Journal of Reproduction and Infertility 3 (3): 67-76, 2012
ISSN 2079-2166

DOI: 10.5829/idosi.jri.2012.3.3.7110

Clinico-histopathological Studies on the Correlation Between Some Parasitic Infestation on Liver and Ovarian Efficiency in Small Ruminants

Hanaa A. El-Hallawany and M.Z. Abdel-Aziz

Pathology Department, Animal Reproduction Research Institute (A.R.R.I.), Giza, Egypt

Abstract: Seventy-five liver samples of (55 adult sheep and 20 adult goats) were collected from abattoirs at Giza governorate Egypt during the period from September 2011-May 2012. Liver samples were visually examined for some parasitic infestation as well as pathological changes. From each animal, liver, heart muscle, ovary, uterus and serum samples were taken. 26.7% of them showed parasitic infestation. With a rate, 11.8% *fasciolasis* (4 sheep, 5 goat), as well as 10.6 % *C.tenuicollis* (5 sheep, 3 goat). Histopathologically, liver tissues with fascioliasis showed 2.6 % acute hepatitis, 9% chronic catarrhal cholangio-hepatitis with hyperplasic biliary epithelium including granulome formation in 4 % of them. Biliary epithelium was greatly hyperplastic forming papillomatous projections with goblet cell hyperplasia. While liver Sections infested with *C. tenuicollis* revealed presence of 2.6% acute hepatitis with cyst formation, 8% chronic cholangio-hepatitis. Out of 21(26.7%) parasitically infested animals, 17(22.6%) Ovaries and their uteri showed morphological and patholological changes, including smooth inactive ovaries with atrophied uterine mucosa at five animals, as well as cystic ovaries with cystic endometritis at twelve animals. Concerning with species smooth inactive and cystic ovaries were noticed in eight (40%) of twenty goats and nine (16.3%) of 55 sheep. With Parasitized animals revealed higher values (P?<?0.05) for AST, ALP, GGT and ALT activity as well as cholesterol when compared to control non infested animals. While showed a significant decrease inserum glucose level and total protiens.The present study concluded that a tight relationship is existed between hepatic and ovarian efficiency. Also the parasitic infestations in small ruminants. *C. tenuicollis* may be affected on the animals fertility as fascioliasis as its damage effect on liver.

Key words: Fasciolasis % *C. tenuicollis* % Histopathology % Serum Biochemistry % Cystic Ovary % Endometritis

INTRODUCTION

Reproductive disorders and parasitic infestation are the main problems that affecting productivity and cause great economic losses in farm animals [1,2]. Parasitic liver affections in meat-producing animals are one of major factors that reduce our national income and cause economic losses, either directly through condemnation of the pathologically affected livers, or indirectly by their effect on the animal growth and so its meat production, [3,4]. From those parasitic liver affections, fascioliasis and cysticercosis which recently have been shown to be with widespread zoonosis throughout the world [5, 6]. Fascioliasis is an important helminthes disease caused by two trematodes, *Fasciola hepatica* (the common liver fluke) and *Fasciola gigantica*. The infective metacercariae usually migrate the liver capsule and hepatic tissue this migration usually cause direct trauma with hemorrhages, necrosis and subsequent granulation tissue end by liver cirrhosis [7]. Cestodes of the family *Taeniidae* that infect the dog (definitive host) and transmitting to a range of intermediate host species where they cause cysticercosis [8]. *Cysticercus tenuicollis (C. tenuicollis)* is the larval stage of the canine tape warm Tania hydatigena. The cysticercoids are developed as fluid-filled cysts and commonly found attached to the omentum, mesentery, liver and peritoneum. Massive invasion and migration of the cysticercoids through the liver tissue and encysts on the peritoneal membranes of ruminants, results in acute severe traumatic hepatitis with hemorrhagic and fibrotic tracts known as hepatitis cysticercosis [6,9, 10]. Ahmed *et al.* [11], Simsek *et al.* [12] and Khadrawy *et al*. [1] were studied the relationship between ovarian activity and Fascioliasis in farm animals.

Corresponding Author: Hanaa A. El-Hallawany, Pathology Department,
Animal Reproduction Research Institute (A.R.R.I.), Giza, Egypt.

They found a tight relationship between Fascioliasis in buffalo-cows and cessation of ovarian activity or repeat breeding. In the same time, Lopez *et al*. [13] were suggested that liver flukes somehow alter normal metabolism and balance of sex hormones in infected heifers.

Serum biochemistry of infected animals is very sensitive indicators for the degree of hepatic damage and the parasitic infestation severity, in which liver damage upsets the vital metabolic processes for normal health and optimum productivity of the animal [14].

The purpose of this study was to overview the Correlation between liver histopathology due to some parasitic infestation and its effect on hepatic and ovarian efficiency in small ruminants.

MATERIALS AND METHODS

Collection of Samples: Seventy-five liver samples (55 adult sheep and 20 adult goats) were collected randomly among liver samples of slaughtered sheep and goat in two slaughterhouses (El-Warrak and El-Monib abattoirs) at Giza governorate, Egypt during the period extended from September 2011-May 2012.in addition to, serum of twenty(20) noninfested animals taken as control for hepatic enzyme activities and Biochemical variables. From each animal samples included (liver, heart muscle, ovary, uteri and serum) were be collected.

Tissue Preparation for Histopathological Examination: Specimens from collected liver, heart muscle, ovary and uteri were immediately taken from the slaughter does and ewes and immersed in 10 % formalin. The fixed specimens were trimmed, washed, dehydrated in ascending grades of alcohol, cleared in xylene and embedded in paraffin. The embedded samples were sectioned at 3-5 Fm thickness, stained with H and E stain and Masson trichrome stain as special stain to collagen fibrous tissue according to Bancroft *et al*.[15].

