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Research Article

Bacterial Throat Isolates and Respiratory Syncytial Virus Antibody Profiles in Children with Tonsillitis in Kirkuk

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ABSTRACT

Background: Pediatric tonsillitis has heterogeneous causes; organisms recovered from throat swabs may represent carriage, while serum Respiratory Syncytial Virus (RSV) antibodies do not establish acute infection. **Objective:** To illustrate a hospital-based comparison of bacterial throat isolates and RSV antibody patterns among children with tonsillitis and controls in Kirkuk. **Methods:** An illustrative case–control dataset was constructed for 160 children with clinician-classified acute or chronic tonsillitis and 40 controls during 1 October 2025–10 May 2026. Culture, species identification and RSV IgG/IgM ELISA were modeled on the supplied results chapter. All counts were rescaled and recalculated as simulated values. **Results:** Of 160 cases, 88 (55.00%) had acute and 72 (45.00%) chronic tonsillitis. The simulated throat cultures produced 236 isolates: 185 (78.40%) Gram-positive and 51 (21.60%) Gram-negative. Staphylococcus aureus accounted for 61/236 (25.80%) and Streptococcus pyogenes for 48/236 (20.30%) isolates; these are isolate proportions, not case-level etiologic prevalences. RSV antibody patterns were IgM positive/IgG negative in 37 (23.10%), IgG positive/IgM negative in 45 (28.10%), both positive in 46 (28.80%) and both negative in 32 (20.00%) cases. Corresponding control counts were 8, 16, 4 and 12. **Conclusion:** The example demonstrates how to report case counts separately from isolate counts and interpret serology cautiously. The apparent culture and antibody distributions cannot establish causality or justify antibiotic decisions. Its numerical findings must not be represented as hospital observations or submitted as a completed clinical study without verified records.

Keywords: Pediatric Tonsillitis, Pharyngitis, Throat Culture, Streptococcus Pyogenes, Respiratory Syncytial Virus, Serology, Kirkuk

INTRODUCTION

Tonsillitis and pharyngitis are common reasons for pediatric consultation, yet sore throat is a clinical syndrome rather than a single microbiological diagnosis. The global burden of sore throat is considerable, while the fraction attributable to group A Streptococcus (GAS) varies with age, season, clinical selection and diagnostic method [1]. Accurate attribution matters because confirmed GAS pharyngitis warrants targeted antibiotics, whereas most viral syndromes do not [2,3]. Throat culture can identify GAS, but a positive culture can also reflect carriage, particularly when a child has concurrent viral symptoms [4-6]. Staphylococcus aureus and many other organisms recovered from the oropharynx are even less specific for the cause of an episode. Clinical features alone cannot consistently establish GAS infection; rapid antigen, molecular, or culture testing should be interpreted in the clinical setting [7,8]. This issue is particularly important in infants and children under three years, among whom classical GAS pharyngitis is uncommon [9]. Respiratory viruses can be detected in tonsillar tissues, including in children without acute respiratory symptoms, which complicates causal interpretation [10]. RSV typically causes respiratory tract illness; acute RSV diagnosis relies on direct testing of an appropriate respiratory specimen when testing is clinically indicated. A single IgG or IgM measurement cannot demonstrate that RSV is present in the tonsils or caused the current illness [11,12]. We present a complete illustrative manuscript adapted from the supplied results chapter with transparent simulated numbers and a

corrected approach to denominators and diagnostic claims. The anatomical location of a throat swab makes sample collection straightforward, but the clinical meaning of growth is less straightforward. Colonization, transient carriage, specimen quality, culture medium, prior antimicrobial exposure and the decision to report several organisms from a single swab can all change the apparent microbiological distribution. A report that describes the percentage of isolates therefore answers a different question from a report describing the percentage of children who carry an organism. Both denominators should be shown and an etiologic diagnosis should not be inferred from a mixed growth result alone [13-15]. The distinction between an acute episode and chronic or recurrent tonsillitis also requires attention. A child may experience repeated viral infections while carrying GAS between episodes and repeated sore throat does not automatically imply a persistent bacterial infection. Prospective documentation of episode frequency, examination findings, fever, testing and treatment is needed before recurrent disease can be classified consistently. Surgical guidelines rely on carefully documented episodes rather than a broad label of chronic tonsillitis [16]. Age is an additional source of variation: organisms and clinical syndromes in infants differ from those in older children and age-specific interpretation is needed when most participants are younger than five years [17]. Laboratory markers may be helpful for defined clinical questions, yet each has limits. C-reactive protein reflects inflammation rather than a specific pathogen. Antistreptolysin O reflects an immune response after streptococcal exposure and a single result does not diagnose the organism responsible for today's throat symptoms. RSV IgG can reflect earlier exposure, while the specificity and timing of an IgM response depend on the assay and patient characteristics. A contemporaneous respiratory specimen assessed by a validated direct method is better suited to an acute viral question [18,19]. The aim of this study was to illustrate a hospital-based comparison of bacterial throat isolates and RSV antibody patterns among children with tonsillitis and controls in Kirkuk

