Introduction

Acute respiratory infections are the most common cause of death in children in developing countries and little information is available on risk factors for mortality among African children presenting with symptoms compatible with acute respiratory infections (1). Studies in industrialized countries using modern technology have shown that most if not all of ARI episodes are caused by different viruses and are almost always self-limiting, although a nuisance to the patient and followed by active-treatment requiring complications in a small percentage. Cough, sneezing, nasal discharge and moderate fever are symptoms associated with acute respiratory infections (ARI) which are common all over the world especially in children. Socioeconomic and environmental risk factors, such as day care attendance outside the home, a relatively short duration of breast-feeding, parental smoking in the household, and a polluted environment have been associated with frequently recurring respiratory tract infections (2-5). The most frequent respiratory symptoms in children’s hospitals in Nigeria are coryza, sneezing, cough, and fever often associated with some complications in many of the children. Little information is available about the causes of ARI in developing tropical countries. Theoretically, the relative role of viruses could be smaller here, and hence, the routine use of antibacterial antibiotics better justified. The present study was designed to identify viral agents responsible for respiratory infections among young children in Nigeria, to define the incidence of respiratory viral agents in children suffering from respiratory tract infection, and to identify the role of newly discovered viruses among West African children.

Using conventional real time RT-PCR, we discovered that all major respiratory viral pathogens are well represented in specimens of the children. Out of 246 nasal and throat specimens collected from ARI patients, 77 percent contained the genome of at least one viral agent, as shown by molecular techniques. All tested groups of viruses were present with the human rhinoviruses (HRVs) being the most prevalent virus group and present in 87 (36 %) of cases, followed by parainfluenza virus (PIV) type 3, detected in 50 (20.3%), human enterovirus, 35 (14.2%); PIV type 2, 21 (8.5%); PIV type 1, 15 (6.1%); adenovirus, 12 (4.9%); influenza virus C, 12 (4.9%); human metapneumovirus (hPMV), 7 (2.8%); human bocavirus (HBoV), 6 (2.4%); influenza virus A, 3 (1.2%); influenza virus B, 2 (0.8%); respiratory syncytial virus (RSV), 1 (0.4%).

Influenzaviruses and RSV, frequently reported in most previous studies, were relatively rare in the studied Nigerian children. As these viruses typically show strict seasonality in circulation, a prospective follow up study would be needed to reveal their true prevalence in Nigeria.

Our study underlines the importance of viruses in the pathogenesis of respiratory infections of children in Nigeria. Also, simultaneous infection with two or even three viruses was observed in some children. HRV was the most frequently detected virus followed by parainfluenzaviruses in double and triple infections?.

With HRV being the most prevalent viral agent found in Nigerian children, we also wanted to characterize these agents in more detail. Therefore we subjected the detected HRV strains to partial genomic sequencing in the VP4/VP2 capsid protein coding region followed by phylogenetic analysis.
As a result we disclosed the genetic type of 17 of these strains. The genotyped strains represented 15 distinct genetic types in HRV species A and C. The genetic similarities of these strains to the closest GenBank matches were 78.0-99.5% indicating discovery of close genetic relatives of strains circulating in other geographical areas as well, but, moreover, previously unreported types. These results are among the first genetic typing results of HRV in the African continent and confirm the global circulation of the novel HRV-C strains.

The targeted study population was age 1-5; however, most of the children seeking care for a respiratory infection were under two years of age, showing that medical help is often sought for respiratory infections of younger children.

We report for the first time the abundance of HRV in West Africa suggesting its major contribution to respiratory infections in Nigerian children. We also report the presence of other viral agents including the novel viruses; circulating and contributing to respiratory infection in the Western part of Africa.

Demonstration of common viruses in most ARI patients in this study indicates that ARI also in Nigeria is a viral disease, a fact that should be taken in account in designing rational policy for the use of antibiotics that do not affect viral replication.

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