Serum Analysis

Blood Samples Collection: Whole blood samples were collected from slaughter sheep, goat and the control animals. Serum was obtained by centrifugation at 3000 rpm for 20 minutes and stored in 1 ml aliquots at-20°C according to Coles [16]. With conventional laboratory techniques, sera were analyzed for estimation of hepatic enzymes levels including serum activities of Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), Gama glutamyl transferase (GGT), Alkaline phosphatase (ALP), serum total protein, albumin, glucose and cholisterol using commercial test kits supplied by Spectrum Diagnostics (Cairo, Egypt) and by means of Digital VIS/Ultraviolet Spectrophotometer (Cecil instruments, Cambridge, England, Series No. 52.232).

Statistical Analysis: Statistical analysis was conducted using SPSS 16.0 for windows (SPSS, Chicago, USA) and was carried out using one-way ANOVA. Data were expressed as Mean ± SD. according to Petrie and Watson [17]

RESULTS AND DISCUSSION

Visual inspection, conventional histopathology, as well as serum levels of hepatic enzymes have assessed evaluation of hepatic damage in this study visual hepatic detection for some parasitic infestation:

In the present work, visual examination of 75 slaughtered small ruminants liver tissues revealed, the presence of 11.8% fasciolasis(4 sheep, 5 goat), as well as 10.6 % *C.tenuicollis* (5 sheep, 3 goat) as single infection as shown in table (1). This rate, more than that recorded by Mohsen *et al.* [18]. who recovered 6.28% *Fasciola* infestation and 6.86%. *C.tenuicollis* in slaughtered goats at Egypt, However, less than that recorded by Fathi and Abdel Haseeb [19] and Ahmedullah *et al*. [20], who are recoded *Fasciola* in 19% and 22.5% in goats and buffaloes at Egypt and brazil respectively. While nearly approach to that recorded by Radfar *et al.* [21]. Who recovered 12.87% of sheep infested with *C.tenuicollis* in Iran. In addition, less than that recorded by Nimbalkar *et al*. [22] who recorded 18.75 %, 15.17% in goats and sheep were infested with *C.tenuicollis* respectively in India. High incidence of fascioliasis among the totally parasitic infested goat may be referred to the grazing behaviors of animals [23].

Histopathological Examination

1iver

Fasciola Infestation: Histopathological examination in the present work revealed two types of hepatitis as shown in table (2)

Acute Hepatitis: Represented in 2 Cases (2.6 %): Grossly, affected liver was enlarged with thick capsule. Hemorrhagic patches and white necrotic foci of abcessiation. On cut section numerous yellowish-white migratory tracks and the markedly dilated, thickened wall bile ducts were noticed as well as different sizes of. liver flukes can be seen.

Table 1: Incidence of some parasitic infestations in visually examined small ruminants liver samples:

	Fasciola spp.		*C.tenuicollis*	
Animal	NO	%	NO	%
Sheep	4	5.3	5	6.6
Goat	5	6.6	3	4
Total (n=75)	9	11.8	8	10.6

Incidence of some parasitic infestations in visually examined small ruminants (n=75) liver samples

Table 2: hepatic lesions due to fascioliasis in small ruminants:

Animal	Acute hepatitis with abscesses	Chronic catarrhal cholangio-hepatitis with hyperplasic biliary epithelium
Sheep	2	2
Goat	0	5
Total (n=75)	2	7
(%)	2.6	9

hepatic lesions due to fascioliasis in small ruminants(n=75) liver samples*

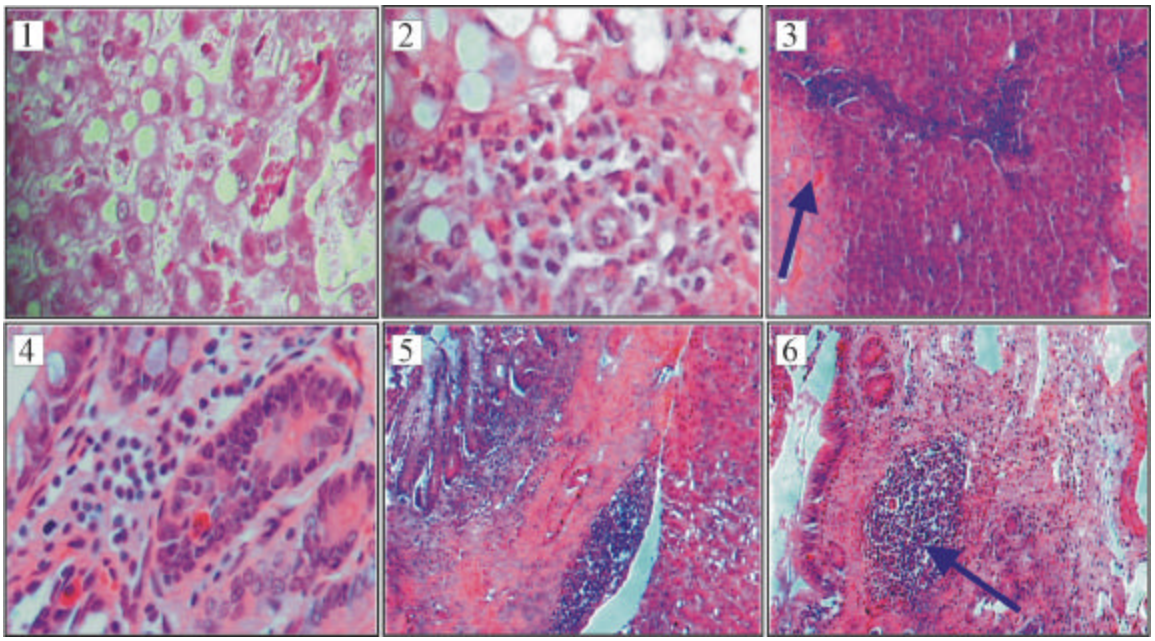

Fig. 1: Liver of small ruminants showing hepatocytes ballooning degeneration and necrosis with dilated hepatic sinusoids. (H and E X 40).

