



# Urinary schistosomiasis in migrant population: a case series from a single centre in southern Italy

Maurizio Milesi<sup>1</sup> · Claudia Indovina<sup>2</sup> · Ornella Dino<sup>3</sup> · Floriana Di Bella<sup>3</sup> · Francesco Di Lorenzo<sup>4</sup> · Adriana Sanfilippo<sup>4</sup> · Francesca Di Bernardo<sup>5</sup> · Concetta Sodano<sup>5</sup> · Tullio Prestileo<sup>4</sup> on behalf of on behalf of the Immigrant Take Care Advocacy (I.Ta.C.A.) team Palermo

Received: 20 July 2018 / Accepted: 22 October 2018 / Published online: 30 October 2018  
© Springer-Verlag GmbH Germany, part of Springer Nature 2018

## Abstract

**Purpose** To understand the frequency of urinary schistosomiasis, in migrants in clinical follow-up at the infectious disease outpatient clinic of ARNAS Civico Hospital in Palermo Italy, to raise awareness on this neglected tropical disease.

**Methods** A retrospective analysis of migrant patients in clinical care in our centre during the triennium 2015–2017.

**Results** 2639 migrants have been in clinical care during the triennium 2015–2017, 72% are male and 28% are female. 214 patients were tested for the presence of *Schistosoma* eggs in urine, these patients are all male. All the patients tested, reported macroscopic haematuria and the 54% had an increase in the peripheral blood eosinophil count. Ninety subjects had a positive microscopic examination for *Schistosoma haematobium* eggs. Patients were treated with a standard dose of praziquantel (40 mg/kg), and tested for *Schistosoma* 1 month after the end of therapy. All the subjects fully recovered.

**Conclusions** Considering the migration phenomenon, the observation of these tropical diseases in European hospitals is becoming more and more common and an increasing number of health care professionals will be dealing with migrants. Searching for haematuria and eosinophilia and then testing for *Schistosoma* in this specific population will increase the number of diagnosis and correct treatment of urinary schistosomiasis, improving the patients' quality of life and preventing severe complications of the disease.

**Keywords** Case Series · Urinary · Schistosomiasis · Migrants

---

The members of the "Immigrant Take Care Advocacy (I.Ta.C.A.) team" are listed in acknowledgement section.

---

✉ Maurizio Milesi  
milesimaurizio@libero.it

<sup>1</sup> Unit of Infectious Diseases, Department of Medical Sciences, University of Torino, Corso Svizzera 164, 10164 Turin, Italy

<sup>2</sup> Immigrant Take Care Advocacy (I.Ta.C.A.), Piazza Nicola Leotta 4, 90127 Palermo, Italy

<sup>3</sup> Migrant Healthcare Outpatient Clinic, Presidio Aiuto Materno, Via Lancia di Brolo, 10 bis, 90145 Palermo, Italy

<sup>4</sup> Unit of Infectious Diseases and Centre for Migration and Health, ARNAS, Ospedale Civico Benfratelli, Piazza Nicola Leotta 4, 90127 Palermo, Italy

<sup>5</sup> Unit of Clinical Microbiology, ARNAS, Ospedale Civico Benfratelli, Piazza Nicola Leotta 4, 90127 Palermo, Italy

## Introduction

Nowadays the world is facing a social, political and economic transformation that is forcing a great number of people to leave, often brutally, their homelands, their cultures and their daily life. The Mediterranean area is a good example to understand the complex migration phenomenon. Africa and Europe are strictly connected, for both geographic proximity and the important economic discrepancy between those two continents. Fifteen of the twenty most developed countries in the world are in Europe, on the other hand twenty of the less developed countries are in Africa; these are the main reasons why the migrant population resettles to a third country in the old continent. The role of infectious diseases in this population has always been marginal, considering the number of diseases that we face every day in clinical practice. However according to the World Health Organization (WHO), it is important to consider the migrant population as a vulnerable

population [1] remembering the definition for “health” in the constitution of WHO statement as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”. An increasing number of Health Care Professionals is dealing with this particular and vulnerable population and it is crucial to understand the importance of screening for infectious diseases, ranging from the most common ones such as viral hepatitis or HIV to the neglected ones. Our study focuses on the frequency of urinary schistosomiasis caused by *Schistosoma haematobium*, in migrants in clinical follow-up at the infectious disease outpatient clinic of ARNAS Civico Hospital in Palermo Italy.

