

## Isolation and Diagnosis of Some Types of Bacteria Causing Tonsillitis in Najaf Governorate

**Dr. Elham Jawad Kadhum**

Assist. Professor., Department of Biology, Faculty of Education for Women, University of Kufa, Iraq.

**ABSTRACT:** Twenty-four (24) bacterial isolates were obtained from thirty (30) clinical samples obtained from individuals of various ages suffering from tonsillitis and tonsillar hypertrophy. These patients were outpatients and inpatients referred at Al-Hakim General Hospital and Al-Sadr Teaching Hospital in Najaf Governorate between November 1, 2025, and January 1, 2026. The samples were distributed among twelve (12) men, nine (9) women, and nine (9) children. The bacterial species under study were identified morphologically and microscopically, and their identification was confirmed using the Vitek Compact2 System.

The results of the current study showed *Streptococcus mutans* bacteria It presented the highest percentage at 6(24%) for both sexes respectively, followed by *Enterococcus faecalis* bacteria at 2,1 (8%, 4%) for males and females respectively. *Staphylococcus* spp bacteria at 1(4%) for both sex, while the other types *E. coli* 2(8%), *pseudomonas aeruginosa*, *kcuria kristinae*, *Stenotrophomonas maltophilia* at 1(4%) in females and (0%) in males, whereas the percentage of *Klebsiella pneumonia* bacteria was 1 (4%) in males and (0%) in females, with no significant differences between males and females.

Current study showed the highest infection rate according to age group was recorded for *Streptococcus mutans*, at 4(16%) in the (4-10 age) group, followed by the 3(12%) at (11-17 age) group, followed by 2(8%) in both (18-24),(25-31 age) group and the (32-38 age) group at 4%. *Enterococcus faecalis* was also recorded at 2(8%) in the (18-24 age) group, followed by the 2 (4%)(4-10 age) group, *E. coli* was recorded at 2(4%) in the (4-10 age) and (18-24 age) group and 0% in the remaining age groups. Other types of bacteria *Pseudomonas aeruginos*, *Staphylococcus-spp* have 4% in (4-10 age) group. *Klebsiella pneumonia* 4% in age group (25-31 year), *Staph. Aureus* have 4% for each age group (4-10 year) and (11-17 years). The study showed an increased infection rate among children and young adult aged (4-10 years) (11-17), more than in other age groups.

Antibiotics susceptibility test was performed on five isolates against five commonly used antibiotics to determine their resistance. *Klebsiella pneumoniae* and *E. coli* showed resistance to all the antibiotics used, while *P. aeruginosa* and *Streptococcus mutans* were resistant to penicillin G and ceftriaxone and sensitive to amikacin, ciprofloxacin, and imipenem. The *S. aureus* isolate showed resistance to penicillin, ceftriaxone, amikacin, ciprofloxacin, and penicillin G, and sensitivity to imipenem

**KEYWORDS:** amikacin, *S. aureus*, *Klebsiella pneumoniae*, *E. coli*.

### INTRODUCTION

Respiratory infections are among the most significant illnesses affecting humans. These infections typically target both the upper and lower respiratory tracts. Lower respiratory tract infections are the most serious, as they affect the lungs, bronchi, and tracheas. Infections of the respiratory tract and its associated structures pose a major problem, with antibiotics prescribed for up to 75% of all infections. Respiratory tract infections occur in several ways, including bacterial, viral (Fendric et al., 2001), and fungal infections. The modes of transmission vary; some infections occur through respiratory droplets from infected individuals, or through the use of personal items such as towels, or through what is known as hospital-acquired infections. Many pathogens contribute to infection, including viruses and bacteria, which are more easily treated with antibiotics than fungi and parasites (Chroussos et al., 2010). The most common type of tonsillitis is pulmonary tuberculosis, which is one of the most serious bacterial infections. Tuberculosis caused by *Mycobacterium tuberculosis* is one of the diseases that directly target the lungs. This disease manifests in several forms and can enter a latent phase where the tubercle bacilli disappear from the sputum (Gordeuill et al., 2007). Fungi are another cause of respiratory tract infections. The aimed of this study is to give the increased incidence of respiratory tract infections, especially during the winter season, it was important to isolate the most significant bacterial pathogens associated with influenza viral infections during this period. Research objective:

- 1- Isolation and identification of some bacterial pathogens causes tonsillitis and upper respiratory tract infections
- 2- Conducting drug sensitivity testing to determine the resistance pattern of these isolates to commonly used antibiotics.

