Rigshospitalet
Diagnostisk Center

STATENS SERUM INSTITUT

Significant circulation of Enterovirus and Parechovirus in Danish toddlers

Authors: Alex Christian Yde Nielsen[1, 2], Mette Louise Gyhrs[3], and Blenda Böttiger[4].

ESCV - September 7.-10. 2022

1. Department of Virology and Microbiological Specialdiagnostics, Statens Serum Institut, Copenhagen, Denmark
2. Department of Clinical Microbiology, Rigshospitalet, Copenhagen, Denmark
3. Department of Paediatrics Hospital of Region Zealand, Holbæk, Denmark
4. Department of Clinical Microbiology, Division of Laboratory Medicine, Lund, Sweden.

INTRODUCTION

Enterovirus (EV) and Parechovirus (PeV) are both genera of the picornavirus family, which is a large family of non-enveloped positive-sense single-stranded RNA viruses containing both human and animal pathogens. EV species A-D and PeV species A are known to circulate worldwide and are both known to be able to cause significant clinical symptoms especially in young children [1,2].
Because both EV and PeV are shed in high titers in the stool a correlation to gastroenteritis seems likely. However, this association is still questionable, and due to the many different virus types and their correlation to more or less specific symptoms, this association may be hard to attain [4,5].
EV circulates all the year around but with a peak in the months of the summer and early autumn in temperate climates, and PeV peaks most often a little later in the year, typically in the months of autumn almost every year in temperate climates [1–3].

AIM

The aim of this study was to describe the prevalence of EV and PeV in stool samples among Danish toddlers, and to correlate these viruses to symptoms of acute gastroenteritis.

METHODS

From August 2009 to January 2012, 454 children were followed with stool samples from the age of 6 months until 15 months. Stool samples were collected both routinely (6, 10, and 15-months-of-age) and when the children suffered from acute gastroenteritis. The samples were analyzed by real-time RT-PCR for EV and PeV [6].

RESULTS

A total of 1096 stool samples were tested. As shown in figure 1, 17,0 % of the routine samples and 16,1 % of the gastroenteritis samples tested positive for EV. The same proportions for PeV were 11,6 % and 11,5 %, respectively.
As demonstrated in figure 2, the positivity rate of EV peaked in the months of July and August where 35 % of the samples were positive, and the same number for PeV was just below 25 % in the months of September to November.

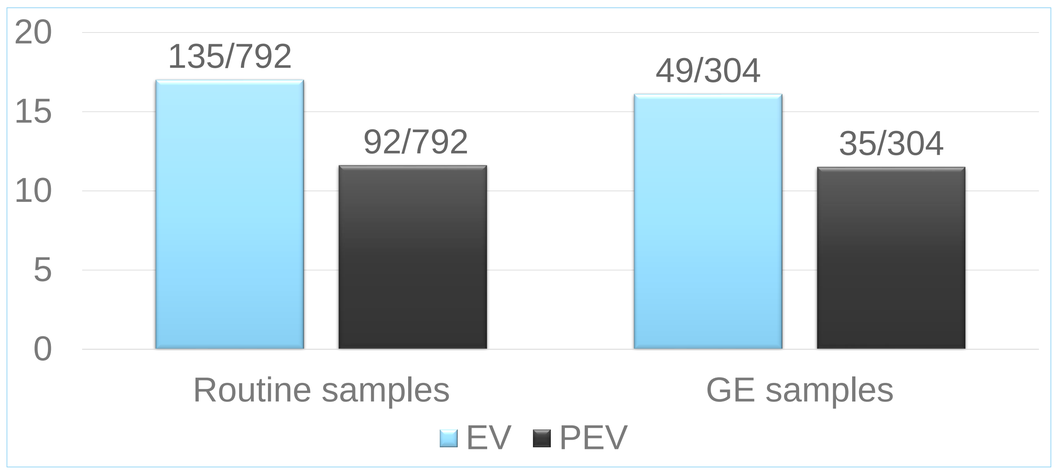

Figure 1. EV and PeV positivity rate for toddlers with and without gastroenteritis.

