

Original Research

Prevalence of fascioliasis among ruminants in Dhamar governorate, Yemen

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Abstract

Background: In Yemen, there is little information about fascioliasis. This parasitic disease is dangerous for livestock and can also cause serious harm to human health.

Aim: This study was aimed to assess the prevalence of fascioliasis among ruminants in Dhamar governorate during the years 2020 and 2021.

Methods: It was retrospective study using post-mortem meat inspection records of the General Establishment for Slaughterhouses and Meat Market (GESMM) in Dhamar governorate. Annual meat inspection records about the number of ruminants infested with liver fluke as well as the total number of ruminants slaughtered were collected.

Results: The mean overall prevalence of fascioliasis among the native ruminants was 0.35%. The mean overall prevalence rates among native cattle, calves, and sheep and goats were 0.88%, 0.38%, and 0.24%, respectively.

Conclusion: The prevalence of fascioliasis was low among ruminants in Dhamar governorate. However, more sensitive epidemiological surveys should be carried out to confirm this finding.

Keywords: Prevalence, Fascioliasis, Ruminants, Dhamar, Yemen.

1. Introduction

Fascioliasis, caused by a liver fluke, is an animals parasitic disease that accidentally affect human. In Yemen, there is little information about fascioliasis and its epidemiology [1]. In general, the World Health Organization (WHO) considered fascioliasis as a neglected tropical disease [2]. *Fasciola hepatica* and *Fasciola gigantica* are the main species causing this foodborne disease. They are leaf-like helminths, seen by the naked eye, measuring about 2 - 7.5 centimetres long. They are classified as trematodes, in particular, liver flukes. *F. hepatica* and *F. gigantica* infect a wide range of ruminants including sheep, goats, cattle, and

camels. As well, humans contacting infected animals can accidentally acquire the infection. *F. hepatica* is found mostly in countries of temperate climate and parts of the Middle East and South America, whereas, *F. gigantica* is found mainly in South and South-east Asia, the Far East and tropical Africa [3].

The adult flukes' habitation is in the liver and the bile duct of the definitive host, herbivorous mammals, as well as humans. These flukes produce eggs that passed in the faeces. To complete their life cycle, the eggs must reach freshwater where miracidia hatch and penetrate the snail intermediate host of Lymnaeidae family. After asexual replication in the snail, cercariae leave the snail. Cercariae encyst on aquatic plants and become metacercariae. The

transmission of these parasites is occurred by ingestion of the metacercariae infective stage. Juvenile flukes excyst in the small intestine of the definitive host. They penetrate the intestine reaching the liver and finally adult flukes enter bile ducts [4].

The veterinary importance of *F. hepatica* and *F. gigantica* came from the fact that they can cause significant mortality in sheep and cattle leading to significant economic losses in endemic areas. In human, these parasites infect about two million persons in more than 70 countries [2]. In Yemen, fascioliasis is reported among cattle and goats but no liver fluke has been found between sheep or camels [5]. Accordingly, few human infections with these parasites are reported in the country [6].

Dhamar governorate is one of Yemeni regions depending on agriculture. Ruminants such as cattle, sheep, and goats are a vital component of farmers' life there. In Dhamar governorate, the occurrence of *Fasciola* infection was reported among sheep [7]. It was performed by finding the eggs of liver flukes in the faeces of infected animals. However, to the best of our knowledge, no previous study has been carried out on finding the flukes in the liver of slaughtered ruminants. This study, therefore, was aimed to analysis the meat inspection data on *Fasciola* species infection documented by General Establishment for Slaughterhouses and Meat Market (GESMM) in Dhamar governorate during the years 2020 and 2021.

2. Methods

Study Area

Dhamar governorate is located in the central area of the western highlands of Yemen. It contains about two millions people distributed among 12 districts [8]. Dhamar city is the central city of Dhamar governorate. It is located 100 kilometers south of Sana'a, the capital city of Yemen. It is about 1600 – 3200 meters over sea level. The governorate has a temperate climate with average temperatures range from 10 to 19 °C in summer, 8 to -1 °C in winter. The annual rainfall would range between 400 and 500 millimeters. Agriculture is the leading economic activity and there is a close contact between Dhamar governorate's rural inhabitants and cattle, sheep and goats.

