environmental health hazard for camels, probably associated with the increasingly dusty environment where camels are reared. It can also predispose camels to secondary infections, as there had been associated bronchopneumonia, by interfering with the defense mechanisms of the lungs [27].

Microscopically, the most predominant lesion seen was severe interstitial pneumonia characterized by heavy infiltration of inflammatory cells into the interalveolar septa with collapse of the alveoli. In other sections, granulomas were seen and yet others presented peribronchiolar mononuclear cell infiltration. Oedema observed in the lung tissue could be due to alteration in the permeability of the vascular wall and by Starling forces-the balance of hydrostatic and osmotic pressures between the intravascular and interstitial compartments [16]. This may have a catastrophic effect on lung function by reducing pulmonary compliance, blocking ventilation of the alveoli, obstructing gas exchange across the alveolar septa, and reducing the surface area of the air-liquid interface in the alveoli. In addition, proteins present in the oedema fluid interfere with surfactant function, further reducing compliance and contributing to pulmonary dysfunction [28].

Conclusion

The results of this study indicated that the percentage frequency of occurrence of pulmonary lesions in slaughtered one humped camel (*Camelus dromedarius*) was 27.8% in the study area. The lesions could result in a lot of economic losses to the livestock industry. Furthermore, this survey provides baseline data for future monitoring of these potentially important lesions affecting lungs of the one humped camel in Maiduguri and other parts of the country (Nigeria).

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Conflict of interest

The authors declare that they have no conflict of interest

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