Fig. 2: Liver of small ruminants showing hepatocytes ballooning degeneration with periportal vein cellular infiltration, mainly eosinophiles, macrophages and lymphocyte (H and E X 40).

Fig. 3 Liver of small ruminants showing, parenchymal destruction and cirrhosis with mononuclear cellular infiltrations (H and E X 10)

Fig. 4: Liver of small ruminants showing, hyperplasic bile glandular epithelium with goblet cell hyperplasia and mononeuclear cellular infiltrations (H and E X 40).

Fig. 5: Liver of small ruminants showing, papillomatous projections of newly formed bile ductules surrounded by thick fibrous tissue, focal and diffuse cellular infiltrations mainly lymphocytes, histocytes and eosinophiles (H and E X 10).

Fig. 6: Liver of small ruminants showing, desquamated bile epithelium, associated with beneath granulome formation (blue arrow) and diffuse cellular infiltration, mainly eosinophiles, lymphocytes, macrophages and plasma cells, (H and E X 10).

Microscopically, hepatic cords were disorganized, swollen hepatocytes with acidophilic cytoplasm and pyknotic nuclei while other hepatocytes showed coagulative necrosis, as well as dilated hepatic sinusoids that engorged with blood (Fig. 1). Also haemorrhagic migratory tracts were noticed within the necrotic hepatic cords. portal veins were surrounded with cellular infiltration mainly eosinophiles; macrophages and lymphocyte with kupffer cells activation, in addition to hepatocytic ballooning degeneration, (Fig. 2).Bile duct in some parts showed periductal cellular infiltrations, mainly neutrophiles, lymphocyte and eosinophiles.

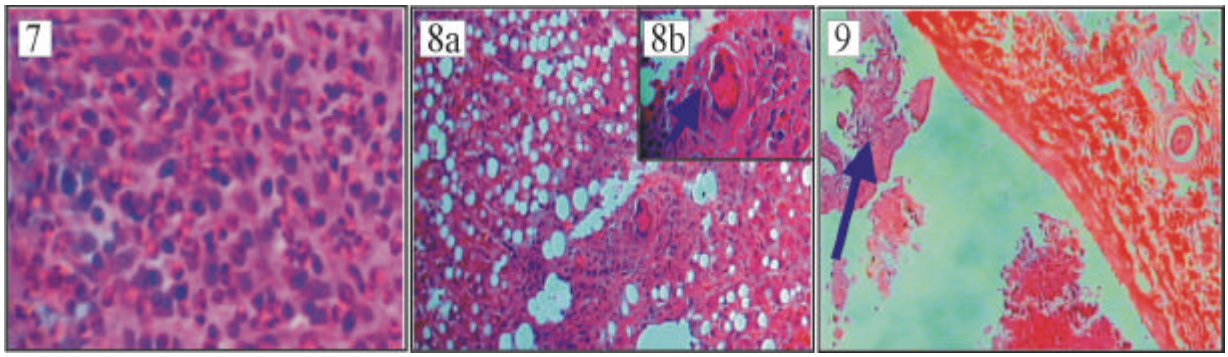

Fig. 7: High power of the previous figure demonstrate the inflammatory cells forming granulome mainly, eosinophiles, lymphocytes, macrophages and plasma cells, (H and E X 40).

Fig. 8a: Liver parenchyma showing fatty necrosis accompanied with cellular infiltration, mainly easinophilis, macrophages, lymphocyte and multinucleated giant cell formation (H and E X 10).

Fig. 8b: multinucleated giant cell formation (blue arrow) (H and E X 40)

Fig. 9: liver of small ruminants showing several hemorrhagic migratory tract some of them containing sections of the parasites (blue arrow) with hepatocytic necrosis, periductal fibrosis and cellular infiltrations(H and E X 10).

Chronic Catarrhal Cholangio-Hepatitis with Hyperplasic Biliary Epithelium Represented in 7 Cases (9%), Three of Them Showed Granulomatous Reaction: Gross appearance of the affected lobe was hard, pale, reduced in size with thickened capsule and in three cases (4%) of the seven cases, there were circum scribed small granulomes with patchy cirrhosis. On cut section, few flukes appeared within the thickened dilated bile ducts.

Microscopically, it characterized by hepatic parenchymal destruction with increased fibrous connective tissues proliferation resulting in hepatic cirrhosis as well as mononuclear cellular infiltrations (Fig. 3). Bile ducts glandular epithelium showed hyperplasic papillomatous projections thrown into the lumen forming newly bile ductules with goblet cell hyperplasia and mononuclear cellular infiltrations. Both bile ducts and newly formed bile ductules surrounded by thick fibrous tissue, associated with focal and diffuse cellular infiltrations mainly lymphocytes, histocytes and eosinophiles (Fig. 4 and 5). In three cases of the seven, necrosis and desquamation of bile duct epithelial lining associated with eosinophilic granulome formation beneath it were noticed. This granulome characterized by central necrosis with cellular infiltration, mainly lymphocytes, macrophages, plasma cells, eosinophiles (Fig.6 and 7). In some cases it accompanied by multinucleated giant cell formation (Fig. 8a and b). Proliferation of fibroblasts that replacing the hepatic parenchyma and parts of mature fluke could be seen within the migratory tracts (Fig. 9). Collagen stained blue with Masson trichrome stain in hepatic fibrous septa and periductal fibrosis.

