

LETTER TO THE EDITOR

Should prospective renal transplant recipients be screened for *Strongyloides stercoralis*?

Paul Arkell ¹, Daniel Pan¹, Peter Riley¹, Philip Cooper², Ian MacPhee³, Catherine Cosgrove^{1,2} and Stephan Brincat⁴

¹Infection Department, St George's University Hospitals NHS Foundation Trust, London, UK, ²Institute for Infection and Immunity, St George's, University of London, Cranmer Terrace, London, UK, ³Institute of Medical and Biomedical Education, St George's, University of London, Cranmer Terrace, London, UK and ⁴Department of Nephrology and Transplantation, St George's University Hospitals NHS Foundation Trust, London, UK

Correspondence to: Paul Arkell; E-mail: paularkell@doctors.org.uk

Strongyloidiasis is a neglected tropical disease caused by *Strongyloides stercoralis*, which affects >100 million people, largely in Africa, Asia and Latin America [1, 2]. Chronic infection can persist for decades, and may be asymptomatic or cause gastrointestinal, cardiopulmonary or skin symptoms [3]. In some individuals with specific types of immune suppression (e.g. exogenous

corticosteroids and organ transplantation), rapid replication and dissemination of larvae result in *Strongyloides* hyperinfection syndrome (SHS), a condition characterized by acute severe illness and high mortality (Figure 1) [4].

In 2019, we looked after an Angolan gentleman with renal transplantation who developed SHS and sadly died [5].

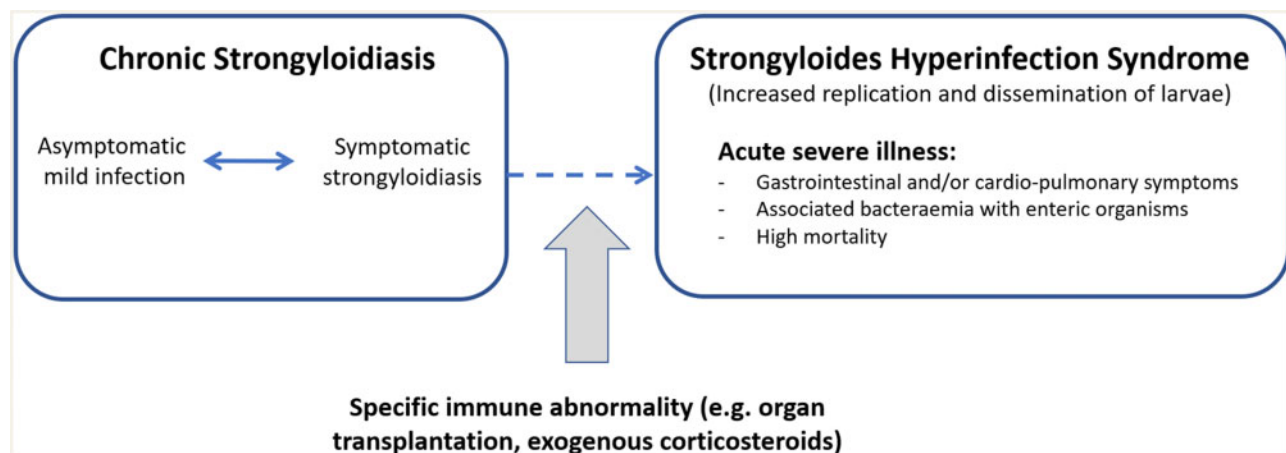


FIGURE 1: Spectrum of human disease caused by *S. stercoralis*.