## Background

Schistosomiasis is one of the major neglected tropical diseases, the etiologic agent is *Schistosoma*, a digenetic blood trematode. There are two clinical forms of schistosomiasis, intestinal and urinary, caused by five main species of *Schistosoma*: *Schistosoma mansoni*, *Schistosoma japonicum*, *Schistosoma mekongi*, *Schistosoma intercalatum* and *S. haematobium* [2]. *Schistosoma* spp. produce eggs that are expelled into the environment through urine and stools. In freshwater, the eggs hatch and release miracidia that will infect specific snail intermediate host (e.g., freshwater snail belonging to the family Planorbidae), where they mature as cercariae that penetrate the skin of the human host, shed their tail, becoming schistosomulae that migrate to portal blood in liver and mature into adults. Paired adult worms of *S. japonicum* and *S. mansoni* reside in the mesenteric venules of bowel and rectum, while *S. haematobium* resides in the venus plexus of bladder. The female worms lay eggs that are moved toward the lumen of the intestine (*S. mansoni* and *S. japonicum*) and of the bladder and ureters (*S. haematobium*) those will be eventually expelled into the environment through urine and stools [3, 4].

The major symptom of urinary schistosomiasis is haematuria that could be associated with eosinophilia (eosinophils count in the peripheral blood above 500 cell/ $\mu$ l) in approximately half of the cases [5, 6], this symptom is brought on by the host immune response against the parasite [7]. This causes a chronic granulomatous inflammation of the bladder walls, resulting in thickening of the bladder mucosa, formation of polyps, dilatation of the ureters, hydronephrosis, and eventually bladder cancer, if not threatened in time and properly [8, 9]. The gold standard diagnostic test is microscopic examination of urine that aims to search the presence of parasite eggs [10]. The standard therapy, according to the guidelines [11] is represented by praziquantel, that is effective together with a proper immune response from the host.

## Methods

The study population consists of migrants that have been in clinical care at the ARNAS Civico Hospital’s Infectious Diseases outpatient clinic during the triennium 2015–2017. It is composed of 2639 subjects, 72% are male and 28% are female. The organization of the workflow for migrant patients is as follows: patients get to the Hospital for screening after 4–6 weeks after their arrival in Italy. The first step is an accurate clinical interview: all the patients are asked for the presence of gross haematuria, and those that report macroscopic haematuria are subsequently tested for *Schistosoma*. The testing for *Schistosoma* consists of microscopic examination of urine for the search of *Schistosoma* eggs, no antigens or serology test for *Schistosoma* are performed. Urine specimens are collected in standard urine culture bottles using the “jump rule”, that is to ask the patient to make a couple of jumps before collecting the sample in order to let the eggs detach from the bladder and to be detected by the microbiologist. Moreover as part of our routine screening workflow a blood sample is taken in every patient, and the following tests are always performed: complete blood count, serum creatinine, liver transaminases, glycaemia, quantiferon TB-Gold and serology for: hepatitis B, hepatitis C, HIV and syphilis (RPR test). This workflow was established according to the current Italian guidelines for migrants’ health [12].

We performed a retrospective analysis on this population, in order to understand how many patients were tested, diagnosed and treated for urinary schistosomiasis. Data were collected from patients’ clinical records, and analysed using the Statistical Package for Social Science (SPSS) software.

## Results

A total of 214 patients were tested for the presence of *Schistosoma* eggs in urine.

Those patients were all male and aged between 16 and 26.

All the patients reported macroscopic haematuria, and 115 (54%) of them had an increase in the peripheral eosinophil count above our laboratory normal upper reference range (eosinophils count > 200 cell/ $\mu$ l). 90 patients out of 214 (42%) had a positive microscopic examination for *S. haematobium* eggs. The presence of macroscopic haematuria was only asked during clinical interview, a urine chemistry exam was not performed. Other comorbidities such as liver or kidney failure were ruled out with a blood test.

