



Clinical presentations of Fasciola Hepatica in Sulaymaniyah teaching hospital/Iraq

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Abstract

Background and objective: Fascioliasis is an often-neglected zoonotic disease caused by liver fluke *Fasciola hepatica* and *Fasciolagigantica*. Human is an accidental final host by ingestion of contaminated plants and water by metacercaria. It occurs worldwide with a high incidence in the Middle East, North Africa and South America and currently is an emerging infection in Iraq. We believe fascioliasis in Sulaymaniyah governorate is an underestimated, not well studied health problem that must be taken into consideration as an emerging infestation in our locality. To identify the characteristic clinical presentations, laboratory and radiological findings and response to treatment in patients with fascioliasis in our locality

Methods: A retrospective case series, including all cases of *Fasciola hepatica* admitted to Sulaymaniyah teaching hospital in Kurdistan region of Iraq between January 2019 and January 2020. Inclusion criteria were any case of fascioliasis diagnosed by ELISA and radiological findings. The data were taken from the medical records and direct interview with the patients.

Results: The case series included 15 patients (12 females and 3 males), the mean age was 40.2 years (range, 25–54 years). Thirteen patients (86.67%) had history of watercress ingestion. Abdominal pain was the main symptom present in all fifteen (100%) and right upper abdominal tenderness was the most prominent sign present in ten patients (66.67%). The two prominent laboratory abnormalities were positive enzyme linked immunosorbent assay (ELISA) in all (100%) and eosinophilia in thirteen patients (86.67%). The most abnormal CT findings was livers multiple nodular micro-abscesses like lesions in seven (46.67%) patients. Two patients presented with biliary obstruction. Triclabendazole was given to all patients with six months follow up.

Conclusion: Fascioliasis is indeed an emerging disease in our region, it should be considered in the differential diagnosis of patients with hepatic or biliary disease with eosinophilia and history of watercress ingestion

Keywords: liver flukes in Iraq, *Fasciola hepatica*; Liver abscesses; diagnosis of human fascioliasis.

Background and objective

Fascioliasis is a parasitic disease caused by liver fluke species of the genus *Fasciola*: *Fasciola hepatica* and *Fasciola gigantica*. While *F. hepatica* is found on a global scale, *F. gigantica* can be found in tropical regions of Africa and Asia¹. Humans are accidental hosts by ingesting raw fresh water plants or drinking water contaminated with metacercariae². Human fascioliasis was only considered of secondary importance until the end of the 1980s owing to the relative small number of human reports. Only about 2000 human cases were reported in the 25 years previous to 1990³. It has been ignored for a long time until the last decade, when it emerged or reemerged in more than 60 countries⁴. A high incidence rate of human fascioliasis was reported in the Middle East (Egypt, Iran, Iraq, Syria and Saudi Arabia) and North Africa (Ethiopia) and South America (Peru and the Bolivian Altiplano)⁵.

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As a consequence, WHO recommended that human fascioliasis should be considered as a zoonosis of major global and regional importance⁶.

In humans, the parasitic infection begins when water plants, containing larva are ingested. The larva excyst in the stomach, penetrate the duodenal wall, escape into the peritoneal cavity, then penetrate the Glissons capsule and entering the liver parenchyma. Then flukes migrate randomly through the hepatic parenchyma making multiple small holes and cavities, causing inflammation, abscess formations, necrosis, granulation, and fibrosis, until they reach the larger bile duct, which is their permanent residence. The hepatic stage lasts two to several months while in the bile ducts the parasite may persist for a decade or more⁷.

Clinical signs and symptoms of fascioliasis may mimic a wide spectrum of hepatic and intestinal pathologies⁸. It should be considered always in endemic areas patients with a history of ingestion of aquatic plants. However, lacks of that history does not rule out infection, as far as there is evidence that infection can be acquired by drinking contaminated water^{9,10}.

