



Pathological investigation of liver lesions in slaughtered cattle in Al-Najaf abattoir

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Abstract

This study has been conducted to examine the macroscopic and histopathologic lesions of liver in slaughtered cattle at Al-Najaf City, and then the prevalence of these lesions has been listed. Liver of two hundred cattle slaughtered at the city slaughterhouse of Al-Najaf were collected from beginning of January to the end of March, 2019 for gross and microscopic investigations. Tissue processing has been carried out for specimens inspected as tissue lesions were examined under light microscopy. The results of the macroscopic and microscopic survey showed that there were variable liver affections in slaughtered cattle. The lesions were arranged from high percentages of lesions such as fasciolosis (32%) and abscesses (32.5%), to moderate to low percentages such as hydatidosis (19.5%), tuberculosis (7.5%), fatty degeneration (3%) and coagulative necrosis (1.5%). The main conclusion of our study revealed that there were high prevalence of liver lesions in slaughtered cattle in Al-Najaf slaughterhouse (4.69%), that lead to liver condemnation and economic losses.

Key words: Fascioliasis, cattle, liver flukes, liver lesions, histopathological examination.

فحص باثولوجي لآفات الكبد في الماشية المذبوحة في مسلخ النجف

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الخلاصة

أجريت هذه الدراسة لفحص الآفات العيانية والنسجية للكبد لدى الأبقار المذبوحة في مدينة النجف ، وتم تسجيل نسب حصول هذه بقرة مذبوحة في مجزرة النجف الأشرف للفترة من بداية شهر كانون الثاني الى نهاية شهر آذار 200 الآفات. تم جمع كبد من لإجراء الفحص العياني والمجهري. وقد أجريت المعالجة النسجية للعينات التي تم تشخيص الآفات فيها كما تم فحص آفات 2019 الأنسجة تحت المجهر الضوئي بعد اجراء الصبغة الروتينية الزرقاء والحمراء وكذلك الصبغة الخاصة الماسون ثلاثي الكروميت أظهرت نتائج المسح العياني والمجهري وجود تباين في ظهور الآفات الكبدية في الأبقار المذبوحة. تم ترتيب الآفات من نسب عالية مثل ديدان الكبد (32 %) والخراجات (32.5 %) ، إلى معتدلة مثل الاكياس المائية (19.5 %) ، والسل (7.5 %) ، إلى النسب المنخفضة كالنتكس الدهني (3 %) والنخر التجلطي (1.5 %). كشفت الأستنتاجات الرئيسية لدراستنا عن وجود نسبة عالية من آفات الكبد في الماشية المذبوحة في مسلخ النجف (4.69 %) ، مما أدى إلى اتلاف الكبد والخسائر الاقتصادية. بالإضافة إلى إمكانية نقل مسببات الأمراض الخاصة بالأبقار إلى البشر.

الكلمات المفتاحية: داء المتورقات (الفاشيولا), ديدان الكبد, الماشية, الآفات الكبدية, الفحوصات النسجية.

Introduction:

Liver lesions in the cattle do not only have adverse effects on the cattle breeding industry but also they contribute to the loss of the

production of animal proteins and, in particular, to the health of consumers (1).

The liver is the largest gland of the mammalian body and supports almost every organ in the body. This organ is critical for

the survival of the creatures due to its many essential roles. The liver is the only internal organ of the body that can rapidly regenerate up to 70% of its lost tissues without any dysfunction. The synthesis of proteins and vitamins, participation in metabolism, drug metabolism, toxic substances' purification detoxification of body, prenatal hematopoiesis, quick provision of energy and bile production and secretion are the most important roles of the liver in the body (2,3). The incidence and prevalence of pathological lesions in the liver are greatly affected by many factors including season, temperature, rainfall, quality of breeding, quality of fodder as well as genetic predisposition (4). Among the most important diseases affecting cattle liver in Iraq is liver fluke, where many previous studies conducted in Iraq indicated a high incidence of these worms (5).

