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Frequency of Streptococcus Pyogenes in Sinnar 2023

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Abstract: Background: *Streptococcus pyogenes* is the common human pathogen causing widespread infection. Bacterial culture, serology and molecular assay were used for laboratory diagnosis of *Streptococcus pyogenes*. the ASO titer test is a blood test that checks for a streptococcal infection.

Objective: This study was conducted to assess the frequency of *Streptococcus pyogenes* at Al karma specialty hospital in Sinnar state.

Material and methods: A cross-sectional study was conducted at Al karma specialty hospital within the period from November to December 2023 and covered 54 patients with *Streptococcus pyogenes* bacteria. They were identified by ASO test. Data was entered, cleaned and analyzed using SPSS analyzer.

Results: Total prevalence for ASO positive serum samples were 16 (29.2%), the lower limit of ASO in infected patients was 215.3 IU/mL while the upper limit was 1370.0 $\uparrow$. the highest prevalence 35(64.8%) found in female.

Conclusion: The study concluded that the frequency of *Streptococcus pyogenes* is considerable and should not be ignored, especially among female patients. Accordingly, they should be placed in the priority of prevention and management interventions to improve their overall outcome.

Keywords: *Streptococcus pyogenes*

The aim of study is reports the frequency of *Streptococcus pyogenes* in Sinnar and to solutions this problem.

I. INTRODUCTION

Streptococcus pyogenes (Group A Streptococci; GAS) is a Gram-positive coccus that causes a variety of infectious diseases, including 1) superficial infections (purulent tonsillitis, erysipelas, pharyngitis, and cellulitis), 2) toxin-mediated diseases (scarlet fever and streptococcal toxic shock syndrome (STSS)), 3) immune-mediated diseases (acute rheumatic fever (ARF) and rheumatic heart disease (RHD)), and invasive infections (necrotizing fasciitis, bacteremia, and meningitis)¹.

Streptococcus pyogenes infections can cause a wide range of clinical symptoms, including asymptomatic colonization, common illnesses including pharyngitis, scarlet fever, and impetigo, and diseases with high death rates like invasive disease and rheumatic heart disease. *S pyogenes* infections disproportionately harm those who live in poverty. The pathogenesis of disorders induced by *S pyogenes* in various human tissues (skin, mucosa, and blood) is influenced by a variety of microbiological factors. Nevertheless, little is known about the variables that connect poverty with the clinical signs of *S pyogenes* infection².

As recognized by WHO, *S pyogenes* is a pathogen of global relevance with an unmet need for a vaccine. High-quality data linking the global burden of diseases caused by *S pyogenes* and the circulating strains are crucial for rational vaccine research and development. Earlier attempts at vaccine development reflected the disease burden and strains prevalent in only high-income countries, where epidemiological data were readily available. However, over the past 10 years, concerted efforts have been made to collect more reliable epidemiological information from low-income countries as well, including those in Africa, Oceania, and Latin America, which has improved understanding of the global molecular epidemiology of *S pyogenes*³.

The production of several bacterial components linked to adhesion and persistence in the host niche, such as M protein and hyaluronic acid capsule, is necessary for persistent colonization. It has been proposed that capsules enhance and facilitate the production of biofilms, and that M protein contributes to this process by making bacterial surfaces more hydrophobic and adherent

to other surfaces. In a recent work, we found that the expression of Streptolysin S (SLS) and cysteine protease SpeB hindered the formation of GAS biofilms on pretreated epithelial cells, but we were unable to identify a direct role of M protein or capsule ⁴. Research on GAS antimicrobial resistance is essential. Penicillin resistance is a serious worldwide problem because almost all Gram-positive bacteria are resistant to it. Thankfully, no penicillin-resistant naturally occurring strain of GAS has been found, and GAS remains susceptible to β -lactam medicines. While other Gram-positive bacteria are becoming resistant to these medicines, it is unclear why penicillin, which has been widely used for 80 years, is still effective against GAS. Only one in twenty persons develop an IgE-mediated reaction that requires switching to macrolides and clindamycin therapy during GAS infections, despite the fact that 8% of people are thought to have a penicillin allergy. However, the care of GAS infections in patients allergic to penicillin is a laborious procedure because clindamycin and macrolides are no longer effective against isolates connected to outbreaks of severe diseases ⁵.