The diagnosis of human fascioliasis can be performed by a combination of a direct method such as examination of eggs in the feces of the individual or with an indirect method such as serological tests that identify IgG or IgM class antibodies against the parasite and Imaging study such as computed tomography scan and abdominal ultrasonography^{11,12}. Abdominal CT and US may also be used in follow up to evaluate the efficacy of medical therapy¹³. Magnetic resonance

imaging (MRI) provides findings which are suggestive of various changes associated with traumatic hepatitis caused by the migration of the fluke in the liver¹⁴. Invasive techniques, such as percutaneous cholangiography and endoscopic retrograde cholangiography can reveal some abnormalities, but are generally not required for the diagnosis¹⁵.

In Iraq, Fascioliasis was reported for the first time in 1964. It was an ectopic human Fascioliasis in the eye by an immature Fasciola gigantica worm¹⁶. In Sulaymaniyah /Kurdistan Region of Iraq, the first case was reported in 1992 by accidental finding of the adult worm in the biliary duct after exploration of common bile duct (CBD)¹⁷. In 2019 we reported seven positive cases after bile analysis for the bile of 129 patients were underwent cholecystectomy for other reasons¹⁸. Fascioliasis seems to be an emerging health problem in both our urban and rural area and going to become an endemic disease in Sulaymaniyah, despite that, we believe it is underestimated and not well studied in our locality, in this study we will elaborate on common clinical presentations, laboratory and imaging findings of Fasciola hepatica cases in our region

Methods

A retrospective case series study has been done on fifteen patients. They were diagnosed with fasciola hepatica in Sulaymaniyah teaching hospital/Iraq, between January 2019 and January 2020. To conduct this study, ethical permission was approved by the ethical committee, College of Medicine /university of Sulaimani. Information was reviewed from

patients, patient data records, and the supervising surgeons.

All patients received a complete history and clinical exam, laboratory tests and imaging study: Diagnosis of Fasciola hepatica infection were based on clinical finding, presence of characteristic findings on the abdominal CT scan or MRI, positive ELISA test for fasciola hepatica; and/or the presence of Fasciola hepatica eggs in the fecal examination. ERCP was done for two patients and cholecystectomy was done for four patients.

Triclabendazole at a dose of 10 mg/kg body Weight/day were given to all patients. They were followed up monthly for 6 months .laboratory tests, abdominal US and/or CT, and serology were used for follow up according to each case's needs.

Results

Fifteen patients (12 females and 3 males) were diagnosed with Fasciola hepatica infection in Sulaymaniyah teaching hospital, between January 2019 and January 2020. The mean age was 40.2 years (range, 25–54 years).Thirteen patients (86.67%) had a history of watercress ingestion. Eight (53.33%) patients came from rural areas, while seven (46.67%) of them were from urban areas as shown in (table 1).

Table 2 shows clinical presentations:

Abdominal pain was the main complaint reported by all fifteen patients with Right upper quadrant

pain in nine patients (60%) and epigastric pain in six patients (40%), fatigue and myalgia in ten (66.67%).There was mild right upper quadrant tenderness on physical examination in ten (66.67%) patients and hepatomegaly in three (20%) patients.

Table 3 shows laboratory findings before treatment:

Leukocytosis was seen in eight patients (53.33%), eosinophilia in thirteen (86.67%), elevation in the erythrocyte sedimentation rate (ESR) in ten (66.67%). Moreover, stool analysis were done for ten (66.67%) patients and revealed operculated eggs of Fasciola hepatica in only three of the samples. However, positive results of enzyme linked immunosorbent assay (ELISA) were recorded in all the cases (100%).

Results of abdominal ultrasonography were exhibited the presence of gallstone in four patients (26.67%), hypoechoic foci mainly located in the peripheral and subcapsular areas of the liver in four (26.66%), dilated common bile duct in two (13.33%) and Fasciola hepatica was seen inside gallbladder of one patient.

The most prominent CT and MRI findings were multiple liver nodular lesions like micro-abscesses in seven (46.67%) patients and Solitary nodular lesions with irregular margins in two patients (Figure 1). Those lesions were mostly located peripherally, subcapsularly and predominantly in the right lobe. Also portal lymph nodes enlargement was seen in three patients (20%).