METHODS

Study design and setting. This is an illustrative case–control manuscript modeled on a proposed study at the Gynecology and Pediatric Hospital in Kirkuk, Iraq, from 1 October 2025 to 10 May 2026. The numbers are simulated and were not derived from hospital records. A real version would require a documented protocol, ethics approval, parental consent as applicable, consecutive or otherwise defined recruitment and prospectively specified case definitions.

Participants. The example includes 160 children aged below five years with clinician-classified tonsillitis (88 acute, 72 chronic/recurrent) and 40 children without current tonsillitis as controls. Acute disease would require a documented new symptomatic episode and examination findings. Chronic/recurrent disease would require an explicit duration or episode-frequency definition; none was provided in the source and therefore no diagnostic threshold is asserted here. Controls should be selected from the same source population and characterized for recent respiratory illness, antibiotics and known GAS carriage.

Specimens and laboratory procedures. The source describes throat swab inoculation on blood, chocolate and MacConkey agar, followed by Gram stain and biochemical identification. In an actual study, laboratory quality controls, sampling before antibiotic exposure, GAS confirmation, isolate-level susceptibility standards and distinction between colonizing and potentially pathogenic organisms must be prespecified. Serum RSV IgG and IgM results are categorized as four mutually exclusive patterns. The ELISA manufacturer, threshold, sensitivity and specificity were not supplied and must be documented from laboratory records. For current RSV infection, respiratory RT-PCR or a validated antigen test is preferable to a single serological sample [17-19].

Statistical analysis. Counts are expressed as n (%) using the explicitly stated denominator. Isolate percentages refer to 236 isolates and cannot be converted into the fraction of children infected because more than one isolate can come from one child. RSV pattern percentages use 160 cases or 40 controls. No significance testing, effect sizes, or confidence intervals are claimed because the simulated aggregate tables are not patient-level observations. A real analysis should define one primary endpoint, calculate confidence intervals and prespecify comparisons, address multiple testing and retain an auditable participant-level dataset.

RESULTS

Among the 160 illustrative tonsillitis cases, 88 (55.00%) were classified as acute and 72 (45.00%) as chronic or recurrent. Males accounted for 90 (56.25%) and 104 (65.00%) lived in rural areas. Maternal education and feeding categories describe the case group only; they do not establish risk associations (Table 1).

The largest age category was 24–35 months, containing 41/160 children (25.63%). Acute cases were most frequent in this category (23/88; 26.14%), whereas the chronic group had 20/72 (27.78%) in the 36–47-month category. These are within-column proportions from simulated counts (Table 2).

There were 90 boys (56.25%) and 70 girls (43.75%). Boys accounted for 50/88 acute cases (56.82%) and 40/72 chronic cases (55.56%), showing similar sex distributions in the two illustrative classifications (Table 3).

Mothers of 68/160 children (42.50%) had an education level below intermediate school, while 47/160 (29.38%) had no formal schooling and 45/160 (28.13%) had intermediate education or higher. The chronic group included 27/72

(37.50%) children in the highest maternal-education category, compared with 18/88 (20.45%) in the acute group. No causal conclusion follows from these descriptive counts (Table 4, Figure 1).