The gross and histopathological alterations of both types observed in this study are agreement with those described by Ghazani *et al.* [24], Zafra *et al.* [25], Sohair Badr and Eman Nasr [8] and Sanaa El-Shamy and Mariem bekhit [26]in sheep, goat and cattle. Those alterations were attributed by Gajewska *et al.* [27], Ruoss *et al.* [28], Mbaya1 *et al*. [29] as host tissue response against parasitic infestation and continuous mechanical irritation by the migrating fluke. As they, cause extensive parenchymal destruction accompanied with intensive haemorrhagic lesions and immunological reactions through the mechanical invasion. On the other hand, it chemically digest hepatic tissue by enzymes and toxins that produced by the fluke as proteases, which can be responsible for negative effect on liver parenchyma and biliary epithelium. Granulomes observed in this work illustrated by Kaya *et al.* [30] and Mendes *et al*. [31] as host immune response that resulted in Fasciola eggs or dead larvae trapped in the liver parenchyma that causing granulomatous reaction.

Cysticercus Tenuicollis (C. Tenuicollis): In the present study two types of hepatitis were distinct histopathologically in hepatic tissue infested with *C. Tenuicollis* as shown in table (3)

Acute hepatitis with cyst formation: was found in two cases (2.6%) of *C. tenuicollis* infested ruminant's livers, Grossly, multiple cysts attached to the omentum, liver and peritoneum., associated with numerous tortuous burrowing migratory tracts of *C. tenuicollis* larvae were seen on liver surface (Fig. 10).

Table 3: Histopathological hepatic lesions in examined small ruminant's liver infested with *C. Tenuicollis*

Animal	Acute hepatitis with cyst formation	Chronic Parasitic cholangio hepatitis
sheep	1	4
goat	1	2
Total	2	6
(%)	2.6	8

*hepatic lesions due to *C. Tenuicollis* in small ruminants(n=75) liver samples*

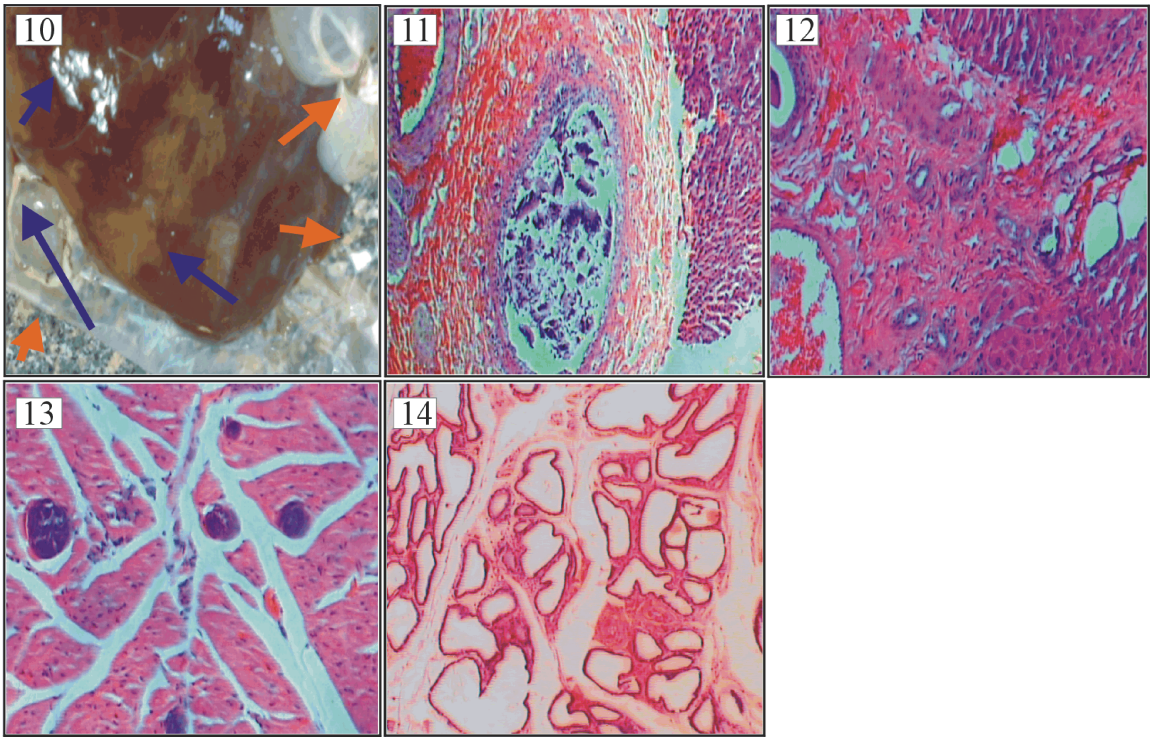

Fig. 10: liver of small ruminants showing multiple *C. tenuicollis* cyst (red arrow) associated with hepatic cellular necrosis and fibrosis around it (blue arrow).

Fig. 11: liver of small ruminants showing *C. tenuicollis* cyst associated with hepatic cellular necrosis, fibrosis and cellular infiltration zone around it (H and E X 4)

Fig. 12: liver of small ruminants showing several hemorrhagic migratory tracts with hepatocytic necrosis, fibrosis and cellular infiltrations (H and E X 10)

Fig. 13: Cardiac muscle showing the multiple C. *tenuicollis* cysts surrounded with mononuclear inflammatory cellular infiltrations and eosinophiles and the cardiac muscle showing degeneration and edema (H and E X 10)liver of small ruminants showing several hemorrhagic migratory tracts with hepatocytic necrosis, fibrosis and cellular infiltrations (H and E X 10)

Fig. 14: Uterus of small ruminants showing gland cystic dilatation (H and E X 4)

Microscopic examination revealed that one or more hepatic cysts of *C. tenuicollis* larvae, that surrounded by a thick inflammatory demarcation zone. This zone formed mainly of Kupffer cells, scanty lymphocytes and fibroblasts(Fig. 11). Hepatic cords showed disrupted with hepatocellular degeneration and necrosis especially around cysts. Hepatic veins and sinusoids were dilated engorged with blood. The migratory tracts were noticed, that filled with. serofibrinous exudates and sections of *C. tenuicollis* larvae as well as cellular inflammatory infiltrations, mainly neutrophiles, eosinophiles, macrophages and few lymphocytes, plasma cells (Fig. 12).