Considering the popularity of cattle products in Al-Najaf region, the key role of liver diseases and lesions in the health and products of cattle, as well as the lack of influential researches in this area, the present investigation was directed with the point of grossly visible and histopathological examination of liver injuries in cattle slaughtered in Al-Najaf City. The reason for the present study is to explore the prevalence of disease conditions influencing the liver of

slaughtered cattle at Al-Najaf abattoir; Iraq, during the period from January to March 2019.

Materials and Methods:

Regular visits were paid to Al-Najaf abattoir during the period from January to March 2019. Routine postmortem examination to slaughtered cattle was carried out with particular attention to the hepatic system. Liver from 220 cattle were collected and thoroughly examined. Two hundred of them showed gross lesions, other twenty were normal in texture and morphology, used as a control.

All observed lesions were recorded and then tissue pieces measured as 1 cubic centimeter were sampled and transferred in a plastic container which contains formalin 10%, to the tissue processing unite in faculty of veterinary medicine, University of Kufa.

The obtained specimens used for routine Hematoxylin and Eosin (H&E) staining (6) and Masson's trichrome staining (6) to study the microscopic changes in liver tissue.

Results And Discussion:

Gross study was performed during collection of samples from slaughterhouses primarily and then during trimming of the samples for histopathology. The prevalence of gross and histopathological conditions of the cattle livers are presented in Table 1.

Table 1: Number and percentage of different liver lesions in microscopic study of affected liver.

Type of lesion	Number of specific lesions/number of liver with lesions	Percentage	Percentage of specific liver lesions/number of slaughtered cattle	Percentage
Fasciolosis	72/200	36%	72/4257	1.69%
Abscesses	65/200	32.5%	65/4257	1.52%
Hydatidosis	39/200	19.5%	39/4257	0.91%
Tuberculosis	15/200	7.5%	15/4257	0.35%
Fatty degeneration	6/200	3%	6/4257	0.14%
Coagulative necrosis	3/200	1.5%	3/4257	0.07%
Total	200	100%	200	4.69%

Fasciolosis

In the present study, the frequency of Fasciolosis were (1.69%). It was higher than the Fasciolosis registered by (7) in Al-Najaf, and (8) in Kerbala who reported (0.71%) and (1.32%) respectively. The high percentage of Fasciolosis in this study may be due to high rates of snails which are considered as intermediate host in Al-Najaf. The seasonal distribution of diseases in slaughtered ruminants was varied in different animals.

The gross pathological changes observed on the liver were enlargement of the liver due to inflammatory changes and fibrosis that took place in the liver parenchyma. The affected bile ducts were markedly thickened and there was fibrosis in the duct wall (figure 1). These findings are consistent with the earlier findings by (9), who proved that thickening of

bile duct is due to chronic nature of *Fasciola* spp. infection. While the same results were achieved most of the lesions is finding with a previous studies (10).

Histopathologically, mature liver fluke in the lumen of the intra-hepatic bile duct that destroyed the bile duct with heavy infiltration of inflammatory cells in the fibrous connective tissue around bile duct (Figure 2), the liver parenchyma showed infiltration of polymorphonuclear inflammatory cells; neutrophils and eosinophils with mononuclear inflammatory cells which were observed in liver paranchyma. Similar results were also recorded by (10), who mentioned that the immature liver flukes migration through the tissue causing hemorrhage and irritation, and brought the cellular inflammatory reactions.

Figure 1: Gross section of cattle liver infected with Fasciolosis showing swelling of bile duct (white arrow head) and abscess (red arrow head).



Figure 2: Histopathological section of cattle liver showed mature liver fluke (white arrow head) in the lumen of the intra-hepatic bile duct with sloughing of superficial layer (red arrow head) (H&E X100).



