

Diagnosis of *Moniezia expansa* in Babylon and Karbala butchery's sheep



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Abstract *Moniezia expansa* is a prevalent species of tapeworm that poses potential health risks to sheep and other ruminant animals. Its distribution is global, including regions such as Babylon and Karbala. The diagnosis of *Moniezia expansa* in sheep processed through butcheries and abattoirs in these areas typically follows a structured approach. A crucial aspect of the diagnostic process involves postmortem examination, where butchers and inspectors meticulously inspect the sheep's intestines. The small intestines, particularly the jejunum and ileum, often serve as habitats for *Moniezia expansa* tapeworms. During visual inspection, professionals identify the presence of adult tapeworms or their segments. Subsequently, the identified tapeworm segments undergo specific identification procedures. Typical *Moniezia expansa* segments exhibit a flat and rectangular shape, often appearing broader than their length and extending several centimeters. Between March 2020 and February 2021, 266 random samples of small intestines were collected from sheep slaughtered in Babylon and Karbala butcheries. The study results indicate that the parasite had a widespread presence in both regions, with infection rates of 30.45% (37.78%, 28.47%) for Babylon and Karbala, respectively. The highest infection rate, reaching 48.71%, was observed during the summer season, particularly in July.

Keywords: *Moniezia expansa* parasite, sheep, butchery's sheep

1. Introduction

The genus *Moniezia* comprises highly prevalent worms that infest sheep intestines. The disease conditions caused by these worms lead to risky economic crises worldwide (Mazyad & El-Nemr, 2002). The characteristic scolex, neck, and strobili are the most highly recognized parts of the worm. Cyclophyllidea and Anoplocephalidae are the order and the family of this genus, respectively. Each proglottid has repeated sexual parts for better differentiation of these worms. Mites are considered the main intermediate hosts for *Moniezia* species, supplying a source of infestation by feeding on grass (Denegri et al., 1998).

Monieziasis is the term for an illness caused by a species of *Moniezia*. For this genus of tapeworms, there are limited species, such as *M. expansa* (Rudolphi, 1810), *M. benedeni* (Moniez 1879), and *M. monarda* (Ohtori et al., 2015).

M. expansa affects sheep (with a high incidence), cattle, goats, swine, and, very rarely, humans (El-Shazly et al., 2004; Gómez-Puerta, 2008). Young animals appear to be the main targets for infestation by *M. expansa* (Wymann, 2008).

Sheep are considered the most crucial livestock for human consumption in Arab countries (Jebur & Abbas, 2021). Pathogenicity and GIT disorders are less severe in calves and lambs than in adult ruminants (Alhayali et al., 2020). Mites are regarded as intermediate hosts in the *Moniezia* life cycle. When ruminants ingest them, their larvae (cysticercoids) actively attach to the small intestine and become adults (Denegri et al., 1998).

According to the abovementioned studies, research on this parasite is very limited in the provinces of Babylon and Karbala, so the present study aimed to reveal the infection rate of the worm and its spread in cattle and sheep in the slaughterhouses of Babylon and Karbala Provinces.

2. Materials and Methods

2.1. Collection of Samples

During the period from March 2020 to February 2021, the small intestines of 266 slaughtered sheep were examined for infection with *Moniezia* species. A total of 122 and 144 intestine samples were collected from slaughterhouses in Babylon and Karbala, respectively. The process of examining the intestine samples was performed by washing the intestines in a special, clean and sterile container to prevent the loss of worms. All the samples were numbered for the animals sequentially according to Rahif (1995), after which the worms were placed in physiological salt solution for 1-7 hours and subsequently transferred to 5% formalin. The samples were diagnosed and examined according to the methods of Soulsby (1982), and the morphology of these worms was identified using a light microscope.



2.2. Statistical analysis

The results were analyzed statistically using a t test, with a significance level of $t = 0.072$.

3. Results and Discussion

During the aforementioned period, 266 samples were examined from the intestines of livestock in the governorates of Babylon and Karbala. Among the total parasite infection rates, 81 were infected, 40 were infected with Babylon, and 41 were infected in Karbala. The total infection rates reached 30.45%: 37.78% and 28.42% in Babylon and Karbala, respectively, as shown in Table 1 (Figure 1). Table 2 shows the results of infections according to month and reveals that there is a direct relationship between the increase in temperature and infection rate. The highest rate was in the summer months, with the highest total infection rate occurring in July (48.71%), as shown in Table 2. The percentage of Babylon was 57.14% in August and 52.94% in Karbala in July, as shown in Figure 2. No significant differences in infection rate were found between the two tables.

3.1 Infection Rates in Babylon and Karbala

The study revealed that the infection rates of *Moniezia expansa* in Babylon and Karbala were 37.78% and 28.47%, respectively. This indicates a greater prevalence of the parasite in Babylon than in Karbala.