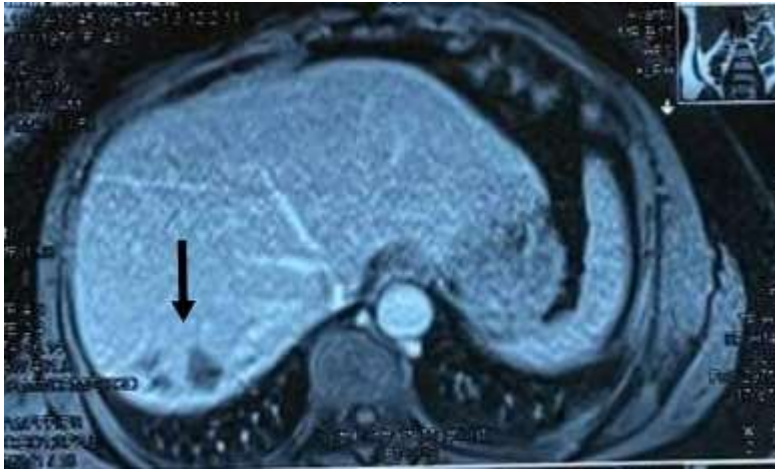


Figure 1 A 41-year-old female patient presented with right upper abdominal pain and fever lasting 3 wk. Abdominal MRI showed few adjacent peripheral enhanced locules in segment VII

Laparoscopic cholecystectomy was done for four gallstone patients with finding Fasciola hepatica inside gallbladder of one of them (Figure 3).

ERCP was performed for two patients based on clinical and imaging finding of extrahepatic biliary obstruction. Extraction of live mobile Fasciola hepatica was done (Figure 2).



Figure 2 A case of conventional cholecystectomy ,Fasciola worm swims in the bile in vitro



Figure 3. Live and mobile Fasciola hepatica removed from the choledochus by balloon catheter during ERCP

Table 1. Demographic characteristic of the patients with frequency distribution and percentages.

	General information	Frequency	Percentage (%)
Gender	Female	12	80%
	male	3	20%
	< 30	2	13.33%
Age	31-40	5	33.33%
	41-50	5	33.33%
	> 50	3	20%
Residence	Rural	8	53.33%
	Urban	7	46.67%
Watercress consumption	Yes	13	86.67%
	No	2	13.33%

Table 2. Shows frequency of presenting symptoms and signs.

Symptoms and signs	Yes (%)	No (%)
Right upper abdominal pain	9 (60%)	6 (40%).
Epigastric pain	6 (40%).	9 (60%)
Fatigue and myalgia	10 (66.67%)	5 (33.33%)
Fever	6 (40%)	9 (60%)
Weight loss	5 (33.33%)	10 (66.67%)
Nausea and vomiting	4 (26.67%)	11 (73, 33%)

Symptoms and signs	Yes (%)	No (%)
Itching	3 (20%)	12 (80%)
right upper quadrant tenderness	10 (66.67%)	5 (33.33%)
Hepatomegaly	3 (20%)	12 (80%)

Table 3. Represents the results of different diagnostic tests for the patients under the study

Investigations	Yes (%)	No (%)	Note
Leukocytosis (>1000 cells/ μ L)	8 (53.33%)	7 (46.67%)	
Eosinophilia (>500 cells/ μ L)	13 (86.67%)	2 (13.33%)	
Elevated ESR (men >15 mm/hr. women >20 mm/hr)	10 (66.67%)	5 (33.33%)	
Positive ELISA test	15 (100%)	0 (0%)	
Positive Stool test	3 (30%)	7 (70%)	Not done in 5

Discussion

Fascioliasis was limited in the past to specific geographical areas, but now it is widespread throughout the world⁶. This emergence appears to be related to climate change and global warming, and increasing travel and import/export.

The previous studies suggest that *Fasciola hepatica* infection in Sulaymaniyah seems to be an emerging health problem and should be considered as suspected our region is gradually becoming endemic to the disease, resembling some of our neighbor countries in Middle East like Iran and Turkey¹⁸⁻²³.

In this study, 12/15 (80%) of cases were female. In parallel to these finding results of some other studies also showed that the rate of incidence was higher among females than the males²³⁻²⁵. The high percentage of infections among the female might be related to several factors; it may be due to that females are in more contact with vegetables or due to lack of proper sanitary education among housewives.

