Histopathological Changes in Ewes Suffering from Emaciation and Cachexia Due to Certain Causes

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ABSTRACT

This study was conducted to report the pathological changes in tissues taken from ewes suffering from emaciation and cachexia with referring to the most implicated possible diseases causing them, since emaciation led to cachexia were the most devastating causes of life followed by economic losses in ewes has been planned and made. This scientific work was designed to collection samples with and histopathological study which were carried out on tissues in twenty old weak ewes purchased from local market in Amara city south of Iraq. Tissue samples included multiple pieces of livers, lungs, and intestine which have been used in histopathological work. Results showed changes in all tissues taken from all animals of the study ranged from thickening of the alveolar septa with interstitial hemorrhage and hyperplasia of bronchial epithelium in the lungs to complete atrophy of the intestinal villi, mucosal denudation, and mild mucosal inflammation in small intestine and mild bridging fibrosis in the centrilobular area in the liver. Results indicated that autopsied ewes had liver lesions occurrence 75%, intestinal lesion 70%, and lung lesion 65%, in all animals of the study, however within the same animals results were indicated that liver and lung lesions 60% , liver and intestinal lesions 55%, lung and intestine lesions 55%, and liver, lung and intestine lesions50%. It had been concluded from this study that aged cachectic and emaciated ewes have a dramatic pathological changes in their internal vital organs and tissues and the possible causes of

these changes are an underling debilitating chronic disease states that render the affected animals weak and unhealthy animals.

INTRODUCTION

Progressive weight loss, depletion of skeletal muscle mass, loss of adipose tissue, systemic inflammation and modulation of appetite are all symptoms and signs associated with cachexia which represents a complex metabolic end state (1, 2).Clinical signs of emaciation, cachexia and ultimately death are closely related to Paratuberculosis or Johne's disease which is a severe debilitating and chronic contagious infection with the acid-fast-staining bacillus Mycobacterium Paratuberculosis in sheep. It is a major disease of cattle, sheep, goats, deer and camels (3). A mild small intestinal villous atrophy without involvement of submucosal and serosal areas of the small intestine in the infected sheep with Paratuberculosis has been reported by (4).In a study done by (5) included investigating goat Paratuberculosis the results revealed a marked emaciation at necropsy. A mild distension of lymphatic vessels on the serosal surface of the jejunum was reported. A mild thickness and corrugation were recorded on the duodenum mucosal surface. Mild thickening in the ileum has been seen. It has also been reported that there were different lesions in the small intestine of the infected animals which include diffuse inflammatory infiltrate, mainly lymphocytes, present in the lamina propria of the ileum, thickening of the villous tips and dilatation of lymphatic vessels. Tuberculosis which is caused by the bacterium mycobacterium tuberculosis is the main causing disease state of emaciation which has been reported as an apparent clinical sign in wild ruminants. It is a primary human pathogen but may infect domestic or wildlife species that are in close or prolonged contact with humans. Most commonly reported lesions in the liver of affected animals included a focal area of capsular fibroplasia and mature fibrosis while in the lung numerous multifocal to confluent necrogranulomas visible throughout the lung parenchyma were seen and in the small intestine a scanty to low numbers of multifocal nests of macrophages in the lamina propria of the mucosa has been reported (6, 7).Lumpy skin disease in cattle has been reported as a disease state causing mostly cachexia and emaciation of infected animals and were prominent and lasted for 2 months (8).In more clear-cut cases of paratuberculosis which is a debilitating disease causing emaciation and

cachexia, small intestinal villi are moderately to markedly atrophic, and macrophages are focally or diffusely distributed, in the villi, or deeper in the lamina propria, as part of an increased chronic inflammatory cell infiltrate. Maedi and/or bacterial pneumonia are often present in sheep with (OPA) Ovine pulmonary adenocarcinoma, and the diffuse lymphocytic interstitial pneumonia or cranioventral suppurative bronchopneumonia induced by these diseases may complicate the gross and histologic appearance of the tumors and mostly these diseases are causing cachexia (9).Typical clinical sign called (bottle jaw) has been reported to occur as a result to chronic fasciolosis which is accompanied by emaciation, a progressive loss of condition, and oedemas in some parts of the body, especially the abdomen and submandibular region (10). Little information had been provided for evaluated and study emaciation lead to cachexia in sheep of Amarah province south of Iraq for evaluating clinical study and histopathological findings and their relationship with emaciation and cachexia.

