HHS Public Access

Author manuscript

Lancet Child Adolesc Health. Author manuscript; available in PMC 2020 June 01.

Published in final edited form as:

Lancet Child Adolesc Health. 2019 November ; 3(11): 758–759. doi:10.1016/S2352-4642(19)30270-6.

Sapovirus: an important cause of acute gastroenteritis in children

Sylvia Becker-Dreps, MD,
Departments of Family Medicine and Epidemiology, 590 Manning Drive, Chapel Hill, NC 27599-7595, USA

Filemon Bucardo, PhD,
Department of Microbiology, Universidad Nacional Autonoma de Nicaragua, León, Campus Médico, 2^{0} piso, León, Nicaragua

Jan Vinjé, PhD
Division of Viral Diseases, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention, 1600 Clifton Road NE, Atlanta, GA 30329, USA

Sapovirus infections are responsible for both sporadic cases and occasional outbreaks of acute gastroenteritis. While all age groups are affected, children younger than five years of age have the highest burden of disease. Sharing many similarities with closely-related noroviruses, common symptoms of sapovirus gastroenteritis include vomiting and diarrhea, which typically resolve within one week.[1] Sapovirus has also been detected in asymptomatic individuals.[1,2]

In recent years, there has been a growing awareness of the importance of sapoviruses to the health of children, due in part to the increasing use of molecular-based diagnostics. Using these diagnostics, sapovirus was detected in 3% to 17% of children with gastroenteritis in high and low-income countries.[2–4] Following rotavirus vaccine introduction in Nicaragua, sapovirus was second only to norovirus as the most commonly detected enteropathogen among children under age five years with gastroenteritis.[5] In this setting, sapovirus was also identified in 15% of children hospitalized for gastroenteritis.[6]

Children with sapovirus gastroenteritis are often co-infected with multiple enteric pathogens, especially in low- and middle-income countries (LMIC), which makes it a challenge to understand the true burden of disease. The Malnutrition and Enteric Disease (MAL-ED) study, a multi-site prospective birth cohort study of enteric infections in children in LMIC, used a nested case-control design to estimate pathogen-specific attributable disease burdens. Using this approach, they found sapovirus to have the third highest attributable incidence for

Corresponding author: Sylvia Becker-Dreps, MD, Departments of Family Medicine and Epidemiology, 590 Manning Drive, Chapel Hill, NC 27599-7595, USA, sbd@unc.edu, 984-974-4662.

Author contributions

All authors contributed to comment conception and performed literature searches. SBD wrote the first manuscript draft. All authors critically reviewed and edited the manuscript and approved the final draft.

Conflicts

We declare no competing interests.

diarrhea of all enteric pathogens among children under 12 months of age, and the second highest attributable incidence among children between 12 and 24 months of age.[7] In both age groups, sapovirus had a more substantial contribution to childhood diarrhea than norovirus, albeit with possibly less severe clinical symptoms. Notably, rotavirus vaccines had been introduced at only three of the eight MAL-ED sites, and at all three sites, sapovirus had a higher point estimate of attributable incidence than rotavirus. However, sapovirus gastroenteritis was not associated with delays in linear growth at two years of life in MAL-ED, as compared to several bacterial enteropathogens.[8]

Given the overall clinical importance of sapovirus infections to child health, what can be done to prevent or reduce its disease burden? There are currently no specific therapeutics to treat sapovirus disease, other than the use of oral rehydration solution. Zinc supplementation has been shown to reduce the duration and severity of gastroenteritis of any cause in LMIC.[9] For control of sapovirus, measures that are recommended to control norovirus transmission are likely also effective against sapovirus, including frequent hand hygiene, environmental disinfection, proper disposal of fecal- or vomit-soiled materials, and limited contact with ill persons. Currently, very little is understood about risk factors for sapovirus disease to guide prevention efforts. The high prevalence of sapovirus in both high and low-income countries argues against the potential that improvements in water and sanitation will substantially reduce disease transmission. Like norovirus, sapovirus can also be transmitted through contaminated food and water,[10] and improved food safety would likely decrease sapovirus disease burden. New technologies, such as use of whole genome sequencing, could be used to better understand transmission from close contacts, food sources, and the environment. Unlike norovirus infection, sapovirus infection has not been associated with host histo-blood group antigen phenotypes.[11] The fact that sapovirus gastroenteritis occurs more frequently in young children as compared to older children and adults[12] suggests that natural infection may provide durable protection against sapovirus and provides optimism for the success of a future sapovirus vaccine to reduce the burden of sapovirus disease.