In total 15 patients, 7(46.67%) of them were from urban areas. This may

be due to the vegetables been transported from rural areas and may be due to that, around the city vegetables are highly irrigated by sewage water. Also this seems to be important point to be considering by our physician that fascioliasis is significantly present in our urban area and not a disease of rural areas only.

The clinical presentation of fascioliasis depend on the worm burden, duration and phase of infection²⁶. The acute phase of disease is characterized by fever, abdominal pain, hepatosplenomegaly, gastrointestinal disturbances, skin rashes, high leukocyte count, eosinophilia, anemia, and elevated erythrocyte sedimentation rate²⁷. The latent phase is also characterized by nonspecific symptoms, including vague gastrointestinal disturbances, and intermittent eosinophilia⁶. The chronic or biliary phase which begins when the adult flukes enter the biliary tree, where they can remain asymptomatic for many years. They occasionally cause inflammation, epithelial hyperplasia and fibrosis, which can lead to biliary obstruction, cholangitis, and pancreatitis²⁸. This phase is characterized by symptoms include biliary colic pain, intermittent jaundice, eosinophilia, and

right upper-quadrant abdominal tenderness⁶.

Diagnosis of fascioliasis may be problematic and delayed because physicians rarely encounter this disease and a long list of other diseases must be included in the differential diagnosis. Lacks familiarity by clinicians in non-endemic areas have led to delay in diagnosis and increase the rate of complications. Diagnosis can be confirmed by demonstrating live parasites or eggs in the bile or feces, however, the disease cannot be ruled out by a negative stool examination. Especially during the acute phase of the disease stool studies for ova are unhelpful, since the parasites cannot produce eggs before the invasion of the biliary tree^{14, 29-34}. In our study Stool examination for egg was positive in only three patients out of ten (30%). This may be due to that most of our patient was in hepatic phase of the disease. In Cosme et al., study, in total 37 cases, egg was detected only in feces of 6 cases³⁵.

Leukocytosis was detected in 8/15 (53.33%) patients, while 13/15 (%86.67) had eosinophilia. Results of this study may indicate that differential leukocyte count was much more informative and important to be considered for the purpose of diagnosis rather than total count, which may highlight a parasitic infestation in the differential diagnosis of hepatobiliary problems. this is also observed in Cosme et al., and Hawramy et al.,^{23,35}.

ELISA detects antibodies against cathepsin L1. It is highly sensitive and specific in the acute phase of the disease, also called Fas2-ELISA^{36,37}. ELISA is the most widely used method for the diagnosis. It is rapid, sensitive and quantitative^{38,39}. Fas2-ELISA exhibited 95% sensitivity and 100% specificity in Jose R. Espinoza et al.,³⁷, and it revealed

positive results in all patients regardless of the stage in Yazgan Aksoy et al.,⁴⁰. In our study ELISA was done for all patients and was positive in all fifteen (100%) cases.

Abdominal US seem to be more useful in chronic fascioliasis, results may be either normal or may show mobile vermiform structures without acoustic shadowing within the gall bladder and in the bile ducts, representing flukes that may be confused with stones^{41,42}. All our patients were underwent abdominal US. The finding includes gallstone, hypoechoic subcapsular liver foci, hepatomegaly and dilated common bile duct. This findings also observed in Cosme et al.,³⁵, Saba et al.,⁴³ and Mekky et al.,⁴⁴.

CT-scans of the abdomen almost show abnormalities in patients with fascioliasis. the abnormalities seen most commonly on CT scans are multiple, small, indiscrete, hypo dense lesions 2–10 mm in diameter, and micro-abscesses arranged in a tunnel-like branching pattern, with frequent subcapsular locations of the lesions. In rare instances, abscess-like lesions 7–10 cm in diameter can be seen. Liver capsular thickening and subcapsular hemorrhage can also be detected^{45,46}. In this study multiple liver nodular lesions like micro-abscesses were the most common CT finding. Portal lymph nodes enlargement was seen in three patients. This finding synchronous with CT findings in Mekky et al.,⁴⁴, Kaya et al.,⁴⁷ and Yazgan Aksoy et al.,⁴⁸.