Study Design

This was a retrospective study covering a period of two years (2020 and 2021) using post-mortem meat inspection records of the General Establishment for Slaughterhouses and Meat Market (GESMM) in Dhamar governorate. Ruminants slaughtered at Central Slaughterhouse –Dhamar Branch (CSDB) and its branches in during this period were the population of this survey. Cattle (adult ≥ 2 years and calves aged < 2 years), sheep, and goats are the main animals slaughtered there. All animals brought to slaughterhouses were undergoing veterinary examination by the specialists. Only healthy non-pregnant animals were slaughtered. After slaughtering, a further examination (meat inspection) for all the organs of the animals was performed by specialized veterinarians. Daily reports were then sent to the GESMM to be recorded and documented and healthy meat is

delivered to the markets.

Data Collection

Several visits to the study sittings were performed during the period between September 2021 and February 2022. Documented data on liver fluke infestations during the two years (2020 and 2021) were collected. All slaughtered cattle, calves, and sheep and goats were included. This study focused on native animals those born and raised in Yemen. Data on imported animals those born outside Yemen were also collected.

Data Analysis

Data were analysed using statistical package for social sciences software (SPSS) version 15. Data were presented as frequencies and percentages.

Ethical Consideration

Prior to commencement of this study, ethical approval was obtained from Tamar University Medical Ethics Committee (No: TUMEC-22009). Permission was taken from the Director General and Director of Veterinary Office of General Establishment for Slaughterhouses and Meat Market, Dhamar Branch.

3. Results

As shown in Figure 1, *F. hepatica* parasite in cattle's liver was detected by specialized veterinarians at the Central Slaughterhouse, Dhamar Branch (CSDB). It measured about 2.3 centimeters long. This figure was taken during our visits.



Figure 1: *Fasciola hepatica* parasite detected in cattle's liver at the Central Slaughterhouse, Dhamar Branch (CSDB).

As shown in Table 1, a total of 51004 native animals were slaughtered at the central slaughterhouse and its sub-branches in Dhamar governorate during the two year (2020 and 2021). The mean overall prevalence of *Fasciola* infection among the slaughtered ruminants was 0.35% (51004/180). It was 0.41% (97/23903) in the year 2020 and 0.31% (83/27101) in the year 2021.

Table 1: Overall prevalence of liver fluke among native ruminants slaughtered at the central slaughterhouse and its sub-branches in Dhamar governorate

Year	Total slaughtered animals	Animals infected with <i>Fasciola</i> species	Prevalence (%)
2020	23903	97	0.41
2021	27101	83	0.31
Total	51004	180	0.35

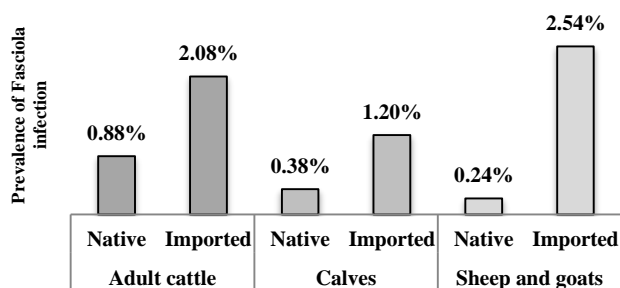
Table 2 shows the distribution of *Fasciola* infection prevalence among native adult cattle, calves, and goats and sheep slaughtered at the central slaughterhouse and its sub-branches in Dhamar governorate during the years 2020 and 2021. The overall mean prevalence of *Fasciola* infection over the two years 2020 and 2021 exhibited that adult cattle had the highest rate of infection (0.88%; 57/6481) followed by calves (0.38%; 42/11019) and then sheep and goats (0.24%; 81/33504). There was a decline in the prevalence of *Fasciola* infection in the year 2021 compared to the year 2020 among cattle and sheep and goats (0.70% vs. 1.09%; and 0.20% vs. 29%, respectively).