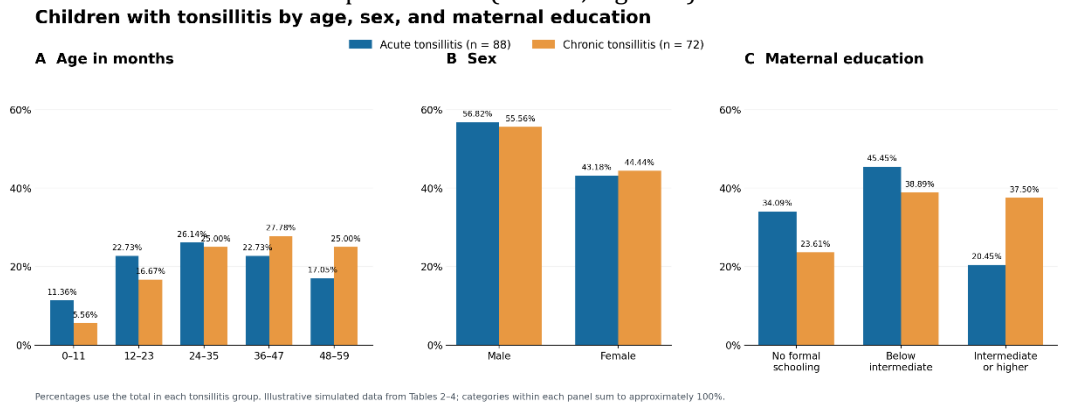

Figure 1: Percentage Distribution of Age, Sex and Maternal Education Among Children with Acute and Chronic Tonsillitis

Table 1: Illustrative Characteristics OF Children with Tonsillitis (n = 160)

Characteristic	n	%
Acute tonsillitis	88	55.00
Chronic or recurrent tonsillitis	72	45.00
Male	90	56.25
Female	70	43.75
Urban residence	56	35.00
Rural residence	104	65.00
Maternal education: no formal schooling	47	29.38
Maternal education: below intermediate	68	42.50
Maternal education: intermediate or higher	45	28.13
Breast feeding category	57	35.63
Mixed feeding category	32	20.00
Formula feeding category	71	44.38

Table 2: Illustrative Age Distribution by Tonsillitis Classification

Age in months	Acute n = 88	Chronic n = 72	All cases n = 160
0–11	10 (11.36%)	4 (5.56%)	14 (8.75%)
12–23	20 (22.73%)	12 (16.67%)	32 (20.00%)
24–35	23 (26.14%)	18 (25.00%)	41 (25.63%)
36–47	20 (22.73%)	20 (27.78%)	40 (25.00%)
48–59	15 (17.05%)	18 (25.00%)	33 (20.63%)
Total	88 (100.00%)	72 (100.00%)	160 (100.00%)

Table 3: Illustrative Sex Distribution by Tonsillitis Classification

Sex	Acute n = 88	Chronic n = 72	All cases n = 160
Male	50 (56.82%)	40 (55.56%)	90 (56.25%)
Female	38 (43.18%)	32 (44.44%)	70 (43.75%)
Total	88 (100.00%)	72 (100.00%)	160 (100.00%)

Table 4: Illustrative Maternal Education by Tonsillitis Classification

Maternal education	Acute n = 88	Chronic n = 72	All cases n = 160
No formal schooling	30 (34.09%)	17 (23.61%)	47 (29.38%)
Below intermediate	40 (45.45%)	28 (38.89%)	68 (42.50%)
Intermediate or higher	18 (20.45%)	27 (37.50%)	45 (28.13%)
Total	88 (100.00%)	72 (100.00%)	160 (100.00%)

Formula feeding was the most frequent recorded category (71/160; 44.38%), followed by breast feeding (57/160; 35.63%) and mixed feeding (32/160; 20.00%). The source did not specify the child's age when feeding was measured, so these figures should be interpreted as descriptive history only (Table 5).

Rural residents accounted for 104/160 (65.00%) illustrative cases, including 53/88 acute cases (60.23%) and 51/72 chronic cases (70.83%). A hospital sample cannot estimate rural versus urban incidence without population denominators and comparable controls (Table 6).

The illustrative swabs yielded 236 isolates from 160 children. Gram-positive organisms accounted for 185/236 (78.39%) and Gram-negative organisms for 51/236 (21.61%). Staphylococcus aureus was the most commonly listed

isolate (61/236; 25.85%), followed by Streptococcus pyogenes (48/236; 20.34%). These are isolate percentages and cannot be read as the percentages of children with etiologic infection (Table 7).