Abscesses

The current study recorded the incidence of liver abscesses reached to (1.52%) this value is higher than the study conducted by (11) and lower than the study conducted by (12) in the province of Kirkuk, which recorded an infection rate of 1.12% and 2.29% respectively, and the reason for this is due to the quality of feed consumed, concentrated feed increases with the incidence of liver abscesses.

Grossly, whitish foci on the surface of the liver were found. Size varied from 0.5 to 1.5 cm in diameter (figure 3). Histopathologically, The abscesses have appeared during the present study with a necrotic center containing leukocytes, hepatocytes and cellular debris (figure 4). Similar result recorded by (13), who explained liver abscesses are a fatal infection in cattle herds because of the possibility of pus-generating bacteria such as staphylococcus or streptococcus or amoebic phases, which are characterized by having a systemic effect on the entire animal body.

Hydatidosis

In the present study, the frequency of Hydatidosis were (0.91%), this value is lower than the study conducted by (7) in Al-Najaf, and (7) in Kerbala, who reported (1.59%) and (4.98%) respectively. This difference may be related to period of study.

The present results of gross examination are in agreement with these study of (14), who showed grossly that liver infected with hydatid cysts of different size and some of these cysts fully or partially embedded (figure 5). Also, who indicated that the Hydatidosis had affect in the productivity of cattle, and their affected organs became inedible for human, moreover, decrease in weight and healthy status for infected animals.

The histopathological changes in liver of cattle affected by cystic echinococcosis

showed intact or disrupted laminated membrane, moderate to broad fibrous capsule surrounding by peripheral fibrous tissue layer with subcapsular mononuclear inflammatory cells aggregation. Also, there thickened capsule of liver (Figure 6).

The fibrous tissue capsule formation neighboring the hydatid cyst wall in liver of infected cattle demonstrated by (15). The formation of fibrous layer may be because immunological response of host against development of hydatid cyst. Also (16) showed that the fibrosis is induced by continuous injurious stimuli such as infection, immunologic reaction and other types of tissue injury.

Tuberculosis

The current study recorded the incidence of liver tuberculosis were (0.35%). This is the first statistic that found a case of tuberculosis in the liver of cattle in the Al-Najaf slaughterhouse, and there is no previous research on the number of liver infected with tuberculosis in Iraq, and there are only a few records of tuberculosis bacteriological isolation and molecular genotyping in Iraq. The most Tb lesions were subcapsular. Granulomas, were 4–15 mm in size (Figure 7) The present result of histopathological lesions were characterized by the formation granuloma, Consists of central necrosis surrounded by macrophages, Langhan giant cells, epithelioid cells, lymphocytes, plasma cells and neutrophils, with or without mineralization (figure 8). Several workers had previously noticed typical histopathological lesions (17).

According to (18), who showed in animal carcasses, post mortem identification of TB lesions typically suggests advanced stage bovine TB. The identification of lesions during the examination of slaughtered animals is the basis for suggesting the disease's occurrence (19).

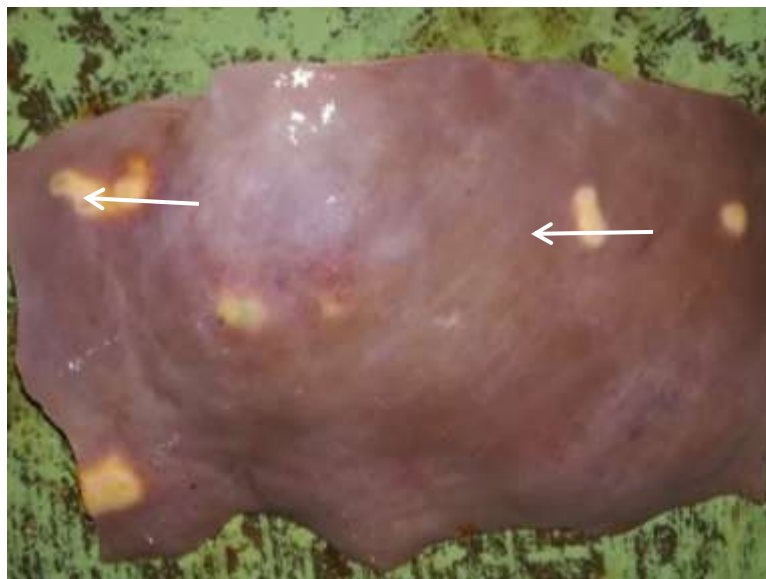


Figure 3: Gross section of cattle liver showing abscesses, that different in sizes and shape and distributed randomly on the surface of the hepatic lobes (arrows head).

