Group A Streptococcus in Household Dogs: Zoonotic Risk Assessment and Case-Based Insights

Abstract

This study aimed to determine whether domestic dogs might act as reservoirs for recurrent Group A Streptococcus (GAS) pharyngitis in humans. Interest arose from a pediatric case in which an 8-year-old with repeated GAS infections recovered only after the family's asymptomatic dog was treated. This prompted an observational cross-sectional investigation involving 201 household dogs to assess potential canine GAS carriage. Dogs were enrolled from veterinary clinics, dog parks, and daycare facilities across Georgia, Florida, Alabama, and Ohio. Each dog underwent oropharyngeal swabbing analyzed with GAS-specific rapid antigen tests, and owners completed questionnaires about household infection history, demographics, and social exposure. Chi-square analysis was planned. All canine samples tested negative for GAS. Although several owners reported recurrent human infections, no evidence of canine colonization was identified. These findings underscore the need for improved diagnostics and additional pediatric-focused research to clarify any zoonotic role in recurrent GAS pharyngitis.

Introduction

Group A Streptococcus (GAS), Streptococcus pyogenes, is a significant bacterial pathogen, responsible for a wide spectrum of human disease ranging from mild pharyngitis to invasive infections such as necrotizing fasciitis and streptococcal toxic shock syndrome worldwide [1]. In the United States, GAS pharyngitis alone accounts for an estimated 5.2 million outpatient visits and nearly 3 million antibiotic prescriptions annually, with the greatest burden falling on children between 5 and 15 years of age [2]. Although most cases respond to standard antibiotic therapy, recurrent infections remain common. These recurrent episodes are frustrating for patients and families, costly to the healthcare system, and represent one of the leading indications for pediatric tonsillectomy [3].

Recurrent GAS infections have important clinical consequences. Patients often require repeated courses of antibiotics, increasing the risk of antimicrobial resistance and microbiome disruption. Children may experience repeated absences from school, while parents face missed workdays. In some cases, recurrent infections persist despite tonsillectomy, a procedure that carries surgical risks and significant recovery time [3]. Even after surgery, recurrence rates of up to 10% have been reported, leaving many families without clear answers. During the fall of 2022, the CDC noted a resurgence of invasive GAS infections in pediatric patients, 20% of which occurred without preceding illness, further highlighting the unpredictable nature of GAS transmission and colonization [4].

The etiology of recurrence often remains unclear, raising questions about the roles of carrier states, host susceptibility, and potential environmental or zoonotic reservoirs [5].

The Infectious Diseases Society of America (IDSA) guidelines for the diagnosis and management of GAS pharyngitis, last updated in 2012, recommend screening of asymptomatic human household contacts in recurrent cases but explicitly discourage throat cultures of household pets without a clear reasons as to why [5]. However, limited anecdotal evidence in the medical literature highlights the potential need for further investigation.

From a microbiological perspective, S. pyogenes remains well-adapted to colonize the human pharynx. Its arsenal of virulence factors includes the M protein, streptolysins, DNases, and superantigen toxins [6]. While these traits are optimized for human hosts, the close relationship of S. pyogenes to canine pathogens such as S. canis raises questions about interspecies adaptability [6]. Genetic homology between the species and shared virulence determinants provide a biologic rationale for why occasional zoonotic carriage might occur.

Case Study

We present a case report of an 8-year-old male presented with his fourth episode of pharyngitis in a five-month period. Each prior episode had been confirmed as Group A Streptococcus by throat culture and treated successfully with Penicillin-VK. Despite surgical tonsillectomy at age seven for recurrent pharyngitis, the patient continued to experience repeated infections. His parents reported no significant past medical history, and neither had tested positive for GAS colonization on throat cultures. At presentation, the child was febrile, with bilateral tender anterior cervical lymphadenopathy, pharyngeal erythema and exudates, with surgically absent tonsils. A rapid antigen test was performed and confirmed with culture, both positive for Streptococcus pyogenes. Given the frequency of recurrence, his pediatrician raised the question of environmental or non-human reservoirs. A consulting veterinarian obtained a swab from the family's golden retriever, who was asymptomatic. The canine swab tested positive for GAS, and both the patient and the dog were treated with a 10-day course of Penicillin-VK. Following dual treatment, the child remained symptom-free over the next 18 months.