Chronic Cholangiohepatitis: In this work, this type was noticed in 6 cases (8%) of examined small ruminants livers.

Grossly, multiple calcified cysts attached to pale hard liver with thickened capsule and fibrosed tortuous burrowing migratory tracts of *C. tenuicollis* larvae.

Microscopically, dilated hepatic veins surrounded with fibrosed migratory tracts and others contain *C. tenuicollis* larvae. Hepatocytes adjacent to those tracts appeared necrosed with patches of cirrhosis, as well as mononuclear cellular infiltrations mainly lymphocytes and macrophages. Collagen stained blue in periductal fibrosis areas with trichrome Masson stain.

Similar gross and microscopic findings were described in sheep and goat by Mohsen *et al*. [18], Senlik, [4], Nath *et al*. [32], Al-Jashamy [33], Nourani, *et al* [12] and Mellau *et al*.[5],who are referred those changes as a response to the cysticerci migration in liver parenchyma.

Cardiac Muscle: Gross, one or more whitish nodules or foci scattered on cardiac muscle. The cardiac muscle in some cases showed congestion or pale streaks Microscopically, Cardiac muscle showed degeneration, focal necrosis and infiltration of mixed inflammatory cells, including lymphocytes, plasma cells and macrophages were associated with the presence of *C. tenuicollis* cyst (Fig. 13)

Morphological and Histopathological Changes in Ovaries and Their Uteri: In this work, as showed in (table 4), out of 21 (26.7%) parasitically infested animals, 17 (22.6%) ovaries showed morphological and patholological changes. The latter included five (2 sheep and 3 goat) showed smooth inactive ovaries and twelve (7sheep and 5 goat) showed cystic ovaries. Concerning with species smooth inactive and cystic ovaries were noticed in eight (40%) of twenty goats and nine (16.3%) of 55 sheep from examined animal ovaries.

In this work the animals that showed bilateral smooth inactive ovaries were, emaciated exhibiting signs of ill-health associated with helminthiasis and with small size genital organs. Their uteri were atrophic with atrophic mucosa. As well as ovaries lack mature follicles and corpora lutea or its degenerative derivatives.

Noticed ovarian inactivity in which, affected is explained by Arthur *et al*., [34], Morrow, [35] and Tanaka *et al*. [36] as Parasitism induces nutritional deficiencies which result in body weight loss. Also as consequence to folliculogenesis failure due to absence or suboptimal release of gonadotrophins resulted in ovarian reduced production of ovarian steroids. Lack of cyclicity is associated with malnutrition and chronic debilitating diseases.

Table 4: Morphological and histopathological changes in examined small ruminant's ovaries that showed parasitic infestation

Animal (n =75)	Smooth inactive ovaries with atrophied uterine mucosa	Cystic ovaries with cystic endometrial gland
Sheep (n =55)	2	7
Goat (n =20)	3	5
Total	5	12
(%)	6.6	16

In the present study, animals that showed Cystic ovaries characterized, by unilateral or bilateral cyst filled with yellowish to milky white exudates. In cross section, follicles appeared with thin walls.

Micrscopically, Cystic follicles wall noticed formed of degenerative granulosa cells and a partially luteinised theca cell layer. While uteri of those animals showed cystic glandular dilatation (Fig. 14). Cystic ovarian disease is attributed by Arthur *et al*. [34], Smith, [37], Jones *et al*., [38], Tanaka *et al*. [39]as resulted of, insufficient or mistiming of the luitenising hormone release as a main cause. This condition has been reported among dairy goats that graze on estrogenic pastures, as well as that showed heredity and phosphorous deficiency. While follicular cysts development were associated with progesterone and oestradiol treatment among goats. Those ovarian alterations (smooth inactive or cystic ovaries) were discussed by Kaplan, [40], as liver flukes reduce animal fertility due to their effect on hormonal balance that alter the normal metabolism of sex hormones.

Hepatic Efficiency: In the present work, The degree of hepatic dysfunction was assessed basing on measuring serum hepatic enzyme activities and Biochemical variables in, parasitically infested animals that showed ovarian pathology (n=17) comparing with control non infested sheep and goat as (n=20). Parasitized animals revealed higher values (P?<?0.05) for AST, ALP, GGT and ALT activity as well as cholesterol when compared to control non infested animals. While showed a significant decrease inserum glucose level and total protiens as shown in table (5).

Group I (A): Control non infested sheep, n =10
GroupI (B): Control non infested goat, n =10
Group II: Animals with Smooth inactive ovaries, n =5
Group III: Animals with Cystic ovaries, n=12

Table 5: Hepatic enzyme activities and Biochemical variables (Mean ± S.E) in examined small ruminant's serum that showed parasitic infestation and ovarian pathology

Parameter	AST (IU/ L)	ALT (IU/ L)	ALP (IU/ L)	GGT (IU/ L)	Glucose (mg/ dl)	Total protein (g/ dl)	Albumin (g/ dl)	Globulin (g/ d)	Cholesterol (mg/ dl)
Group I (A)	46.40 ±2.98	34.25± 2.52	61.45± 3..82	33.92± 3.19	84.72± 3.26	7.18± 0.14	4.54± 0.24	2.64± 0.19	63.46± 3.48
Group I (B)	32.29 ±4.57	26.40 ±2.53	56.42 ±2.68	33.62 ±2.98	31.62 ±10.98	6.61± 0.75	2.87± 0.30	3.37± 0.59	63.46± 3.48
Group II	86.45± 3.22**	43.86± 5.42*	89.87± 4.16**	49.61± 2.97*	67.64± 4.14**	6.08± 0.36*	2.84± 0.10**	3.24± 0.12	90.64± 4.53**
Group III	65.33 ±2.50*	38.75± 1.98*	72.33± 4..36*	56.68± 2.93**	73.76± 3.48	6.43± 0.16	3.77± 0.15	2.66± 0.09	71.00± 2.84

