



Parasitological and Pathological studies on Tissue parasites among slaughtered animals in Dakahlia province, Egypt

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Abstract:

The present study was carried on 939 carcasses of slaughtered animals at Mansoura abattoir (387 cattle, 205 buffaloes and 347 sheep), of various ages, sex and breeds in order to investigate the incidence of grossly visible tissue parasites. Macroscopic *Sarcocystis* spp. cysts were recorded in 26.82% of examined buffalo carcasses. *Hydatid* cysts were recovered at overall incidence rate of 2.02%, where buffaloes showed higher infection (2.43%) than cattle (1.80%). *Cysticercus bovis* cysts were only recovered from heart of two cattle (0.51%), while no infection was detected in buffalo carcasses. *Cysticercus tenuicollis* cysts were found in cattle (0.25%). In sheep, *Cysticercus tenuicollis* cysts were recorded at high rate of 21.03% and *Cysticercus ovis* cysts were detected in 5.47% of examined sheep carcasses. The seasonal dynamics and anatomical distribution of the detected parasites were studied. Moreover, these parasites caused variable range of tissue lesions, from non-significant pathology as in macroscopic sarcocystosis to those caused extensive damage resulting in infiltrative, degenerative changes, necrosis and granuloma formation.

Key words: Prevalence, *Sarcocystis*, *Hydatid*, *Cysticercus*, Egypt.

INTRODUCTION

Egypt is an agriculture based country and livestock sector plays a major role in its economy, Dakahlia Province is considered one of the largest agricultural district in the Nile Delta, if not in the Nile valley where the largest number of farm animals present there, (EL Shazly et al.,

2002). Mansoura abattoir is large municipal abattoir in Dakahlia province due to large number of animals slaughtered there. Cattle, buffaloes and sheep are considered the main sources of national and individual income as they are multipurpose animals producing milk, meat and hide. The recent increase in human population in Egypt necessitates maintaining a higher

production levels of our stock by eliminating all risk factors threatens animals health, among which, disease producing agents were the most important. Parasitic diseases are a global problem and considered as a major obstacle in the health and performance of livestock (Abera et al., 2010) therefore, parasites control may allow for increase weight gains, improve feed conversion, increase milk production, improve reproductive performance, improve carcass quality, improve immune status and may reduce morbidity and mortality (Hawkins, 1993). There is no single requirement more crucial to the sustainable control of parasites in grazing animals than a comprehensive knowledge of the epidemiology of the parasites as they interacts with the host in a specific climatic, management and production environment (Barger, 1999).

Tissue parasites are considered to have major economic significance resulting from condemnation of edible organs and downgrading of infected carcasses as well as the zoonotic importance of some parasites which causes public health problems. The metacestodes causing tissue damage in different organs, resulting in condemnation of meat or viscera (Oryan et al; 1994). *Taenia saginata* cysticercosis and hydatidosis are considered as an important public health problem

(Schandevyl and Vercruysse; 1982, Singh and Dhar; 1988, Oryan et al; 1995). Also, *Sarcocystis* species are obligate tissue protozoan parasites of livestock causing downgrading of the meat and their products thereby leading to economic losses (JyothiSree et al; 2016).

Therefore, this study was planned to determine the prevalence of different tissue parasites among slaughtered animals in Dakahlia province for assessment of the role played by strategic deworming and good management practice in reduction of their existence as well as to describe the pathological lesions caused by them.

MATERIAL AND METHODS

1. Animals and study area:

A total number of 387 cattle, 205 buffaloes and 347 sheep carcasses were examined at slaughtering during the period extended from August 2015 to July 2016 for detection of grossly visible tissue parasites in Mansoura abattoir, Dakahlia province. Routine meat inspection was carried out on each slaughtered animal including, the whole carcass and the internal organs, according to Gracey et al., 1999. Sex was detected from examined carcasses while, age couldn't be included in the study due to frequent separation of heads for separate inspection.

2. Laboratory examination and permanent mounts for identification of

revealed parasites according to Pritchard and Kruse, 1982 guidelines:

Cysts of *Sarcocystis* were dissected out from surrounding muscular tissue and their sizes were measured, then cysts were crushed between two glass slides and their contents were diluted with few drops of saline and spread over the two glass slides to make a thin smear which fixed in methyl alcohol and stained by Geimsa stain. *Cysticercus bovis* and *Cysticercus ovis* cysts were dissected out from surrounding tissues and their sizes were measured then compressed between two glass slides and examined under stereomicroscope for detection of scolex of viable cysts. *Hydatid* cysts were dissected out and their sizes were measured, then incision made to evacuate their contents and a drop of the whitish sediment representing *Hydatid* sand was examined under microscope. *Cysticercus tenuicollis* cysts were collected, their sizes were measured and incised to obtain their scolices which compressed between two glass slides and examined under stereomicroscope.

3. Histopathological examination:

For more characterization of the revealed tissue parasites, some samples were fixed in formalin 10% and embedded in Paraffin wax. Thin sections of 4 -5 microns thickness were made and stained

with H&E stain for suspected pathological lesions.

RESULTS

Inspection of 387 cattle, 205 buffaloes and 347 sheep revealed five visible tissue parasites namely; *Cysticercus bovis*, *Cysticercus ovis*, *Cysticercus tenuicollis*, *Hydatid cyst* and finally *Sarcocystis* species.

1. Overall incidence and tissue distribution:

1. 1. Cattle and buffaloes:

During inspection of carcasses of cattle and buffaloes, four tissue parasites were detected namely, *Cysticercus bovis*, *Hydatid cyst*, *Cysticercus tenuicollis* and *Sarcocystis* species. Macroscopic *Sarcocystis* spp. cysts were recovered from buffaloes at a rate of 26.82% while, no cases were recorded in cattle. *Cysticercus bovis* cysts were recovered from cattle only at very low incidence rate (0.51%) and were not detected in examined buffaloes. *Hydatid* cysts were the tissue cysts recorded in both cattle and buffaloes at a low rate of 2.02% in total examined large ruminants, where buffaloes showed higher incidence (2.43%) than cattle (1.80%).

Tissue distribution of the revealed sarcocysts indicated that esophagus was the mostly infected organ with a prevalence of

100% as cysts are detected in esophagus of all infected cases, followed by throat muscles (3.63%) where, only two cases were found in mixed infection of esophageal and throat muscles. Heads of slaughtered animals were separated from carcasses as a routine habits occurring in Mansoura abattoir and examined separately for the presence of *Sarcocystis* where, 9 cases were found with *Sarcocystis* spp. cysts in tongue (4.39%) from total examined buffalo heads. All *Hydatid* cysts recovered from cattle were detected in lungs only (100%) while, in buffaloes 4 cases were recorded in lungs (80%) and only one case was recorded with *Hydatid* cysts in both liver and lungs (20%). *Cysticercus bovis* cysts were only recovered from hearts of two cattle (0.51%) while, *Cysticercus tenuicollis* cysts were recorded in one cattle omentum (0.25%).