Study Rationale & Design

This case report and several other documented reports over the past decades have raised the possibility that dogs and other companion animals might occasionally serve as reservoirs for GAS. A case from the 1980's described a family in which recurrent pharyngitis resolved only after the household dog was identified as a carrier and treated [7]. Similarly, a case from the 1990's reported the isolation of GAS from the conjunctiva of a household pet, hypothesizing transmission to human contacts [8]. Although rare, such cases suggest the potential for zoonotic transmission. However, many early studies failed to distinguish between S. pyogenes (Group A) and S. canis (Group G); the latter being a frequent isolate in canines [6]. Misclassification likely inflated the perceived role of dogs in GAS epidemiology and contributed to IDSA's stance on excluding pet carrier states from consideration in recurrent pharyngitis [5]. However, Streptococcus canis itself has been identified as a cause of human bacteremia emphasizing its zoonotic potential [9].

Because the evidence underlying the IDSA's 2012 recommendation against routine testing of household canines for GAS carriage may have been limited, newer diagnostic tools may justify re-evaluating this guidance. Modern rapid antigen detection tests (RADTs) and polymerase chain reaction (PCR) assays are highly specific for GAS, reducing the risk of misidentification with other beta-hemolytic streptococci [5]. Applying these tools in a systematic study of companion animals allows for more reliable assessment of whether true GAS colonization occurs. To address this knowledge gap, we conducted a cross-sectional investigation of 201 domestic dogs to test for GAS colonization using RADTs, and collected detailed owner survey data. The study's objective was to provide novel insight into whether domestic canines may serve as occasional reservoirs of GAS and whether current guidelines should be reconsidered in select cases.

Methods

Sampling and Recruitment

Between May and September 2024, 201 dogs were recruited from veterinary clinics, dog parks, and daycare facilities across Georgia, Florida, Alabama, and Ohio. Sites were identified through public listings and numbered, and a random number generator was used to select clusters for participation. When a selected facility declined, additional sites were randomly chosen until the recruitment goal was met. This ensured geographic diversity while maintaining randomization.

Recruitment days were also randomized to balance weekday and weekend attendance. All dogs present at the selected sites on designated days were approached for participation. Inclusion criteria required dogs to be at least six weeks old, with owner consent. Exclusion criteria included inability of the owner to complete the survey or refusal of the dog to tolerate swabbing.

Ethics

Owner consent was obtained prior to survey participation and swab collection. All swabbing was performed by trained personnel, minimizing discomfort. This study was reviewed and exempted from institutional board approval given its observational design and non-invasive nature in animals with owner consent.

Data Collection and Surveys

Owners provided informed consent and completed a structured survey (Figure 1). Information collected included dog demographics (age, sex, breed), health history, vaccination status, socialization habits (dog parks, daycare, boarding, shelter or breeder history, primarily indoor or outdoor environment), and household strep history. Owners were asked whether they or other household members had experienced recurrent strep throat before or after acquiring their dog, including the number of episodes, approximate ages, and whether tonsillectomy had been performed.

Surveys also included canine symptoms such as cough, rhinorrhea, decreased appetite, recurrent colds, allergy issues, wheezing, drooling, or watery eyes, as it may not be clear as to whether or not the canine may be symptomatic or asymptomatic. These variables allowed comparison of seemingly asymptomatic versus symptomatic animals.

