

# **FREQUENCY OF HUMAN METAPNEUMOVIRUS IN INFANTS AND CHILDREN WITH WHEEZY CHEST**

Thesis

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in Pediatrics*

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَأَنْزَلَ اللَّهُ عَلَيْكَ الْكِتَابَ وَالْحِكْمَةَ  
وَعَلَّمَكَ مَا لَمْ تَكُنْ تَعْلَمُ وَكَانَ فَضْلُ اللَّهِ  
عَلَيْكَ عَظِيمًا

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✍ **Sherif Moustafa Abdel Aziz**



*I'd like to dedicate this work,  
to my Parents,  
my Wife and Kids,  
my Brothers and Sister,  
who always spirited me to complete my work.*





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(Abstract)

This work was a cross sectional study including (50) infants and children all presenting with wheezy chest recruited from the Pediatrics Pulmonology Outpatient Clinic, Specialized New Children Hospital (Abou El- Reesh), Cairo University. The patients' mean age was  $31.3 \pm 20.9$  (in months) , 70% were males and 30% were females. The aim is to study the frequency of hMPV in infants and children with wheezy chest and to demonstrate its correlation with the severity of the disease. All patients were classified into new onset wheezers and recurrent wheezers .Patients were re-classified our wheezy infants and children according to their atopic status into atopic 42% and non- atopic 58% groups. The hMPV was found in 6% (no=3) of the patients using direct immunoflorecense assay.

**Key words**

Human Metapneumovirus + wheezy chest + infants and children

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**List of Abbreviations**

<b>aMPV</b> .....	Avian metapneumovirus
<b>ARI</b> .....	Acute Respiratory Illness
<b>ARTI</b> .....	Acute respiratory tract infection
<b>BAL</b> .....	Bronchoalveolar lavage
<b>CBC</b> .....	Complete Blood Picture
<b>COPD</b> .....	Chronic obstructive pulmonary disease
<b>DFA</b> .....	Direct immunofluorescence
<b>ED</b> .....	Emergency department
<b>EDTA</b> .....	Ethylene-diamine-tetra-acetic acid
<b>EPR-3</b> .....	Expert Panel Report 3
<b>FEV1</b> .....	Forced Expiratory Volume in 1 Second
<b>FITC</b> .....	Fluorescein isothiocyanate
<b>GERD</b> .....	Gastroesophageal reflux disease
<b>GOR</b> .....	Gastro-oesophageal reflux
<b>HIV</b> .....	Human immunodeficiency virus
<b>hMPV</b> .....	Human metapneumovirus
<b>ICS</b> .....	Inhaled corticosteroids
<b>IgE</b> .....	Immunoglobulin E
<b>IgG</b> .....	Immunoglobulin G
<b>IgG</b> .....	Immunoglobulin G
<b>ILI</b> .....	Influenza like illness
<b>ISAAC</b> .....	International Study of Asthma and Allergies in Childhood
<b>LABAs</b> .....	Long-acting $\beta$ 2AR-agonists
<b>LRTI</b> .....	Lower respiratory tract infection
<b>mAPI</b> .....	Modified Asthma Predictive Index

**List of Abbreviations**

<b>MCC</b> .....	Mucociliary clearance
<b>MDI</b> .....	Metered dose inhalers
<b>NRC</b> .....	National research center
<b>OCS</b> .....	Oral corticosteroid
<b>OM</b> .....	otitis media
<b>ORFs</b> .....	Open reading frames
<b>PBS</b> .....	Phosphate buffered saline
<b>PCR</b> .....	Polymerase chain reaction
<b>RAST</b> .....	Radioallergosorbent test
<b>RBM</b> .....	Reticular basement membrane
<b>RNA</b> .....	Ribonucleic acid
<b>RSV</b> .....	Respiratory syncytial virus
<b>SABAs</b> .....	Short-acting $\beta$ 2AR-agonists
<b>SARS</b> .....	Severe acute respiratory syndrome
<b>SDB</b> .....	Sleep-disordered breathing
<b>SMART</b> .....	Salmeterol Multicenter Asthma Research Trial
<b>URTI</b> .....	Upper respiratory tract infection
<b>WHO/IMCI</b> .....	World Health Organization / Integrated Management of childhood Illness
<b>wLRIs</b> .....	Wheezy lower respiratory tract illnesses
<b><math>\beta</math>2AR</b> .....	Beta -2- adrenergic receptor