1. 2. Sheep:

During postmortem inspection of carcasses of slaughtered sheep, two types of tissue cysts were recorded where; *Cysticercus tenuicollis* cysts prevailed at higher rate (21.03%) than *Cysticercus ovis* cysts (5.47%).

Regarding the tissue distribution pattern of recovered *Cysticercus tenuicollis* cysts, omentum recorded to be the highest infected tissue (56.16%) as single infection, followed by mesentery (17.80%) and liver

(13.69%) as single infections then mixed infection of liver and omentum (8.21%) and mixed infection of liver and mesentery (4.10%) where, recorded cases were 41, 13, 10, 6, 3 out of total infected 73 cases with *C. tenuicollis* in the mentioned five tissue distribution patterns respectively. All *Cysticercus ovis* cysts were recovered from hearts of sheep.

2. Seasonal prevalence of tissue parasites among examined animals:

Table (1) showed the seasonal dynamics of detected *Sarcocystis* spp. cysts in esophageal musculature where, the higher infection rates were detected in Autumn (34.28%) followed by Summer (26.25%), Spring (25.53%) and Winter (23.25). Among total examined large ruminants, *Hydatid* cysts were recorded to be at highest rate during Autumn (4.71%), followed by Summer (2.12%), then Spring (0.82%) and Winter had the lowest prevalence (0.76).

Dealing with the seasonal fluctuations in incidence of *C. tenuicollis* infection in sheep, Spring was recorded with the highest infection (28.26%), followed by Autumn (22.97%), Summer (17.09%) and the lowest was in winter (15.62%). Moreover, sheep showed the highest infection with *Cysticercus ovis* in Summer and Spring (6.83% and 6.52%,

respectively), followed by Autumn (4.05%) and the lowest was in Winter (3.12%).

3. Prevalence of tissue parasites in relation to sex:

Buffalo females showed higher infection with sarcocystosis (42.37%) than males (20.54%). Also, females were highly infected with hydatidosis (6.77% and 6.25%) than males (0.68% and 1.40%), in buffaloes and cattle, respectively. In contrast, sheep males appeared to be infected with *C. tenuicollis* and *C. ovis* higher (21.14% and 6.04%, respectively) than females (20.40% and 2.04%, respectively).

4. Pathological lesions of the revealed tissue parasites:

4. 1. *Cysticercus bovis*:

The only identified two cysts were calcified and appeared as small yellowish whitish hard calcareous nodules around 5 mm in size and microscopically appeared as focal area of caseation and calcifications surrounded by fibrous connective tissue and inflammatory cells infiltration.

4. 2. *Hydatid cyst*:

Only one case was detected with caseous cysts that were similar in shape to the unilocular cysts and upon incisions in that cyst revealed that the cavity of these specimens filled with a thick matrix of creamy to cheesy material and laminated layer of the wall still present that may be

due to bacterial contamination of the cysts. Degenerative changes in both cysts and tissues were detected from histological sections taken from random samples where changes ranged from highly infiltration of the tissue surrounding cysts with inflammatory cells to granulomatous reactions formed from macrophage, giant cells and lymphocytic infiltrations and finally calcification while cystic degeneration was the absence of a germinal layer and the presence of intact laminated layer and necrotic wall of the cyst.

4. 3. *Cysticercus tenuicollis*:

Cysts in livers were detected either rested flat on the surface, or made adhesion between liver lobes which completely or partially surrounded the cyst with fibrous connective tissues extending to larger area of liver parenchyma, however histological sections revealed no inflammatory cells infiltration.

4. 4. *Cysticercus ovis*:

Macroscopically, no viable cysts were detected where the degenerated cysts appeared as hard creamy nodules with ill-defined edges and a core of cheesy content if caseated and some cysts were calcified. Microscopically, the muscle fibers revealed severe degenerative and necrotic changes ranged from focal area of caseation surrounded by fibrous connective tissue and infiltration of the tissue with inflammatory

cells to granuloma formation which consisted of central area of caseation surrounded by macrophages, lymphocytes, Langhan' s giant cells and surrounded by fibrous tissue with leukocytic infiltration of the surrounding tissue. Some sections showed areas of calcifications.

4. 5. *Sarcocystis* spp.:

Histological sections were taken from infected muscles and cross section in cysts revealed its division into compartments each consisted of myriads crescentic bradyzoites without inflammatory cells infiltration

Discussion

In our study, macroscopic *Sarcocystis* spp. cysts were recorded in 26.82% of examined buffalo carcasses, which is near to **Abu-Elwafa and Abbas (2011)** (19.81%) and **Metwally et al., (2014)** (25.5 %), while higher than that recorded by **Huong et al., (1997)** (10.5%), **Latif et al., (1999)** (15.6%) and **El-Dakhly et al., (2011)** (6.9%), and lower than those obtained by **Abass (2008)** (67.32%). Esophagus was the mostly infected organ (100%), where cysts detected in esophagus of all infected cases, which agreed with **Huong (1999)**, **Latif et al. (1999)**, and **Abu-Elwafa et al. (2015)**.

Concerning the seasonal dynamics, the highest prevalence of *Sarcocystis* spp. infection in buffaloes was during Autumn (34.28%), which is agreed with **Abass (2008)** and **Abu-Elwafa and Al-Araby (2008)**. Females showed higher incidence rate (42.37%) than males (20.54%), similar to that reported by **Abass (2008)** and **El-Dakhly et al. (2011)**.

Higher incidence rate of macroscopic *Sarcocystis* spp. may be attributed to the significant role of felines in their transmission (**Abu-Elwafa and Abbas, 2011**). On the other hand, higher incidence among buffalo females may be attributed to that most of slaughtered females were old aged more than 5 years, being in agreement with **Huong (1999)** who stated that prevalence increase with age and higher infection among the oldest animals due to a longer exposure to the infection.

The achieved results in this study showed that the overall incidence of *Hydatid* cysts was 2.02% where, buffaloes showed higher incidence rate (2.43%) than cattle (1.80%), being nearly similar to those obtained by **Kadir et al., (2012)** (1.70% in cattle), **Muqbil et al., (2012)** (2.6% in cattle), and lower than **Singh and Dhar (1988)** (48.1% in buffaloes), **Dalimi et al., (2002)** (16.4% in cattle and 12.4% in buffaloes), **Kouidri et al., (2012)** (25.66%

in cattle), **Elmajdoub and Rahman (2014)** (10.56% in cattle), while higher than those obtained by **Abu-Elwafa and Al-Araby (2008)** (0.15% in cattle and 0.15% in buffaloes) and **Omar et al., (2013)** (0.068% in cattle).

