

Chapter-17

UPPER AND LOWER RESPIRATORY TRACTS BACTERIAL INFECTIONS

Mohd Akhlak

Research Scholar, Glocal University, Saharanpur, U.P., India.

Seema Negi

*Central Research Station (CRS), Subharti Medical College,
Swami Vivekanand Subharti University, Meerut, U.P., India.*

Sanjay Kumar*

*Professor, Glocal College of Paramedical Science and
Research Centre, Glocal University, Saharanpur, U.P., India.*

**Correspondence to: sanjay_redrose@yahoo.co.in*

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ABSTRACT

Upper respiratory and lower respiratory system bacterial infections represent a significant global health burden, contributing to illness (condition) and death rate worldwide. While *Mycobacterium tuberculosis* remains a pivotal concern, this comprehensive study on bacterial infections affecting the respiratory tracts upper and lower, excluding tuberculosis. This study provides thorough understanding of the diverse bacterial pathogens, their epidemiology, clinical manifestations, diagnostic approaches, and current treatment modalities.

Keywords: Upper Respiratory Tract, Lower Respiratory Tract, Bacterial Infection.

17.1 INTRODUCTION

The both upper and lower respiratory system or tracts are vulnerable to various bacterial infections, ranging from mild self-limiting illnesses to severe and potentially, life-threatening conditions. This section provides a general summary of the vogue and impact of respiratory bacterial infections on public health, emphasizing the requirement for a detailed examination of causative agents beyond *Mycobacterium tuberculosis*. The respiratory tract infections (upper and lower) to the action of disease or pathogenic bacteria transferred via droplets and air of the infected person generally these type infections start infants, adults and old persons and we can say bacterial respiratory system infections (upper and lower) generally start in infants or new born baby the both respiratory system or tracts (upper and lower) bacterial infections show especially in starting years of life or infants.

The URT and LRT infections in fact perform the 50% of all infectious diseases generally in kids. During the first three years of life all kids or children regardless of gender (male/female) typically go through around eight episodes of both upper respiratory and lower respiratory system bacterial infections every year. The pathogens like bacteria are behind for the respiratory tract (URT & LRT), infections basically the same. Even though they affect the different both upper respiratory and lower respiratory tract (LRT) parts upper is like the nose and throat, and lower is like the lungs, generally they show many same characteristics because they are family. These similarities help the doctors and scientists to understand the disease and figure out how to treat and prevent these infections.

The most dangerous and acute bacterial infection disease “Diphtheria” a highly perilous and severe bacterial infection affecting the upper respiratory system induced by toxigenic strains of *Corynebacterium diphtheriae*. Diphtheria, a prevalent childhood illness and death in the pre-vaccination era (Youwang Y. et al, 1992). Over time the frequency

of diphtheria has diminished globally, in other words we can say declined in both developed and developing nations. Anyway, the re-occurring of toxigenic strains of diphtheria in several countries is predominantly linked to insufficient vaccine coverage and declining vaccine immunity in adults (*WHO, 2016*). India in particular, shoulders a significant portion of the risk factor on worldwide of diphtheria witnessing a notable increase in reported cases in recent years (*WHO, 2006*).

The study delves into the publicized literature on diphtheria in India since 1996, India aiming to outline its epidemiology and propose many rules for effective prevent measures within the country. The burden of diphtheria persists and numerous episodes have been documented in the recent past.

The resistance of antibiotics is a global health problem increase the complications of URT and LRT bacterial infections comes with its challenges, and antibiotic resistance represents a substantial and urgent risk to worldwide population health. It involves the capacity of bacteria to resistance the effect of antibiotic medications that were originally designed to cure bacterial infections. This resistance makes standard treatments ineffective and responsible spread of bacterial infections, and associated with the complications and problems treatment of both upper and lower respiratory system or tracts bacterial infections.

