IJMPES International Journal of
Medical Parasitology & Epidemiology Sciences

http://ijmpes.com
doi 10.34172/ijmpes.2020.08
Vol. 1, No. 2, 2020, 19–20
eISSN 2766-6492

Letter to the Editor

Schistosomiasis: A Neglected Tropical Parasitic Disease of Public Health Concern

Mahendra Pal[1]

[1]Narayan Consultancy on Veterinary Public Health and Microbiology, Anand, 388001, Gujarat, India

To the Editor

The neglected diseases, which involve diverse etiological agents, such as viruses (chikungunya, dengue, rabies), bacteria (anthrax, bovine tuberculosis, brucellosis, leprosy, leptospirosis, plague), fungi (chromoblastomycosis), protozoa (leishmaniasis, malaria, trypanosomiasis), helminthes (dracunculiasis, echinococcosis, lymphatic filariasis, onchocerciasis, schistosomiasis, taeniasis/cysticercosis), and ectoparasites (scabies) are important diseases from public health and economic point of view (1,2). These diseases are seen in both sexes, all age groups, and in all seasons. In addition, they are responsible for morbidity and mortality worldwide, especially in tropical and sub-tropical regions. According to the World Health Organization (WHO), about one billion people in 198 countries are affected with neglected tropical diseases (1). Neglected diseases are primarily reported in the underprivileged people of the society living in developing nations with insufficient medical facilities and poor environmental sanitation (1,2). Among these, schistosomiasis (bilharziasis and snail fever) is an acute and chronic tropical disease and a neglected helminthic zoonosis of global distribution. The recorded history of schistosomiasis goes back to the year 1851 when the German physician Theodor Bilharz first described it following an autopsy in Egypt (1). Since then, schistosomiasis has been reported from Brazil, Burundi, Cambodia, China, Ghana, Iran, Japan, Jordan, India, Kenya, Laos, Mauritius, Middle East, Niger, Nigeria, Oman, Philippines, Puerto Rico, Rwanda, Saudi Arabia, Sierra Leone, Suriname, Tanzania, Thailand, Tunisia, Venezuela, and Yemen (1,3-6). Over 250 million people are estimated to have contracted the disease globally, with up to 779 million still at risk of infection (1,4). Among African countries, Nigeria has the maximum number of schistosomiasis cases with about 29 million infected people, among which 16 million are children, and about 101 million people are at risk of getting infected (1). Schistosomiasis is an important public health problem in rural Egypt affecting about six million people (3).

Schistosomiasis is a highly debilitating parasitic zoonosis that can lead to chronic illness; it is caused by trematode worms of the genus *Schistosoma* that has several species, including *Schistosoma guineensis, Schistosoma intercalatum, Schistosoma japonicum,* Schistosoma *haematobium, Schistosoma mansoni*, and *Schistosoma mekongi* (1,5). Out of these species, three species of *Schistosoma,* namely *S. haematobium, S. japonicum,* and *S. mansoni* are commonly implicated in the etiology of human schistosomiasis (3).

Natural infection due to *Schistosoma* is recorded in humans and many species of animals, which include cattle, buffalo, antelope, goat, horse, pig, monkey, cat, dog, gerbil, pig and wild ruminants (5). Transmission of infection in humans occurs when cercaria (larvae)

