Schistosomiasis

A parasitic disease most common in tropical regions, especially Africa, Schistosomiasis infection occurs through direct contact with contaminated water

Key messages

- **Schistosomiasis (also known as bilharzia) is a parasitic disease, most commonly found in tropical regions, especially Africa.**
- **Schistosomiasis infection occurs by direct contact with contaminated water. Larval forms of the parasite live in certain types of snails and are released into infested lakes and rivers. These larvae can penetrate human skin and move into internal organs.**
- **There may be no symptoms, or symptoms may not become apparent until months or years after infection.**
- **There is currently no vaccine to help prevent schistosomiasis.**
- **Common travel destinations reporting schistosomiasis include Egypt, Kenya, Tanzania, South Africa and some areas of Brazil. Many cases diagnosed in the UK result from swimming in Lake Malawi.**
- **Travellers should avoid contact with freshwater rivers and lakes in risk areas whenever possible.**
- **Schistosomiasis is diagnosed by testing urine or stool, and blood samples (serology); screening should be carried out several weeks after exposure to freshwater.**

Overview

Schistosomiasis, also known as bilharzia, is both an acute and chronic parasitic disease caused by infection with blood flukes (trematode worms) [1]. It has a complex life cycle involving freshwater snails. Several species exist; the most common are *Schistosoma mansoni*, *Schistosoma japonicum*,

and *Schistosoma haematobium*. Left untreated, schistosomiasis can cause serious long-term health problems affecting the intestines and the bladder and reproductive organs (urogenital systems) [2].

Schistosomiasis is one of the most widespread human parasitic infections and is the most common parasite spread by contact with freshwater. The health implications and economic effects of schistosomiasis are extensive. Disease occurs more commonly in children, with infection frequently found in those under 14 years in many risk areas [2, 3].

Increasing numbers of tourists and travellers are becoming infected. They may present with severe acute infection and unusual problems, including paralysis [2].

Risk areas

Schistosomiasis is mostly found in tropical and sub-tropical regions of Africa, Asia, the Caribbean and South America [2, 3]. Locally acquired schistosomiasis in the French island of Corsica has also been identified [2].

[Global Overview Map currently being updated]

It has been reported in 78 countries in both rural areas and the outskirts of cities [1, 2]. It often affects people in poorer communities with no access to safe drinking water or adequate sanitation. Contact with freshwater during farming, fishing and clothes washing also increases risk of exposure [2, 3].

Swimming and playing in freshwater are also a risk [1]. An estimated 90 percent of people needing schistosomiasis treatment live in Africa [2].

National control programmes have successfully reduced the amount of schistosomiasis in many countries, including Brazil, Cambodia, China, Egypt, Iran, Jordan, Mauritius, Morocco, Oman, Saudi Arabia and Tunisia. In Burundi, Burkina Faso, Ghana, Niger, Rwanda, Sierra Leone, Tanzania, Togo, Yemen and Zimbabwe it has been possible to scale up schistosomiasis treatment to a national level and this has had significant impact on the disease [2].

The World Health Organization (WHO) provides an interactive resource showing the status of schistosomiasis in endemic countries.

Please check the 'Other Risks' section of our Country Information pages for individual country recommendations for travellers.

Different species of the Schistosoma parasite occur in different parts of the world and cause different types of disease. *Schistosoma mansoni* occurs in Africa, the Middle East, the Caribbean, Brazil, Venezuela and Suriname. *Schistosoma haematobium* occurs in Africa, the Middle East and the island of Corsica (France). *Schistosoma japonicum* occurs in China, Indonesia, and the Philippines [2].

These three species cause the majority of human disease; *Schistosoma haematobium* causes urogenital schistosomiasis affecting the bladder, kidneys and genital organs. All other species cause disease of the intestines and sometimes the liver. Other species that cause human infection occur in fewer areas of the world: *Schistosoma mekongi* is found in several districts of Cambodia and the Lao People's Democratic Republic, while *Schistosoma intercalatum* and related species are found in the rain forest areas of central Africa [2].

Water development projects, particularly man-made lakes and irrigation schemes can lead to shifts in snail populations and distribution of risk areas. Population movement such as rural-urban migration [4], forced displacement and the rise of ecotourism have all contributed to an increase of schistosomiasis in some areas [2].