# Isolation and Diagnosis of Some Types of Bacteria Causing Tonsillitis in Najaf Governorate

## METHODS

### Specimen Collection

In this study (30) clinical specimens were collected from individuals with tonsillitis, of both sexes and various age groups, between November 1, 2025, and January 1, 2026. These specimens were collected from patients admitted to the Respiratory Clinic and those admitted to Al-Hakim General Hospital using cotton swabs preserved in transport media reinforced with protective media.

### Sample Culture

After collecting samples from patients, they were immediately transported to the laboratory. The samples were cultured using the streaking method on plates of both blood agar, used to diagnose hemolytic bacteria and distinguish the shapes and colors of the growing colonies and MacConkey agar a differential medium on which only Gram-negative bacteria grow. The plates were incubated at 37°C for 24 hours. Plates that showed no growth after 24 hours were incubated for another 24 hours before being considered negative. Bacterial species were identified using the Vitek Compact2 System, a modern and rapid system for bacteriological diagnosis, providing results with an accuracy of up to 99%, according to the manufacturer's instructions.

### Preservation and Maintenance of Bacterial Isolates

This method is called long-term preservation, in which the tubes containing the liquid nutrient medium were inoculated with a Glycerol at a concentration of 15% was added to the bacteria under study and incubated at 20°C. The antibiotic resistance of the bacteria under study was investigated using the susceptibility test. Drug susceptibility testing of the bacterial isolates under study was performed using the Müller-Hinton agar method. (MacFaddin, 2000).

### Antibiotic Susceptibility Testing

Muller-Hinton agar is prepared as the best laboratory medium for growing most pathogenic bacteria. The medium is densely inoculated with the bacteria to be tested under sterile conditions using spreading. Antibiotic tablets are placed on the medium using alcohol-sterilized forceps at evenly spaced intervals. No more than six tablets can be placed on the plate...

The plate is incubated for 18 hours (not exceeding 24 hours) at 37c. The inhibition zones around each tablet are measured in millimeters, and the results are recorded. Confirmation of Bacterial Isolate Diagnosis Using the Vietic 2 Compact System. This device is used to confirm the diagnosis of isolates after examination using conventional methods. It is used to diagnose most types of bacteria through a special diagnostic kit. The kit contains (47) wells that are inoculated with a 24-hour bacterial suspension. The suspension is incubated for (24) hours, and the device records the color changes resulting from bacterial growth. (Koneman et al., 1978).

## RESULT AND DISCUSSION

### Isolation and Identification

Twenty-four bacterial isolates causing tonsillitis were obtained and identified from thirty (30) clinical sample after culture, purification, and biochemical testing. The results are shown in table (1):

**Table (1) Numbers and Percentages of Patients Infected with Bacterial Types Distributed according to Sex**

| %(percentage) | Females | (percentage)% | Males | Types of bacteria                   |
|---------------|---------|---------------|-------|-------------------------------------|
| 8             | 2       | 0             | 0     | <i>E.coli</i>                       |
| 4             | 1       | 0             | 0     | <i>Kocuria kristinae</i>            |
| 24*           | 6       | 24*           | 6     | <i>Streptococcus mutans</i>         |
| 4             | 1       | 0             | 0     | <i>Stenotrophomonas maltophilia</i> |
| 4             | 1       | 0             | 0     | <i>Staphylococcus aureus</i>        |
| 0             | 0       | 4             | 1     | <i>Klebsiella pneumonia</i>         |
| 4             | 1       | 8             | 2     | <i>Enterococcus faecalis</i>        |
| 4             | 1       | 0             | 0     | <i>Pseudomonas aeruginosa</i>       |
| 4             | 1       | 4             | 1     | <i>Staphylococcus -spp</i>          |
| 60*           | 14      | 40            | 10    | Total                               |
|               |         | 8.7           |       | X2P<0.05                            |