MATERIALS AND METHODS

Locations and Animals Study

The study was performed in Amara city south of Iraq in which a local animal's market is available**.** Twenty local breed ewes (a prostrate and weakened adult Awassi ewes) were purchased from local market and were selected according to their body condition status and other signs of emaciation and weakness.

Laboratory Analysis

Tissue samples were collected from all animals from lungs, liver, and small intestine (multiple pieces of different sites). The excess fat and associated organs were trimmed off, and the intestinal contents were flushed out for examination of intestinal mucosa. The samples were then preserved in 10% neutral buffered formalin, dehydrated through graded ethanols and embedded in paraffin blocks. Sections of 5 µm in thickness were cut and routinely stained with hematoxylin and eosin (11).

Statistical Analysis

The analysis of data was performed through the application of description statistic (percentage) and inferential statistical (spearman correlation coefficient) to present correlation between two variables (12).

RESULTS

Clinical Signs

Most important evidence in a possible relationship between the clear cachexia and emaciation together with other clinical signs such as nasal discharge, diarrhea, lachrymation, and loss of wool which were clear in all animals of the study with the histopathological findings necessitate that those animals haven't been in a physiological condition but a pathological one. None of the ewes in this study were pregnant this was clear when slaughtered and had no lambs when purchased.

Histopathological Changes

Results have been reported according to type of the tissue and histopathological findings since thickening of alveolar septa with interstitial hemorrhage had been detectedn in lung Figure (1), Moreover Hyperplasia of bronchial epithelium were also noted Figure (2) , Furthermore , Moderate villous atrophy with Mucosal denudation were also encountered in intestinal tissue Fgure (3), However complete atrophy of villi, Mild Mucosal inflammation Figure (4), infiltration of inflammatory cells, lymphocytes, plasma cells were also detected Figure (5), in addition mild bridging fibrosis in the centrilobular area seen in hepatic tissue Figure (6).

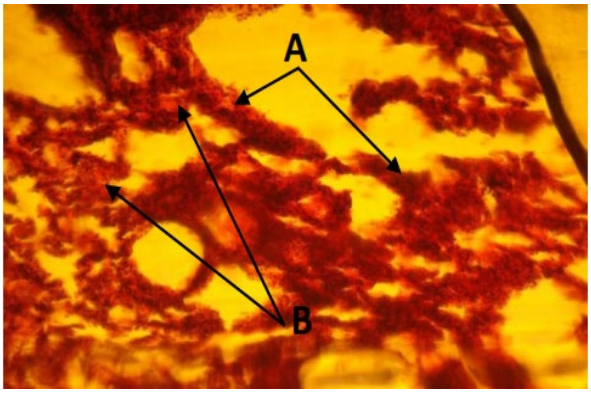

Figure (1): section of lung shows A) thickening of the alveolar septa B) interstitial hemorrhage H&E 125X.

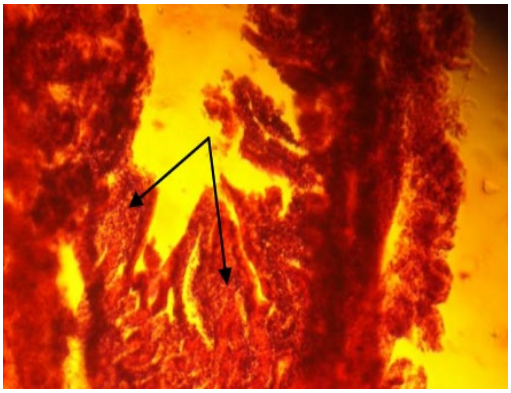

Figure (2): section of lung shows hyperplasia of bronchial epithelium H&E 125X.