None of the patients was diagnosed with renal or hepatic failure. We observed that the 33% of the positive patients came from Ivory Coast, the 24% from Mali, 16% from Gambia, 10% from Guinea, 8% from Senegal, 5% from Nigeria, and the last 4% from other sub-Saharan countries. We treated the patients with a single administration of 40 mg/kg of praziquantel and screened for *Schistosoma*, 1 month after the end of treatment. Eighty-one patients out of ninety fully recovered after the first praziquantel administration (40 mg/kg). Nine patients had a persistent finding of *Schistosoma* eggs in urine at 1-month follow-up examination. Those patients were retreated with a standard dose of praziquantel. Six fully recovered after the second drug administration, however three patients still had a positive microscopic exam and needed a third standard dose of praziquantel; after this treatment all three fully recovered from the infection. In each of these nine patients, we performed a lower abdomen ultrasound as supplemental diagnostic analysis. All the patients presented ultrasonographic signs of severe disease consisting of: hyperechogenicity with no shadow cone of the urinary bladder walls, associated with an increased mucosal thickness and the presence of one or more endoluminal masses. Despite the severe ultrasonographic findings, all nine patients eventually recovered after the second and third administration of praziquantel. A second abdomen ultrasound was performed after 3 months from the clinical recovery and none of the patients showed ultrasonographic signs of severe disease. 124 patients had a negative microscopic examination; the diagnostic test was repeated in those patients that reported macroscopic haematuria without a finding of eosinophilia this group is composed of 99 subjects. The second urinary test had a negative result in all the patients of this group. Macroscopic haematuria resolved spontaneously in 4–12 weeks. 25 patients presented persistent eosinophilia, in this group we performed a parasitological stool examination, five patients out of twenty-five had a positive result, two were positive for *Ancylostoma duodenale*, two were positive for *Strongyloides stercoralis* and one was positive for *Entamoeba* spp., all those patients were treated according to the current CDC guidelines [13]. Urinary tract infections were ruled out with a urine culture. As regards the remaining 20 patients, in 10 patients eosinophilia spontaneously decreased, in the other 10 patients no diagnosis was found.

## Discussion

Considering the migration phenomenon, the observation of these tropical diseases in European hospitals is becoming more and more common. For this reason, the World Health Organization decided to raise awareness on this pathology

in order to improve early diagnosis and treatment. Some Italian and Spanish authors [14, 15] enlightened the same problems we are facing: lack of literature, lack of knowledge and sometimes, poor praziquantel availability.

During this contingent international and politic situation, an increasing number of health care professional will be dealing with migrants. Our study reports 90 cases of urinary schistosomiasis out of 214 patients that were tested based on the anamnestic data of macroscopic haematuria, during the triennium 2015–2017. Testing all the patients coming from the sub-Saharan area or from countries where urinary schistosomiasis has a high prevalence, independently by the presence of macroscopic haematuria would be a very interesting data from an epidemiological point of view, that might allow clinicians to diagnose those infected patients that have no symptoms. Unfortunately, in our centre, a mass screening for this pathology is quite expensive and is not achievable due to a lack of resources; moreover the fact that the study is hospital centred might be leading to a potential selection bias and this is a limit of our study.

The overall frequency of urinary schistosomiasis in migrants in clinical care at our centre is low, but it is crucial to keep in mind the particular epidemiology of certain neglected infectious disease in this specific population. Although we observed an increase in the peripheral eosinophil count above our laboratory upper reference range (eosinophils count > 200 cell/ $\mu$ l) in all the 90 patients that had a positive urinary microscopic examination; it is essential to mention that according to literature, in patients suffering from urinary schistosomiasis the eosinophil count is within normal limits in approximately half of the cases [5, 6]. In conclusion, despite a low frequency it is important, while approaching and taking the medical history of a migrant patient, to ask for haematuria and test all the patients that complain or have a history of persistent haematuria that can be associated with an increase of the eosinophils count. It is very important to ask the patient if he is experiencing haematuria since sometimes this symptom has been present from a long time and might be neglected from the patient during self-reporting. Furthermore, the costs of a wrong diagnosis are much higher than the costs of a standard praziquantel therapy [16]. Considering this data, it is crucial to raise awareness on this neglected tropical disease, especially in patients coming from the sub-Saharan area. Searching for haematuria and eosinophilia in this specific population will increase the number of diagnosis and correct treatment of urinary schistosomiasis, improving the patients' quality of life and preventing severe complications of the disease.