Risk for travellers

Travellers are at risk of schistosomiasis if they wade in, swim, wash in, paddle or have any other contact with freshwater in endemic areas. Although schistosomiasis is found throughout tropical regions, schistosomiasis in travellers is often acquired in Africa [2, 5, 6]. Popular destinations in Africa where travellers have been exposed include Lake Malawi, the Nile River, the Omo River, Lake Tanganyika (which borders Burundi, the Democratic Republic of the Congo, Tanzania and Zambia), Lake Victoria and the Zambezi River (Angola, Botswana, Mozambique, Namibia, Zambia and Zimbabwe) [6].

A review of consecutive schistosomiasis cases presenting at the Hospital for Tropical Diseases, London, United Kingdom (UK) recorded a total of 1,020 cases in travellers from 1997 to 2012. The most common reason for travel was tourism (44.2%), followed by migration to the UK (20.3%), expatriates (11.0%), business travel (8.6%) and visiting friends and relatives (6.1%). Of the new entrants 48.8% were born in countries classified as endemic. All 1,020 cases reported travel to Africa and *Schistosoma haematobium* was the predominant species in those with microscopy confirmed schistosomiasis. Malawi was the most common destination visited, with 410 visitors [5].

A European Network for Tropical Medicine and Travel Health review examined clinical and demographic case data from travellers and migrants in 16 European countries reported 1,587 schistosomiasis cases between 1997 and 2010. Reasons for travel included business, humanitarian/missionary work, migration, military service, tourism and visiting friends or family. Most infections were acquired in Africa, then South America and then Southeast Asia, with a small number of cases reported in travellers who visited the Caribbean or Central America [7].

A rise in 'off the beaten track' trips and adventure travel has contributed to the increase in schistosomiasis in travellers [2]. Outbreaks have occurred in school trip groups [8, 9], adventure travellers on African river trips [10, 11] and cases have been reported in business travellers, expatriates and people visiting friends and family [12].

Travel to Malawi, with the likelihood of swimming in Lake Malawi [5-8] and contact with the River Nile [10, 11] are important risk factor for travellers Some water-based activities, such as river

rafting trips can carry a high risk of exposure [10, 11].

In 2014, a cluster of locally acquired schistosomiasis cases were reported in the French Mediterranean island of Corsica. All were exposed to freshwater from swimming in the Cavu River on the island [13]. Between 2015 and 2018, sporadic schistosomiasis cases in Corsica were linked to the Cavu River, although the cases in 2018 had also swum in the Solenzara River. In 2020, a case of schistosomiasis was reported in a European resident who had travelled to Corsica in 2019 and swam in the Solenzara River, and other freshwater sources and rivers, but had no contact with the Cavu River [14].

This highlights the potential for the schistosoma parasite to spread into new areas not usually associated with schistosomiasis.

Schistosomiasis cases in UK travellers

Schistosomiasis does not occur naturally in the United Kingdom (UK), it is a travel-associated infection. In England, Wales and Northern Ireland (EWNI) in 2015 a total of 43 cases were reported in returned travellers, with 42 cases in 2016, 38 cases in 2017, 65 cases in 2018, 48 cases in 2019, 40 cases in 2020, 66 cases in 2021 and 123 cases in 2022. Out of the 123 cases reported in 2022, travel history was only known for six cases. The majority of these cases reported travel to Africa, with three cases reporting travel to Northern Africa and two cases reporting travel to Eastern Africa. One case reported travel to South America and one case reported travel to Southeast Asia (some cases travelled to more than one region; all regions are included [15].

Transmission

Schistosoma eggs are excreted in human faeces (*S. mansoni* and *S. japonicum*) or urine (*S. haematobium*). Without adequate sanitation systems, urine and faeces containing parasite eggs may contaminate local water sources. The eggs hatch in freshwater and the larvae, known as miracidia, infect snails. *S. mansoni* miracidia infect Biomphalaria snails, *S. haematobium* miracidia require Bulinus snails and *S. japonicum* prefers Oncomelania species. These snails therefore act as vectors for the disease, with specificity for each schistosoma species. Another larval stage of the parasite, termed cercariae, emerge from the snails. Cercariae are free swimming and are capable of penetrating human skin. Once they have penetrated skin, the cercariae undergo development and migrate to the liver and then via the venous system to the capillaries of the bowel (*S. mansoni* and *S. japonicum*) or bladder (*S. haematobium*) where mature worms mate and begin to produce eggs. The eggs are then passed into the environment via the faeces or urine and the life cycle begins again [4].