Received: 14.3.2020; Editorial decision: 16.3.2020

© The Author(s) 2020. Published by Oxford University Press on behalf of ERA-EDTA.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact journals.permissions@oup.com

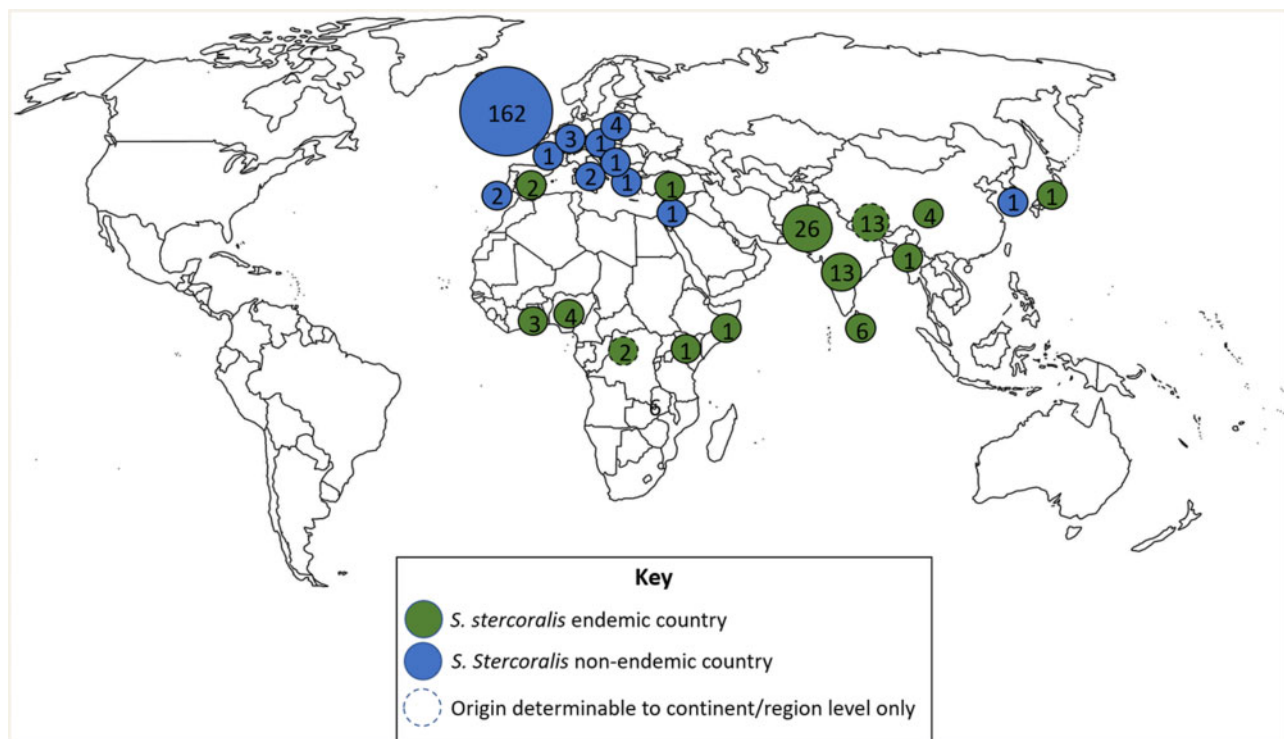


FIGURE 2: Global map displaying our transplant recipients' ethnic origin and demographic risk of strongyloides. Numbers within circles display number of individuals.

We subsequently reviewed 264 renal transplant recipients at our centre and found that 30% could be at risk of strongyloides based on their likely ethnic origin, which we determined using *Onolytics*, a software that assigns the most probable origin of each individual based on first name and surname [6] (Figure 2). Eosinophilia prior to transplantation was significantly more common in this group (49% versus 36%; $P=0.049$), as was enteric bacteraemia after transplantation (10% versus 4%; $P=0.046$). These could indicate undiagnosed infection. Despite this, none had been tested. Overall mortality of transplant recipients was low (6% after a median follow-up duration of 4.5 years) and was not associated with country of origin.

In the UK, there are no community-level or transplant clinic data suggesting the prevalence of strongyloidiasis. However, a recent systematic review of migrants originating from endemic countries and arriving/living in any non-endemic country found a pooled *S. stercoralis* seroprevalence of 12.2% [7]. Office for National Statistics data showed that 7.4% of individuals living in the UK were born in Africa, Asia or Latin America [8]. Therefore, somewhere in the region of 0.9% of individuals receiving renal transplantation in the UK could be seropositive for strongyloides.