A. Transmission of GAS

Human-to-human transmission of Strep A occurs between and within families, close contacts, homes, and community settings, according to multiple lines of epidemiological data.

However, clinicians, epidemiologists, public health professionals, and vaccine makers must comprehend the dynamics of transmission during sore throat episodes, especially when developing and assessing the effects of various therapies. In 1940s experiments, individuals with confirmed Strep When requested to speak, cough, or sneeze, a pharyngeal colonization showed sporadic positive cultures of the pathogen from "settle plates" put near the patient. These findings showed that big respiratory droplets from coughing and sneezing, but not talking, could spread Strep A ⁶.

B. Diagnosis

The most common method for identifying streptococci in clinical samples (particularly *S. pyogenes*) is to cultivate the material on blood agar plates, which allows for a simple initial screen for β -hemolytic colonies. Despite the growing use of automated identification technologies, clinical microbiology still uses a number of simple, quick laboratory procedures to confirm suspected colonies as *S. pyogenes*. The diagnosis of poststreptococcal diseases, such as glomerulonephritis, acute rheumatic fever, and brain problems, depends on the identification of certain antibodies, unlike the diagnosis of acute *S. pyogenes* infections ⁷.

II. MATERIALS AND METHODS

This study was conducted as analytical cross sectional one in Sinnar State -Sudan. The practical part was performed at laboratory of Al karma specialty hospital.

The study was performed during the period from November to December 2023. Serum collected from 54 patients presented with symptoms of Streptococcus pyogenes infection. Detection was performed by Fast Test Kit (Immunofluorescence Assay) is intended for in vitro quantitative determination of antistreptolysin O antibody (ASO). Also levels of antibodies were detected as well according to the CLSI guidelines.

III. RESULT

Out of 54 tested samples for ASO detection. Gender distribution was 19 (32.8%) males and 35 (60.3%) were females as in table 1 and figure 1. ASO result showed 29.2% were positive and the rest 70.8% were negative as in table 2 and figure 2.

