

# **Strongyloides stercoralis in the United Kingdom: A systematic review and meta-analysis of published cases**

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## **Background**

*Strongyloides stercoralis* is a soil-transmitted intestinal helminth which can cause lifelong infections in humans. Symptoms of infection can vary, whilst many may be asymptomatic. When an infected host is immunocompromised, *S. stercoralis* has the potential to cause a ‘hyper-infection’ – a life-threatening disseminated disease with mortality up to 71%. Given treatment with anti-parasitic agents has a high eradication rate, successfully screening at-risk groups can reduce the threat of hyper-infection, particularly in those who may be immunocompromised. We conducted a systematic review and meta-analysis of *S. stercoralis* infections reported in the United Kingdom to describe the demographics and clinical features in those with this parasitic infection.

## **Methods**

A systematic search of PubMed and Scopus was performed and studies describing patients in the United Kingdom with proven *S. stercoralis* infection were included. The outcomes studied were weighted pooled prevalence (WPP) of clinical features during illness, demographics, and relevant investigation findings. We used the DerSimonian-Laird random-effects model to report prevalence of clinical variables and a Freeman-Tukey double arcsine transformation was applied to our data.

## Results

Seventeen studies with 1361 patients were analysed. A third of cases reported were in returning travellers (454/1361, 33.3%), whilst 24.5% (334/1361) were cases in migrants. A total of 342/1361 (25.1%) cases were described in Armed Personnel who had returned to the United Kingdom. A minority of cases were in those living with HIV (8/1361, 0.6%) and 223/1361 (16.4%) were cases from a mixed cohort.

The weighted pooled prevalence (WPP) of asymptomatic cases was 31.0% [95%CI 27.5% - 34.6%,  $I^2=92.3\%$ ]. The most reported symptoms were abdominal pain (WPP 30.8% [95%CI 27.4% - 34.3%],  $I^2=91.6\%$ ), rash (WPP 28.4% [95%CI 25.3% - 31.7%],  $I^2=98.8\%$ ) and diarrhoea [WPP 9.4% [95%CI 6.0% - 13.1%],  $I^2=80.7\%$ ].

Returning travellers were more likely to be asymptomatic with a WPP of 44.63% (95%CI 38.57 - 50.75%), whilst migrant groups commonly presented with abdominal pain (WPP 42.4% (95%CI 35.1% - 47.9%) and diarrhoea (WPP 65.3% [95%CI 25.2 - 96.8%]). Rashes were a frequent complaint in those diagnosed with *S. stercoralis* in the armed forces (WPP 75.3% [95%CI 70.2% - 80.1%]).

The most common diagnostic modality in reported cases was *Strongyloides* serology (51.8%), followed by stool culture (30.8%). A small number were diagnosed with the use of ELISA (9.1%). When analysing laboratory findings, the average eosinophil count was  $1.75 \times 10^9/L$  (standard deviation  $\pm 1.24 \times 10^9/L$ ).

Of the 478 patients followed up, 255 were treated successfully (30.8%). There were only 4 reports of hyper-infection.

## Conclusion

Our meta-analysis illustrates that a third of patients with *S. stercoralis* infection in the UK were asymptomatic, whilst commonly reported symptoms may include non-specific abdominal pain, diarrhoea, and a rash. Given these non-specific presentations, clinicians should have a low threshold in screening migrant groups and returning travellers for *S. stercoralis* – particularly if there are plans for immunosuppressive therapy.