As shown in Table No. (1), the percentages of bacterial infection with respect to gender were recorded, *Streptococcus mutants* bacteria It showed the highest percentage at 6(24%) for both sexes respectively, *Streptococcus mutans* can colonize the tonsils and play a role in chronic tonsillitis and related systemic conditions. (Kojima A, et al , 2012) followed by *Enterococcus faecalis* bacteria at 2,1 (8%, 4%) for males and females respectively. In chronic or complicated tonsillitis cases (such as a peritonsillar abscess or quinsy), *E. faecalis* can occasionally be isolated alongside other aerobic and anaerobic bacteria (Wahab D, et al. 2013) *Staphylococcus spp*, bacteria at 1(4%) for both sex, while the other types *E. coil* 2(8%), *pseudomonas aeruginosa*, *kcuria kristinae*,1(4%) *The clinical spectrum of K. kristinae infections has recently widened. The increasing spread of this undervalued bacterium and its resistance to antibiotics signify a new challenge for public health, which requires exact actions to limit it*

## Isolation and Diagnosis of Some Types of Bacteria Causing Tonsillitis in Najaf Governorate

,*Stenotrophomonas maltophilia* at 1(4%) in females and (0%) in males, *Stenotrophomonas maltophilia* is a rare, opportunistic Gram-negative bacterium that can cause severe, necrotizing tonsillitis. It is known for its intrinsic multidrug resistance and is notoriously challenging to treat standard antibiotics.(Borhan WM, et al. 2015). whereas the percentage of *Klebsiella pneumonia* bacteria was 1 (4%) in males and (0%) in females, with no significant differences between males and females. An unusual case of recurrent tonsillitis due to *pseudomonas aeruginosa*. *P. aeruginosa* in the head and neck region of an immunocompetent patient is mainly seen in ear infections, and sometimes in sinusitis. *P. aeruginosa* is an occasional finding in tonsil smears as part of normal microbial flora, but it rarely produces supportive tonsil infection (Ward D. 2018)

**Table No. (2) Numbers and percentages of those infected with different types of bacteria, distributed according to age groups**

|   | 32-38 Year |    | 25-31 Year |    | Year 18-24 |    | Year 11-17 |     | 4-10 Year |                                     | Type of bacteria |
|---|------------|----|------------|----|------------|----|------------|-----|-----------|-------------------------------------|------------------|
| % | NO         | %  | NO         | %  | NO         | %  | NO         | %   | NO        |                                     |                  |
| 0 | 0          | 0  | 0          | 4  | 1          | 0  | 0          | 4   | 1         | <i>E.coli</i>                       |                  |
| 0 | 0          | 0  | 0          | 0  | 0          | 4  | 1          | 0   | 0         | <i>Kocuria kristinae</i>            |                  |
| 4 | 1          | 8  | 2          | 8  | 2          | 12 | 3          | 16* | 4         | <i>Streptococcus mutans</i>         |                  |
| 0 | 0          | 0  | 0          | 0  | 0          | 4  | 1          | 0   | 0         | <i>Stenotrophomonas maltophilia</i> |                  |
| 0 | 0          | 0  | 0          | 0  | 0          | 4  | 1          | 4   | 1         | <i>Staph. Aureus</i>                |                  |
| 0 | 0          | 4  | 1          | 0  | 0          | 0  | 0          | 0   | 0         | <i>Klebsiella pneumonia</i>         |                  |
| 0 | 0          | 0  | 0          | 8  | 2          | 0  | 0          | 4   | 1         | <i>Enterococcus faecalis</i>        |                  |
| 0 | 0          | 0  | 0          | 0  | 0          | 0  | 0          | 4   | 1         | <i>Pseudomonas aeruginos</i>        |                  |
| 0 | 0          | 0  | 0          | 0  | 0          | 0  | 0          | 4   | 1         | <i>Staphylococcus-spp</i>           |                  |
| 4 | 1          | 12 | 3          | 20 | 5          | 24 | 6          | 40* | 9         | Total                               |                  |
|   |            |    |            |    | 7.9        |    |            |     |           | X2P< 0.05                           |                  |