Swab Collection and Testing

Canine oropharyngeal swabs were obtained using sterile polyester-tipped swabs. To minimize false negatives, collectors aimed to contact the posterior pharyngeal wall and tonsillar tissue when feasible. However, in some uncooperative dogs, sampling may have been limited to the oral cavity. Swabs were tested immediately with McKesson Rapid GAS antigen detection kits, which include built-in positive and negative control wells. Results were recorded as positive, negative, or invalid.

Rapid antigen detection tests were selected because of their high specificity for Streptococcus pyogenes, reducing the risk of misidentification with Streptococcus canis or other beta-hemolytic streptococci[5, 6]. To confirm reliability, invalid results were repeated once, and if the second test was also invalid, the sample was excluded.

Sample Size and Analysis

The target of 201 samples was determined by power analysis, sufficient to detect a colonization prevalence greater than 2% with 95% confidence. Descriptive statistics were used to summarize dog demographics, owner survey data, and symptom frequency. Chi-square testing was planned to assess associations between canine GAS positivity and human household infections. Because all canine samples were negative, this statistical analysis was not performed.

Cross-Sectional Study Findings

Study Population

A total of 201 dogs were enrolled between May and September 2024 from veterinary clinics, dog parks, and daycare facilities across Georgia, Florida, Alabama, and Ohio. Recruitment included both suburban and urban populations. Dogs ranged in age from six weeks to 14 years, with a mean age of 4.8 years. Male and female dogs were nearly equally represented (Figure 2). Breeds included a wide distribution of mixed-breed, retriever, terrier, shepherd, and toy-group dogs, consistent with general companion animal populations [10].

Of the enrolled animals, 95% lived primarily indoors, while 5% spent the majority of their time outdoors. More than half (57%) attended dog parks or daycares on a regular basis, indicating significant socialization (Figure 3). Vaccination rates were high, reflecting routine veterinary care.

Symptom Data

At the time of swabbing, 85.1% of dogs exhibited no observable respiratory or oral symptoms. Among the 14.9% with symptoms, the most common findings included allergy-related issues (4.5%), watery eyes (3.9%), and rhinorrhea (2.5%). Cough and wheezing were rare, and no dogs presented with fever or systemic illness (Figure 4). Owners frequently attributed mild symptoms to allergies or seasonal factors rather than infection.

GAS Testing Results

All 201 canine oropharyngeal swabs were negative for Streptococcus pyogenes on rapid antigen detection testing. Three initial invalid tests were repeated immediately with new kits, and all yielded negative results on repeat testing. No swabs were positive, and therefore statistical analysis of risk factors associated with positivity could not be performed.

The complete absence of GAS carriage in this large sample supports the view expressed in the IDSA guidelines[5] that routine testing of dogs in cases of recurrent human GAS is unnecessary in most circumstances.

Owner Survey Results

Owners provided information regarding household strep throat history. Seven owners (3.5%) reported recurrent GAS pharyngitis in themselves or household members within the past two years. Of these households, five owned dogs that were highly socialized, frequently attending dog parks, daycare, or boarding facilities (Figure 3). Two reported that the onset of recurrent human infections coincided with acquisition of their dog, though in both cases the dogs tested negative for GAS in this study.

Interestingly, in households reporting recurrent strep, owners were more likely to note canine symptoms such as increased drooling, watery eyes, or rhinorrhea, though none of these dogs tested positive for GAS (Figure 4). These findings suggest that while symptomatic dogs may raise suspicion, symptoms alone are not predictive of GAS colonization.

These figures provide a visual summary of the cohort, highlighting the diversity of the canine sample and the survey-reported trends, while reinforcing the uniform absence of positive GAS swabs.

Discussion

This study represents one of the largest prospective efforts to evaluate canine colonization with Streptococcus pyogenes. Among 201 dogs sampled across four states, none tested positive for Group A Streptococcus. These findings suggest that domestic canines are unlikely to serve as widespread reservoirs for GAS, and support the current IDSA guidelines [5]. However, several methodological limitations from this study must be acknowledged and addressed. RADTs were chosen because of their high specificity for S. pyogenes, thereby reducing the risk of misclassification with other streptococci [5]. On the other hand, RADTs are less sensitive than culture or molecular methods, particularly if swab technique is suboptimal; therefore in uncooperative dogs, collectors may not have reached the posterior pharynx or tonsillar tissue, potentially resulting in false negatives. Molecular assays such as PCR could increase sensitivity in future studies.

