Overnutrition, Nasopharyngeal Pathogenic Bacteria and Proinflammatory Cytokines in Infants with Viral Lower Respiratory Tract Infections

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Abstract

BACKGROUND: Little is known about the interaction between the nasopharyngeal bacterial profile and the nutritional status in children. In this study, our main goal was to evaluate the associations between overnutrition and the presence of four potentially pathogenic bacteria in the nasopharynx of infants with viral lower respiratory tract infections (LRTI). In addition, we determined whether changes in the nasopharyngeal bacterial profile were associated with mucosal and serum proinflammatory cytokines and with clinical disease severity. METHODS: We enrolled 116 children less than 2 years old hospitalized for viral LRTI during two consecutive respiratory seasons (May 2016 to August 2017); their nutritional status was assessed, and nasopharyngeal and blood samples were obtained. S. aureus, S. pneumoniae, H. influenzae, M. catarrhalis, and respiratory viruses were identified in nasopharyngeal samples by qPCR. Cytokine concentrations were measured in nasopharyngeal and blood samples. Disease severity was assessed by the length of hospitalization and oxygen therapy. RESULTS: Nasopharyngeal pathogenic bacteria were identified in 96.6% of the enrolled children, and 80% of them tested positive for two or more bacteria. The presence and loads of M. catarrhalis was higher ($p = 0.001$ and $p = 0.022$, respectively) in children with overnutrition (n = 47) compared with those with normal weights (n = 69). In addition, the detection of >2 bacteria was more frequent in children with overnutrition compared to those with normal weight ($p = 0.02$). Multivariate regression models showed that the presence and loads of S. pneumoniae and M. catarrhalis were associated with higher concentrations of IL-6 in plasma and TNF-α in mucosal samples in children with overnutrition. CONCLUSIONS: The nasopharyngeal profile of young children with overnutrition was characterized by an over representation of pathogenic bacteria and proinflammatory cytokines.

Author keywords
children; co-detection; nasopharynx; overnutrition; pathogenic bacteria; viral respiratory infection