

***Shigella* and *Salmonella* infections are associated with markers of environmental enteropathy among children under five in Zambia**

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Background

We investigated moderate-to-severe diarrhoeal stool samples collected from children under-5 for relationships between specific enteric pathogens and levels of stool environmental enteropathy (EE) markers: calprotectin (CALP), alpha-1-antitrypsin (AAT) and myeloperoxidase (MPO).

Methods

A cross-sectional study of 234 randomly selected from 2,050 stored stool samples was conducted among children presenting with moderate to severe diarrhoea in Lusaka province of Zambia. Stool samples were tested for 15 enteric pathogens using the Luminex XTag GPP panel and three (3) faecal markers of EE were tested by the enzyme-linked immunosorbent assay (ELISA) method using commercial kits.

Results

Of the 234, 114 (49%) were female, 103 (44%) were asymptomatic for diarrhoea, 181 (77%) had two or more enteric pathogens detected in stool. The median age of children was 15.6 months (IQR=8.4, 25.2) with 88 (38%) being infants. Fifty six percent (131/234) children were positive for Rotavirus, 43.2% (101/234) Enterotoxigenic *E. coli*, 36%(86/234) *Giardia*, 35%(82/234) Adenovirus and 34.2%(80/234) had *Shigella*.

The mean EE score was 5 (SD=2.25). The median concentration of MPO, CALP, and AAT were 2560.4 ng/ml (IQR=806.1, 6522.9), 79.1 ng/ml (IQR=0, 362.5), and 48.6 mg/ml (IQR=12.1, 139.5) respectively. In a multivariable linear regression model, *Shigella* and *Salmonella* were independently associated with increase in mean EE score. The presence of *Shigella* in stool was associated with 0.92 unit increase in EE score (coefficient=0.92; 95%CI=(0.14, 1.70); p=0.022. While the presence of *Salmonella* was associated with an 0.83 unit increase in EE score (coefficient=0.83; 95%CI=(0.08, 1.58); p=0.030). Additionally, *Shigella* and *E. coli* 0157 were associated with geometric mean increases in MPO 3.78 (2.41, 5.93); P <0.0001 and 2.19 (1.38, 3.47); P = 0.001.

Conclusion

Salmonella and *Shigella* are associated with EE and together with *E. coli* 0157 are associated with increased MPO. All are possible major drivers of EE score using the dominance analysis.