Considering the tissue distribution of the recovered cysts, all *Hydatid* cysts recovered from cattle were detected in lungs only (100%), while in buffaloes, 4 cases were in lungs (80%) and only one case recorded with *Hydatid* cysts in both liver and lungs (20%). This is agreed with **Singh and Dhar (1988); Dalimi et al., (2002); Amuamuta et al., (2012); Kouidri et al., (2012); Asfaw and Afera (2014); Birhanu and Abda (2014)** as they mentioned that lungs had the highest rate of infection followed by liver, while dissimilar to **El-Madawy et al., (2011); Lahmar et al., (2012); Muqbil et al., (2012); Omar et al., (2013); Elmajdoub and Rahman (2014)** as they reported that liver had the highest rate followed by lungs.

Our results showed that the highest infection of *Hydatid* cyst in cattle was recorded in Autumn (5.63%), and in buffaloes was in Summer (5%). This showed similarity to **Elmajdoub and Rahman (2014)** as they found that Autumn was recorded with the highest infection rate among examined cattle. Females are found highly infected with *Hydatid* cyst (6.77%

and 6.25%) than males (0.68% and 1.40%) in buffaloes and cattle, respectively. This agreed with **Elmajdoub and Rahman (2014); Birhanu and Abda (2014)**. Higher incidence among females may be attributed to that most of slaughtered cattle and buffalo females were old aged, more than 5 years.

Cysticercus bovis cysts were only recovered from hearts of two cattle (0.51%) and the two cases were males (0.56%), one in Winter (1.14%) and the other one was in Summer (0.64%), while no infection was detected in buffaloes. This incidence rate was slightly lower than that recorded by **Abu-elwafa and Al-Araby (2008)** (3.61%), **Abdo et al., (2009)** (1.6%), **Bedu et al., (2011)** (3%) and **Usip et al., (2011)** (2.09%), while higher than that of **Dupuy et al., (2014)** (0.14%) and **Hashemnia et al., (2015)** (0.078%). Lower incidence rate may be attributed to the covered irrigation system and lower incidence of *Taenia saginata* in man.

Cysticercus tenuicollis cysts are recorded to be the lowest incidence among tissue parasites infecting large ruminants where, only one case was recorded in cattle (0.25%), male (0.28%), and was recorded in Winter season (1.14%); similarly, **Abass (2008)** also recorded infection in cattle (0.071%) slaughtered in the same abattoir.

In sheep, the incidence of *Cysticercus tenuicollis* was recorded at higher rate (21.03%) among examined sheep. This result is found within the range recorded by **Christodoulopoulos et al., (2008)** (29.41%), **Senlik (2008)** (24.1%), **Abu-Elwafa et al., (2009)** (19.21%), **Oryan et al., (2012)** (17.52%) and **Mekuria et al., (2013)** (22.8%). Obtained results were higher than that recorded by **Radfar et al., (2005)** (12.87%), **Sultan et al., (2010)** (16.93%), **Ghaffar (2011)** (0.7%), **Nimbalkar et al., (2011)** (15.17%) and **El-Dakhly et al., (2012)** (1.6%), while lower than that obtained by **Bekele et al., (1988)** (37.1%), **Sissay et al., (2008)** (79%), **Essa and Al-Azizz (2011)** (40.55%) and **Wondimu et al., (2011)** (56.8%).

Regarding the tissue distribution pattern of recovered cysts in examined sheep, omentum recorded to be the highest infected tissue at rate of 56.16% as single infection, and 8.21% in mixed infection with liver. This is agreed with **Radfar et al., (2005)**, **Senlik (2008)**, **Abu-Elwafa et al., (2009)**, **Nimbalkar et al. (2011)**, **Saulawa et al., (2011)** and **Wondimu et al., (2011)**. Dealing with the seasonal fluctuations in incidence of *C. tenuicollis* in examined sheep, Spring was recorded with the highest prevalence (28.26%), in agreement with **Khanjari et al., (2015)** and **Mirzaei and Rezaei (2015)**. Males

appeared to be infected slightly higher with *C. tenuicollis* (21.14%) than females (20.40%), being agreed with **Saulawa et al., (2011)** and **Mekuria et al., (2013)**.

Cysticercus ovis cysts in our study were recorded at lower incidence rate of 5.47%, where all cysts were recovered from hearts of sheep (100%). This result is nearly agreed with **Abu-Elwafa and Al-Araby (2008)** (8.27%), while higher than that obtained by **Ibrahim et al., (2008)** (2.97%), **Oryan et al., (2012)** (0.09%) and **Hashemnia et al., (2016)** (1.27%), and lower than that obtained by **Al-Qureishy (2008)** (12%) and **Sissay et al., (2008)** (26%).

The highest infection rate in our study was recorded in Summer and Spring at rates of 6.83%, 6.52%, respectively, being similar to that reported by **Abu-Elwafa and Al-Araby (2008)**; as they revealed that the highest rates were in Spring and Summer, **Abu-Elwafa et al., (2009)**; reported that the maximum rate of infection was in Summer, and **Hashemnia et al., (2016)**; detected that higher prevalence rate in Spring, followed by Summer. Also, infection of sheep with that metacestodes recorded to be higher in males than females which mainly attributed to the regulations of slaughtering females and almost of the slaughtered sheep were males.