Table 1: The gender of patients

	Frequency	Percent
Male	19	32.8
Female	35	60.3
Total	54	100

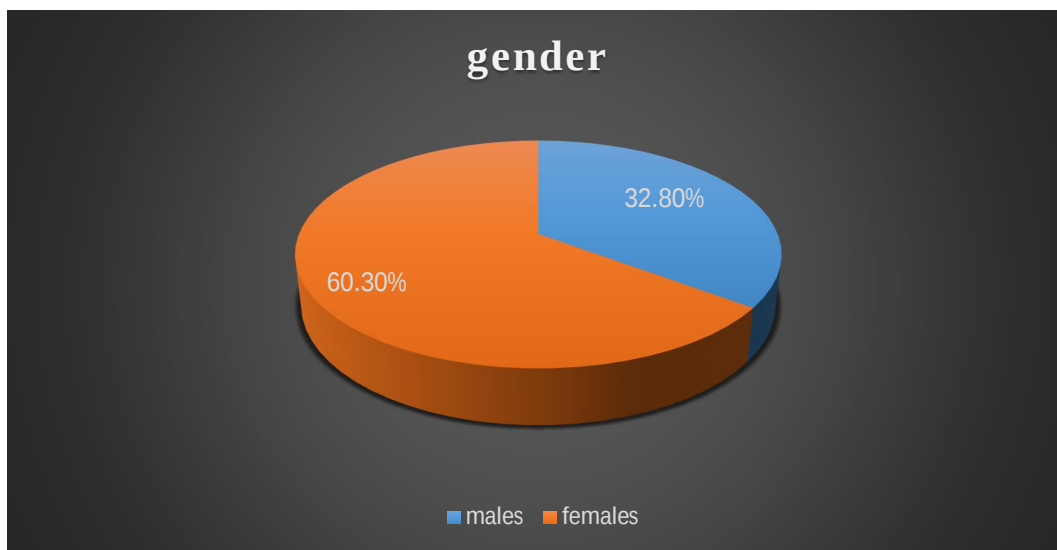


Figure 1: genders of patients

Table 2: The result of ASO test

ASO Result	Number	percent
Positive	16	29.2
Negative	38	70.8
Total	54	100

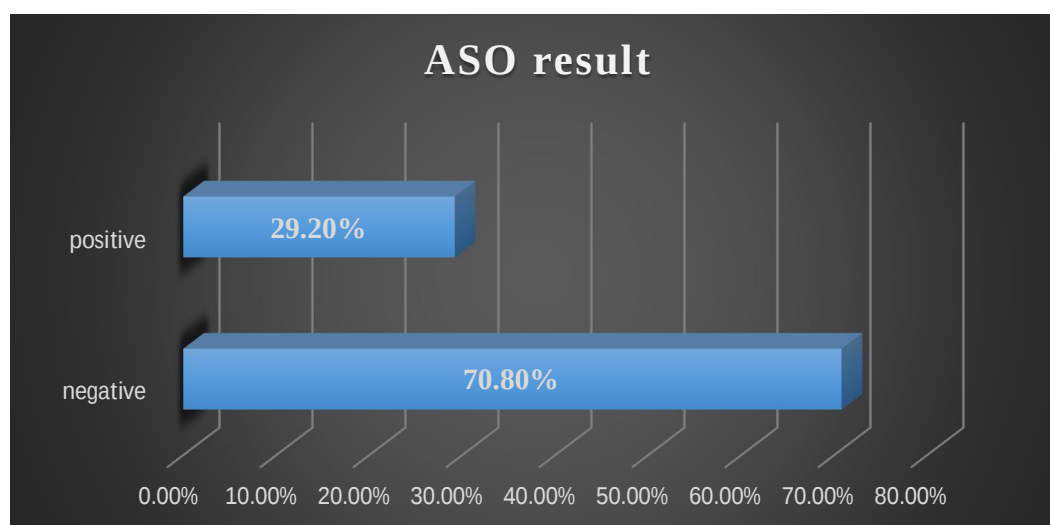


Figure 2: ASO result

Detection of antibody level showed the lower limit of ASO in infected patients was 215.3 IU/mL while the upper limit was 1370.0 $\uparrow$. the highest prevalence 35(64.8%) found in female. the mean $\pm$ standard deviation (SD) was 210.2 $\pm$ 207.3 IU/ml as in table 3.

Table 3: The result of ASO test according to the level of antibody by (IU/ml)

ASO(IU/ml)		
No. of patients	Mean	SD
54	210.20	207.3

A. Discussion

Globally, Streptococcus pharyngitis is a major public health challenge. This study aimed to assess the frequency of streptococcus pyogenes in sinnar by ASO test and covered 54 participants in Sinnar State-Sudan. The study found that (35.2%) male lower than in India (60.8%) (8) and in Yemen (36.5%) (9).and found that (64.8%) female higher than in India (39.2%) (8) and in Yemen (63.5%) (9). This study also showed that the frequency of streptococcus pyogenes diagnosed by ASO test was 16(29.2%), which similarly 96(30.2%) reported in Iraq (10) and in India (11), higher than 33 (12.4%) reported in Korea (12), lower than 60(64.5%) in Yemen (13). The mean of ASO in Sinnar were found 210.2 IU/ml (SD 207.3), lower than 352 IU/mL (SD 233) in Korea (12) and 390.5 IU/mL (SD 108.1) in Iraq (9).

An agreement obtained with other Sudanese study investigated the prevalence of Streptococcal pyogenes among children under 17 years old in ENT Kosti Teaching Hospital and examines the susceptibility of isolated S. pyogenes strains to commonly used antibiotics. As total of 384 throat swabs were obtained from children under the age of 17 who attended the Kosti Teaching Hospital between 2019 and 2021. Streptococcus pyogenes was isolated by conventional microbiology procedures. Each S. pyogenes strain was subjected to antibiotic susceptibility testing according to the CLSI guidelines. Most participants of this study were females 219 (57%) and aged between 5 and 10 years 259 (67.4%). Out of the 384 participants, 134 (34.9%) and 255 (66.4%) suffered from lymphadenopathy and tonsil hyperplasia, respectively. Interestingly, lymphadenopathy and tonsil hyperplasia were more (P 0.05) in the 5–10 age group than those aged 11–16 years. Moreover, 41.4% of the participants were infected by a GAS sore throat. GAS sore throat is significantly associated with lymphadenopathy (P 0.000) and tonsil hyperplasia (P 0.000). Notably, males (P 0.479) and individuals aged 5–10 years (P 0.654) were less likely to have a GAS sore throat ¹⁴.

IV. CONCLUSION

The frequency of streptococcus pyogenes in sinnar 29.2% from all percipient patients in this study.