(Mean ± S.E) *Significant at P< 0.05, ** High Significant at P< 0.01

Our result showed that, the activities of AST, ALT, ALP and, GGT in the serum of animals that showed parasitic infestation and ovarian pathology, a noticed significally increases in animals of Group II(that showed smooth in active ovaries) as following, 86.45±3.22**, 43.86± 5.42*, 89.87± 4.16** and49.61± 2.97* U/L respectively While in in animals of Group III (that showed cystic ovaries) showed anon significant decrease comparing to animals of Group I A and B (control non infested) as following 65.33 ±2.50* 38.75± 1.98*, 72.33± 4..36* and56.68± 2.93** U/L. respectively. Aspartate transaminase (AST) is a cytoplasmic and mitochomdrial enzyme that catalyses the transamination of L-aspartate to oxaloacetate and glutamate and AST activity is found in almost all cells. Alanine Transaminase (ALT) is a cytoplasmic enzyme that catalyzes the reversible transamination of L-alanine and 2-oxoglutarate to pyruvate and glutamate[41]. Similar result recorded by Ellah *et al*. [42] and Nazifi *et al.* [6] in sheep and goat. Those results attributed to liver damage and cirrhosis at chronic hepatitis with liver trauma from parasitic infestation.

Also in this study the concentration of glucose in infested animals with ovarin pathology were 67.64± 4.14** and73.76± 3.48 mmol/L. respectively. Obtained values of serum glucose level revealed a significant decrease in animals of Group II and non significant decrease in animals of Group III comparing to animals of Group I A and B, this observed result may be attributed to the depression of glucogenisis pathways as aresult of liver damage and / or to the glucuse consumption by the parasite [42, 6].

The concentration of total protein in the serum of animals of Group II and III was 6.08± 0.36* and6.43± 0.16 g/L. this indicates significant hypoproteinaemia, hypoalbuminaemia and hyperglobulinaemia comparing to animals of Group I A and B. Simillar results were observed by Abd Ellah, [43] and Abd-El-Salam *et al.* [44] who attributed this hypoproteinaemia, to alteration in protein catabolism, decreased synthesis, or losses, which seen in chronic liver disease. Values of serum albumin were significantly decreased in both group II and III comparing to to animals of Group I A and B. This finding was supported by histopathological examination, which revealed degenaration and necrosis of hepatocytes due to extensive fibrosis which replaced the hepatic paryncyma. As, the liver is the only site of albumin synthesis, so there is a direct relation between the decrease of albumin level and the degree of liver damage. Similar results obtained in Fasciola infestation in goat and sheep respectively by Mbwaye, [45]. and Ellah *et al*. [42].

The concentrations of cholesterol was 90.64± 4.53**and 71.00± 2.84mmol/L, respectively. This valuss indicating a high significant increase in animals of group II and with non significant change in animals of group III comparing to animals of group I A and B.. Simillar results recorded by Ellah *et al*. [42]. who reported a high significant increase in cholesterol level in sheep suffaring from hepatic damage. This finding discussed by Latimer *et al.* [46]., as Lipoproteins are synthesized in the liver; the presence of hepatic dysfunction may results in disturbance in their serum levels.

The Relation Between Liver Parasites, Hepatic and Ovarian Efficiency: In the current study, hepatic enzyme analysis for GGT and AST concentrations were significantly higher in infected especially in animals showed smooth inactive ovaries or cystic ovaries. This explained by Shaaban *et al.* [47],. López-Díaz *et al.* [15]. and Melissa Paczkowski [48]as metabolic clearance rate of cyclic hormones in the liver might be impaired due to liver damage and cirrhosis. More over Picardi *et al* [49], suggesting that chronic hepatitis and liver trauma from parasitic infection could damage the GH and GH-receptor interactions, resulting in increased circulatory concentrations of GH and decreased concentrations of IGF-1. In addition, Spicer *et al* [50] and Melissa Paczkowski [48] stated that Leptin is synthesized and secreted by adipose tissue and evidence indicates that it may play a role in the hypothalamo-pituitary-gonadal axis. If adipose tissue deposition is delayed by parasitic infections so, decreased body conditioning, as a common sign of parasitic infestation and delayed age of puberty due to depressed serum leptin concentration.

CONCLUSIONS

We conclude that:

- A tight relationship is existed between hepatic and ovarian efficiency and parasitic infestations in small ruminants.
- *C. tenuicollis* may be have the same effect on the animal fertility as fascioliasis as its damage effect on liver.