**Acknowledgements** *Immigrant Take Care Advocacy (I.Ta.C.A.) team*: Abraha Yodit, Bellipanni Pierfrancesco, Dalle Nogare Ernesto Renato, D'Angelo Antonino, Di Bella Floriana, Di Lorenzo Andrea, Di Marco Lorenza, Graffeo Gabriella, Antonio Ficalora, Giammanco Anna, Infantona Maria, Indovina Claudia, La Rosa Ambra, Mandalà

Cosimo, Marrone Patrizia, Milesi Maurizio, Oueslati Sonia, Orlando Giuseppina, Pasqualino Gaetano, Perricone Emma, Prestileo Federico, Scimeca Concetta, Sodano Concetta, Spadaro Filippo, Touran Zacaria, Vassallo Paleologo Fulvio. No specific funding has been received since this study was conducted as part of our routine work.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

## References

1. World Health Organization. Office of the High Commissioner for Human Rights and the International Organization for Migration. 2013. International Organization for Migration.
2. Colley DG, Bustinduy AL, Secor WE, King CH. Human schistosomiasis. *Lancet*. 2014;383:2253–64.
3. Ross AG, Bartley PB, Sleigh AC, Olds GR, Li Y, Williams GM, McManus DP. Schistosomiasis. *N Engl J Med*. 2002;346:1212–20.
4. Adebayo AS, Survayanshi M, Bhute S, et al. The microbiome in urogenital schistosomiasis and induced bladder pathologies. *PLoS Negl Trop Dis*. 2017;11:e0005826.
5. Coltart CEM, 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;109:214–20. <https://doi.org/10.1093/trstmh/tru195>.
6. Marchese V, et al. Schistosomiasis in immigrants, refugees and travellers in an Italian referral centre for tropical diseases. *Infect Dis Poverty*. 2018;7:55. <https://doi.org/10.1186/s40249-018-0440-5>.
7. Barda B, Coulibaly JT, Hatz C, Keiser J. Ultrasonographic evaluation of urinary tract morbidity in school-aged and preschool-aged children infected with *Schistosoma haematobium* and its evolution after praziquantel treatment: a randomized controlled trial. *PLoS Negl Trop Dis*. 2017;11:e0005400.
8. Botelho MC, Veiga I, Oliveira PA, et al. Carcinogenic ability of *Schistosoma haematobium* possibly through oncogenic mutation of KRAS gene. *Adv Cancer Res Treat*. 2013;2013:876585.
9. Ray D, Nelson TA, Fu C-L, et al. Transcriptional profiling of the bladder in urogenital schistosomiasis reveals pathways of inflammatory fibrosis and urothelial compromise. *PLoS Negl Trop Dis*. 2012;6:e1912.
10. Werf MJVD, Vlas SJD. Diagnosis of urinary schistosomiasis: a novel approach to compare bladder pathology measured by ultrasound and three methods for hematuria detection. *Am J Trop Med Hyg*. 2004;71:98–106.
11. Kramer CV, Zhang F, Sinclair D, Olliaro PL. Drugs for treating urinary schistosomiasis. *Cochrane Database Syst Rev*. 2014. <https://doi.org/10.1002/14651858.CD000053.pub3>.
12. “I Controlli Alla Frontiera La Frontiera Dei Controlli, LINEE GUIDA SALUTE MIGRANTI”. INMP-Istituto Nazionale per La Promozione Della Salute Delle Popolazioni Migranti Ed Il Contrasto Delle Malattie Della Povertà., June 2017. [http://www.inmp.it/ig/LG\\_Migranti-web.pdf](http://www.inmp.it/ig/LG_Migranti-web.pdf). Accessed 06 Sept 2018.
13. “Parasites”. Centers for Disease Control and Prevention. <http://www.cdc.gov/parasites/index.html>. Accessed 07 Aug 2018.
14. Roure S, Valerio L, Pérez-Quílez O, et al. Epidemiological, clinical, diagnostic and economic features of an immigrant population of chronic schistosomiasis sufferers with long-term residence in a non-endemic country (North Metropolitan area of Barcelona, 2002–2016). *PLoS One*. 2017;12:e0185245.
15. Riccardi N, Nosenzo F, Peraldo F, et al. Increasing prevalence of genitourinary schistosomiasis in Europe in the Migrant Era: neglected no more? *PLoS Negl Trop Dis*. 2017;11:e0005237.
16. WHO Schistosomiasis. <http://www.who.int/schistosomiasis/strategy/en/>. Accessed 06 Sept 2018.