Human fascioliasis treatment has been difficult for a long time. Nowadays, Triclabendazole is the drug of choice because of its effectiveness against both adult and immature worms⁴⁹⁻⁵¹. Triclabendazole at a dose of 10 mg/kg body weight (single or split postprandial

dose) reportedly is effective in about 80%-90% of patients⁵². Efficacy of treatment of *F. hepatica* can be monitored by improvement in clinical symptoms during a period of weeks to months; resolution of peripheral eosinophilia; disappearance of eggs in stool; gradual decrease in ELISA titer and improvement in radiographic findings. If these criteria are not met within 6 months of therapy, retreatment should be considered⁵³. In this study Triclabendazole at a dose of 10 mg/kg body Weight/day were given to all patients. They were followed up monthly for 6 months until complete response seen in all patients. Laboratory tests, abdominal US and/or CT, and serology were used for follow up according to each case's needs.

Conclusions

Fascioliasis is not uncommon disease in our region and we will give recommendation to our physician to always put fascioliasis in differential diagnosis for patients with hepatobiliary disease with history of watercress ingestion and eosinophilia. Those patients may need more investigation including ELISA and CT-scan if there was doubt about the disease. Physician awareness and experience in early detection and treatment of fascioliasis is important because delay in treatment associated with a lot of complications and morbidity. Public awareness about this zoonotic disease, its effect on human, ways of transmission and prevention of spread is of high importance, which is more easily preventable than to diagnose and treating.

Conflict of interests

None.

Authors' contributions

The authors are the same

References

1. Mas-Coma, Santiago, Valero, M. A., & Bargues, M. D. (2009a). Chapter 2 Fasciola, Lymnaeids and Human Fascioliasis, with a Global Overview on Disease Transmission, Epidemiology, Evolutionary Genetics, Molecular Epidemiology and Control. In *Advances in Parasitology*. [https://doi.org/10.1016/S0065-308X\(09\)69002-3](https://doi.org/10.1016/S0065-308X(09)69002-3)
2. Qureshi, A. W., Tanveer, A., & Mas-Coma, S. (2016). Epidemiological analysis of human fascioliasis in northeastern Punjab, Pakistan. *Acta Tropica*. <https://doi.org/10.1016/j.actatropica.2015.12.023>
3. Chen, M. G., & Mott, K. E. (1990). Progress in assessment of morbidity due to Fasciola hepatica infection: a review of recent literature. In *Tropical Diseases Bulletin*.
4. Kim, A. J., Choi, C. H., Choi, S. K., Shin, Y. W., Park, Y. K., Kim, L., Choi, S. J., Han, J. Y., Kim, J. M., Chu, Y. C., & Park, I. S. (2015). Ectopic human Fasciola hepatica infection by an adult worm in the mesocolon. *Korean Journal of Parasitology*. <https://doi.org/10.3347/kjp.2015.53.6.725>
5. Nyindo, M., & Lukambagire, A. H. (2015). Fascioliasis: An Ongoing Zoonotic Trematode Infection. In *BioMed Research International*. <https://doi.org/10.1155/2015/786195>
6. WHO. (2007). Report of the WHO Informal Meeting on use of triclabendazole in fascioliasis control. In *World Health Organization*.
7. Lim, J. H., Mairiang, E., & Ahn, G. H. (2008). Biliary parasitic diseases including clonorchiasis, opisthorchiasis and fascioliasis. *Abdominal Imaging*.