REFERENCES

1. El-Khadrawy, H.H., M.E. Faragalla, M.M. Abd El Aziz and W.M. Ahmed, 2008. Field Investigation on the Correlation Between Ovarian Activity and Fascioliosis in Buffalo-Cows. American-Eurasian Journal of Agriculture. and Environment. Science, 3(4): 539-546.
2. El-Moghazy, F.M., 2011. Effect of parasitic infestation on oxidant | antioxidant status in buffaloes. Middle East Journal of scientific research, 7(4): 585-593.
3. Radostits, O.M., C.C. Gay, K.W. Hinchcliff and P.D. Onstable, 2007. Veterinary Medicine. 10th Ed. Elsevier Saunders, London, pp: 389-390.
4. Senlik, B., 2008. Influence of host breed, sex and age on the prevalence and intensity of Cysticercus tenuicollis in sheep. Journal of Animal and Veterinary Advances, 7(5): 548-551.
5. Mellau, L.S.B., H.E. Nonga and E.D. Karimuribo, 2010. A slaughterhouse survey of liver lesions in slaughtered cattle, sheep and goats at Arusha, Tanzania. Research. Journal of Veterinary Science, 3: 179-188.
6. Nazifi, S., S. Ahmadnia, S. Bahrami, M. Moraveji, S.M. Razavi and M. Moazeni, 2011. Biochemical Characterization of Cysticercus Tenuicullis in Iranian Fat-tailed Sheep. Australian Journal of Basic and Applied Sciences, 5(3): 248-251.
7. Özer1, B.L., S. Ender, G. Yüksel, G. Gürden, Y. U™ur and B. Sedat, 2003. Endoscopic extraction of living fasciola hepatica: Case report and literature review Turkish Journal of Gastroenterol., 14(1): 74-77.
8. Thompson, R.C.A. and A.J. Lymbery, 1995. Echinococcus and hydatid disease, 1st Edition, Wallingford, CAB International.
9. Kara, M. and A. Doganay, 2005. Investigation of antigenic specificity against C. tenuicollis cyst fluid antigen in dogs experimentally infected with Taenia hydatigena. Turkish Journal of Veterinary and Animal Science, 29: 835-840.
10. Nourani, H., K.H. Pirali Kheirabadi, H. Rajabi and A. Banitalebi, Research Note, 2010. An unusual migration of Taenia hydatigena larvae in a lamb Tropical Biomedicine 27(3): 651-656
11. Ahmed W.A., G.M. Nabil, H.H. El-khadrawy, E.M. Hanafi and S.I. Abdel-Moez, 2006. Monitoring progesterone level and markers of oxidative stress in blood of buffalo-cows with impaired fertility. Egyptian Journal of Biophysics and Biomedical Engineering, 7: 71-83.
12. Simsek, S., A. Risvanli, A.E. Utuk, M. Yuksel, N. Saat and E. Koroglu, 2007. Evaluation of relationship between repeat breeding and Fasciola hepatica andhydatid cyst infections in cows in Elazig district of eastern Turkey. Research in Veterinary Science, 83: 102-104.
13. López-Díaz, M.C., M.C. Carro, C. Cadórniga, P. Díez-Baños and M. Mezo, 1998. Puberty and serum concentrations of ovarian steroids during prepuberal period in Friesian heifers artificially infected with Fasciola hepatica. Theriogenology, 50: 587-593.
14. Moreno, M., A.V. Jiménez-Luque, T. Moreno, E.S. Redondo, H.J. Martín de las Mulas and J. Pérez, 1999. Liver pathology and immune response in experimental Fasciola hepatica infections of goats Veterinary Parasitology, 82(1) 22 March, pp: 19-33.
15. Bancroft, J.D. and G. Marilyn, 2002. Theory and practice of histological techniques. 5th London Edinburgh New York Philadelphia St. Louis Sydney Toronto.
16. Coles, E.H., 1986. Veterinary Clinical Pathology. 4th Ed., Saunders Comp. Philadelphia, London, Toronto.
17. Petrie, A. and A. Watson, 1999. Statistical for Veterinary and Animal Science. Ltd,. K.A. Quetroz and F. Dangelis.
18. Mohsen, I. Arafa and Ibrahem A. Fouad, 2008. Studies On Some Internal Parasites Of Goats In Assiut Governorate Especially Which Affecting Liver Assiute University Bulletin Environment Research, 11(1), March.

19. Fathi, M.N. and S.N. Abdel Haseeb, 2006. Incidence and hazardous effect of some parasitic infestation of sheep and goats slaughtered at Al-Niqat Al Kams Province. 12 Sci. Cong. Faculty Veterinary Medicine Assiute University Egypt, pp: 199-215.
20. Radfar, M.H., S. Tajalli and M. Jalalzadeh, 2005. Prevalence and morphological characterization of Cysticercus tenuicollis (Taenia hydatigena cysticerci) from sheep and goats in Iran Veterinarski Arhiv, 75(6): 469-476.
21. Ahmedullah, F.M., M.M. Akbor, M.G. Haider, M.A. Hossain, H.N. Khan, M. Hossain and I.S. Shanta, 2007. Pathological Investigation Of Liver Of The Slaughtered Buffaloes In Barisal District. Bangladesh. Journal of Veterinary Medicine, 5(1 and 2): 81-85.
22. Nimbalker, P.K., A.A. Shinde, V.N. Kamtikar and S.P. Muley, 2011. Study on Taenia hydatigena in the slaughtered sheep (ovis bharal) and goats (capra hircus) in Maharashtra, India Global Veterinaria, 6(4): 47-377.
23. Gebely, M.A., 2004. Prevalence of some parasitic diseases in small ruminants in Siwa Oasis. M.V. Sc. Thesis, Faculty Veterinary Medicine Beni-Suef, Egypt.
24. Ghazani, M., H. Movassagh, R. Mohammad, O. Valilou, R. Ali, A. Ahmadzadeh, R. Karami and Z. Khadijeh, 2008. The Prevalence of Sheep Liver Trematodes in the Northwest Region of Iran Turkish Journal of Veterinary and Animal Science, 32(4): 305-307.
25. Zafra, R., L. Buffoni, A. Mart?´nez-Moreno, A. Pe´rez-E´ cija, F.J. Martinez-Moreno and J. Pe´rez, 2008. A Study of the Liver of Goats Immunized with a Synthetic Peptide of the Sm14 Antigen and Challenged with Fasciola hepatica Journal of Pe´rez Journal of Comparative Pathology, 139: 169-176.
26. Sanaa, A.H. El-Shamy and Mariem Bekhit, 2011. Pathological studies on the liver affections of cows and calves in slaughter houses in Alexandria governorate. Assiut. Veterinary Medicine Journal, pp: 57. 129 April.
27. Gajewska, A., K. Smaga-Koz»owska and M. Wiœniewski, 2005. Pathological changes of liver in infection of Fasciola hepatica: Wiad Parazytol., 51(2): 115-23.
28. Ruoss, C., Amanda Tadros, Tim O'Shea1, Jim McFarlane1 and Ghanim Almahbobi, 2009. Ovarian follicle development in Booroola sheep exhibiting impaired bone morphogenetic protein signalling pathway Reproduction, 138: 689-696.
29. Mbaya1, A.W., P. Shingu1 and J. Luka1, 2010. A Retrospective Study on the Prevalence of Fasciola Infection in Sheep and Goats at Slaughter and Associated Economic Losses from Condemnation of Infected Liver in Maiduguri Abattoir, Nigeria Nigerian Veterinary journal, 31(3): 224-228.
30. Kaya, G., E.O. Atesoglu and A. Akca, 2007. Fasciola hepatica egg-induced granuloma in bovine liver: a case report Medycyna Wet., 63(2).
31. Mendes, R.E., R. Zafra, A. Pérez-Écija, B. Leandro, M. ! lvaro, T. Miriam and M. José Pérez', 2010. Evaluation of local immune response to Fasciola hepatica experimental infection in the liver and hepatic lymph nodes of goats immunized with Sm14 vaccine antigen Inst. Oswaldo Cruz, 105(5) Rio de Janeiro Aug.
32. Nath, S., S. Pal, P. Sanyal, R. Ghosh and S. Mandal, 2010. Chemical and Biochemical characterization of Taenia hydatigena cysticerci in goats. Veterinary World, 3(7): 312-314.
33. Al-Jashamy, K., 2010. Scanning Electron Microscopy and Histological Morphology of Cysticercus fasciolaris, which induced Fibrosarcomas in Laboratory Rats Annals Of Microscopy Vol 10, May
34. Arthur, G., D. Noakes and H. Pearson, 1983. Veterinary Reproduction and Obstetrics (Theriogenology). 6th Ed; Balliere Tindal, 59: 444-456.
35. Morrow, D.A., 1986. Current Therapy in Veterinary Theriogenology: Diagnosis, Treatment and Prevention of Reproductive Diseases in Small and Large Animals. Philadelphia: W.B. Saunders Company, (2nd Edition), pp: 575-629.
36. Tanaka, T., Toshihiko Yamaguchi, Hideo Kamomae and Yoshihiro Kaneda, 2003. Nutritionally Induced Body Weight Loss and Ovarian Quiscence in Shiba Goats. Journal of Reproduction and Development, 49(1): 113-119.
37. Smith, C.M., 1986. Anoestrus, Pseudo pregnancy and Cystic Follicles. In: D.A. Morrow (2nd Ed). Current Therapy in Veterinary Theriogenology: Diagnosis, Treatment and Prevention of Reproductive Diseases in Small and Large Animals, W.B. Saunders Company (Philadelphia), pp: 585-586.