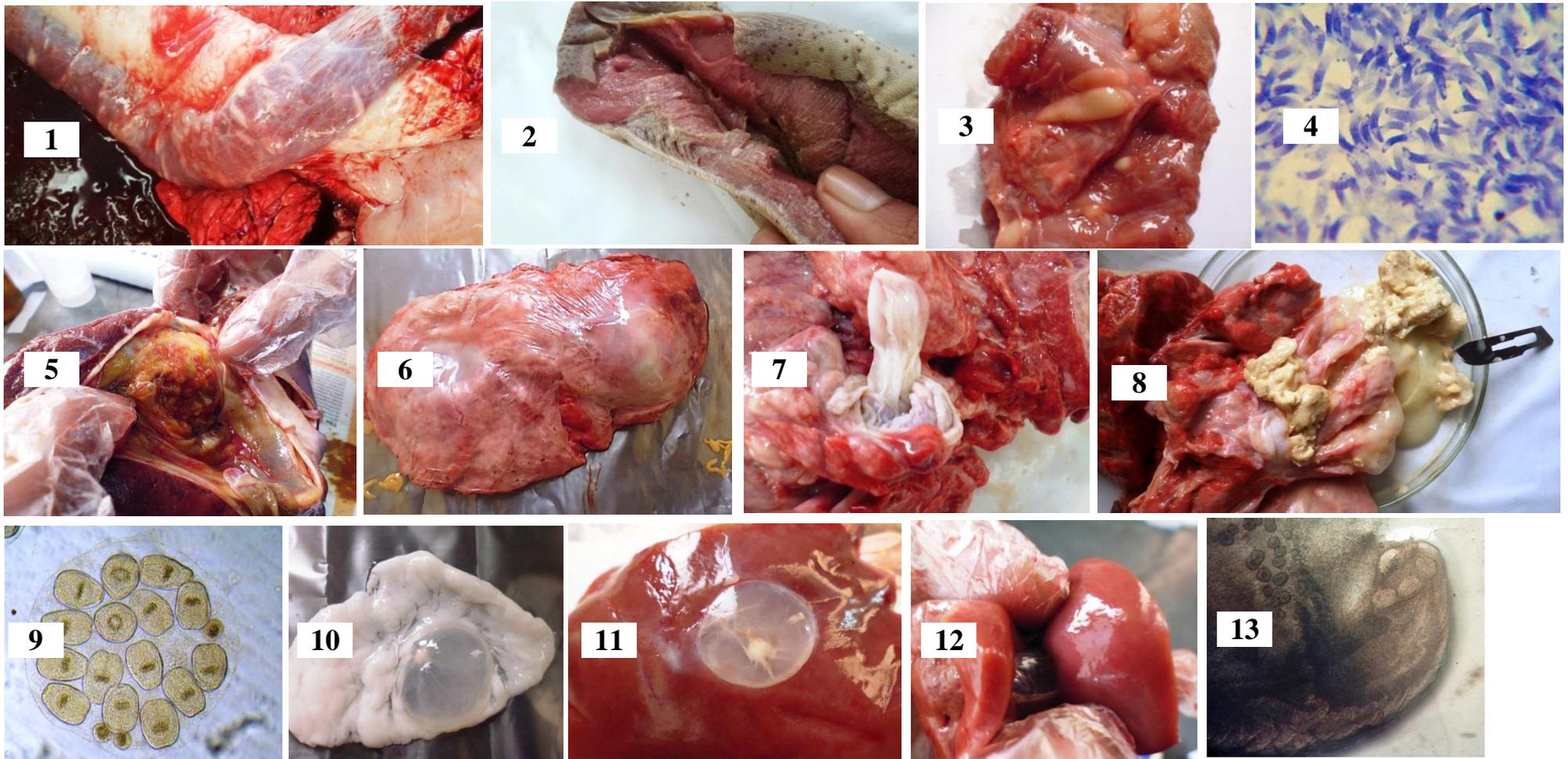
The main histopathological lesions described in this paper are similar to those reported by **Hashemnia et al., 2016** (*Cysticercus ovis*), **Scandrett et al., 2012** (*Cysticercus bovis*), and **Sakamoto and Cabrera, 2003** (*Hydatid* cysts).

Table (1): Seasonal dynamics of tissue parasites revealed from slaughtered animals in Mansoura abattoir:

Season	Cattle							Buffaloes				Sheep					
	No. Ex.	<i>C. bovis</i>		<i>Hydatid</i>		<i>C. tenuicollis</i>		No. Ex.	<i>Sarcocyst</i>		<i>Hydatid</i>		No. Ex.	<i>C. ovis</i>		<i>C. tenuicollis</i>	
		+ve	%	+ve	%	+ve	%		+ve	%	+ve	%		+ve	%	+ve	%
Summer	155	1	0.64	1	0.64	-	0.00	80	21	26.25	4	5	117	8	6.83	20	17.09
Autumn	71	-	0.00	4	5.63	-	0.00	35	12	34.28	1	2.85	74	3	4.05	17	22.97
Winter	87	1	1.14	1	1.14	1	1.14	43	10	23.25	-	0.00	64	2	3.12	10	15.62
Spring	74	-	0.00	1	1.35	-	0.00	47	12	25.53	-	0.00	92	6	6.52	26	28.26
Total	387	2	0.51	7	1.80	1	0.25	205	55	26.82	5	2.43	347	19	5.47	73	21.03

Table (2): Prevalence of tissue parasites in relation to sex of slaughtered animals in Mansoura abattoir:

Sex	Cattle							Buffaloes				Sheep					
	No. Ex.	<i>C. bovis</i>		<i>Hydatid</i>		<i>C. tenuicollis</i>		No. Ex.	<i>Sarcocystis</i>		<i>Hydatid</i>		No. Ex.	<i>C. ovis</i>		<i>C. tenuicollis</i>	
		+ve	%	+ve	%	+ve	%		+ve	%	+ve	%		+ve	%	+ve	%
Male	355	2	0.56	5	1.40	1	0.28	146	30	20.54	1	0.68	298	18	6.04	63	21.14
Female	32	-	0.00	2	6.25	-	0.00	59	25	42.37	4	6.77	49	1	2.04	10	20.40
Total	387	2	0.51	7	1.80	1	0.25	205	55	26.82	5	2.43	347	19	5.47	73	21.03



1. *Sarcocystis* spp. in buffalo esophagus. **2.** *Sarcocystis* spp. in buffalo tongue. **3.** *Sarcocystis* spp. in throat muscles. **4.** *Sarcocystis* spp. cyst bradyzoites. **5.** Opened *Hydatid* cyst in buffalo liver. **6.** *Hydatid* cyst in lung of large ruminants. **7.** Opened *Hydatid* cyst in lung of large ruminant.

8. Caseated *Hydatid* cyst infecting large ruminant. **9.** *Hydatid* broad capsule. **10.** *C. tenuicollis* attached to remenant of omentun of sheep. **11.** *C. tenuicollis* attached to liver of sheep. **12.** *C. tenuicollis* attached to liver of sheep with adhesion of lobes. **13.** *C. tenuicollis* scolex under stereomicroscope