Table 2: Distribution of *Fasciola* infection prevalence among native ruminants slaughtered at the central slaughterhouse and its sub-branches in Dhamar governorate

Types animals	2020		2021		Mean overall prevalence %
	Total	Infected n (%)	Total	Infected n (%)	
Adult cattle	3033	33(1.09)	3448	24(0.70)	0.88
Calves	6133	21(0.34)	4886	21(0.43)	0.38
Sheep and goats	14737	43(0.29)	18767	38(0.20)	0.24

n: number of animals infected with *Fasciola* species; %: percentage

As revealed in Figure 2, mean overall prevalence of *Fasciola* infection among native and imported ruminants slaughtered at the central slaughterhouse and its sub-branches in Dhamar governorate during the years 2020 and 2021. The years 2020 and 2021 total slaughtered imported cattle, calves, and sheep and goats were 1344, 5506, and 1418, respectively. Accordingly, numbers of the imported animals infected with *Fasciola* species were 28, 66, and 36, respectively. Imported cattle, calves, and sheep and goats showed higher prevalence of the infection compared with natives (2.08% vs. 0.88%, 1.20% vs. 0.38% and 2.54% vs. 0.24%, respectively).

**Figure 2: Mean overall prevalence of *Fasciola* infection among native and imported ruminants slaughtered at the central slaughterhouse and its sub-branches in Dhamar governorate during the years 2020 and 2021**

Note: No imported sheep or goats were slaughtered during the 2021.

4. Discussion

The present study demonstrated that although fascioliasis was occurred in the native cattle, calves, and sheep and goats slaughtered at Central Slaughterhouse – Dhamar Branch (CSDB) and its branches in Dhamar governorate, the prevalence was low. The mean overall prevalence of fascioliasis among the native ruminants was 0.35%. The findings exhibited that the prevalence of *Fasciola* infection was higher among adult cattle than calves or sheep and goats. As well, the results also showed that the prevalence of *Fasciola* infection was higher among the imported animals than natives.

According to the data obtained from the GESMM, Dhamar Branch, the prevalence of *Fasciola* infection was lower among the native ruminants. The highest prevalence rate was detected among adult cattle to be 1.09% in the year 2020. This percentage, however, declined to 0.70% in 2021. On the other hand, the prevalence of *Fasciola* infection among calves was not exceeded 0.43%. Similarly, a lower prevalence of the infection was detected among sheep and goats during the years 2020 and 2021 (0.29% and 0.20%, respectively).

Regarding the prevalence of *Fasciola* infection among imported ruminants, the results displayed higher prevalence rates compared to native ones. Imported sheep and goats showed the highest prevalence of 2.54% during the year 2020. The mean overall prevalence among the imported cattle and calves was 2.08% and 1.20% during the years 2020 and 2021, respectively. Yemen usually imports animals from neighbouring countries, especially Ethiopia and Somalia. This is consistent with many recent reports confirming that the prevalence of fascioliasis among ruminants in these countries is high [9-11].

Records of Dhamar Branch GESMM on the prevalence of liver fluke among ruminants in Dhamar governorate showed lower rate than that reported by a previous study from the same country, Taiz. It has been 5.47% among slaughtered cattle and 3.14% slaughtered goats [5]. In addition, the prevalence reported by the present study was lower than that reported by similar slaughterhouse studies carried out in Iran and Tanzania among sheep and goats and cattle (6.6% and 8.6%, respectively) [12,13]. Furthermore, it was much lower than that reported among slaughtered cattle in Kashmir (26.84%) and Uganda (65.74%), respectively [14,15].

On the other hand, the findings from this study were in agreement with that reported from other slaughterhouse surveys. For example, in north-eastern Iran, the rate of infection was reported to be 0.71 among cattle, 0.35% among sheep, and 0.20% among goats [16]. Another study from Botswana reported a prevalence rate of 0.09% among cattle [17].

