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Short Communication

Human Metapneumovirus (HMPV): A Viral Respiratory Infection of Increasing Public Health Concern

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Human metapneumovirus was first detected in the Netherlands in 2001. Since then, this virus has been widely observed in infants, immunocompromised persons and in older age groups, accounting for a significant percentage of acute respiratory tract infections (ARTI's), with significant morbidity and occasional mortality.

HMPV was discovered by a team of scientists led by van den Hoogen. This was a landmark discovery in the field of clinical medicine and virology. This virus belonging to the family Paramyxoviridae and genus Metapneumovirus, was first detected in the nasopharyngeal secretions of young children with ARTI. However, on retrospective analysis of archived samples it was observed that this virus was already spreading in the human population since the early 1950's but had remained undetected due to a lack of advanced diagnostic methods in virus detection then.

The HMPV is an enveloped single-stranded, non-segmented RNA virus. The genomic structure of the virus is 13 kilobases in length and it encodes nine proteins, namely, M, M2, SH, G, L, N, P, F, and M2-2 protein, with the G and F proteins vital for membrane fusion and host cell attachment. However, the genome of the HMPV lacks the non-structural proteins NS1 and NS2 which are present in the genomic structure of the Respiratory Syncytial Virus (RSV).

The genetic lineages of HMPV are two, namely, A and B, with two subgroups in each (A1, A2 and B1, B2). All these subgroups are present world-wide and circulate seasonally, especially in winter and early spring, in temperate locales [1]. It is estimated that 10 to 20 million people worldwide are infected annually by the HMPV. However, some believe the number of infections may be much higher due to missed diagnosis and lack of reporting. The virus infects all age groups but is more commonly spread among infants and young children, immunocompromised individuals such as cancer patients, HIV-positive individuals, transplant patients (who are on long-term immunosuppressant treatment), older individuals (above 65 years) with significant comorbidities and individuals with chronic illnesses such as COPD, bronchial asthma, and cardiac disease. Some of these individuals when infected with HMPV may experience significant morbidity with occasional mortality.

The mode of transmission of the human metapneumovirus is via respiratory droplets and direct contact with contaminated areas. It has an incubation period of 3 - 6 days with the F protein inducing viral entry by causing membrane fusion. The virus mainly targets epithelial cells leading to mucus hypersecretion, cellular inflammation and consequent damage.

The clinical features of infection with the HMPV can be varied ranging from mild to severe. The patient may present with mild nasal congestion, cough, sore throat, rhinorrhoea or with more serious clinical features such as pneumonia and bronchiolitis which if progressive can lead to respiratory distress and severe hypoxia, at times requiring mechanical ventilation.

In the adult population, severe HMPV infection is more common in people who are in the older age group (> 65 years of age), immunocompromised, or have longstanding cardiopulmonary comorbidities [2,3]. Particularly in the elderly population, HMPV may present with clinical features of fever, cough, shortness of breath and generalised malaise, thereby mimicking influenza or other respiratory viruses. In the vulnerable age groups and in patients with chronic severe comorbidities, HMPV can cause a severe lower respiratory tract infection, including the acute respiratory distress syndrome (ARDS) [2,4]. Consequently, severe HMPV outbreaks with resultant pneumonia leading to ARDS and death have also been reported among inmates in rehabilitation centres, long-term care settings, and other healthcare facilities [5,6].

Children commonly present with cough, fever and wheeze which is often difficult to distinguish from an RSV infection. However, it must be remembered that HMPV is responsible for approximately 10% of all hospital admissions due to respiratory infections in children under the age of 5 years, and so, should arouse a high index of suspicion in this patient population.

Since clinical features are often quite indistinguishable from other respiratory viral infections, an accurate diagnosis is vital for patient management and surveillance of the population at risk. Mainstay in the diagnosis of HMPV infection is the reverse transcription polymerase chain reaction (RT-PCR) which has a high level of sensitivity and specificity and is considered the gold standard in the diagnosis of HMPV infection. Other diagnostic investigations include immunofluorescence assays which are capable of rapid antigen detection but are less sensitive, viral culture and serology.

As yet, no antiviral treatment has been approved for the treatment of HMPV infection. Treatment is essentially supportive and includes adequate hydration with intravenous fluids, antipyretics during fever and bronchodilators and steroids especially in patients who have underlying bronchial asthma and have developed wheezing during the course of the infection. Oxygen supplementation is given in patients with pneumonia or an acute exacerbation of bronchial asthma who develop hypoxia during the course of the illness. Antibiotics are not usually recommended except in case of superadded bacterial infection. In severe cases, patients may also develop fulminant pneumonia leading to ARDS, which may require mechanical ventilatory management.

In patients who are immunosuppressed, the dose of immunosuppressants may be reduced if appropriate, during the acute stage of the infection. Immunoglobulins and ribavirin have been tried in select severe cases, but their efficacy is yet to be determined in clinical trials.

Several vaccine trials are underway but, as yet no significant breakthrough has been achieved. Hence, preventive measures are highly recommended, such as hand hygiene including the use of hand sanitizers, good respiratory etiquette, isolation of patients with the HMPV infection in order to prevent further spread of the infection in the community, use of personal protective equipment (PPE) during outbreaks of infection, disinfection of potentially infected surfaces, rapid public health response and strong surveillance, to prevent further outbreaks of infection.

HMPV, though a relatively recent discovery, has a considerable public health impact on the general population, as it is a leading cause of hospitalization in the paediatric population, second only to the respiratory syncytial virus (RSV) infection. Moreover, it is also a significant cause of morbidity in the elderly and immunocompromised patients and those with chronic conditions such as COPD, bronchial asthma and cardiovascular disease.

With growing public health awareness of the disease process and its prompt diagnosis, it is hoped that the human metapneumovirus infection will be effectively contained globally and successfully managed whenever future outbreaks occur.

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