In conclusion, sapovirus is increasingly recognized as an important cause of acute gastroenteritis in children in both low- and high-income settings. As no vaccines or antivirals are currently available, supportive treatment with oral rehydration and zinc supplementation (in LMIC) are recommended. Control measures similar to those recommended for norovirus may help decrease disease transmission. In the future, prophylactic vaccines against sapovirus may contribute to reduce the overall burden of childhood gastroenteritis.

Acknowledgements

SBD and FB are supported by the National Institute of Allergy and Infectious Diseases (R01AI127845). The funders of the study played no role in the writing of this comment. The authors had final responsibility for the decision to submit the comment for publication.

The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

References

1. Oka T, Wang Q, Katayama K, Saif LJ. Comprehensive review of human sapoviruses. Clin Microbiol Rev 2015; 28: 32–53. [PubMed: 25567221]

2. Sánchez GJ, Mayta H, Pajuelo MJ, et al. Epidemiology of sapovirus infections in a birth cohort in Peru. Clin Infect Dis 2018; 66: 1858–1863. [PubMed: 29309577]

3. Diez-Valcarce M, Castro CJ, Marine RL, et al. Genetic diversity of human sapovirus across the Americas. J Clin Virol 2018; 104: 65–72. [PubMed: 29753103]

4. Hassan F, Kanwar N, Harrison CJ, et al. Viral etiology of acute gastroenteritis in <2-year-old US children in the post-rotavirus vaccine era. J Pediatric Infect Dis Soc 2018; 9 3 [Epub ahead of print].

5. Becker-Dreps S, Bucardo F, Vilchez S, et al. Etiology of childhood diarrhea after rotavirus vaccine introduction: a prospective, population-based study in Nicaragua. Pediatr Infect Dis J 2014; 33: 1156–63. [PubMed: 24879131]

6. Bucardo F, Reyes Y, Svensson L, Nordgren J. Predominance of norovirus and sapovirus in Nicaragua after implementation of universal rotavirus vaccination. PLoS ONE 2014; 9: e98201. [PubMed: 24849288]

7. Platts-Mills JA, Liu J, Rogawski ET, et al. Use of quantitative molecular diagnostic methods to assess the aetiology, burden, and clinical characteristics of diarrhoea in children in low-resource settings: a reanalysis of the MAL-ED cohort study. Lancet Glob Health 2018; 6: e1309–e1318. [PubMed: 30287127]

8. Rogawski ET, Liu J, Platts-Mills JA, et al. Use of quantitative molecular diagnostic methods to investigate the effect of enteropathogen infections on linear growth in children in low-resource settings: longitudinal analysis of results from the MAL-ED cohort study. Lancet Glob Health 2018; 6: e1319–e1328. [PubMed: 30287125]

9. Sazawal S, Black RE, Bhan MK, Bhandari N, Sinha A, Jalla S. Zinc supplementation in young children with acute diarrhea in India. N Engl J Med 1995; 333: 839–44. [PubMed: 7651474]

10. Kobayashi S, Fujiwara N, Yasui Y, Yamashita T, Hiramatsu R, Minagawa H. 2012 A foodborne outbreak of sapovirus linked to catered box lunches in Japan. Arch Virol 157: 1995–1997. [PubMed: 22752792]

11. Bucardo F, Carlsson B, Nordgren J, et al. Susceptibility of children to sapovirus infections, Nicaragua, 2005–2006. Emerg Infect Dis 2012; 18: 1875–8. [PubMed: 23092588]

12. Rockx B, De Wit M, Vennema H, et al. Natural history of human calicivirus infection: a prospective cohort study. Clin Infect Dis 2002; 35: 246–53. [PubMed: 12115089]