38. Jones, T.C., D.R. Hunt and W.N. King, (6th Ed), 1997. Veterinary Pathology. Baltimore, Maryland: Lippincoott Williams and Wilkins, pp: 1149-1221.
39. Tanaka, T., R. Sawai, R. Kumai, S. Kim, T. Kiroiwa and H. Kamomae, 2007. Does Exogenous Progesterone and Oestradiol treatment from the mid luteal phase induce Follicular Cysts in Goats. Journal of Animal Reproductive Science, 97(3-4): 257-264.
40. Kaplan, R.M. and D.V.M. PhD, 2001. Fasciola hepatica: A Review of the Economic Impact in Cattle and Considerations for Control Veterinary Therapeutics, 2: 1.
41. Burtis, C.A., E.R. Ashwood and D.E. Bruns, 2006. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 4th Edn., Elsevier Saunders, Philadelphia, pp: 755-888-2412.
42. Ellah, M.R.A., H.M. Ahmed, A.M. Mohamed, A.M. I.S.A. Eltayb, S.A.A. Ellah, A.A. Elfattah Rayan, R.M. Ahmed, N.Y. Nagieb and M.K. Luis, 2010. Effect of hepatic dysfunction on serum lipoproteins and macro elements status in sheep fascioliasis. The Internet Journal of Veterinary Medicine, 7: 2.
43. Abd Ellah, M.R., 1998. Evaluation of liver function tests in liver disorders in cattle and buffaloes. M.V. Sc. Thesis, Clinical Laboratory Diagnosis, Faculty of Veterinary Medicine, Assiut University, Egypt.
44. Abd-El-Salam, M.N., A.S. Sayed, M. Moubark and M.R. Abd Ellah, 1998. Clinical, biochemical and pathological studies of some liver affections in buffaloes. 8th Science Conf. Faculty of Vet. Med. Assiut University, Egypt.
45. Mbwaye, J., 2005. Serological changes in goats experimentally infected with Fasciola gigantica in Buea sub-division of S.W.P. Cameroon. Veterinary Parasitology, 131: 255-259.
46. Latimer, K.S., E.A. Mahaffey and K.W. Prasse, 2003. Duncan and Prasse's Veterinary Laboratory Medicine: Clinical Pathology. 4th ed, Iowa, Iowa State Press, pp: 173-174.
47. Shaaban, M.M., S.A. Ghaneimah, W.A. Hammad, M.M. El-Sharkawy, S.I. Elwan and Y.A. Ahmed, 1980. Sex steroids in women with liver cirrhosis. International Journal of Gynaecology Obstetrics, 18: 181-184.
48. Melissa, J., B.S. Paczkowski and A. Texas, 2004. University Chair of Advisory Committee, Effects of Experimental Fascioliasis on Puberty and Comparison of Mounting Activity by Radiotelemetry in Pubertal and Gestating Beef Heifers.
49. Picardi, A., U.V. Gentlucci, E.M. Zardi, D. Caccavo, T. Petitti, S. Manfrini, P. Pozzilli and A. Afeltra, 2003. TNF-" and growth hormone resistance in patients with chronic liver disease. Journal of Interferon Cytokine Research, 23: 229-235.
50. Spicer, L.J., 2001. Leptin: a possible metabolic signal affecting reproduction. Domestic Animal Endocrinology, 21: 251-270.