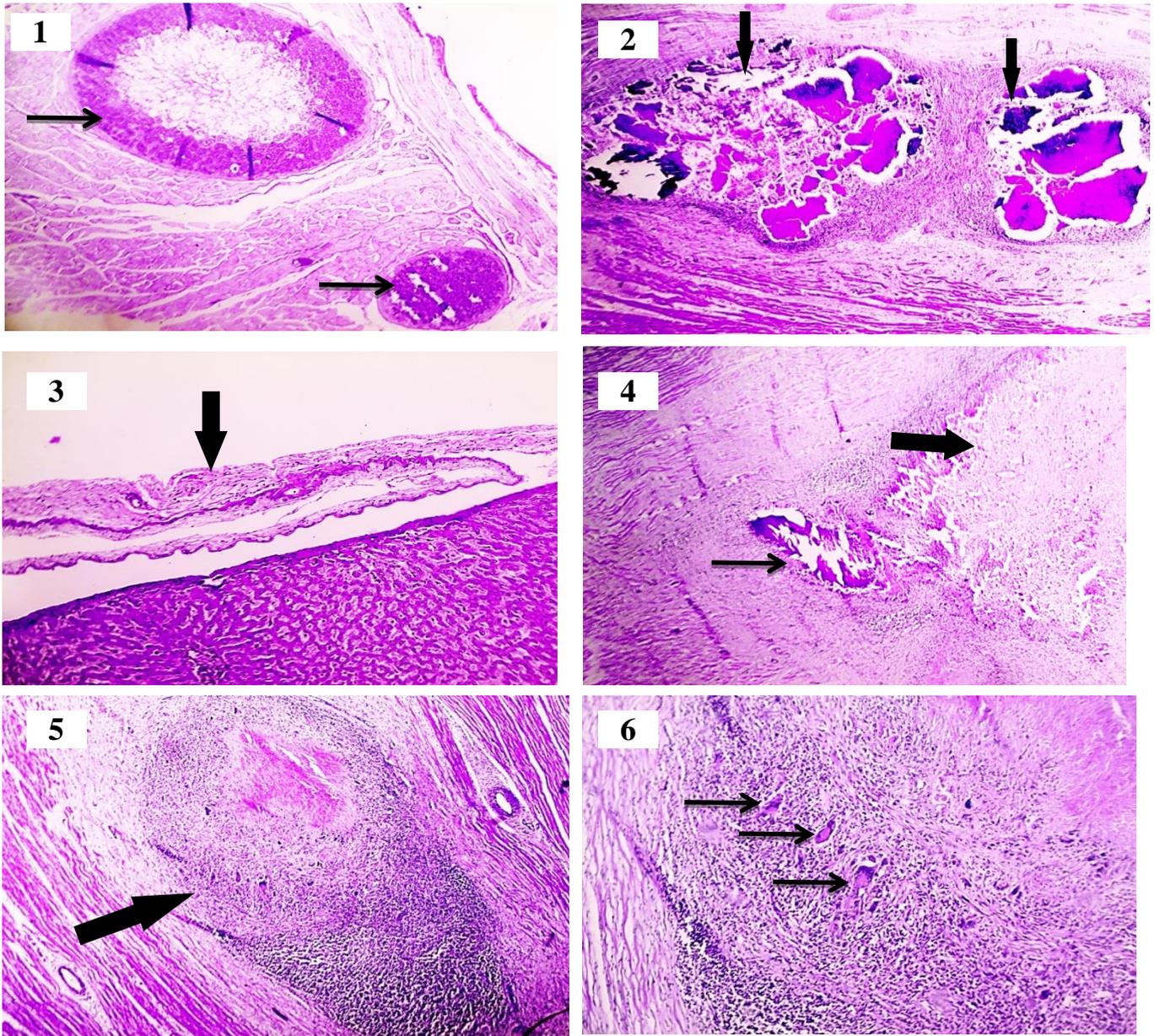


Photo (1): Esophagus infected with intact macroscopic *sarcocysts* (arrows) cross section composed of compartments each consisted of myriads crescentic bradyzoites (H&E, X: 50).

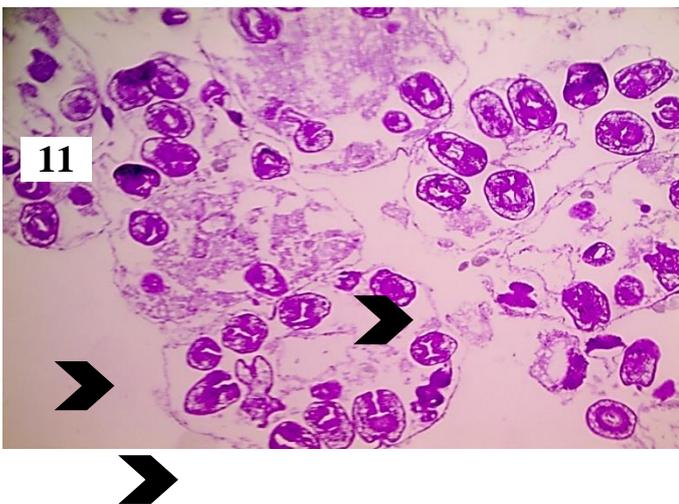
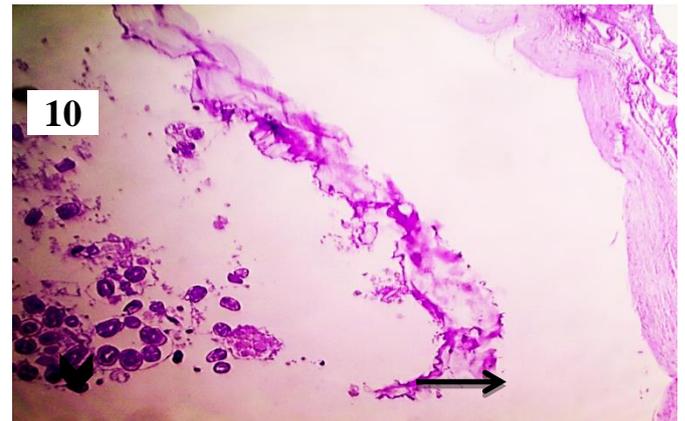
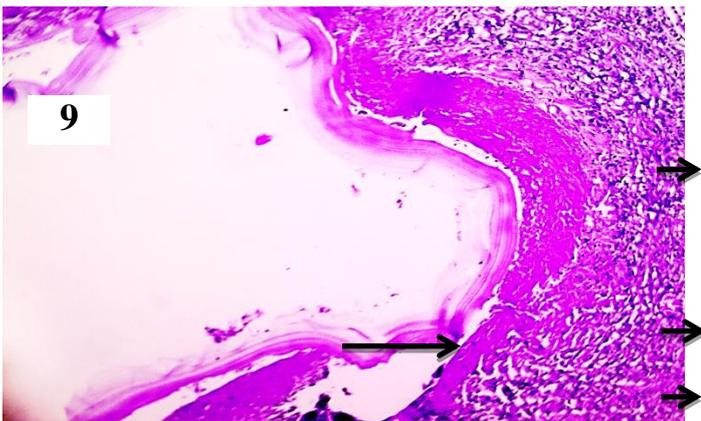
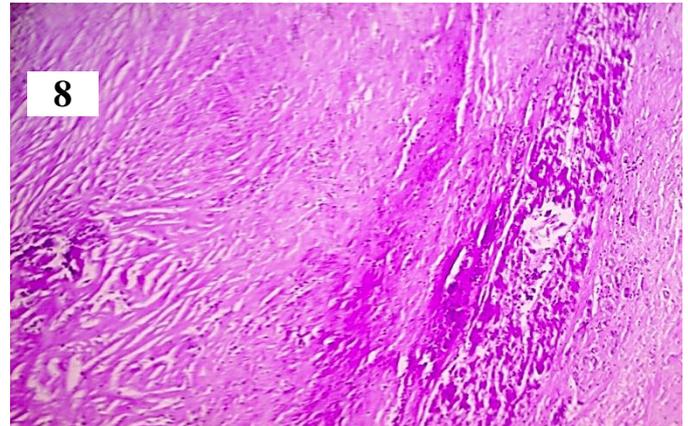
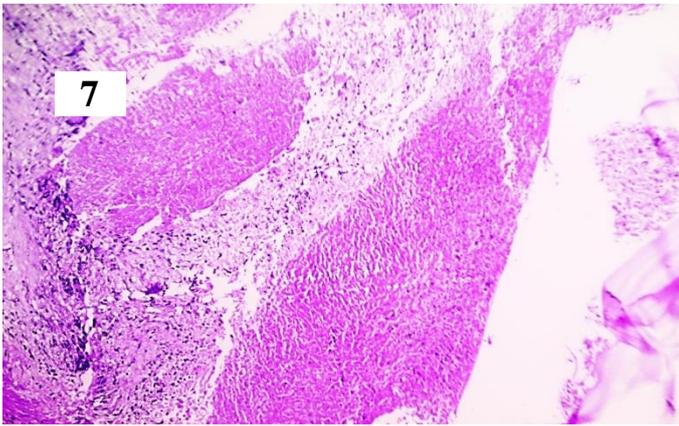
Photo (2): Heart of cattle infected with dead *C. bovis* cyst shows focal caseation and calcification surrounded by fibrous tissue and inflammatory cells (arrows) (H&E, X: 100).