Signs and symptoms

Initial contact with cercariae can cause an itchy, papular rash, known as "swimmers itch". Once infection has been established, symptoms can occur within two to three weeks of exposure, but many infections are asymptomatic (without symptoms) at first.

The symptomatic, acute phase of illness is known as Katayama fever and presents with fever, malaise, a bumpy, itchy skin rash (urticaria) and a raised level of white blood cells (eosinophilia) [16]. Other symptoms can include cough, diarrhoea, weight loss, blood in urine (haematuria), headaches, joint and muscle pain, and enlargement of the liver and spleen.

Symptoms are cause by the body's reaction to the worms' eggs travelling through the body [2]. This usually happens 14 to 84 days after the first infection and is frequently misdiagnosed [17].

Chronic (long term) infection with *S. mansoni* and *S. japonicum* causes liver scarring, high pressure in the liver's blood vessels (portal hypertension) with fluid build-up in the abdomen (ascites) and oesophageal varices (dilated veins which can cause heavy bleeding). Long-term infection with *S. haematobium* is associated with bladder scarring, kidney obstruction, chronic urinary infection and possibly bladder cancer [17].

Neuroschistosomiasis can occur when adult worms atypically travel to the brain or spinal cord. This deposition of eggs in neural tissues leads to complications such as raised intracranial pressure, myelopathy and radiculopathy (dysfunction of the spinal cord or nerve roots). Symptoms include headache, visual impairment, limb pain and muscle weakness [18].

Diagnosis and treatment

A detailed travel history is essential in establishing a possible schistosomiasis diagnosis and identification of the species. Asking returning travellers about exposure to freshwater helps estimate their risk of infection. Eosinophilia (increased numbers of eosinophil white blood cells) is also a useful indicator but is not specific [17]. Diagnosis can be made by finding schistosome eggs on microscopic examination of stool or urine [2]. This is the most reliable way of diagnosing schistosomiasis but requires the adult worms to be producing eggs which may not occur until at least eight weeks after initial infection, when the worms have matured.

Diagnosis can also be made by finding eggs on rectal biopsy (tissue sample from the back passage). Blood tests (serology) to check for antibodies to schistosomal antigens (marker proteins) can help an earlier diagnosis, as seroconversion occurs at eight to 12 weeks [17, 19].

Patients should be referred to an infectious diseases or tropical medicine specialist for treatment. The drug of choice for all species of schistosomiasis is praziquantel [2].

In endemic areas, some countries have opted for a public health programme involving treatment of local populations at highest risk, especially children [1]. Some expatriates and long-term travellers in endemic areas choose to take praziquantel periodically or a few months after leaving an endemic country. However, the quality of locally sourced medicines should be taken into consideration.

Preventing schistosomiasis

There is currently no vaccine for schistosomiasis [20] and no drug available to prevent infection.

Travellers should be advised of the risk of swimming and wading in rivers and lakes or other freshwater contact in endemic countries. This includes popular destinations such as Lake Malawi, the Nile River and Lake Victoria.

Local claims that schistosomiasis is not present in freshwater may not be reliable. Topical applications of insect repellent before exposure to water or towel drying after accidental exposure to schistosomiasis do not preventing infection. Travellers should drink safe water (boiled, filtered or bottled) to prevent infection via contact with mouth or lips. Iodine treatment alone will NOT guarantee water is safe and free of parasites [6].

Risk of exposure is higher in still to moderately flowing water where the snail hosts tend to be found and increases exponentially with length of time in contact with water containing cercariae [21]. Brief contact with fast-flowing water is considered to be less of a risk.

Chlorination kills schistosomes; therefore, there should be no risk in well maintained swimming pools. Schistosomiasis cannot be contracted through sea water. Freshwater used for washing should be brought to a rolling boil for one minute and then cooled to avoid scalding before use [22].

Schistosomiasis in travellers is usually without symptoms (asymptomatic). Anyone who swam or bathed in freshwater in endemic areas may have been exposed and should be advised to undergo screening tests, ideally with an infectious diseases specialist [2, 22].