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## INTRODUCTION

During the first years of life, pulmonary and non-pulmonary diseases can clinically manifest as recurrent episodes of wheezing, which can be called the “wheezy baby syndrome” (*Dela et al., 2009*).

Generally, the first episode of wheezing occurs during the first year of life and is associated with upper airway respiratory infection, and this is especially true of recurrent forms (*Bouzas et al., 2012*).

Wheezing in children is a common problem encountered by family physicians. Approximately 25 to 30 percent of infants will have at least one wheezing episode, and nearly one half of children have a history of wheezing by six years of age. The most common causes of wheezing in children include asthma, allergies, infections, gastroesophageal reflux disease, and obstructive sleep apnea. Less common causes include congenital abnormalities, foreign body aspiration, and cystic fibrosis. Historical data that help in the diagnosis include family history, age at onset, pattern of wheezing, seasonality, onset of attack, and association with feeding, cough, respiratory illnesses, and positional changes (*Weiss, 2008*). Recurrent early life wheeze is not always asthma, and up to 50 per cent of children are reported to remit (*Hovland et al., 2012*).

Many common respiratory viral infections can trigger recurrent wheezing, which in turn can have an impact later in childhood. The most often identified viruses in the first episode of wheezing in infants are respiratory syncytial virus (RSV), rhinovirus, parainfluenza, Human metapneumovirus (hMPV), coronavirus, influenza, bocavirus and adenovirus (*Jackson and Lemanske Jr, 2010*).

The hMPV has been identified in many countries as a common respiratory tract virus, now one of the leading causes of lower respiratory tract infections in young children (*Ong et al., 2007*), as It has been suggested that it is responsible for 5–10% of acute respiratory tract infections in neonates and children (*Agrawa et al., 2011*).

The hMPV infection is clinically similar to RSV, with signs and symptoms ranging from severe cough, fever, rhinorrhea and influenza like symptoms to bronchiolitis, pneumonia and attacks of wheezing (*Moattari et al., 2010*).

Studies concluded that the more common diagnoses for cases with hMPV infection were bronchiolitis (49.5%) and recurrent wheezing (45.5%) (*García-García et al., 2006*).

The hMPV was identified recently in the Netherlands in respiratory samples from children with acute respiratory symptoms. The seropositivity of the anti-hMPV IgG antibody in China was 74.5% in children aged 0 to 5 months, 64.0% in 6

to 11 months, 72.7% in 12 to 23 months, 87.1% in 24 to 35 months and 90.3% in 3 to 6 years (*Zhang et al., 2008*).

The hMPV is an enveloped non-segmented RNA virus belonging to genus Metapneumovirus, family Paramyxoviridae (*Mackay et al., 2004*). It is classified by phylogenetic analysis into two major genetic lineages termed subtypes A and B and are further subdivided into four subgroups (A1, A2, B1, and B2). Subtype A is the most dominant one. Some authors reported recently the existence of novel sub-lineages within the hMPV subgroup A2, named A2a and A2b, and various subtypes in the B2 group (*Regev et al., 2012*).

Studies showed that direct immunofluorescence (DFA) staining of clinical specimens, with results available within 2 to 4 h, is commonly used in clinical virology laboratories for the rapid diagnosis of respiratory viruses (*Landry et al., 2008*).

## **AIM OF THE STUDY**

**T**he aim of this work is to study the frequency of hMPV in infants and children with wheezy chest and to demonstrate its correlation with the severity of the disease.