Changes in rotavirus strains circulating in Malawi before vaccine introduction and six years post vaccine era

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BACKGROUND

Malawi introduced a live-attenuated G1P[8] Rotarix™ rotavirus vaccine (RV1) in its national immunization program on 29 October 2012. The vaccine has reduced the diarrhoea-associated hospitalisations and mortalities by almost a third in Malawi. However, the impact of vaccination on the circulating strains has not been fully evaluated. We therefore conducted a study to determine the changes in the rotavirus strains circulating in Malawi following vaccination.

METHODS

Stool samples were collected from under-five year old children who presented with diarrhoea at Queen Elizabeth Central Hospital (QECH) before (November 2011 – October 2012) and after (November 2012 – October 2018) vaccine introduction. All stool samples were screened for rotaviruses using Premier Rotaclone Enzyme Immunoassay (EIA). Rotavirus dsRNA was extracted from all positive samples and a nested reverse transcription polymerase chain reaction was used to assign G and P genotypes to VP7 and VP4 encoding genes, respectively.

RESULTS

The proportion of rotavirus detection in children with diarrhoea was higher (44%, *n*=187/428) before vaccine introduction but declined (24.46%, *n*=863/3528) in the vaccine era. The pre-vaccine era had two rotavirus peak seasons observed in March and July while the post vaccine era had one rotavirus peak season observed from March to April. Fewer rotavirus strains circulated in the pre-vaccine era (*n*=9) with G2P[4](26%, *n*=48/187), G1P[8](17%, *n*=32/187) as predominant strains while the vaccine era had a high strain diversity *(n=20)* predominated by G1P[8] *(21.4%, n=186/863),* G2P[4*] (21.4%, n=184/863),* G2P[6]*(8%, n=76/863)* and G12P[6]*(7.1%, n=61/863)*. Cases caused by G2P[6] and G12P[6] were present throughout but G2P[4] and G1P[8] gradually declined in the later years of the vaccine era. G3P[4] emerged as the most prevalent strain in 2018.

CONCLUSION

Rotavirus strain diversity increased during the post-vaccine period. Continual surveillance is necessary to assess not only whether the emergence of strains like G3P[4] is due to vaccine use but also the vaccine effectiveness against these emerging strains.