Photo (3): Liver of sheep infected with *C. tenuicollis* without any significant pathological lesions (arrow) (H&E, X: 100).

Photo (4): Heart of sheep infected with dead *C. ovis* cyst shows focal caseation (thick arrow) and calcification (thin arrow) surrounded by fibrous tissue (H&E, X: 100).

Photo (5): Heart of sheep infected with dead *C. ovis* cyst shows granuloma formation consisted of central area of caseation surrounded by macrophages, lymphocytes, Langhan' s giant cells and surrounded by fibrous tissue (arrow) (H&E, X: 100).

Photo (6): Heart of sheep infected with dead *C. ovis* cyst high power to show granuloma formation consisted of central area of caseation surrounded by macrophages, lymphocytes, Langhan' s giant cells and surrounded by fibrous tissue (arrows) (H&E, X: 200).



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Photo (7): Liver infected with fertile hydatid cyst (long arrow) showing granulomatous reaction in hepatic parenchyma characterized by aggregation of macrophages and giant cells (short arrows) (H&E, X: 100).

Photo (8): Liver infected with fertile hydatid cyst shows extensive fibrosis (asterisk) with hyaline degeneration (arrow) (H&E, X: 100).

Photo (9): Lung infected with fertile hydatid cyst (arrow) **L:** lumen surrounded by extensive fibrosis and inflammatory cells (asterisk) (H&E, X: 200).

Photo (10): Lung infected with fertile hydatid cyst consisted of form outside laminated wall (thick arrow), germinal epithelium (thin arrow) and broad capsule (arrowheads) (H&E, X: 50).

Photo (11): Lung infected with fertile hydatid cyst high power of previous Fig. to show broad capsule (arrowheads) enclosing many invaginated scolices (H&E, X: 50).

References

- Abass, I., E., A. (2008):** Studies on tissue parasites of farm animals in Dakahlia province. M. V. SC. Thesis, Faculty of Veterinary Medicine, Mansoura University.
- Abdo, B. R. N., Sayed, A. S. M., Hussein, A. A. A., and Arafa, M. I. (2009):** Occurrence of cysticercosis in cattle and buffaloes and *Taenia saginata* in man in Assiut Governance of Egypt. *Veterinary World*; 2(5): 173-176.
- Abera, M., Mohammed, T., Abebe, R., Aragaw, K., and Bekele, J. (2010):** Survey of ixodid ticks in domestic ruminants in Bedelle district, Southwestern Ethiopia. *Tropical animal health and production*; 42(8): 1677-1683.
- Abu-Elwafa, S. A., and Al-Araby, M. A. (2008):** Prevalence of tissue parasites among slaughtered animals in Dakahlia province. *Mansoura, Veterinary Medicine Journal*; 10(1): 79-91.
- Abu El-Wafa, S. A. and Abbas, I. E. A. (2011):** *Sarcocystis* species prevalent among slaughtered buffaloes at Dakahlia province, Egypt. *Mansoura Veterinary Medicine Journal*; 13(1): 131-140.
- Abu-Elwafa, S. A., Al-Araby, M. A. and Abbas, I. E. A. (2009):** Metacestodes among sheep slaughtered at Mansoura abattoir, Dakahlia province, Egypt. *Mansoura Veterinary Medicine Journal*; 11(1): 21-33.
- Abu-Elwafa, S. A., Abbas, I. E. A. and Al-Araby, M. A. (2015):** Ultrastructure of *Sarcocystis buffalonis* (Huong et al., 1997) infecting water buffaloes (*Bubalus bubalis*) from Egypt. *International Journal of Advanced Research*; 3(1): 452-457.
- Al-Qureishy, S. A. (2008):** Prevalence of cestode parasites in sheep slaughtered in Riyadh City, Saudi Arabia. *Journal of the Egyptian Society of Parasitology*; 38(1): 273-280.
- Amuamuta, A., Akalu, B., and Chanie, M. (2012):** Major causes of lung and liver condemnation and financial impact in cattle slaughter at Bahir Dar Municipal Abattior. *African Journal of Basic and Applied Sciences*; 4(5): 165-171.
- Asfaw, A., and Afera, B. (2014):** Prevalence of *Hydatid Cyst* in cattle at municipal

