

PREVALENCE AND MOLECULAR CHARACTERIZATION OF ENTERIC
VIRUSES AND THEIR ASSOCIATION WITH MALNUTRITION IN CHILDREN
LESS THAN TWO YEARS OLD IN THE VHEMBE REGION OF LIMPOPO
PROVINCE, SOUTH AFRICA

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A dissertation submitted in fulfilment of the requirements for an award of Masters of Science
Degree in Microbiology

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March 2012

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ABSTRACT

The association between malnutrition and diarrhea is usually mutually reinforcing, however little is known on the association of enteric viruses such as Adenovirus (Adv), Astrovirus (Asv), Rotavirus (RV) and Norovirus with malnutrition and diarrhea. These pathogens have been acknowledged as major causes of infantile gastroenteritis worldwide. Furthermore malnourished children have been reported to be at a bigger risk of death resulting from diarrhea. The aim of the present study was to determine the association between enteric viruses, malnutrition and diarrhea in children less than two years in the Dzimauli community in Limpopo province, South Africa.

A total of 821 stool specimens were collected from 79 children and tested for the presence of Adv, Asv and RV using an Enzyme Linked immunosorbent Assay (ELISA). Rotavirus positive samples were subsequently subjected to VP7 and VP4 genotyping using reverse transcriptase polymerase chain reaction (RT-PCR). Anthropometric measurements were used to determine the nutritional status of the children. A total of 249 samples were randomly selected and screened for norovirus (NoV) using a one-step real-time reverse transcriptase-polymerase chain reaction (RT-PCR) for genogroup identification.

Of the 821 cases visited, 6.6% were underweight, while 13.9% were stunted and 3.4% were wasted. An estimated 2.1% of the cases were overweight. Of the 821 specimens, infection by at least one enteric virus was found in 34.17%. The incidences of adenovirus, astrovirus and rotavirus were 1.46%, 1.05% and 0.85% respectively. Three of ELISA rotavirus positive samples were successfully genotyped. The strains detected were, P[6] (14.28%), P[8] (14.28%), and G1P[6] (14.28). Five percent (41/821) of the samples screened were diarrheal. Of the three viruses tested by ELISA only rotavirus was found in diarrheal samples and was

statistically significantly associated with diarrhea in this study population. ($\chi^2=8.272$; $p=0.004$). Out of the 821 cases, 94.4% had received at least one dose of rotavirus vaccine while vaccine information was not available for 5.6%.

Rotaviruses were not detected in the cases that had completed the rotavirus vaccine schedule (3 doses). However, it was detected in 2 (0.5%) among those who received the vaccines two times and 5 (1.3%) among those who took only one dose. Among the 249 specimens randomly selected, Norovirus infection was detected in 52.2%. Of the 130 norovirus positive samples, 16, 95 and 19 samples contained genogroup I, genogroup II and the coexistence of both genogroups respectively. GII was the most prevalent (48.6%) and the only one detected in all diarrheal cases.

In general, viral infection appeared to be a factor predisposing stunting since 22% of children infected with at least one virus were stunted compared to 13% in the case of uninfected children. The presence of these viruses in the asymptomatic carrier might pose a great risk of untreated illness which could later impact intestinal absorption, the nutrition, physical growth and development of the infected children. Norovirus seems to be a problem that needs further investigation in this region. The decrease in diarrhea cases and rotavirus infection observed among the vaccinated children suggest acquired protection due to Rotavirus vaccine; however more epidemiological surveillances of this nature are necessary to validate the present findings as this was the first study of this kind in the Limpopo Province.