17.2 UPPER RESPIRATORY TRACT OR SYSTEM BACTERIAL INFECTIONS

This section explores bacterial infections affecting the upper respiratory system or tract, mark such as pharyngitis, sinusitis etc (*Chow AW and Vortel JJ, 1992*). But these are not limited. Pathogens such as *streptococcus pneumoniae*, *Corynebacterium diphtheriae*, *Haemophilus influenzae*, and *streptococcus pyogenes*, etc (*Hedges JR and Lowe RA, 1987*) Epidemiological trends, clinical manifestations, and emerging antibiotic resistance patterns are analysed.

17.3 LOWER RESPIRATORY TRACT OR SYSTEM BACTERIAL INFECTIONS

Focusing on pneumonia and bronchitis, this section delves into bacterial infections impacting the lower respiratory tract. Key pathogens such as *Klebsiella pneumoniae*, *Legionella pneumophila*, and *Staphylococcus aureus* are examined, with an emphasis on risk factors, clinical presentation, and the evolving landscape of antibiotic resistance.

17.4 DIAGNOSTIC APPROACHES

The accurate and timely diagnosis of respiratory bacterial infections is crucial for effective management (*Oliveira Pereira C. et al, 2018*). This section evaluates traditional and cutting-edge diagnostic methods, including microbiological cultures, molecular techniques, and imaging modalities. The function of rapid diagnostic tests and their effect on patient outcomes are also discussed.

17.4.1 Laboratory Tests

- **Throat Culture:** Identifies the bacteria causing the infection (*Pham H. et al, 2019*) (e.g., *Corynebacterium diphtheriae*, *Streptococcus pyogenes*).
- **Blood Cultures:** Identifies bacteria in the bloodstream, useful in severe cases.
- **Sputum Culture:** Identifies the specific bacteria causing the infection.
- **Toxin testing:** The detection of toxin produced by bacteria, such as *Corynebacterium diphtheria* useful to identify toxigenic strains from non-toxigenic strains. This can be done with many diagnostic tests like, Elek test, polymerase chain reaction (PCR) testing, and enzyme immunoassay (EIA), test (*Yanagihara,2019*).
- **Antibiotic Sensitivity Testing:** If bacterial cultures are positive, performing antibiotic sensitivity testing helps guide appropriate antibiotic therapy.

17.4.2 Treatment Modalities

Antibiotic therapy remains the cornerstone of treating bacterial respiratory infections (*Douglas RG,1990*). This section provides a detailed analysis of current treatment guidelines, emerging therapies, and challenges associated with antibiotic resistance. Additionally, the function of supportive measures and vaccination strategies in preventing these infections is explored.

17.5 FUTURE PERSPECTIVES

Anticipating future challenges, this section discusses potential trends in bacterial respiratory infections, including the effect of climate change, globalization, and help the new upcoming therapeutic approaches and the significance of technology in surveillance, diagnosis, and treatment is also considered.

- **Antibiotic Resistance:** The expanding commonness of resistance of antibiotics is one of the most important concerns in the treatment of bacterial infections.

Continued research into new antibiotics and alternative treatment strategies is Important to address this issue.

- **Advanced Diagnostic Tools:** Improvements in diagnostic tools, including fast and proper testing methods, can improve the early detection of bacterial infections. This allows for timely and targeted treatment, reducing the infections from person to person and many other methods (Yanagihara, 2019).
- **Microbiome Research:** Understanding the respiratory microbiome and its role in health and disease is an emerging area of research. Manipulating the microbiome may provide novel ways to treat bacterial infections.

17.6 CONCLUSION

In conclusion, this complete review article offers a detailed examination of both upper respiratory and lower respiratory tracts bacterial infections, excluding Mycobacterium tuberculosis. By synthesizing current knowledge, the article aims to provide a helpful guide for Doctors, researchers, and policymakers who are focused on stopping and treating respiratory bacterial infections and working towards the prevention and management of respiratory infections on a global scale.

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