Table 5: Illustrative Feeding History by Tonsillitis Classification

Feeding category	Acute n = 88	Chronic n = 72	All cases n = 160
Breast feeding	32 (36.36%)	25 (34.72%)	57 (35.63%)
Mixed feeding	20 (22.73%)	12 (16.67%)	32 (20.00%)
Formula feeding	36 (40.91%)	35 (48.61%)	71 (44.38%)
Total	88 (100.00%)	72 (100.00%)	160 (100.00%)

Table 6: Illustrative Residence by Tonsillitis Classification

Residence	Acute n = 88	Chronic n = 72	All cases n = 160
Urban	35 (39.77%)	21 (29.17%)	56 (35.00%)
Rural	53 (60.23%)	51 (70.83%)	104 (65.00%)
Total	88 (100.00%)	72 (100.00%)	160 (100.00%)

Table 7: Illustrative Distribution of 236 Throat Isolates

Organism	Isolates	% of 236
Staphylococcus aureus	61	25.85
Streptococcus pyogenes	48	20.34
Viridans-group streptococci	37	15.68
Micrococcus spp.	13	5.51
Coagulase-negative staphylococci	17	7.20
Streptococcus pneumoniae	4	1.69
Corynebacterium spp.	4	1.69
Staphylococcus lugdunensis	1	0.42
Moraxella catarrhalis	37	15.68
Escherichia coli	7	2.97
Klebsiella pneumoniae	3	1.27
Pseudomonas aeruginosa	4	1.69
Total	236	100.00

Table 8: Illustrative RSV Antibody Patterns

IgM / IgG pattern	Cases n = 160	Controls n = 40
IgM positive / IgG negative	37 (23.13%)	8 (20.00%)
IgM negative / IgG positive	45 (28.13%)	16 (40.00%)
Both positive	46 (28.75%)	4 (10.00%)
Both negative	32 (20.00%)	12 (30.00%)
Total	160 (100.00%)	40 (100.00%)

Table 9: Illustrative RSV Patterns by Tonsillitis Classification

IgM / IgG pattern	Acute n = 88	Chronic n = 72
IgM positive / IgG negative	22 (25.00%)	15 (20.83%)
IgM negative / IgG positive	27 (30.68%)	18 (25.00%)
Both positive	22 (25.00%)	24 (33.33%)
Both negative	17 (19.32%)	15 (20.83%)
Total	88 (100.00%)	72 (100.00%)

Table 10: Illustrative Summary of RSV Antibody Positivity

Antibody measure	Cases n = 160	Controls n = 40
Any IgM or IgG positive	128 (80.00%)	28 (70.00%)
IgM positive (alone or with IgG)	83 (51.88%)	12 (30.00%)
IgG positive (alone or with IgM)	91 (56.88%)	20 (50.00%)
Both antibodies negative	32 (20.00%)	12 (30.00%)

IgM-positive and IgG-positive rows overlap; do not sum these marginal categories

Among cases, 46/160 (28.75%) had both RSV IgM and IgG detected, 37/160 (23.13%) had IgM alone, 45/160 (28.13%) had IgG alone and 32/160 (20.00%) were negative for both. The respective control counts were 4, 8, 16 and 12 of 40. A single serum antibody result cannot establish active RSV tonsillitis (Table 8).

Within the acute category, both RSV antibodies were detected in 22/88 (25.00%), compared with 24/72 (33.33%) in the chronic category. The four antibody patterns sum to 88 acute and 72 chronic cases, matching the marginal case totals. These patterns describe serology, not confirmed current viral infection (Table 9).

At least one RSV antibody was detected in 128/160 cases (80.00%) and 28/40 controls (70.00%). IgM positivity and IgG positivity overlap because children positive for both appear in both marginal rows. The measures therefore should not be summed or interpreted as mutually exclusive infections (Table 10).