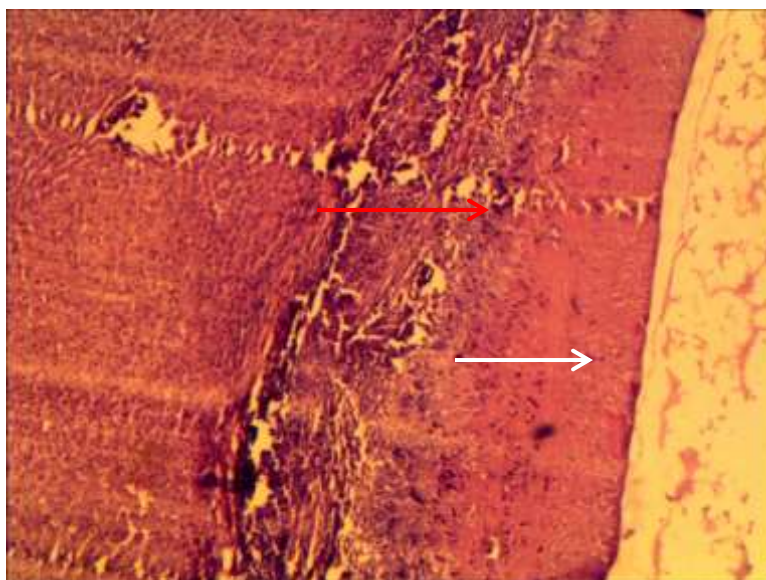


Figure 4: Histopathological section of cattle liver showed large abscess with necrotic center (white arrow head) surrounded by fibrous connective tissue capsule (red arrow head) (H&E X100).



Figure 5: Gross section of cattle liver infected with hydatid cyst, showing cysts were round in shape and variable in size (arrows head).



Figure 6: Hydatid cyst showing continuous laminated membrane (white arrow head), fibrous tissue capsule (red arrow head), subcapsular mononuclear inflammatory cells aggregation (black arrow head), and thickened capsule of liver (yellow arrow head) (H&E X100).

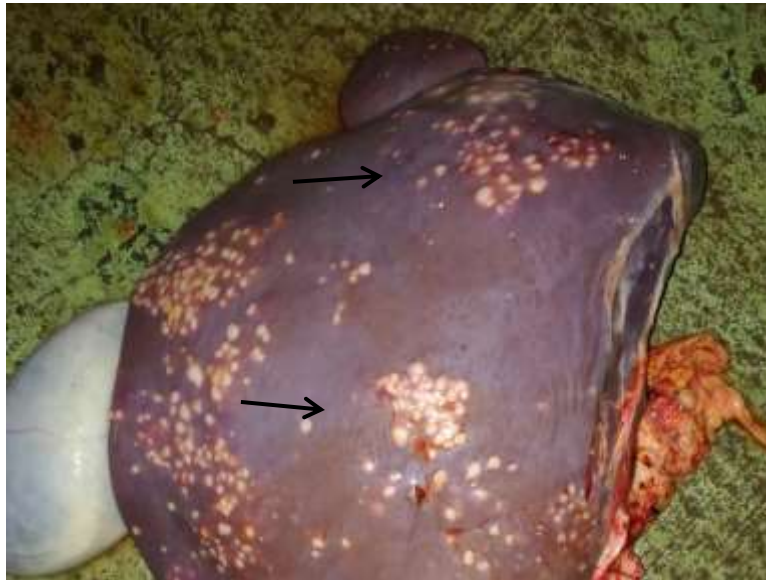


Figure 7: Gross section of cattle liver infected with tuberculosis, showing yellowish white lesions of various sizes and numbers, distributed randomly through the liver (arrows head).