Professor Dr. Mahendra Pal born in a respected family on April 10, 1946 in Delhi, India, is a globally recognized personality in the field of Veterinary Public Health. He obtained his B.V. Sc. & A.H., M.V.P.H., Ph.D., and D.Sc. in 1969, 1975, 1981, and 1988, respectively. He got First Position in MVPH at All India Institute of Hygiene and Public Health, Calcutta, India. Previously, he served as the Professor and Head of the Department of Veterinary Public Health, College of Veterinary Science, Anand, India. After retirement, Prof. Pal worked as Professor of Veterinary Public Health (UNDP) at Addis Ababa University, Ethiopia. Prof. Pal had an opportunity to work as Visiting Scientist at Massey University, Palmerstone, New Zealand (1984), Institute of Tropical Medicine, Antwerp, Belgium (1985-1986), and Tokyo University, Japan (1989-1990). Prof. Dr. Mahendra Pal, Ex-Professor of Veterinary Public Health (UNDP), Addis Ababa University, Ethiopia, is an internationally renowned scientist, and a well known distinguished academician with 628 publications and 8 books. Prof. Pal also worked as Professor and Head, Department of Veterinary Public Health, Anand Agricultural University, India. He is associated as Editor, Associate Editor, and Member of many online journals. Prof. Pal guided over 67 students at DVM, MVSc, MSc, and Ph.D. level in India and Ethiopia. He is credited to develop Pal's medium, APRM medium, PHOL stain and Narayan stain for the study of fungi, which are implicated in the clinical disorders of humans and animals. Prof. Pal elucidated for the first time the role of Cryptococcus neoformans in the mastitis of goat and buffalo, Fusarium solani in corneal ulcer of buffalo, Aspergillus fumigatus in rhinitis of camel and mule, Trichophyton verrucosum in dermatitis of deer, and Candida tropicalis in human lung empyema. He has established for the first time the prevalence of Cryptococcus neoformans in the environment of New Zealand, Nepal, and Djibouti. Prof.Pal has reported the first isolation of Candida albicans from mastitic milk,and Trichophyton verrucosum in dermatitis of camel in Ethiopia. Prof. Pal launched the Ph.D. programme for the first time in Veterinary Public Health at Addis Ababa University, Ethiopia and also at College of Veterinary Science, Anand, Gujarat, India. His biography is published in World's Who and Who. Prof. Pal is recipient of many award including "Distinguished Teacher Award", "Jawaharlal Nehru Award", "International Achievement Award", and "Life Time Achievement Award". He delivered series of guest lecturers in medical and veterinary colleges in India, New Zealand, Japan, and Ethiopia. Prof. Pal is the "First Indian Veterinarian" who worked as "JSPS Visiting Scientist" at University of Tokyo, Japan. He is serving as Chief Editor, Editor, Associate Editor, and Member of the editorial board of over seventy online journals. Prof. Pal is "Life Member" of several scientific societies. He is invited by many International Associations to attend the Conference. Considering his immense contribution, Prof. Pal is known as "Father of Veterinary Mycology" in India. Very recently, he launched "Narayan Consultancy" on Veterinary Public Health and Microbiology to give free technical advice to scientists of poor resource countries of the world. In addition, Prof. Pal is doing charitable work for the needy and poor people in various ways from his personal money since 1970.

Received: October 28, 2019, **Accepted**: March 20, 2020, **ePublished**: April 1, 2020

***Corresponding Author:** Mahendra Pal, Email: palmahendra2@gmail.com

Open Access
Scan to access more free content

released by fresh water snails penetrate through the skin following contact with infested water (5,6). Cercaria develops in snails that remain in water (5). It is important to cite that children, adolescents, and adults are at risk of getting infected if they are exposed to contaminated water bodies (1). Women who are doing domestic jobs in infested water, such as washing the clothes, are also at risk and can develop female genital schistosomiasis (6).

The incubation period for patients with acute schistosomiasis is generally 14-84 days (1). The disease is characterized by intestinal, hepato-splenic, urogenital, and central nervous system manifestations (1). Clinical spectrum in humans includes fever, loss of appetite, headache, weight loss, weakness, chill, diarrhea, abdominal pain, coughing, dyspnoea, vomiting, anemia, ascites, visual impairment, epileptic seizures, ataxia, hydronephrosis, eosinophilia, hepatosplenomegaly, haematuria, dysuria, painful urination, and papular dermatitis (3,5,6). The fever may last for 1-7 days in mild and 8-30 days in severe cases. Blood in the urine is the main clinical manifestation of urinary schistosomiasis. The enlargement of the liver is frequently observed in advanced cases of schistosomiasis (1). Chronic infection may affect the ability of people to work, and in some cases death can occur (6). Genital schistosomiasis has been linked with increased risk of HIV infection (1,6).