Table (2) shows the number and percentage of bacterial infections according to age groups. The highest infection rate was recorded for *Streptococcus mutans*, at 16% in the (4-10 age) group, followed by the (11-17 age) group at 12%, then the (25-31 age) group at 8%, and the (32-38 age) group at 4%. *Enterococcus faecalis* was also recorded at 8% in the (18-24 age) group, followed by the (4-10 age) group at 4%, and the 0% in the remaining age groups. *E. coli* was recorded at 4% in the (4-10 age) and (18-24 age) group and 0% in the remaining age groups. Other types of bacteria *Pseudomonas aeruginos*, *Staphylococcus-spp* have 4% in (4-10 age) group. *Klebsiella pneumonia* 4% in age group (25-31 year), *Staph. Aureus* has 4% for each age group (4-10 years) and (11-17 years). The study showed an increased infection rate among children and young adult aged (4-10 years) (11-17), more than children in groups. The pathogen may vary with the age of the patient. *Staphylococcus ssp.* and *Streptococcus mutans* remain a significant component of commensal flora. They are opportunistic pathogens and some of the species isolated in this study are known to cause tonsillitis. *Staphylococcus aureus*,

### Antibiotic susceptibility test of bacterial isolates :

An antibiotics susceptibility test was performed on five isolates against five commonly used antibiotics to determine their resistance. *Klebsiella pneumoniae* and *E. coli* showed resistance to all the antibiotics used, while *P. aeruginosa* and *Streptococcus mutans* were resistant to penicillin G and ceftriaxone and sensitive to amikacin, ciprofloxacin, and imipenem. The *S. aureus* isolate showed resistance to penicillin, ceftriaxone, amikacin, ciprofloxacin, and penicillin G, and sensitivity to imipenem

**Table No. (3) Antibiotic Drug Sensitivity Test**

| Antibiotic | <i>P.aeruginosa</i> | <i>Streptococcus mutans</i> | <i>Klebsiella pneumonia</i> | <i>E.Coli</i> | <i>S.aureus</i> | LSDP<0.05 |
|------------|---------------------|-----------------------------|-----------------------------|---------------|-----------------|-----------|
| pG         | R                   | R                           | R                           | R             | R               | P<0.05    |
| Imp        | S                   | S                           | R                           | R             | S               |           |
| Cip        | S                   | S                           | R                           | R             | S               |           |
| Ak         | S                   | S                           | R                           | R             | R               |           |
| Cro        | R                   | R                           | R                           | R             | R               |           |