- abattoir of Shire. *Journal of Veterinary Science and Technology*; 5(3): 186.
- Barger, I. A. (1999):** The role of epidemiological knowledge and grazing management for helminth control in small ruminants. *International journal for parasitology*; 29(1): 41-47.
- Bedu, H., Tafess, K., Shelima, B.; Woldeyohannes, D., Amare, B., and Kassu, A. (2011):** Bovine cysticercosis in cattle slaughtered at Zeway municipal abattoir: Prevalence and its public health importance. *Journal of Veterinary Science and Technology*; 2:108.
- Bekele, T., Mukasa-Mugerwa, E., and Kasali, O. B. (1988):** The prevalence of cysticercosis and hydatidosis in Ethiopian sheep. *Veterinary parasitology*; 28(3): 267-270.
- Birhanu, T., and Abda, S. (2014):** Prevalence, economic impact and public perception of *Hydatid Cyst* and *Cysticercus bovis* on cattle slaughtered at Adama municipal abattoir, south eastern Ethiopia. *American-Eurasian Journal of Scientific Research*; 9(4): 87-97.
- Christodouloupoulos, G., Theodoropoulos, G., and Petrakos, G. (2008):** Epidemiological survey of cestode-larva disease in Greek sheep flocks. *Veterinary Parasitology*; 153(3): 368-373.
- Dalimi, A., Motamedi, G. H., Hosseini, M., Mohammadian, B., Malaki, H., Ghamari, Z., and Far, F. G. (2002):** Echinococcosis/hydatidosis in western Iran. *Veterinary parasitology*; 105(2): 161-171.
- Dupuy, C., Morlot, C., Demont, P., Ducrot, C., Calavas, D., Callait-Cardinal, M. P., and Gay, E. (2014):** Construction of standardized surveillance indicators for bovine cysticercosis. *Preventive veterinary medicine*; 115(3): 288-292.
- El-Dakhly, K. M., Khaled, A., El-Nahass, E. S., Hirata, A., Sakai, H., and Yanai, T. (2011):** Prevalence and distribution patterns of *Sarcocystis* spp. in buffaloes in Beni-Suef, Egypt. *Tropical Animal Health and Production*; 43(8): 1549-1554.
- El-Dakhly, K. M., Abo El-Hadid, S. M., El-Askalany, M. A. and Yani, T. (2012):** An abattoir-based study on helminths of slaughtered Sheep in Beni-Suef, Egypt. *Beni-Suef University Journal of Applied Sciences*; 1(1): 49-60.
- El-Madawy R. S., Khalifa N. O. and Afify, J. S.A. (2011):** Epidemiological and molecular studies Of *Hydatid Cyst* In slaughtered cattle and sheep in Toukh,

Egypt. Benha Veterinary Medical Journal; special issue (1) : 95-101.

Elmajdoub, L. O., and Rahman, W. A. (2014): Prevalence of *Hydatid Cysts* in slaughtered animals from different areas of Libya. Journal of Veterinary Science and Medicine; 2(2): 1-7.

El shazly, A. M., El-wafa, S. A., Haridy, F. M., Soliman, M., Rifaat, M. M. A. and Morsy, T. A. (2002): Fascioliasis among live and slaughtered animals in nine centers of Dakahlia governorate. Journal of the Egyptian Society of Parasitology; 32(1): 47-58.

Essa, I. M., and Al-Azizz, S. A. (2011): Studies on *Cysticercus tenuicollis* collected from slaughtered sheep and goats in basrah abattoir, Iraq. The Egyptian Journal of Experimental Biology (Zoology); 7(2): 343-347.

Ghaffar, N. M. (2011): Tenuicollosis in slaughtered sheep at Duhok abattoir-Kurdistan region of Iraq. Basrah Journal of Veterinary Research; 10(1): 1-24.

Gracey, J. F., Collins, D. S. and Huey, R. J. (1999): Meat hygiene, 10th ed. Saunders, London.

Hashemnia, M., Shahbazi, Y., and Afshari Safavi, E. A. (2015): Bovine cysticercosis with special attention to its prevalence, economic losses and food safety importance in Kermanshah, west of Iran. Journal of

Food Quality and Hazards Control; 2(1): 26-29.

Hashemnia, M., Shahbazi, Y. and Kish, G. F. (2016): Prevalence and pathological lesions of ovine cysticercosis in slaughtered sheep in western Iran. Journal of Parasitic Diseases; 1-4.

Hawkins, J. A. (1993): Economic benefits of parasite control in cattle. Veterinary Parasitology; 46(1-4): 159-173.

Huong, L. T. T. (1999): Prevalence of *Sarcocystis* spp. in water buffaloes in Vietnam. Veterinary parasitology; 86(1): 33-39.

Huong, L. T., Dubey, J. P., Nikkilä, T., and Uggla, A. (1997): *Sarcocystis buffalonis* n. sp.(Protozoa: *Sarcocystidae*) from the water buffalo (*Bubalus bubalis*) in Vietnam. The Journal of parasitology; 83(3): 471-474.

Ibrahim, M. M., Ghamdi, M., and Gahmdi, M. S. A. (2008): Helminths community of veterinary importance of livestock in relation to some ecological and biological factors. Turkiye Parazitoloji Dergisi; 32(1): 42-47.

JyothiSree, C., Venu, R., Samatha, V., Malakondaiah, P., and Rayulu, V. C. (2016): Prevalence and microscopic studies of *Sarcocystis* infection in naturally infected water

buffaloes (*Bubalus bubalis*) of Andhra Pradesh. Journal of Parasitic Diseases; 1-7.

Kadir, M. A., Ali, N. H., and Ridha, R. G. M. (2012): Prevalence of helminthes, pneumonia and hepatitis in Kirkuk slaughter house, Kirkuk, Iraq. Iraqi Journal of Veterinary Sciences; 26(3): 83-88.

Khanjari, A., Cheraghi, N., Bokaie, S., Fallah, S., Basti, A. A., Fallah, M., and Mohammadkhan, F. (2015): Prevalence of *Cysticercus tenuicollis* in slaughtered sheep and goats by season, sex, age, and infected organ at Amol abattoir, Mazandaran province, Iran. Comparative Clinical Pathology; 24(1): 149-152.

Kouidri, M., Khoudja, F. B., Boulkaboul, A., and Selles, M. (2012): Prevalence, fertility and viability of cystic echinococcosis in sheep and cattle of Algeria. Bulgarian Journal of Veterinary Medicine; 15(3): 191-197.

Lahmar, S., Trifi, M., Naceur, S. B., Bouchhima, T., Lahouar, N., Lamouchi, I., Maamouri, N., Selmi, R., Dhibi, M., and Torgerson, P. R. (2012): Cystic echinococcosis in slaughtered domestic ruminants from Tunisia. Journal of Helminthology; 87(03): 318-325.

Latif, B. M. A., Al-Delemi, J. K., Mohammed, B. S., Al-Bayati, S. M.,

and Al-Amiry, A. M. (1999): Prevalence of *Sarcocystis* spp. in meat-producing animals in Iraq. Veterinary parasitology; 84(1): 85-90.

Mekuria, E., Shimelis, S., Bekele, J., & Sheferaw, D. (2013): Sheep and goats *Cysticercus tenuicollis* prevalence and associated risk factors. African Journal of Agricultural Research; 8(24): 3121-3125.

Metwally, A. M., Abd Ellah, M. R., AL-Hosary, A. A., and Omar, M. A. (2014): Microscopical and serological studies on *Sarcocystis* infection with first report of *S. cruzi* in buffaloes (*Bubalus bubalis*) in Assiut, Egypt. Journal of Parasitic Diseases; 38(4): 378-382.

