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Clinical characteristics and viral shedding of children with norovirus gastroenteritis

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Background: Norovirus (NoV) is an emerging enteric pathogen worldwide. NoV plays an increasingly important role in enteric infections. The rapid transmission of NoV via person-to-person contact makes infection control difficult. A quantitative method is even more important in the management of NoV infection in immunocompromised hosts, including transplant and cancer patients.

Materials & Methods: Fecal specimens were collected from previously healthy children with NoV gastroenteritis confirmed by RT-PCR. The transcript of VP2 gene was reverse transcribed into cDNA and dissolved in DNase-free distilled water. The cDNA quantity was equivalent, approximately, to 4.12×1012 copy numbers according to EndMemo number calculation. The standard curve using 10-fold serial dilution of the cDNA was obtained (10^{-1}-10^{-10}). The equivalent copy numbers in 53 fecal samples from NoV-infected patients were counted. The clinical presentations of the patients were retrospectively collected and analyzed by GraphPad Prism 6.0 (GraphPad Software, Inc.). The NoV was also genotyped using methods as described earlier. Fisher exact test was used to determine differences between clinical features. Statistical significance was analyzed using a nonparametric Mann-Whitney U test for two independent samples.

Results: A total of 53 fecal samples from NoV-infected hospitalized children age range, 8 months to 5 years were collected for analysis of viral load with the time for sample collection varied from day 1 to day 19 after the onset of the illness. We identified a longer shedding period in 21 febrile patients (6.75±3.14 days after disease onset) than in 32 afebrile ones (5.7±3.4 days after disease onset) (p=0.03); however, there is no significant difference between the 37 older patients (≥1 years old, 6.5±3.9 days after illness onset) and the 16 younger ones (<1 years old, 5.8±2.6 days after illness onset) in terms of viral shedding. Furthermore, we found a significantly longer shedding period in patients infected by NoV GII.4 Sydney strain (30 cases; 6.9±3.1 days after illness onset) than those infected by non-GII.4 Sydney strains (23 cases; 5.7±3.7 days after disease onset) (p<0.01).

Discussion: In this study, we used the SYBR green-based real-time RT-PCR to measure NoV viral load in the feces of patients with NoV infection. SYBR green real-time RT-PCR showed a higher sensitivity in viral load calculation as the detection limit of the technique was at 50 RNA copies/ml in a previous study. With this method, we found febrile NoV GII.4 Sydney strain-infected children have a longer viral shedding. In the previous study indicate that Norovirus infection induced immune response in the patients, and inflammation may drive viral replication, leading to a longer shedding period following the onset of the illness.

Conclusion: In conclusion, we devised a sensitive method for quantification of NoV viral load in patients and successful established the model of NoV viral shedding. This method is useful for devising efficient infection control measures for NoV infection, investigating outbreaks, and monitoring viral transmission and evolution.

Biography

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