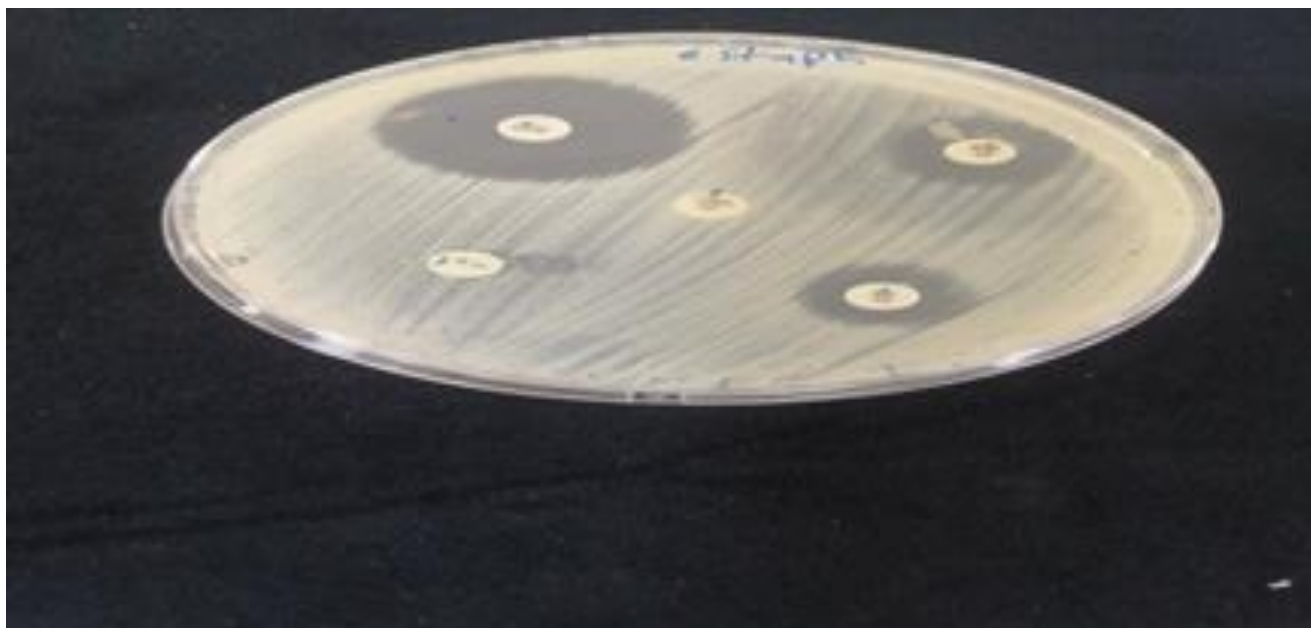


Figure (1) Measurement of the inhibition diameter for the sensitivity test of *Staphylococcus aureus* bacteria