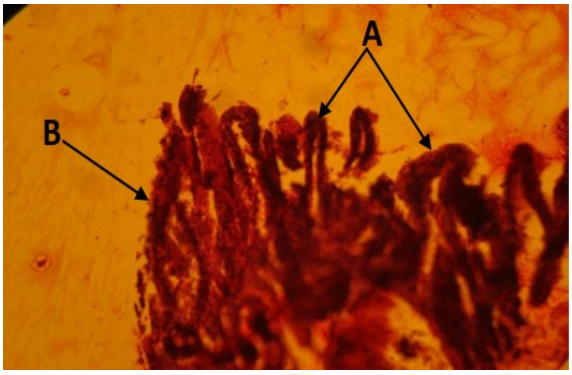

Figure (3): section of intestine shows A) moderate villus atrophy B) mucosal denudation H&E 125X**.**

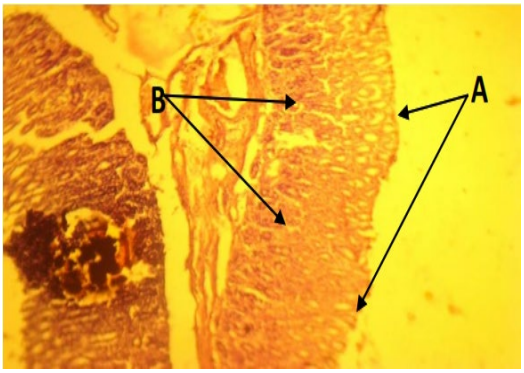

Figure (4): section of intestine shows A) complete atrophy of the villi B) mild mucosal inflammation H&E 50X

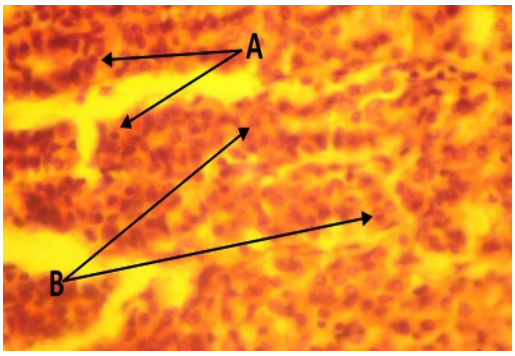

Figure (5): section of intestine shows infiltration of chronic inflammatory cells A) lymphocytes B) plasma cell H&E 500X.

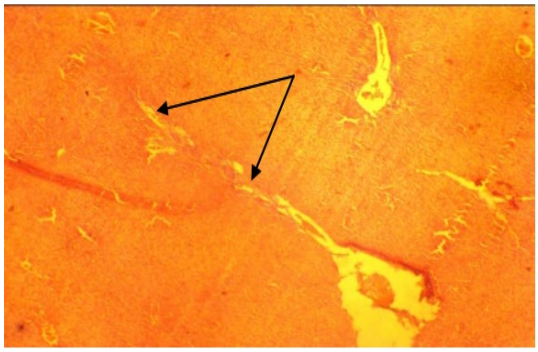

Figure (6): section of liver shows mild bridging fibrosis in the centrilobular area H&E 50X..

Statistical Interpretation of the Results

Table (1) shows that higher percentage of tissue damage in all animals of the study appeared in liver lesions (75%) and the lower one appeared with intestine lesions (70 %) while the lowest appeared with lung lesions (65 %). Table (2) shows that higher percentage of tissue damage within the same animal appeared in liver and lung lesions together (60%) and the lowest one appeared with liver, lung and intestine lesions together (50%). Table (3) shows that there was a significant difference between liver and lung lesions occurrence ($p \leq 0.05$) as well as between liver and intestine lesions occurrence in all animals of the study ($p \leq 0.05$). Frequency in table (1) and table (2) refers to the number of affected animals out of the total number of animals of the study with each tissue as illustrated.

Table (1): Distribution of tissues damage in all animals of the study

Tissues Damage	Frequency	Percentage
Liver lesion occurrence	15	75 %
Intestine lesion occurrence	14	70 %
Lung lesion occurrence	13	65 %

Table (2): Distribution of tissues damage within the same animal

Occurrence in Tissues	Frequency	Percentage
Liver and lung lesions occurrence	12	60 %
Liver and intestine lesions occurrence	11	55 %
Lung and intestine lesions occurrence	11	55 %
Liver, lung and intestine lesions occurrence	10	50 %

Table (3) shows the association between occurrences of tissue lesions in all animals of the study

Variables		Lung	Intestine
Liver	Correlation Coefficient	0.545*	0.578*
	Sig. (P~ value)	0.013	0.023
Lung	Correlation Coefficient		0.485*
	Sig. (P~ value)		0.048