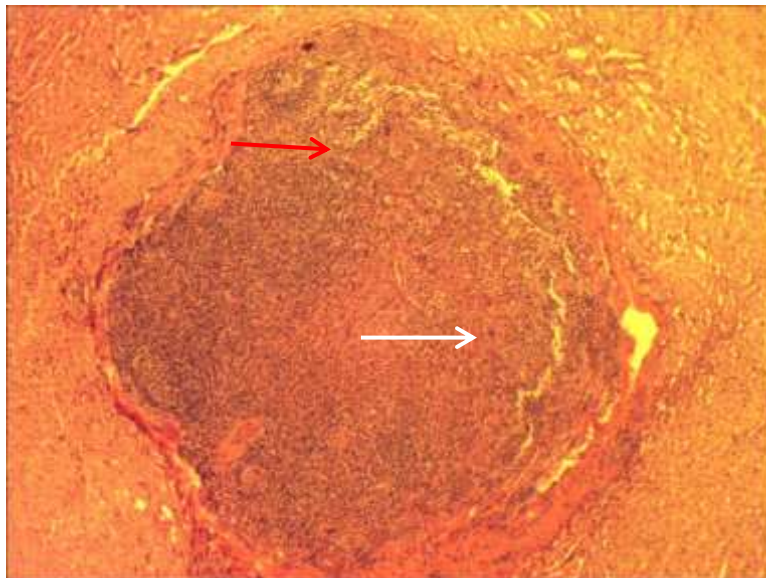


Figure 8: Histopathological section of cattle liver showed tuberculosis, tubercle with central of caseous necrosis (white arrow head) surrounded by cellular infiltrate with the outside fibrous capsule (red arrow head) (H&E X100).

Fatty degeneration

In the present study, the frequency of fatty degeneration were (0.14%). This is the first result at the level of the Al-Najaf slaughterhouse,

In macroscopic examination, the lobes of livers with notable fatty change were observed enlarged, pale yellow, soft and friable with rounded edges (Figure 9).

The present result of histopathological lesions were characterized by hepatocyte swelling and vacuolation, darkening and compression of their nuclei (pyknosis), and in some cases, pushing nuclei to the border of the cell (Figure 10).

Depending to (20), showed that in order to be considered clinically significant, fat degeneration will involve at least 5% of

hepatocytes. According to (21) showed the Fatty degeneration is most common in zone 3, but with disease progression or severity, steatosis may spread uniformly across the hepatic acinus or spread irregularly.

Coagulative necrosis

In the present study, the frequency of coagulative necrosis were (0.07%). According to (22), coagulative necrosis occurs when blood flow to a tissue is reduced or blocked. Usually this blockage is due to a physical obstruction in the blood vessel. The cells of the liver require oxygen and nutrients from the blood in order to function and survive. If plaque or cholesterol builds up in the blood vessels leading to blood flow will be reduced, which minimize the amount of oxygen and nutrients to the liver. If the liver cells do not

receive enough oxygen and nutrients from the blood, they can die and become necrotic.

Grossly showed progressively color change from brown-red to dark gray, it has solid texture with thickened capsule (Figure 11). Histopathologically; destruction and extensive dystrophic change of liver parenchyma with large edema have be shown (Figure 12).

According to (23) showed relationship between massive non-inflammatory liver necrosis and acetic acid ingestion. The relationship mechanism is not well understood. The one suggested theory is that thrombosis and circulatory disturbances in the hepatic arteries and portal veins result in the liver dysfunction.



Figure 9: Gross section of cattle liver showing fatty degeneration, the liver were enlarged, pale yellow, soft and round edges.