Resources

- NHS: Schistosomiasis (Bilharzia)
- US Centers for Disease Control and Prevention. About Schistosomiasis
- US Centers for Disease Control and Prevention: Parasites - Schistosomiasis. Life Cycle

REFERENCES

1. World Health Organization. WHO launches new guideline for the control and elimination of human schistosomiasis. 22 February 2022. [Accessed 31 January 2023]
2. World Health Organization. Schistosomiasis Fact sheet. 1 February 2023 [Accessed 11 April 2024]
3. Colley D, Bustindury A, Secor W et al. Human Schistosomiasis. Lancet 2014;383;2253-64. [Accessed 31 January 2023]
4. Hussein A, Adam D, Abdelmaboud A et al. Risk factors of schistosomiasis among basic school pupils at Geissan locality, Blue Nile State. World J Pharm Med Res. 2016; 2 (2). [Accessed 31 January 2023]
5. Coltart C, Chew A, Storrar N et al. Schistosomiasis presenting in travellers: a 15 year observational study at the Hospital for Tropical Diseases, London. Trans R Soc Trop Med Hyg. 2015 Mar;109(3):214-20. [Accessed 31 January 2023]
6. US Centers for Disease Control and Prevention. Travelers' Health Schistosomiasis. Last reviewed 16 September 2022. [Accessed 11 April 2024]
7. Lingscheid T, Kurth F, Clerinx J et al. Schistosomiasis in European Travelers and Migrants: Analysis of 14 years of TropNet Surveillance Data. Am J Trop Med Hyg, 2017 Aug;97(2):567-574. [Accessed 31 January 2023]

8. Moore E, Doherty J. Schistosomiasis among travellers returning from Malawi: a common occurrence. Q J Med 2005;98:69-70. [Accessed 31 January 2023]

9. Mickan C, Junghanss T, Stojkovic M. Tropenmedizin im Zeitalter hoher globaler Mobilität Schistosomiasis bei einer Schulklasse nach Ruandareise. Deutsche Medizinische Wochenschrift (1946). 2019 Aug;144(17):e109-e113. [Accessed 31 January 2023]

10. Kristiansen T, Pettersen F, Lier T et al. Schistosomiasis in Norwegian students after travel to Africa. Tidsskr Nor Laegeforen. 2021 Feb 15. [Accessed 31 January 2023]

11. Röser D, Bjerrum S, Helleberg M et al. Adventure tourism and schistosomiasis: serology and clinical findings in a group of Danish students after white-water rafting in Uganda. JMM Case Rep. 2018 Feb 2;5(4):e005141. [Accessed 16 January 2023]

12. Marchese V, Beltrame A, Angheben A et al. Schistosomiasis in immigrants, refugees and travellers in an Italian referral centre for tropical diseases. Infect Dis Poverty. 2018 Jun 16;7(1):55. doi: 10.1186/s40249-018-0440-5. [Accessed 31 January 2023]

13. European Centre for Disease Prevention and Control. Rapid Risk Assessment. Local transmission of Schistosoma haematobium in Corsica, France. 16 May 2014. [Accessed 31 January 2023]

14. Rothe C, Zimmer T, Schunk M et al. Developing Endemicity of Schistosomiasis, Corsica, France. Emerg Infect Dis. 2021 Jan;27(1):319-21. [Accessed 31 January 2023]

15. UK Health Security Agency. Travel-associated infections in England, Wales and Northern Ireland: 2022. Last updated 21 March 2024. [Accessed 11 April 2024]

16. Ross A, Vickers D, Olds G et al. Katayama syndrome. Lancet Infect Dis, 7 2007; 218-224. [Accessed 31 January 2023]

17. Gray D, Ross A, Li Y et al. Diagnosis and management of schistosomiasis. BMJ 2011; 342:2651. [Accessed 31 January 2023]

18. **Carod-Artal F. Neurological complications of Schistosomia infection. Trans R Soc Trop Med Hyg 2008;102:107-16.**

19. Checkley A, Chiodini P, Dockrell D et al. Eosinophilia in returning travellers and migrants from the tropics: UK recommendations for investigation and initial management. J Infect 2010;60:1-20. [Accessed 16 January 2023]

20. Ogongo P, Nyakundi R, Chege G et al. The Road to Elimination: Current State of Schistosomiasis Research and Progress Towards the End Game. Front Immunol. 2022 May 3;13:846108. [Accessed 31 January 2023]

21. **Steinmann P, Keiser J, Bos R et al. Schistosomiasis and water resources development: systematic review, meta-analysis, and estimates of people at risk. Lancet Infect Dis, 6, Issue 7, 411-25.**

22. US Centers for Disease Control and Prevention. Parasites. Schistosomiasis. Prevention and control. Last reviewed 27 October 2020. [Accessed 31 January 2023]

Published Date: 31 Jan 2023

Updated Date: 11 Apr 2024