- <https://doi.org/10.1007/s00261-007-9326-x>
8. Marcos, L., Maco, V., Terashima, A., Samalvides, F., Espinoza, J. R., & Gotuzzo, E. (2005). Fascioliasis in relatives of patients with Fasciola hepatica infection in Peru. *Revista Do Instituto de Medicina Tropical de Sao Paulo*. <https://doi.org/10.1590/S0036-46652005000400008>
 9. Panosian, C. (2000). *Tropical Infectious Diseases: Principles, Pathogens, and Practice*: Edited by Richard L. Guerrant, David H. Walker, and Peter F. Weller. Philadelphia: Churchill Livingstone, 1999. 1644 pp., illustrated. \$295. *Clinical Infectious Diseases*. <https://doi.org/10.1086/313784>
 10. Tuazon, C. U., Price, T. A., & Simon, G. L. (1993). Fascioliasis: Case Reports and Review. *Clinical Infectious Diseases*. <https://doi.org/10.1093/clinids/17.3.426>
 11. Mas-Coma, S., Bargues, M. D., & Valero, M. A. (2014). Diagnosis of human fascioliasis by stool and blood techniques: Update for the present global scenario. *Parasitology*. <https://doi.org/10.1017/S0031182014000869>
 12. Dusak, A., Onur, M. R., Cicek, M., Firat, U., Ren, T., & Dogra, V. S. (2012). Radiological Imaging Features of Fasciola hepatica Infection – A Pictorial Review . *Journal of Clinical Imaging Science*. <https://doi.org/10.4103/2156-7514.92372>
 13. Bassily, S., Iskander, M., Youssef, F. G., El-Masry, N., & Bawden, M. (1989). Sonography in diagnosis of fascioliasis. In *The Lancet*. [https://doi.org/10.1016/S0140-6736\(89\)92368-4](https://doi.org/10.1016/S0140-6736(89)92368-4)
 14. Han, J. K., Han, D., Choi, B. I., & Han, M. C. (1996). MR findings in human fascioliasis. *Tropical Medicine and International Health*. <https://doi.org/10.1046/j.1365-3156.1996.d01-43.x>
 15. Condomines, J., Rene-Espinet, J. M., Espinos-Perez, J. C., & Vilardell, F. (1985). Percutaneous Cholangiography in the Diagnosis of Hepatic Fascioliasis. *The American Journal of Gastroenterology*. <https://doi.org/10.1111/j.1572-0241.1985.tb02123.x>
 16. Fattah, F. N., Babero, B. B., Karaghoul, A. A., & Shaheen, A. S. (1964). The zoonosis of animal parasites in Iraq. x. a confirmed case of human ectopic fascioliasis. *The American Journal of Tropical Medicine and Hygiene*. <https://doi.org/10.4269/ajtmh.1964.13.291>
 17. Hawrami, T. (2004). liver fluke causing dilatations of common bile duct. *Basrah Journal of Surgery*. <https://doi.org/10.33762/bsurg.2004.55608>
 18. Peri Cholecystectomy Bile Analysis for Fasciola hepatica Eggs in Sulaimani Teaching Hospital. (2019). *Kurdistan Journal of Applied Research*. <https://doi.org/10.24017/science.2019.ichms.22>
 19. Mas-Coma, Santiago, Valero, M. A., & Bargues, M. D. (2009). Climate change effects on trematodiasis, with emphasis on zoonotic fascioliasis and schistosomiasis. In *Veterinary Parasitology*. <https://doi.org/10.1016/j.vetpar.2009.03.024>
 20. Fuentes, M. V., Valero, M. A., Bargues, M. D., Esteban, J. G., Angles, R., & Mas-Coma, S. (1999). Analysis of climatic data and forecast indices for human fascioliasis at very high altitude. *Annals of Tropical Medicine and Parasitology*. <https://doi.org/10.1080/00034983.1999.11813491>
 21. Ashrafi, K., Saadat, F., O'Neill, S.,