The survey data provided by the dog owners offered additional insight into the results. Seven households reported recurrent human strep infections temporally associated with dog ownership, particularly among families whose dogs frequently attended parks, daycare, or boarding facilities. Although none of these dogs tested positive for GAS, the association highlights the need for targeted studies in households with recurrent pediatric infections rather than in random canine populations. Such targeted approaches may better capture the rare instances where zoonotic transmission occurs.

Gaps in this and prior studies, including those informing the 2012 IDSA guidelines, suggest it may be premature to completely dismiss household dogs as potential GAS carriers; at least when it comes to refractory cases where other causes have been thoroughly addressed or excluded. Further research is needed, as recurrent GAS infections carry significant clinical implications causing morbidity, family disruption, and increased antibiotic use and resistance [1].

Future research should focus on three key directions. First, molecular testing of dogs in households with recurrent pediatric GAS diagnoses could better define the prevalence of true canine colonization. Second, longitudinal studies are needed to determine whether canine carriage, when present, is transient or persistent. Third, interdisciplinary collaboration between pediatricians, otolaryngologists, veterinarians, and microbiologists will be essential to build a comprehensive understanding of zoonotic dynamics.

References:

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Figures

QUESTIONS	ANSWERS
Date of Visit	MM/DD/YYYY
Reason for visit to vet	Welness visit, sick visit, or follow-up
Canine breed	
Canine age	Years/Months
Canine gender	Male/Female
Rapid GAS Test Result	Positive/Negative/Invalid
Canine current symptoms	
Canine immunization status	Up to date/Not up to date
Canine socialization habits	Boarded, Go to parks, Attend doggy daycare, Adopted from the pound, Adopted from a pet shop, Indoors or Outdoors mostly
Primary environment	Indoor/Outdoor
Human strep infection in household	Yes/No
Frequency of human infections	Numerical (episodes/year)
Timing of onset relative to dog acquisition	Before/After
Tonsillectomy performed	Yes/No
Length of canine ownership	Years
Number of canines in household	
Number of humans in household	

Figure 1. Survey structure and response format.
Survey questions administered to dog owners are displayed in the left column, with corresponding response options shown on the right. Blank fields indicate short-answer or free-text responses. The survey was designed to collect standardized demographic, health, socialization, and household Group A Streptococcus exposure data.