There are several factors that could have significant impacts on the difference in the prevalence of fascioliasis between one country to another or even between different areas in the same country. Ecological and climatic factors along with animal husbandry practices and parasite control measures play an important role in the prevalence of the disease [17].

Climate of Dhamar governorate could be responsible for

the low prevalence of fascioliasis. Restively dry conditions in Dhamar governorate, the average annual rainfall varies between 400 and 500 mm, do not favour the transmission of the parasite. For instance, the average annual rainfall varies between 200 mm to about 1000 mm in Taiz governorate of the same country. It also varies between 1000 and 1400 mm in Lira district of Uganda, where a higher prevalence has been reported [18]. As well, in Dhamar governorate, there are no rivers and natural water bodies, lakes, and animals drinking channels are very scarce especially in eastern districts. These conditions, however, increase the risk of infections by providing optimal conditions for the survival of the snails, intermediate host [17, 19].

The low prevalence of fascioliasis in Dhamar governorate can be also attributed to the improvement of veterinary services. In Dhamar city, there is an academic faculty at Thamar University, Faculty of Agriculture and Veterinary. This faculty has contributed to the graduation of many veterinarians. There are sufficient private veterinary practitioners. Anthelmintics are available and the awareness of the farming community may have become better.

Post-mortem meat inspection for assessing the prevalence of liver fluke infection among animals has been reported to be less sensitive than faecal egg count and serological techniques [20-22]. On the other hand, farmers may not prefer to send their sick ruminants to official slaughterhouses. Therefore, the findings of this study could underestimate the prevalence of the disease in Dhamar governorate.

5. Conclusion

The present study concludes that the prevalence of fascioliasis is low among native cattle, calves, and sheep and goats slaughtered at Central Slaughterhouse – Dhamar Branch (CSDB) and its branches in Dhamar governorate. However, across sectional studies using more sensitive epidemiological methods are needed.

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Competing interests

The authors declare that they have no competing interests.