- Rahmati, B., Amin Tahmasbi, H., Pius Dalton, J., Nadim, A., Asadinezhad, M., & Rezvani, S. M. (2015). The endemicity of human fascioliasis in Guilan province, northern Iran: The baseline for implementation of control strategies. *Iranian Journal of Public Health*.
22. Kabaalioğlu, A., Apaydin, A., Sindel, T., & Lüleci, E. (1999). US-guided gallbladder aspiration: A new diagnostic method for biliary fascioliasis. *European Radiology*. <https://doi.org/10.1007/s003300050759>
 23. Hawramy, T. A. H., Saeed, K. A., Qaradaghy, S. H. S., Karboli, T. A., Nore, B. F., & Bayati, N. H. A. (2012). Sporadic incidence of Fascioliasis detected during Hepatobiliary procedures: A study of 18 patients from Sulaimaniyah governorate. *BMC Research Notes*. <https://doi.org/10.1186/1756-0500-5-691>
 24. Kaya, M., Beştaş, R., & Çetin, S. (2011). Clinical presentation and management of fasciola hepatica infection: Single-center experience. *World Journal of Gastroenterology*. <https://doi.org/10.3748/wjg.v17.i44.4899>
 25. Saba, R., Korkmaz, M., Inan, D., Mamikoğlu, L., Turhan, Ö., Günseren, F., Çevikol, C., & Kabaalioğlu, A. (2004). Human fascioliasis. In *Clinical Microbiology and Infection*. <https://doi.org/10.1111/j.1469-0691.2004.00820.x>
 26. Behar, J. M., Winston, J. S., & Borgstein, R. (2009). Hepatic fascioliasis at a London hospital - The importance of recognising typical radiological features to avoid a delay in diagnosis. *British Journal of Radiology*. <https://doi.org/10.1259/bjr/78759407>
 27. Mas-Coma, S., & Bargues, M. D. (1997). Human Liver Flukes: a Review. *Research and Reviews III Parasitology*.
 28. Sezgin, O., Altıntaş, E., Tombak, A., & Üçbilek, E. (2010). Fasciola hepatica-induced acute pancreatitis: Report of two cases and review of the literature. *Turkish Journal of Gastroenterology*. <https://doi.org/10.4318/tjg.2010.0081>
 29. Harinasuta, T., Pungpak, S., & Keystone, J. S. (1993). Trematode infections: Opisthorchiasis, clonorchiasis, fascioliasis, and paragonimiasis. In *Infectious Disease Clinics of North America*.
 30. Lim, J. H., Mairiang, E., & Ahn, G. H. (2008). Biliary parasitic diseases including clonorchiasis, opisthorchiasis and fascioliasis. *Abdominal Imaging*. <https://doi.org/10.1007/s00261-007-9326-x>
 31. Mas-Coma, M. S., Esteban, J. G., & Bargues, M. D. (1999). Epidemiology of human fascioliasis: A review and proposed new classification. *Bulletin of the World Health Organization*.
 32. Kabaalioğlu, A., Çubuk, M., Şenol, U., Çevikol, C., Karaali, K., Apaydin, A., Sindel, T., & Lüleci, E. (2000). Fascioliasis: US, CT, and MRI findings with new observations. *Abdominal Imaging*. <https://doi.org/10.1007/s00261000017>
 33. Yazgan Aksoy, D., Kerimoğlu, Ü., Oto, A., Ergüven, S., Arslan, S., Ünal, S., Batman, F., & Bayraktar, Y. (2006). Fasciola hepatica infection: Clinical and computerized tomographic findings of ten patients. *Turkish Journal of Gastroenterology*.
 34. Kang, M. L., Teo, C. H. Y., Wansaicheong, G. K. L., Giron, D. M., & Wilder-Smith, A. (2008). Fasciola hepatica in a New Zealander traveler. *Journal of Travel Medicine*.