The risk of SHS in seropositive individuals who undergo organ transplantation is not known. A retrospective study in Brazil identified 46 cases among 15 860 transplant recipients (0.3%), but most of these had received pre-emptive anthelmintic treatment [9]. Despite this, international [10] and US [11] transplantation guidelines make pragmatic recommendations for serological screening of potential recipients. An alternative approach would be routine treatment of at-risk individuals using ivermectin (a drug that is both safe and effective for chronic strongyloidiasis) [12]. UK guidelines only recommend testing for tropical infections in prospective donors [13].

We would urge clinicians to consider strongyloidiasis in renal transplant recipients if they have ever lived in the tropics. Serological screening (or treatment based on demographic risk factors alone) may be beneficial and should be considered for inclusion in transplantation guidelines.

ACKNOWLEDGEMENTS

The authors would like to thank Mrs Maria Fernandez, Renal Transplant Nurse Coordinator, Department of Nephrology and Transplantation, St George's University Hospitals NHS Foundation Trust.

CONFLICT OF INTEREST STATEMENT

None declared. The results presented in this article have not been published previously in whole or part, except in abstract format.

REFERENCES

- Genta RM. Global prevalence of strongyloidiasis: critical review with epidemiologic insights into the prevention of disseminated disease. *Rev Infect Dis* 1989; 11: 755–767
- Bisoffi Z, Buonfrate D, Montresor A et al. Strongyloides stercoralis: a plea for action. *PLoS Negl Trop Dis* 2013; 7: e2214
- Nutman TB. Human infection with *Strongyloides stercoralis* and other related *Strongyloides* species. *Parasitology* 2017; 144: 263–273
- Buonfrate D, Requena-Mendez A, Angheben A et al. Severe strongyloidiasis: a systematic review of case reports. *BMC Infect Dis* 2013; 13: 78

5. Pan D, Arkell P, Stone NRH et al. Delayed *Strongyloides stercoralis* hyperinfection syndrome in a renal transplant patient with *Pneumocystis jirovecii* pneumonia receiving high-dose corticosteroids. *Lancet* 2019; 393: 1536
6. Lakha F, Gorman DR, Mateos P. Name analysis to classify populations by ethnicity in public health: Validation of Onomap in Scotland. *Public Health* 2011; 125: 688–696
7. Asundi A, Beliaevsky A, Liu XJ et al. Prevalence of strongyloidiasis and schistosomiasis among migrants: a systematic review and meta-analysis. *Lancet Glob Health* 2019; 7: e236–e248
8. Office for National Statistics. *Population of the UK by Country of Birth and Nationality*. <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/datasets/populationoftheunitedkingdombycountryofbirthandnationality> (9 March 2020, date last accessed)
9. Miglioli-Galvão L, Pestana JOM, Lopes-Santoro G et al. Severe *Strongyloides stercoralis* infection in kidney transplant recipients: a multicentre case-control study. *PLoS Negl Trop Dis* 2020; 14: e0007998
10. Clemente WT, Pierrotti LC, Abdala E et al. Recommendations for management of endemic diseases and travel medicine in solid-organ transplant recipients and donors: Latin America. *Transplantation* 2018; 102: 193–208
11. Fischer SA, Lu K; AST Infectious Diseases Community of Practice. Screening of donor and recipient in solid organ transplantation. *Am J Transplant* 2013; 13 (Suppl 4): 9–21
12. Henriquez-Camacho C, Gotuzzo E, Echevarria J et al. Ivermectin versus albendazole or thiabendazole for *Strongyloides stercoralis* infection. *Cochrane Database Syst Rev* 2016; CD007745. doi: 10.1002/14651858.CD007745.pub3
13. Advisory Committee on the Safety of Blood Tissues and Organs. *Microbiological Safety Guidelines*. 2017. <https://www.gov.uk/government/publications/guidance-on-the-microbiological-safety-of-human-organs-tissues-and-cells-used-in-transplantation> (9 March 2020, date last accessed)