Risks for cold frequency vary by sex: role of asthma, age, TLR7 and leukocyte subsets

Liisa M. Murray [1], Stephanie T. Yerkovich[2], Manuel A. Ferreira[3] and John W. Upham[1,4]

Affiliations: [1]Diamantina Institute, The University of Queensland, Brisbane, Australia. [2]Faculty of Medicine, The University of Queensland, Herston, Australia. [3]QIMR Berghofer Medical Research Institute, Brisbane, Australia. [4]Respiratory and Sleep Medicine, Princess Alexandra Hospital, Brisbane, Australia.

Correspondence: J.W. Upham, Translational Research Institute, 37 Kent Street, Woolloongabba, Brisbane, QLD 4102, Australia. E-mail: j.upham@uq.edu.au

Cite this article as: Murray LM, Yerkovich ST, Ferreira MA, *et al*. Risks for cold frequency vary by sex: role of asthma, age, TLR7 and leukocyte subsets. *Eur Respir J* 2020; 56: 1902453 [https://doi.org/10.1183/13993003.02453-2019].

ABSTRACT Viral respiratory infections are usually benign but can trigger asthma exacerbations. The factors associated with upper respiratory tract infection (cold) frequency are not fully understood, nor is it clear whether such factors differ between women and men.

To determine which immunological and clinical variables associate with the frequency of self-reported respiratory infections (colds), 150 asthma cases and 151 controls were recruited. Associations between antiviral immune response variables: toll-like receptor (TLR)7/8 gene expression, plasmacytoid dendritic cell (pDC) numbers and interferon-α, tumour necrosis factor and interleukin-12 production, and asthma were then examined that might explain cold frequency.

People with asthma cases reported more colds per year (median 3 *versus* 2; p<0.001) and had lower baseline TLR7 gene expression (odds ratio 0.12; p=0.02) than controls. Associations between many variables and cold frequency differed between women and men. In women, high blood neutrophil counts (β=0.096, p=0.002), and younger age (β=−0.017, p<0.001), but not exposure to children, were independently associated with more frequent colds. In men, low TLR7 expression (β=−0.96, p=0.041) and high CLEC4C gene expression (a marker of pDC; β=0.88, p=0.008) were independently associated with more frequent colds. Poor asthma symptom control was independently associated with reduced TLR8 gene expression (β=−1.4, p=0.036) and high body mass index (β=0.041, p=0.004).

Asthma, age and markers of inflammation and antiviral immunity in peripheral blood are associated with frequent colds. Interestingly, the variables associated with cold frequency differed between women and men.