- <https://doi.org/10.1111/j.1708-8305.2008.00207.x>
35. Cosme, A., Ojeda, E., Cilla, G., Torrado, J., Alzate, L., Beristain, X., Orive, V., & Arenas, J. I. (2001). Fasciolosis hepato-biliar. Estudio de una serie de 37 pacientes. *Gastroenterologia y Hepatologia*. [https://doi.org/10.1016/S0210-5705\(01\)70204-X](https://doi.org/10.1016/S0210-5705(01)70204-X)
 36. Espinoza, J.R., Timoteo, O., & Herrera-Velit, P. (2005). Fas2-ELISA in the detection of human infection by *Fasciola hepatica*. *Journal of Helminthology*, 79(3), 235–240. <https://doi.org/10.1079/joh2005303>
 37. Espinoza, Jose R., Maco, V., Marcos, L., Saez, S., Neyra, V., Terashima, A., Samalvides, F., Gotuzzo, E., Chavarry, E., Huaman, M. C., Bagues, M. D., Valero, M. A., & Mas-Coma, S. (2007). Evaluation of FAS2-ELISA for the serological detection of *Fasciola hepatica* infection in humans. *American Journal of Tropical Medicine and Hygiene*. <https://doi.org/10.4269/ajtmh.2007.76.977>
 38. Espino, A. M., Dumenigo, B. E., Fernandez, R., & Finlay, C. M. (1987). Immunodiagnosis of human fascioliasis by enzyme-linked immunosorbent assay using excretory-secretory products. *American Journal of Tropical Medicine and Hygiene*. <https://doi.org/10.4269/ajtmh.1987.37.605>
 39. Marrero, C. A. R., Santiago, N., & Hillyer, G. V. (1988). Evaluation of Immunodiagnostic Antigens in the Excretory-Secretory Products of *Fasciola hepatica*. *The Journal of Parasitology*. <https://doi.org/10.2307/3282184>
 40. Yazgan Aksoy, D., Kerimoğlu, Ü., Oto, A., Ergüven, S., Arslan, S., Ünal, S., Batman, F., & Bayraktar, Y. (2006). *Fasciola hepatica* infection: Clinical and computerized tomographic findings of ten patients. *Turkish Journal of Gastroenterology*.
 41. Han, J. K., Choi, B. I., Cho, J. M., Chung, K. B., Han, M. C., & Kim, C. W. (1993). Radiological findings of human fascioliasis. *Abdominal Imaging*. <https://doi.org/10.1007/BF00198118>
 42. Tuazon, C. U., Price, T. A., & Simon, G. L. (1993). Fascioliasis: Case Reports and Review. *Clinical Infectious Diseases*. <https://doi.org/10.1093/clinids/17.3.426>.
 43. Saba, R., Korkmaz, M., Inan, D., Mamikoğlu, L., Turhan, Ö., Günsere, F., Çevikol, C., & Kabaalioglu, A. (2004). Human fascioliasis. In *Clinical Microbiology and Infection*. <https://doi.org/10.1111/j.1469-0691.2004.00820.x>
 44. Mekky, M. A., Tolba, M., Abdel-Malek, M. O., Abbas, W. A., & Zidan, M. (2015). Human fascioliasis: A re-emerging disease in Upper Egypt. *American Journal of Tropical Medicine and Hygiene*. <https://doi.org/10.4269/ajtmh.15-0030>
 45. Han, J. K., Choi, B. I., Cho, J. M., Chung, K. B., Han, M. C., & Kim, C. W. 1993. Radiological findings of human fascioliasis. *Abdominal Imaging*. <https://doi.org/10.1007/BF00198118>
 46. Tuazon, C. U., Price, T. A., & Simon, G. L. (1993). Fascioliasis: Case Reports and Review. *Clinical Infectious Diseases*. <https://doi.org/10.1093/clinids/17.3.426>
 47. Kaya, M., Beştaş, R., & Çetin, S. (2011). Clinical presentation and management of fasciola hepatica infection: Single-center experience. *World Journal of Gastroenterology*. <https://doi.org/10.3748/wjg.v17.i44>.

- [4899](#)
48. Yazgan Aksoy, D., Kerimoğlu, Ü., Oto, A., Ergüven, S., Arslan, S., Ünal, S., Batman, F., & Bayraktar, Y. (2006). Fasciola hepatica infection: Clinical and computerized tomographic findings of ten patients. Turkish Journal of Gastroenterology.
 49. D., T., M.P., G., K., G., H.P., M., W., K., & N., S. (2000). Acute fascioliasis with multiple liver abscesses. Scandinavian Journal of Infectious Diseases.
 50. Das, K., Sakuja, P., Aggarwal, A., Puri, A. S., & Tatke, M. (2007). Non-resolving liver abscess with Echinococcus cross-reactivity in a non-endemic region. Indian Journal of Gastroenterology.
 51. Karabuli, T., Shaikhani, M., Karadaghi, S., & Kasnazan, K. (2009). Hepatobiliary and pancreatic: Fascioliasis. Journal of Gastroenterology and Hepatology (Australia).
<https://doi.org/10.1111/j.1440-1746.2009.05955.x>
 52. López-Vélez, R., Domínguez-Castellano, A., & Garrón, C. (1999). Successful treatment of human fascioliasis with triclabendazole. European Journal of Clinical Microbiology and Infectious Diseases.
<https://doi.org/10.1007/s100960050338>
 53. Chen, M. G., & Mott, K. E. (1990). Progress in assessment of morbidity due to Fasciola hepatica infection: a review of recent literature. In Tropical Diseases Bulletin.

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