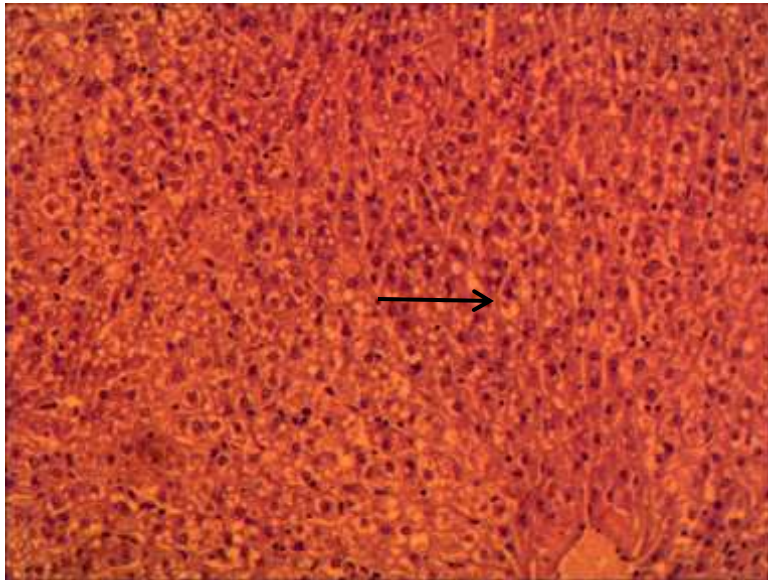


Figure 10: Histopathological section of cattle liver showed fatty degeneration. Vacuolar degeneration of hepatocytes, large lipid vacuole and displacement of nucleuses to the periphery (arrow head) (H&E X200).



Figure 11: Gross section of cattle liver showing coagulative necrosis, The liver appeared progressively color change from brown-red to dark gray and has solid texture with thickened capsule.

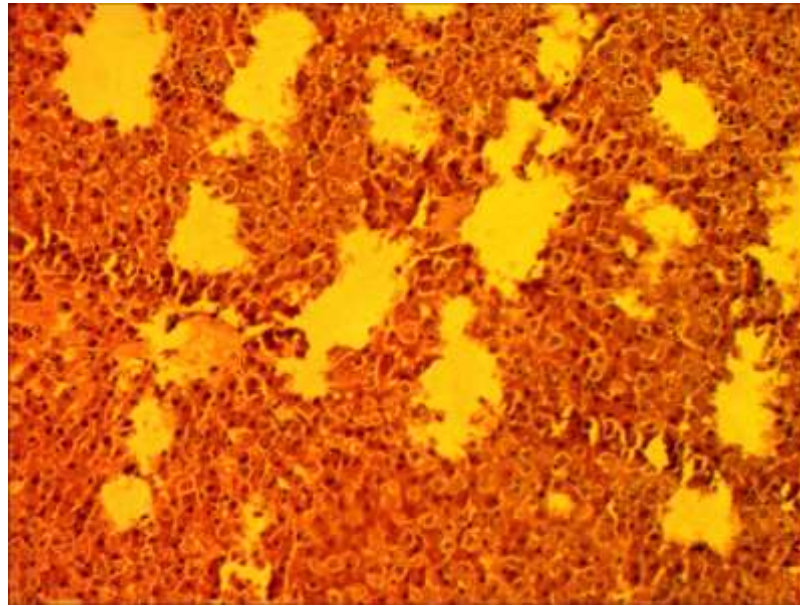


Figure 12: Histopathological section of cattle liver showed coagulative necrosis. There were extensive dystrophic change of liver parenchyma with large edema (H&E X100).

Conclusions

1. High prevalence of liver lesions in slaughtered cattle in Al-Najaf slaughterhouse (4.69%).
2. The most occurrence lesions were fasciolosis and abscesses.
3. The tuberculosis lesions is diagnosed histologically for the first time in Iraq.

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