References

- Abdul-Ghani R. Fascioliasis in Yemen: A long track of neglect despite reports of existence. *Yemeni J Med Sci.* 2018;12:1-4. <https://doi.org/10.20428/YJMS.12.1.E>
- World Health Organization. Neglected tropical diseases: Fascioliasis. Available from: <https://www.who.int/news-room/questions-and-answers/item/q-a-on-fascioliasis>. [Cited 2024 March 25].
- Cheesbrough M. District laboratory practice in tropical countries. 2nd ed. Cambridge University Press: UK; 2009.
- Schmidt GD, Roberts LS. Foundations of Parasitology. 8th ed. Roberts LS, Janovy J JR. McGraw-Hill: New York; 2009.
- Hezam K, Morshed AF, Hassan A, Abbas A, Ghaleb H, Zhang J, et al. Prevalence of parasitic helminthes among slaughtered animals in slaughterhouses in Taiz, Yemen. *Int J Curr Microbiol App Sci.* 2016;5:80-88. doi: <http://dx.doi.org/10.20546/ijcmas.2016.508.010>.
- Farag HF. Intestinal parasitosis in the population of the Yemen Arab Republic. *Trop Geogr Med.* 1985;37:29-31.
- Al-Shaibani IRM, Al-Haj A. Prevalenc of gastrointestinal helminthes in sheep in and around Thamar city, Yemen. *Yemeni J Biol Sci.* 2010;6:99-107.
- Public Health and Population Office of Dhamar Governorate, Primary Health Care Management, Proposal of the National Campaign for Controlling Schistosomiasis 2014, unpublished. Dhamar, Yemen: Public Health and Population Office of Dhamar Governorate, 2014.
- Abaya SW, Mereta ST, Tulu FD, Mekonnen Z, Ayana M, Girma M, et al. Prevalence of human and animal fasciolosis in Butajira and Gilgel Gibe health demographic surveillance system sites in Ethiopia. *Trop. Med. Infect. Dis.* 2023;8:208. <https://doi.org/10.3390/tropicalmed8040208>.
- Bilal ZM, Musa KS. Coprological prevalence and associated risk factor of bovine fasciolosis around furda veterinary clinic, East Hararghe, Ethiopia. *Vet Med Open J.* 2021; 6:39-44. doi:10.17140/VMOJ-6-157.
- Mohamed MOS, Ibrahim AM, Ahmed HA, Yusuf MA, Mio JB, Salah OM, et al. assessment of the prevalence and associated risk factors of gastrointestinal parasite of goats in Afgooye District, Lower Shabelle, Somalia. *Journal of Applied Veterinary Science and Technology.* 2023;04:93-99. doi:10.20473/javest.V4.I2.2023.93-99.
- Khanjari A, Bahonar A, Fallah S, Bagheri M, Alizadeh A, Fallah M, et al. Prevalence of fasciolosis and dicrocoeliosis in slaughtered sheep and goats in Amol abattoir, Mazandaran, northern Iran. *Asian Pac J Trop Dis.* 2014;4:120-124. doi:10.1016/S2222-1808(14)60327-3.
- Nonga H, Mwabonimana M, Ngowi H, Mellau L, Karimuribo E. A retrospective survey of liver fasciolosis and stilesiosis in livestock based on abattoir data in Arusha, Tanzania. *Trop Anim Health and Prod.* 2009;41:1377-80. <http://dx.doi.org/10.1007/s11250-009-9325-8>.
- Gul N, Tak H, Fazilli KM, Abdullah I, Sofi TA. Prevalence of Fasciola infection in slaughtered Animals in Kashmir. *International Journal of Veterinary Sciences and Animal Husbandry.* 2016;1: 30-6.
- Opio LG, Abdelfattah EM, Terry J, Odongo S, Okello E. Prevalence of fascioliasis and associated economic losses in cattle slaughtered at Lira municipality abattoir in Northern Uganda. *Animals.* 2021;11:681. <https://doi.org/10.3390/ani11030681>.
- Oryan A, Mansourian M, Moazeni M, Nikahval B, Barband S. Liver distomatosis in cattle, sheep and goats of northeastern Iran. *Global Vet.* 2011;6:241-6.
- Mochankana ME, Robertson ID. A retrospective study of the prevalence of bovine fasciolosis at major abattoirs in Botswana. *Onderstepoort Journal of Vet Res.* 2016;83, a1015. <http://dx.doi.org/10.4102/ojvr.v83i1.1015>.
- Lira district local government, district profile. Climate and rainfall. Available from: <https://lira.go.ug/about-us/district-profile>. [Cited 2024 April 8].
- Ogunrinade A, Ogunrinade B. 1980. Economic importance of bovine fascioliasis in Nigeria. *Trop Anim Health and Prod.* 1980;12:155-60. <http://dx.doi.org/10.1007/BF02242647>
- Mazeri S, Sargison N, Kelly RF, Bronsvoort BM, Handel I. Evaluation of the performance of five diagnostic tests for *Fasciola hepatica* infection in naturally infected cattle using a bayesian no gold standard approach. *PLoS ONE.* 2016;11:e0161621.
- Rapsch C, Schweizer G, Grimm F, Kohler L, Bauer C, Deplazes P, et al. Estimating the true prevalence of *Fasciola hepatica* in cattle slaughtered in Switzerland in the absence of an absolute diagnostic test. *Int J Parasitol.* 2006;36:1153-8.
- Gröning H, Oksanen A, Skrzyzyczak T, Autio T. A survey for

Al-Adhroey AH., et al. Prevalence of Fascioliasis among ruminants in Dhamar governorate, Yemen.

antibodies against *Fasciola hepatica* in cattle and sheep in Finland indicates a low level of exposure. Acta Vet Scand. 2023;65:24.

<https://doi.org/10.1186/s13028-023-00688-9>.