Mirzaei, M., and Rezaei, H. (2015): Role of goats and sheep in the epidemiology of *Cysticercus tenuicollis* in Tabriz, Northwest Iran. Comparative Clinical Pathology; 24(2): 441-444.

Muqbil, N. A., Al-salami, O. M., and Arabh, H. A. (2012): Prevalence of unilocular hydatidosis in slaughtered animals in Aden governorate-Yemen. Jordan Journal of Biological Sciences; 5(2): 121-124.

Nimbalkar, R. K., Shinde, S. S., Kamitkar, V. N., and Muley, S. P. (2011): Study on *Taenia hydatigena* in the slaughtered sheep (*Ovis bhara*) and goats (*Capra hircus*) in Maharashtra,

- India. *Global Veterinaria*; 6(4): 374-377.
- Omar, M., Sultan, K., Haridy, M., and Omran, A. (2013):** prevalence of Cystic echinococcosis in slaughtered ruminants in different abattoirs, Upper Egypt. *American Journal of Animal and Veterinary Sciences*; 8(3): 117-121.
- Oryan, A., Moghaddar, N., and Gaur, S. N. S. (1994):** Metacestodes of sheep with special reference to their epidemiological status, pathogenesis and economic implications in Fars Province, Iran. *Veterinary Parasitology*; 51(3): 231-240.
- Oryan, A., Moghaddar, N., and Gaur, S. N. S. (1995):** *Taenia saginata* cysticercosis in cattle with special reference to its prevalence, pathogenesis and economic implications in Fars Province of Iran. *Veterinary Parasitology*; 57(4): 319-327.
- Oryan, A., Goorgipour, S., Moazeni, M., and Shirian, S. (2012):** Abattoir prevalence, organ distribution, public health and economic importance of major metacestodes in sheep, goats and cattle in Fars, southern Iran. *Tropical biomedicine*; 29(3): 349-359.
- Pritchard, M. H. and Kruse, G. O. W., (1982):** The collection and preservation of animal parasites. University of Nebraska Press, U. S. A.
- Radfar, M. H., Tajalli, S., and Jalalzadeh, M. (2005):** Prevalence and morphological characterization of *Cysticercus tenuicollis* (*Taenia hydatigena* cysticerci) from sheep and goats in Iran. *Veterinarski arhiv*; 75(6): 469-476.
- Sakamoto, T., and Cabrera, P. A. (2003):** Immunohistochemical observations on cellular response in unilocular hydatid lesions and lymph nodes of cattle. *Acta tropica*; 85(2): 271-279.
- Saulawa, M. A., Magaji, A. A., Faleke, O. O., Mohammed, A. A., Kudi, A. C., Musawa, A. L., Sada, A., Ugboma, A. N., Akawu, B., Sidi, S., Lawal, N. and Ambursa, A.U. (2011):** Prevalence of *Cysticercus tenuicollis* cysts in sheep slaughtered at Sokoto abattoir, Sokoto state, Nigeria. *Sokoto Journal of Veterinary Sciences*; 9(2): 24-27.
- Scandrett, W. B., Haines, D. M., Parker, S. E., Robinson, Y., Forbes, L. B., Brandt, J., Geerts, S., Dorny, P., and Gajadhar, A. A. (2012):** Validation of an immunohistochemical assay for bovine cysticercosis, with comparison to a standard histological method. *Veterinary parasitology*; 186(3): 301-311.

- Schandevyl, P., and Vercruysse, J. (1982):** Cysticercosis in cattle in Senegal. *Veterinary parasitology*; 11(2): 267-270.
- 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.
- Singh, B. P., and Dhar, D. N. (1988):** *Echinococcus granulosus* in animals in northern India. *Veterinary parasitology*; 28(3): 261-266.
- Sissay, M. M., Uggla, A., and Waller, P. J. (2008):** Prevalence and seasonal incidence of larval and adult cestode infections of sheep and goats in eastern Ethiopia. *Tropical Animal Health and Production*; 40(6): 387-394.
- Sultan, K., Desoukey, A. Y., Elsiefy, M. A., and Elbahy, N. M. (2010):** An abattoir study on the prevalence of some gastrointestinal helminths of sheep in Gharbia Governorate, Egypt. *Global Veterinaria*; 5(2): 84-87.
- Usip, L. P. E., Isaac, L., Amadi, E. C., Utah, E. and Akpaudo, U. (2011):** The occurrence of cysticercosis in cattle and taeniasis in man in Uyo, capital city of Akwa Ibom State, Nigeria. *Nigerian Journal of Agriculture, Food and Environment*; 7(2): 47-51.
- Wondimu, A., Abera, D., and Hailu, Y. (2011):** A study on the prevalence, distribution and economic importance of *Cysticercus tenuicollis* in visceral organs of small ruminants slaughtered at an abattoir in Ethiopia. *Journal of Veterinary Medicine and Animal Health*; 3(5): 67-74.

الملخص العربي

درسات طفيلية و باثولوجية نسيجية على طفيليات الأنسجة الموجودة بالحيوانات المذبوحة بمحافظة الدقهلية

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أجريت هذه الدراسة لتحديد الطفيليات المنتشرة بين انسجة الحيوانات المذبوحة بمحافظة الدقهلية من خلال زيارات منتظمة الي مجزر المنصورة حيث تم فحص عدد ٩٣٩ من ذبائح المجترات, ٣٨٧ من الأبقار, ٢٠٥ من الجاموس و ٣٤٧ من الأغنام للكشف عن مدى اصابتها خلال الفترة الممتدة من اغسطس ٢٠١٥ الى يوليه ٢٠١٦. اثناء فحص ذبائح الأبقار وجدت ٣ انواع من طفيليات الأنسجة وهم: الأكياس المائية الهيداتيية (١,٨٠٪), اليرقة المثانية البقرية (٠,٥١٪) و اليرقة المثانية ذات الرقبة المعلقة (٠,٢٥٪) اما بفحص ذبائح الجاموس وجد نوعين من طفيليات الأنسجة وهم: المتكيسات العضلية (٢٦,٨٢٪) و الأكياس المائية الهيداتيية (٢,٤٣٪) وايضا وجد اصابة ذبائح الأغنام بنوعين من طفيليات الأنسجة وهم : اليرقة المثانية ذات الرقبة المعلقة (٢١,٠٣٪) و اليرقة المثانية الغنمية (٥,٤٧٪). وقد تم دراسة معدل الانتشار وكذلك معدل الانتشار الموسمي و التوزيع التشريحي لهذه الطفيليات. وكذلك دراسة التغيرات الباثولوجية التي تحدث في الانسجة والاعضاء المختلفة لهذة الحيوانات بهدف التوصل لنتائج مؤكدة لتشخيص هذه الطفيليات في الأنسجة المختلفة .