3.2 Seasonal variation in infection status

The results showed a direct relationship between the increase in temperature and infection rate. The highest infection rate of 48.71% was observed in the summer month of July. This finding suggested that the infection rates of *Moniezia expansa* are influenced by seasonal factors, with higher rates occurring during warmer months.

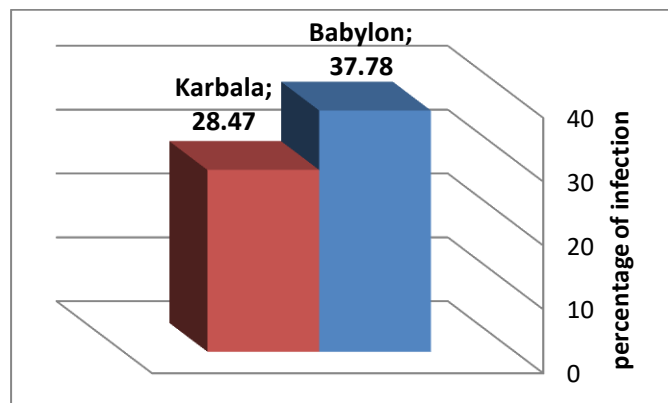


Figure 1 The total infection rates of slaughtered *Moniezia expansa* animals.

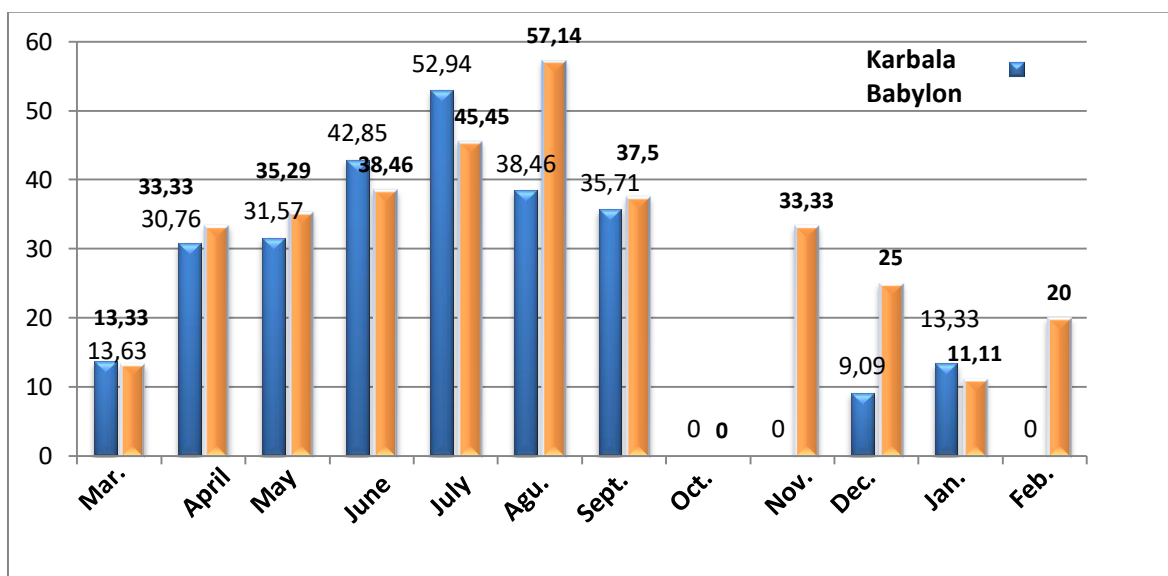


Figure 2 Infection rates of *Moniezia expansa* in animals according to month.



Table 1 Infection rates of slaughtered *Moniezia expanza* animals.

Governorate	No. total sample	No. inf. sample	Total inf. %
Babylon	122	40	37.78
Karbala	144	41	28.47
Total	266	81	30.45

Table 2 Infection rates of *Moniezia expanza* in slaughtered animals according to month of year.

Months	Babylon			Karbala			Total		
	No. Ex. samples	No. Inf. samples	%	No. Ex. samples	Inf. samples	%	Ex. samples	Inf. samples	%
March	15	2	13.33	22	3	13.63	37	5	13.51
April	12	4	33.33	13	4	30.76	25	8	32
May	17	6	35.29	19	6	31.57	36	12	33.33
June	13	5	38.46	14	6	42.85	27	11	40.74
July	22	10	45.45	17	9	52.94	39	19	48.71
August	7	4	57.14	13	5	38.46	20	9	45
September	8	3	37.5	14	5	35.71	22	8	36.36
October	0	0	0	6	0	0	6	0	0
November	6	2	33.33	0	0	0	6	2	33.33
December	8	2	25	11	1	9.09	19	3	15.78
January	9	1	11.11	15	2	13.33	24	3	12.5
February	5	1	20	0	0	0	5	1	20
Total	122	40	32.78	144	41	28.47	266	81	30.45