ASO positivity was seen more in females compared to male.

ASO test is simple, rapid and useful without depending upon other test.

ASO test is accurate diagnosis of streptococcal infection.

V. RECOMMENDATION

According to our findings we recommend the following

1/ Further studies in large population size and with different diagnostic tools.

2/Further studies take history from patients.

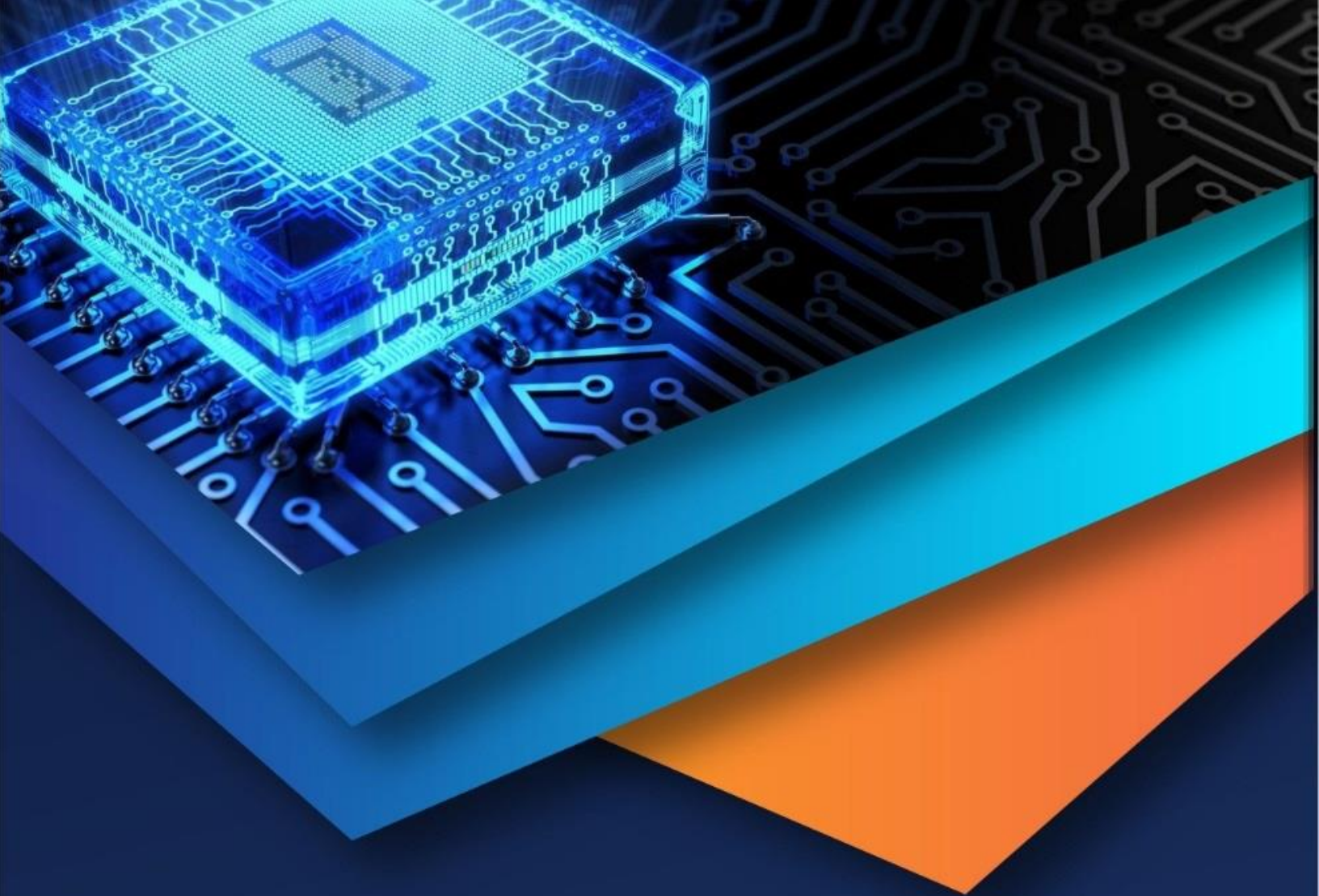
3/The regular follow up can detect the early complication so further deterioration can be prevented or at least early recognized.

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