The affected animals may show anorexia, diarrhea, dysentery, anemia, splenomegaly, dehydration, weight loss, and emaciation besides eosinophilia and liver fibrosis (1).

Diagnosis of the disease requires both clinical and laboratory tests. Computed tomography (CT), and particularly magnetic resonance imaging (MRI), are useful in neuroschistosomiasis. Ultrasonography is a precious device for monitoring the direct effect of interventions on schistosomiasis morbidity (1). Proctoscopic examination may reveal the nodules and ulcerations. Characteristic eggs of *Schistosoma* spp. can be demonstrated in the feces, urine, and biopsy specimens. Immunological tests, such as compliment fixation, flocculation, precipitation haemagglutination, indirect fluorescent antibody test, and enzyme-linked immunosorbent assays (ELISAs) may be applied to diagnose the disease. Intradermal tests show immediate hypersensitivity (5). Recently, PCR-based methods to detect parasite DNA in stool or urine are being employed for diagnosis of the disease (1).

Microscopic detection of eggs in the feces is considered the simple and low cost diagnostic method that can be routinely employed at the primary health centre where the facilities for immunological and molecular techniques are not available in the laboratory (1).

A number of drugs including metrifonate, oxamniquine, praziquantel, and niridazole are used to treat schistosomiasis cases (3,5). Presently, praziquantel is considered the main treatment. The drug is considered safe and effective against adult worms of all the six species of *Schistosoma* that infect humans. However, this anti-schistosomal drug fails to prevent re-infection, and there is also a concern of emergence of drug resistance (1). Moreover, about 90% of people in need of schistosomiasis treatment live in African countries (6).

Further research should be conducted to find a chemotherapeutic agent that may not develop drug resistance against this parasite.

Currently, no vaccine is commercially available to immunize the susceptible population. Several measures, which include proper disposal of urine and feces, provision of safe and wholesome drinking water, avoidance of contact with contaminated water, application of molluscicides in snail breeding areas, mass chemotherapy of affected individuals in endemic areas, and health education of people about the severity of disease, mode of transmission, and environmental sanitation will certainly mitigate the prevalence and incidence of this helminthic zoonosis (5). Children should avoid swimming in the contaminated water. Travelers visiting endemic area are advised not to engage in activities involving direct contact with water. Schistosomiasis control has been successfully implemented over the past 40 years in several countries (6).

There is a need to develop potent, safe, and low cost vaccines that can be easily affordable by low-income countries to immunize the communities at risk. Moreover, a multifaceted approach is required to control this neglected helminthic disease.

Conflict of Interests
None declared.

Ethical Issues
Not applicable.

References

1. Pal M. Neglected tropical zoonoses and their impact on public health [dissertation]. Debre Zeit, Ethiopia: Addis Ababa University, College of Veterinary Medicine and Agriculture; 2014:1-43
2. Pal M. Anthrax: a neglected bacterial zoonosis of major public health concern. Acta Sci Microbiol. 2018;1(5):78-79. doi:10.31080/asmi.2018.01.0057
3. Wu GY, Halim MH. Schistosomiasis: progress and problems. World J Gastroenterol. 2000;6(1):12-19. doi:10.3748/wjg.v6.i1.12
4. Steinmann P, Keiser J, Bos R, Tanner M, Utzinger J. Schistosomiasis and water resources development: systematic review, meta-analysis, and estimates of people at risk. Lancet Infect Dis. 2006;6(7):411-425. doi:10.1016/s1473-3099(06)70521-7
5. Pal M. Zoonoses. 2nd ed. Jaipur, India: Satyam Publishers; 2007.
6. World Health Organization (WHO). Schistosomiasis. Fact Sheet. 2nd ed. Geneva, Switzerland: WHO; 2020.