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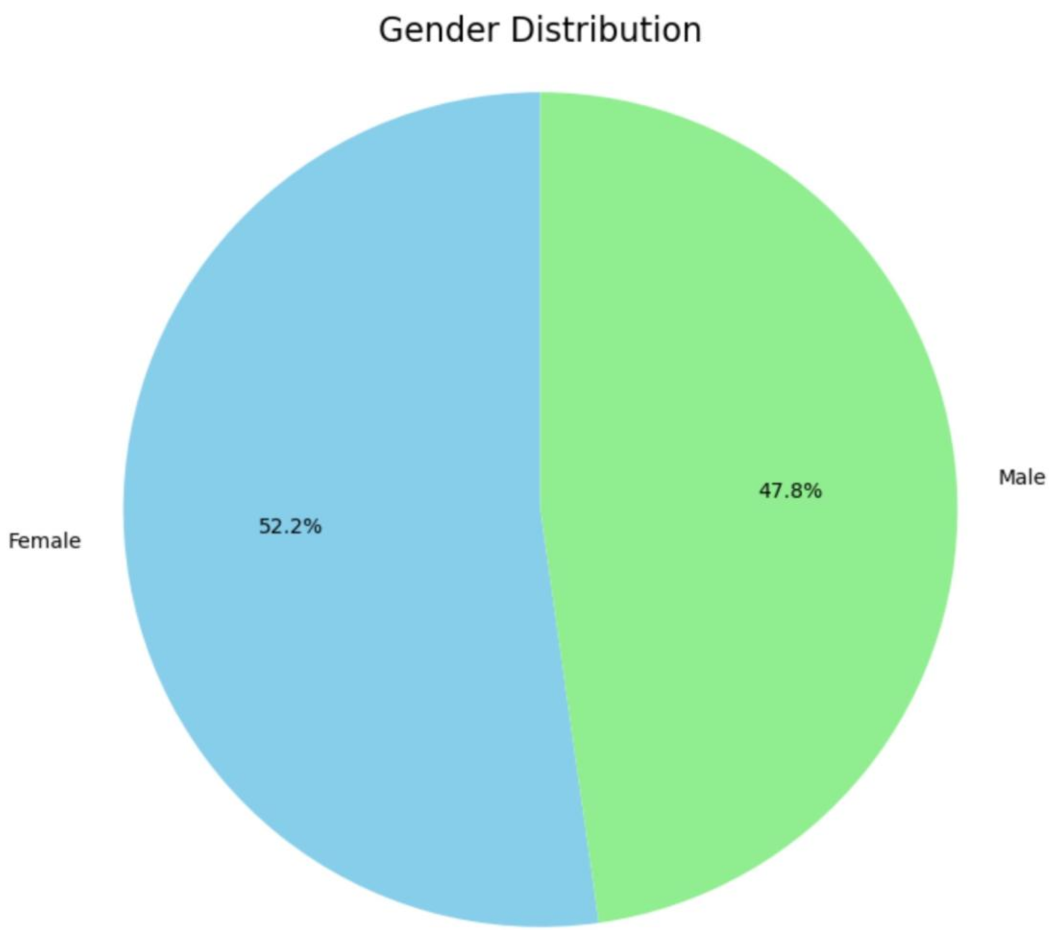

Figure 2. Gender distribution of canines tested.
Distribution of male and female dogs included in the study sample (n = 201), demonstrating near-equal representation between sexes.

Male and Female genders of Canines sampled were equally represented in this research study (n=201)