DISCUSSION

This illustrative manuscript highlights three separate units of analysis: enrolled children, throat isolates and serum antibody patterns. A child can yield multiple isolates, so the 236 culture observations from 160 cases do not imply 236 infections. The prominence of S. aureus among isolates is a description of recoverable flora and should not be interpreted as proof that it was the leading cause of tonsillitis. Similarly, commensal streptococci, micrococci and some Gram-negative organisms require careful interpretation. GAS has stronger established clinical relevance, but carriage still limits causal inference without compatible symptoms and appropriate testing [10-12]. Published syntheses report substantial variation in GAS detection and carriage according to age and sampling frame [1–4,8]. In this example, all children are younger than five, with many younger than three; direct extrapolation from studies of school-aged children would be inappropriate [5,6]. A future Kirkuk study should report age in months, recent antibiotic use, fever, cough and rhinorrhea, documented recurrent episodes and the proportion of children-not just isolates-with confirmed GAS. Blinding culture interpretation to case status where practical and collecting matched controls would improve internal validity. The RSV categories require a separate interpretation. IgG can persist after previous exposure, while a single IgM result can vary by age, assay performance, timing and immune response. Even direct viral nucleic acid detection in tonsillar tissue may be observed without current acute illness [16–20]. Consequently, the serological comparisons here cannot quantify acute RSV prevalence or coinfection. An etiologic study should collect a contemporaneous nasopharyngeal specimen for molecular RSV testing and, if relevant, a respiratory viral panel, with a prespecified window from symptom onset [21–25]. The original chapter labeled many isolates "pathogenic" or "commensal" without sufficient evidence for each episode, described antibiotic susceptibility figures without numerical results and used inconsistent denominators in several subgroup tables. The revised manuscript therefore omits unsupported antibiotic resistance claims and inferential p values. Neither CRP nor a single ASO measurement can reliably sort every child into bacterial and viral causes [5,26]. Clinical assessment and microbiological confirmation remain central to GAS stewardship [5–7,9–15]. The major limitation is fundamental: these are simulated counts, not a study performed in Kirkuk. The named hospital and dates define the requested hypothetical setting only. Additional limitations of the source include absent case definitions, unavailable recruitment details, unspecified assay characteristics, unknown patient-level culture results, no raw susceptibility data and no ethics or consent documentation. These cannot be resolved by proportional rescaling. The tables are useful as a manuscript structure and denominator check, not as publishable results. The descriptive age table places 14 of 160 children (8.75%) in the first year of life and 33 (20.63%) at 48–59 months. These distributions make the absence of a clear age-specific sampling frame particularly relevant. GAS prevalence in clinical studies depends strongly on age and symptoms and test performance should be considered in relation to pretest probability [26-29]. Sex distributions were similar across the simulated acute and chronic classifications, while the difference in maternal education or residence categories cannot be given a causal interpretation in the absence of suitable controls and covariate adjustment. The high rural count may reflect referral pathways and travel rather than disease frequency. The culture table groups 185 Gram-positive and 51 Gram-negative isolates. S. aureus contributes 61 and S. pyogenes 48 isolates, with 37 viridans-group streptococci and 37 M. catarrhalis isolates. These proportions describe what the simulated laboratory recovered, not a prevalence estimate in children. A clinical study should count each child once for a defined endpoint, document mixed-growth rules and use a GAS-specific test strategy. Reviews of rapid antigen and molecular methods show why sensitivity, specificity, clinical selection and the handling of negative tests should be reported [12–15]. Epidemiologic syntheses and clinical reviews likewise distinguish carriage from true disease, an issue that persists even for GAS [2,6,8,29,30]. In the antibody table, the both-positive pattern appears in 46 of 160 cases (28.75%) versus 4 of 40 controls (10.00%), while IgG-positive/IgM-negative appears in 45 cases (28.13%) and 16 controls (40.00%). These differences are simply illustrative distributions. They cannot be converted into a comparison of acute RSV infection rates, especially given the absence of contemporaneous respiratory PCR. RSV test accuracy varies with age and specimen type [21–25]. Tissue studies have found respiratory viruses in children with chronic tonsillar disease and in other tonsillar conditions; detection itself needs clinical context [16–20]. Historical serological work also cautions against equating a single antibody measurement with the active cause of an episode [30]. For clinical practice, this manuscript supports a structured pathway: document symptoms and signs; apply age-appropriate criteria for GAS testing; test and treat confirmed GAS according to local guidance; and reserve RSV direct testing for a clearly stated clinical or surveillance purpose [5,7,12–15]. For recurrent throat disease, the episode record and severity should guide further assessment rather than a single culture or antibody result [29]. For scientific reporting, a complete observational manuscript requires transparent participant selection, missing-data handling and prespecified analysis, as set out in STROBE [28].

CONCLUSIONS

A pediatric tonsillitis study should report child-level GAS detection, isolate-level culture findings and RSV testing as distinct outcomes. The simulated example demonstrates coherent totals for 160 cases and 40 controls while preserving the distinction between bacterial recovery and causation. Verified hospital data, an approved protocol and direct RSV testing are required before the article can describe findings from Kirkuk.

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