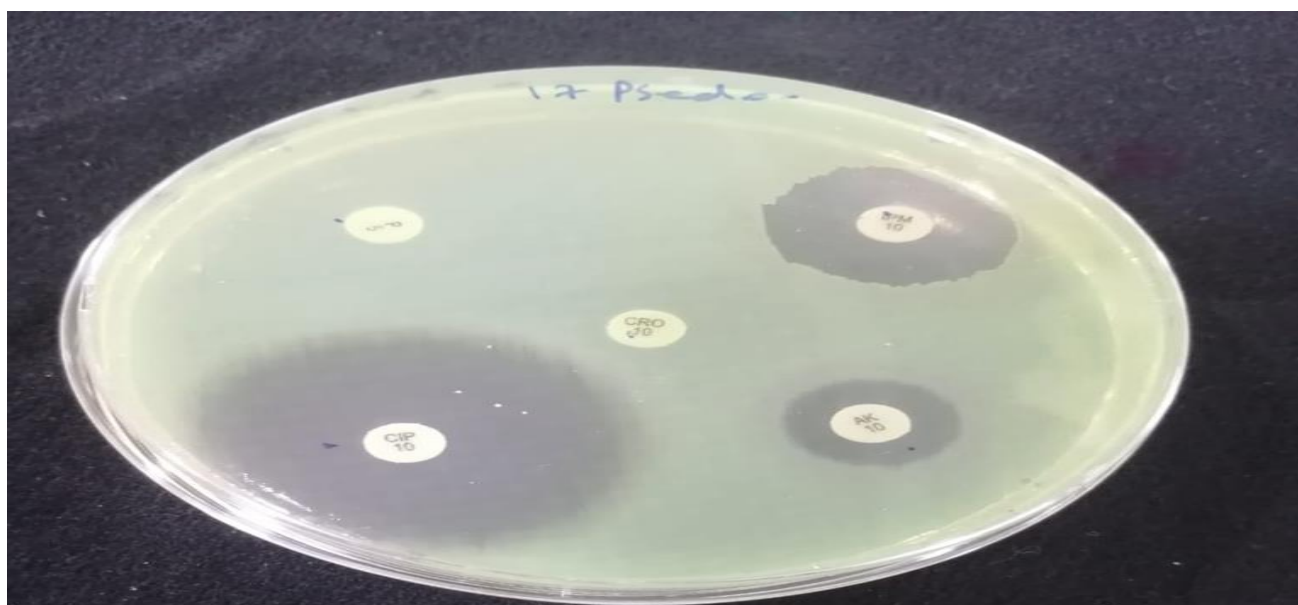


Figure (2): Susceptibility of *Pseudomonas aeruginosa* bacteria to antibiotics.

## CONCLUSIONS

Gram-positive bacteria are more prevalent in the tonsils than Gram-negative bacteria. Which is considered as normal flora in the pharynx, while Gram-negative bacteria are opportunistic and their presence in tonsillitis is unusual and may result from biofilm formation. Gram-negative bacteria are more resistant to antibiotics than Gram-positive bacteria.

## REFERENCES

- 1) Borhan WM, Dababo MA, Thompson LD, Saleem M, Pashley N. Acute necrotizing herpetic tonsillitis: a report of two cases. *Head Neck Pathol.* 2015;9:119–122. Doi: 10.1007/s12105-013-0516-2.
- 2) Chroussos , G.; Mantagos , S. ; Syrogiannopoulos , A.(2010) . Compliance and safety study in children with upper and lower respiratory tract infections .*Journal of IMAB .*, 16 :pp 47-48.
- 3) Godreuil ,S.;Tazi,L, and Bafiuls , A.(2007). Pulmonary Tuberculosis and Mycobacterium Tuberculosis .Brigham University , Department of Microbiology .U.S.A.
- 4) Fendric , A.M.;Saint , S.;Brook ,I.;Jacobs , M.R.;Pelton, . And Sethi ,S.(2001).Diagnosis and treatment of upper respiratory tract infections in the primary care setting . *Clin .Ther.* .23:1683-1706.

## Isolation and Diagnosis of Some Types of Bacteria Causing Tonsillitis in Najaf Governorate

- 5) Rehab F Abdulhasan Ahmed ,Elham jawad Kadhum. (2025). Screening for Integrin Genes Associated with Virulence Factors and Antibiotic Resistance in Clinical Isolates of Highly Pathogenic Klebsiella Pneumoniae., Al-Harf Journal., No. 24 .,Vol. 4, November 2025
- 6) Kojima A, et al. Infection of specific strains of Streptococcus mutans, oral bacteria, confers a risk of ulcerative colitis. Sci. Rep. 2012;2:332. Doi: 10.1038/srep00332.
- 7) Lieberman D, Shleyfer E, Castel H, Terry A, Harman I, Delgado J . Nasopharyngeal versus oropharyngeal sampling for isolation of potential respiratory pathogens in adults . J Clin Microbiol 2006 ; 44(2): 525-28.
- 8) Macfaddin, J. E. (2000). Individual biochemical tests for Identification of Medical Bacteria.3<sup>rd</sup> ed. Lippincott Williams Wilkins, London.p:57 – 424.
- 9) Z Younis Jabbar, J M Hussein. Antibiotic Susceptibility of Escherichia coli Isolated from Urinary Tract Infections in Najaf., Al-Harf Journal ., No. 25., Vol. 2, May 2026
- 10) Wahab D, Bichard J, Shah A, et al. Just a sore throat? Uncommon causes of significant respiratory disease. BMJ Case Rep 2013;2013:bcr2013008739 10.1136/bcr-2013-008739.
- 11) Ward D. Bacterial biofilms may be source of recurrent tonsillitis. Medicine & Health. Washington University in St. Louis. 2018.