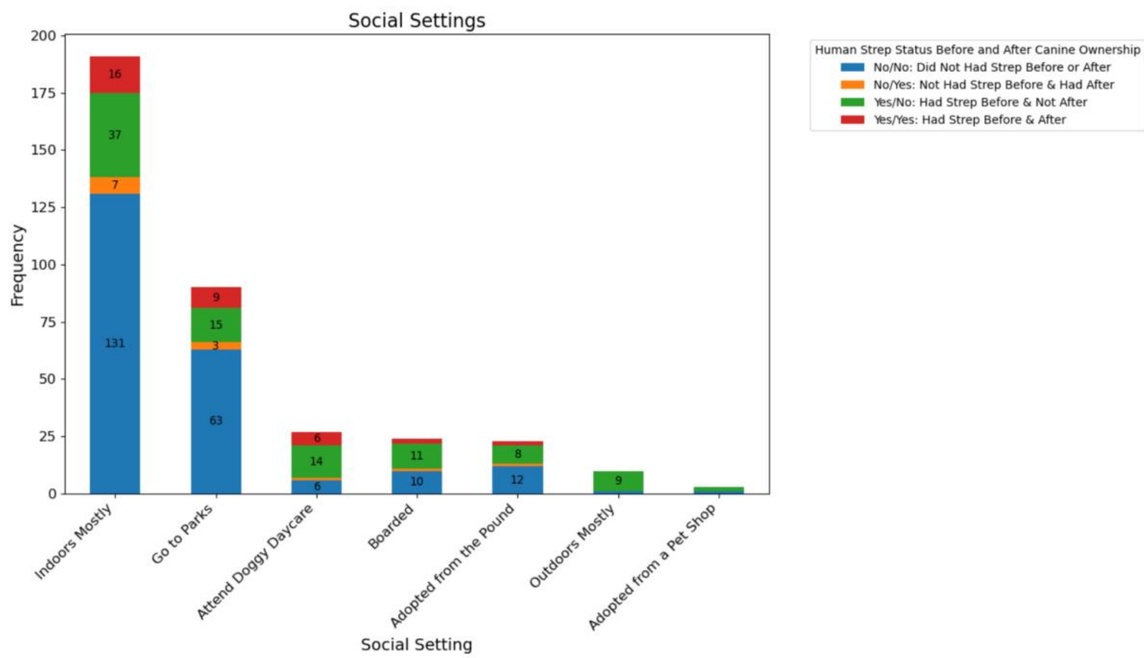

Figure 3. Social settings attended by enrolled canines.
Frequency of canine participation in social environments, including dog parks, daycare, boarding facilities, and other settings, in relation to reported household Group A Streptococcus infections before and after canine acquisition (n = 201).

Frequency of social settings the sampled canines in this study partake in relation to confirmed human-positive Group A Streptococcus diagnosis before and after humans acquired the household canine (n=201)

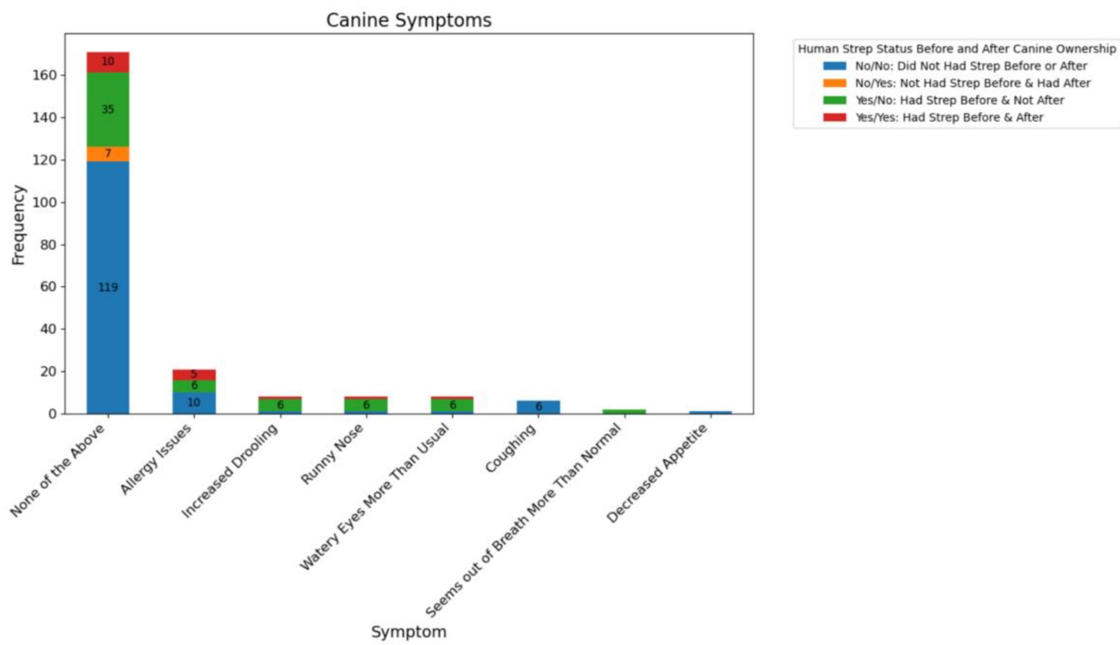

Figure 4. Reported clinical symptoms among enrolled canines.
Frequency of owner-reported respiratory and ocular symptoms among enrolled dogs in relation to household Group A Streptococcus infection history before and after canine acquisition (n = 201).

Frequency of current canine symptoms in relation to confirmed human-positive Group A Streptococcus diagnosis before and after humans acquired the household canine (n=201)