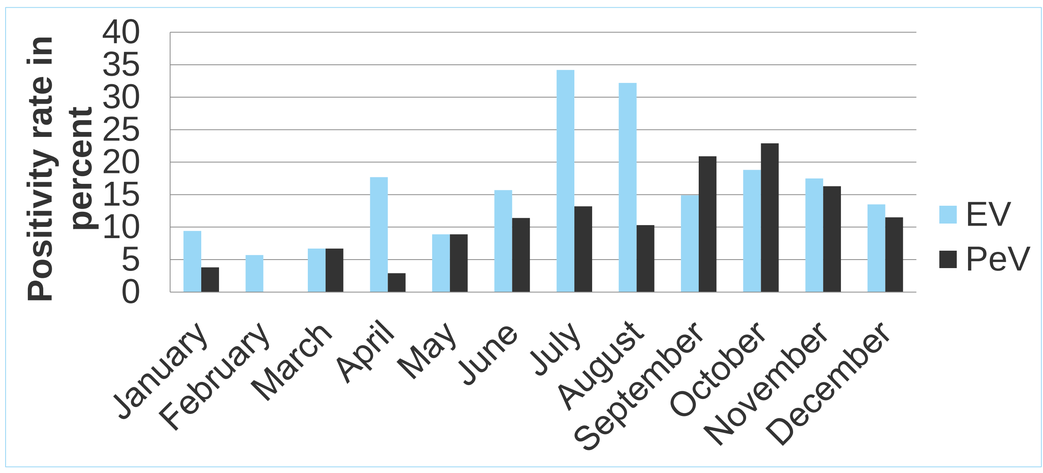

Figure 2. The monthly positivity rate for EV and PeV in percent, 2009-2011.

CONCLUSIONS

No association between EV and PeV and symptoms of acute gastroenteritis was found in this study.
These viruses are highly prevalent in stools of toddlers. This sheds a light on the limited usability of using stool samples alone to diagnose acute infections with EV and PeV in toddlers.

REFERENCES

1. N. Khetsuriani, A. Lamonte-Fowlkes, S. Oberst, M.A. Pallansch, Enterovirus surveillance--United States, 1970-2005., MMWR. Surveill. Summ. Morb. Mortal. Wkly. Report. Surveill. Summ. / CDC. 55 (2006) 1–20.
2. T.K. Fischer, S. Midgley, C. Dalgaard, A.Y. Nielsen, Human parechovirus infection, Denmark, Emerg. Infect. Dis. 20 (2014) 83–87.
3. M.A. Pfaller, S.S. Richter, G. Funke, J.H. Jorgensen, M.L. Landry, K.C. Carroll, D.W. Warnock, eds., Manual of Clinical Microbiology, 11th Edition, American Society of Microbiology, 2015.
4. J. Chansaenroj, S. Tuanthap, T. Thanusuwannasak, A. Duang-In, S. Klinfueng, N. Thaneskongtong, V. Vutithanachot, S. Vongpunsawad, Y. Poovorawan, Human enteroviruses associated with and without diarrhea in Thailand between 2010 and 2016, PLoS One. 12 (2017).
5. G.P.K. Chiang, Z. Chen, M.C.W. Chan, S.H.M. Lee, A.K. Kwok, A.C.M. Yeung, E.A.S. Nelson, K.L. Hon, T.F. Leung, P.K.S. Chan, Clinical features and seasonality of parechovirus infection in an Asian subtropical city, Hong Kong, PLoS One. 12 (2017).
6. A.C.Y. Nielsen, B. Böttiger, S. Midgley, L.P. Nielsen, A novel enterovirus and parechovirus multiplex one-step real-time PCR-validation and clinical experience., J. Virol. Methods. (2013).