DISCUSION

Results of current study showed that all animals have had a clear and prominent histopathological changes ranging from mild bridging fibrosis in the centrilobular area in their livers to complete atrophy of the villi and mild mucosal inflammation in their intestines and hyperplasia of bronchial epithelium with thickening of the alveolar septa and interstitial hemorrhage in their lungs and all these changes were in a strong relation to animals' outstanding appearance of cachexia and emaciation.These results were in agreement with others (4) who mentioned that there were a clear histopathological changes in different tissues and organs of sheep suffering from paratuberculosis which is a debilitating disease of its dramatic effects is cachexia and emaciation with histopathological changes in the gastrointestinal tract of affected animals.In a study made by (13) a number of goats suffered from caprine paratuberculosis showed at necropsy a

marked emaciation with histopathological changes in different areas in the small intestine, mild to moderate infiltration with inflammatory cells have been detected in the lamina propria of the middle and final portions of the jejunum and ileum.

The inflammatory cells were mainly lymphocytes and this result was consistent with the result of this study in which there were an inflammatory cell mainly lymphocytes in the layers of the small intestine. It was mentioned by (15) that the lungs of springbok showed numerous multifocal to confluent necrogranulomas throughout the parenchyma. The necrogranulomas consisted of a central area of caseous necrosis that was often moderately calcified, surrounded by large numbers of macrophages and epithelioid cells, in a few necrogranulomas there was infiltration of moderate numbers of neutrophils into the necrotic centre with occasional pus formation.

The surrounding bronchioles were plugged with necrotic cellular debris consisting of neutrophils, macrophages and respiratory epithelial cells; similar result has been reported in this study in which an inflammatory changes occurred in the lungs of the tested animals.Results of this study showed mild bridging fibrosis in the centrilobular area in the liver which were in agreement with result found by (14) who reported that there was a pyogenic inflammation in the liver of sheep suffering from caseous lymphadenitis which a disease of sheep and goats causing emaciation and cachexia and is often referred to as “thin ewe syndrome.Many researchers attributed the cachexia and emaciation to the heavy infestation of animals like sheep and goats with liver fluke which caused massive damage to the livers of infected animals and concurrently emaciation and cachexia. It has been found by (15) that infected sheep with liver fluke showed changes in the livers including fibroplasias and cellular infiltration of Glisson’s capsule, accompanied by granulomas in the parenchyma beneath the partial surface, similar results found in this study regarding the liver histopathology.

التغيرات النسجية في النعاج التي تعاني من الدنف والنحول نتيجة لبعض الاسباب

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الخلاصة

تم اجراء هذه الدراسة لغرض تسجيل التغيرات النسجية في الانسجة الماخوذة من النعاج التي تعاني من الدنف والنحول مع الاشارة الى الى بعض الامراض المسببة لهاتين الحالتين. اذ تم دراسة الحالات السريرية للنعاج المصابة بالنحول المؤدي الى الدنف والتي تعد من الحالات المهلكة والمسببة للخسائر الاقتصادية في هذه الحيوانات. اذ تضمنت الدراسة جمع عينات وفحص نسجي مرضي لعشرين نعجة تم شرائها من سوق الحيوانات في مدينة العمارة جنوب العراق. مثلت العينات النسجية قطع من الكبد , الرئة والامعاء اذ تم اجراء الفحص النسجي لها. اظهرت النتائج ملاحظة تغيرات في كل الانسجة الماخوذة من كل الحيوانات في الدراسة والتي تراوحت بين تزايد سمك الحاجز السنخي مع نزف نسجي وفرط التنسج للنسيج الطلائي للقصيبات في الرئة اما في الامعاء الدقيقة فقد لوحظ وجود ضمور كامل في الزغيبات , انسلاخ والتهاب في الطبقة المخاطية مع وجود تجسر ليفي بين الحواجز الفصية للكبد. كانت النسب المئوية للتغيرات النسجية كالتالي:في الكبد كانت نسبة الحدوث 75% في الامعاء 70% وفي الرئة 65% في كل حيوانات الدراسة. اما ضمن نفس الحيوان كانت نسب حدوث التغيرات النسجية كالتالي:الكبد والرئة كانت نسبة الحدوث 60% في الكبد والامعاء 55% وفي الكبد الامعاء والرئة 50%.

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