4. Discussion

Tapeworms that infect humans and animals are considered one of the biggest problems of the current century because of the diseases they cause and the great economic losses they cause. Despite the many studies and research conducted on tapeworm infection, we did not find a comprehensive, expanded or annual study for all seasons of year for tapeworm infections in sheep in Iraq. Most of the studies included parasites that infect the digestive system, and tapeworms are among the parasites studied. In our investigation, infection with *Moniezia* was found to be more prevalent in Babylon (37.78%) than in Karbala (28.42%), as shown in Table 1. After investigating the whole year of infection to identify the aforementioned parasite during the period from March (2020) to February (2021), it was found that the number of infections increased with increasing temperature, with the highest infection rate reaching 48.71% in July and the lowest infection rate occurring on January 12.5%. These findings are in agreement with those of Anisimova and Al- Fatlawi (2012), who included 47 camels; the percentages of *Moniezia* infection were 15.38% and 32.35% in Diwania and Najaf, respectively. Additionally, a greater percentage of infections occurred in September (33.33%) than in October (23.07%). This study disagreed with the findings of Elbahy et al. (2015), whose results showed that the recovered cestodes were *Moniezia expansa*, *Moniezia benedeni*, *Avitellina centripunctata*, and *Moniezia denticulate*; the highest infection rate was among sheep (62.89%), while the lowest was among buffaloes (3.69%). Regarding the seasonal and monthly incidence of trematode infection, the highest infection rate was recorded during the winter and spring seasons (30.09%), the peak infection rate was observed in December (66.66%) for cestode infection, the highest infection rate was recorded in autumn and winter, and the peak infection rate was observed in November 56.43% and December 34.55%.

The results of the present study do not agree with the results of Aydenizöz and Yildiz (2003), who conducted a study in Turkey in which the rate of infection with the sheep parasite Anoplocephalidae was 4.43% of sheep and 0.34% of cattle were slaughtered in Kirikkale. The helminth species determined were *M. expansa*, 3.98% *M. expansa*, 0.86% *A. centripunctata* and 0.15% *T. ovilla* in the total sheep examined and 89.92% *M. expansa*, 19.42% *A. centripunctata*, and 3.59% *T. ovilla* in infected sheep.

Although animal breeding is important for the Iraqi economy, the benefit of animal breeding is low. Parasitic infections are an important cause of economic loss for animal producers. Helminth infections often go unnoticed because, in most infections, there are no clinical signs (Umur and Gicik,1995. Tigin et al.,1989). Although light infections have not caused clinical symptoms in older animals, depressed tract systems, diarrhea, depression in growth, anemia, edema and decreased wool are symptoms recorded in younger animals (Burgu A. and Guclu, 1990 Cantoray et al.,1993, Soulsby, 1982).

The predominant *Moniezia* species in sheep reared in Babylon city is *Moniezia expansa*, which requires further investigation, and the high incidence of parasitic infection in sheep may be related to various factors, including the temperature, different environmental conditions in the study area, lambing, and lactation, which contribute peculiar stress



factors responsible for female malnutrition and weakness (Aliyn et al., 2020); in contrast, the sex of animals plays no role in the epidemiology and occurrence of *Moniezia* spp. (Adu and Hasan, 2016).

5. Conclusions

- The prevalence of *Moniezia* infection in sheep in the Babylon and Karbala provinces of Iraq was investigated from March 2020 to February 2021.
- The infection rate was greater for Babylon (37.78%) than for Karbala (28.42%).
- There was a direct relationship between temperature and infection rate, with the highest rate observed in the summer months.
- The highest infection rate was recorded in July (48.71%), while the lowest rate was in January (12.5%).
- These findings are consistent with previous studies that have shown higher infection rates in warmer months.
- This study highlights the importance of monitoring and controlling *Moniezia* infection in sheep to prevent economic losses for animal producers.

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Ethical considerations

Transparency and Full Disclosure: Honest and clear communication with all stakeholders involved—livestock farmers, butchers, and consumers—was imperative. Stakeholders were furnished with the correct information regarding the detection, treatment, and consequences of *Moniezia expansa* infection. This transparency was essential for responsible decision-making processes at every level of operation.

Food Safety: Considering that these sheep were destined for butcheries, there was an ethical responsibility to ensure meat safety and prevent any potential transmission of the parasite to consumers. Regular inspection of livestock and adherence to strict hygienic slaughtering practices were key to preventing foodborne transmission.

Conflict of interest

The authors declare that they have no conflicts of interest.

Funding

This study investigated the infection rates of *Moniezia expansa*, a tapeworm parasite, in sheep in the governorates of Babylon and Karbala in Iraq. The total infection rates were 37.78% in Babylon and 28.47% in Karbala. The study also analyzed the infection rates according to the month of the year and revealed that the highest infection rates occurred in July for Karbala (52.94%) and August for Babylon (57.14%). These findings suggest that tapeworm infections in sheep pose a significant problem in these regions and highlight the need for further research and control measures.

References

- Adu, M. M., and Hasan, D. I. (2016). Prevalence of nematodes infestation in goats reared in Nasarawa state, Nigeria. *Nigerian J Agri Food Environ*, 12(3):79-84.
- Alhayali, N. S., Hasan, M. H., Al-Malhah, K. H. (2020). Natural heavy infection with immature Sarcocysts of *Sarcocystis* spp. in sheep in Mosul city: A case report. *Iraqi J Vet Sci.*;34(2):373-376. DOI: 10.33899/ijvs20110.
- Aliyn, A. A., Ewah, F. O., Maikenti, J. I., Aynba, S. O., Aimankhu, O. P., Ahmed, H. O., Harura, A., Idris, A. M. (2020). Helminth parasites of goats and sheep at slaughterhouse in Lafia Nasarawa State, Nigeria. *Fud J Sci.*;4(2):34-40. DOI: 10.33003/fjs-20200402-154.
- Anisimova I., and Al- Fatlawi, M. (2012). *Moniezia expansa* (Moniex, 1879) in camels (*Camelus dromedarius*) in central Iraq. *Kufa J. Vete. Med. Sci.*3(2) : 111-116.
- Aydenizöz, M., Yildiz, K. (2003). Prevalence of Anoplocephalidae Species in Sheep and Cattle Slaughtered in Kirikkale, Turkey. *Revue Méd. Vét.*, 154(12), 767-771.
- Burgu, A., Guclu, F. (1990). Evcil ruminantlarda Anoplocephalose. *Etlik Vet. Mikrobiyol. Derg.*, 6, 131-146.
- Cantoray, R., Guclu, F. Aydenizoz, M. (1993). Konya E.B.K. mezbahasında kesilen koyunlarda Anoplocephalidae türlerinin yayilisi. *Selcuk Univ. Vet. Fak. Derg.* 9, 53-57.



- Denegri, G., Bernadina, W., Perez-Serrano, J. and Rodriguez-Caabeiro, F. (1998). Anoplocephalid cestodes of veterinary and medical significance: a review. *Folia Parasitologica*, 45(1): 1-8.
- Elbahy, N., Elkhtam, A., Aboulaila, M. (2015). Prevalence of Different Flatworms Infecting Ruminants In Menoufia Governorate. *JCVR*. 9(1):66-77. doi . 10.21608/JCVR.2015.37188.
- El-Shazly, A. M., Morsy, T. A., Dawoud, H. A. (2004). Human Moniezia expansa: the first Egyptian parastic zoonosis. *Journal of the Egyptian Society Parasitology*, 34 (2): 380–381.
- Gómez-Puerta, D. (2008). Occurrence of Moniezia expansa in domestic pig. *Veterinary Parasitology*, 33: 191-194.
- Jebur, L. A., Abbas, A. K. (2021). A comparative study of cattle and sheep amoebiasis in selected regions of Baghdad city. *I J Vet Med.*;45(1):37-40. DOI: 10.30539/ijvm.v 45i1.1038.
- Mazyad, S. A. M., El-Nemr, H. I. (2002). The endoparasites of sheep and goats, and shepherd in North Sinai Governorate, Egypt. *Journal of the Egyptian Society Parasitology*, 32(1):119-126.
- Ohtori, M., Aoki, M., Itagaki, T. (2015). Sequence differences in the internal transcribed spacer1 and 5.8S ribosomal RNA among three Moniezia species isolated from ruminants in Japan. *The Journal of Veterinary Medical Sciences*, 77(1): 105-107
- Rahif, R.H. (1995). Prevalence and seasonal distribution of cestod Infection in sheep and goats in Baghdad. *Iraqi.J.Vet Sci.*,8(2),279- 286.
- Soulsby, E. J. L. (1982). Helminths, Arthropods and Protozoa of Domesticated Animals, 7th ed., The English Language Book Society and Bailliére Tindal, London., pp: 93-98,
- Tigin Y., Burgu A., Doganay A., Bozan H. and Guclu, F. (1989). Koyun ve sigirlarda Anoplocephalidae turlerinin yayilisi. *Ankara Univ. Vet. Fak. Derg.* 36, 614-627.
- Umur S. In addition, Gicik, Y. (1995). Kars yoresi ruminantlarinda Anoplocephalidae turlerinin yayilisi. *T. Parazitol. Derg.*, 19, 272-281
- Wymann, M. N. (2008). Gastrointestinal parasite egg excretion in young calves in periurban livestock production in Mali. *Research in Veterinary Science*, 84(2):225-231.