

Association of *Streptococcus pyogenes* with Symptomatic Pharyngitis in Kosti City, Sudan

Elnaim Bushra Ahmed^{1,2}, Ahmed Mohammed Adam², Ali Adam Bakhiet², and Babiker Saad Al mugadam^{2*}

¹Kosti Police Hospital, Kosti city, Sudan

²Department of Microbiology, Faculty of Medical Laboratory Sciences, University of El Imam El Mahdi, Kosti city, Sudan

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*For Correspondence

Babiker Saad Al mugadam, Department of Microbiology, Faculty of Medical Laboratory Sciences, University of El Imam El Mahdi, Kosti city, Sudan, Tel: 00249917717034.

E-mail: Babiker888@yahoo.com

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ABSTRACT

Streptococcal pharyngitis is a one of the most common illness and it has a serious complications. This study aimed to determine the frequency of Streptococcal pharyngitis and the susceptibility patterns of *S. pyogenes* to antibiotics. A total of 40 throat swabs were collected during period from August to November 2017. All *S. pyogenes* isolates were subjected to antibiotics susceptibility testing. Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) soft-ware version 21. The frequency of streptococcal pharyngitis was 70%. The frequency was higher in females (87.5%) than males (43.75%). Frequency of pharyngitis showed significant difference among age. All *S. pyogenes* isolates were sensitive to Penicillin G (P). The signs and symptoms of group A streptococcal and non-streptococcal pharyngitis overlap so broadly that accurate diagnosis base only on clinical grounds is usually impossible. The particular concern, repeated inappropriately treated episodes of group A streptococcal pharyngitis or misuse of drugs can aid in development of drugs resistant that will limit the selections in treatment of streptococcal pharyngitis resulting in persistence of infection which may associate with a serious autoimmune diseases. Microbiological investigations can play a key role in the avoiding and limiting the extending of this problem.

INTRODUCTION

Streptococcal pharyngitis (strep throat) is a bacterial infection of the throat and tonsils, caused mainly by *Streptococcus pyogenes* (*S. pyogenes*), which also known as group A streptococci [1]. But also it can cause by Group C and G beta hemolytic Streptococci [2]. *S. pyogenes* (GAS) infections may associated with serious complication include acute rheumatic fever (ARF) and acute poststreptococcal glomerulonephritis [3,4]. The global estimate of tonsillitis is 600 million cases annually, with over of 550 million of these cases occurring in developing countries [5].

Penicillin and its derivatives remain the drugs of choice for Streptococcal pharyngitis. However in patients with allergic to those drugs, alternatively macrolides and quinolones are prescribe [6]. The emergence of macrolides resistance now a day's is a one of the most health challenges as in *S. pyogenes* isolates is an increasing problem worldwide that was limiting the choices of anti-*S. pyogenes* drugs in patients with allergy to Pencillin [7-10].

This study was conducted to determine the frequency of Streptococcal pharyngitis among symptomatic patients and the susceptibility patterns of *S. pyogenes* isolates to antibiotics.

MATERIALS and METHODS

This a cross sectional-hospital base study, carried out in Kosti teaching hospital, White Nile State, Sudan, during period from August to November 2017. A total of 40 throat swab were collected from patients of both gender (16 Males and 24 Females) with average age of 5-20 years old. Each swab was cultured directly on 5% sheep blood agar and incubated aerobically at 37°C for 24 h. The primary isolates were subcultured on 5% sheep blood agar and the identification of the isolated pathogens was done on the bases of colonial morphology, Gram stain, and manual biochemical tests [11]. All *S. pyogenes* isolates were further subjected to antibiotics susceptibility testing (AST).

Antibiotics Susceptibility Testing (AST)

AST were done using modified Kirby-Bauer disk diffusion technique according to clinical and laboratory standard institute (CLSI) guidelines 2011 [12]. Using sterile wire loop, 3-5 well isolated colonies were emulsified in 3-4 ml of sterile physiological sa-line to make a bacterial suspension equivalent to 0.5 McFarland. Using sterile cotton swab, each suspension of tested organism was inoculated on Muller Hinton agar (Hi media).Using sterile forceps, the antibiotics discs were placed and evenly distributed on the surface of the agar. The applied antibiotics (Bioanalyse) include Penicillin G (P) 10 units, Clindamycin (cl) 15 µg, Azithromycin (AZM) 15 µg and Amoxycillin (AMX) 10 µg. Each plate was incubated aerobically at 37°C for 18 h. The diameter of inhibition zone around each disc was measured in mm and the result was interpreted according to CLSI guidelines 2011 using Bioanalyse interpretative chart [12].

Data analysis: All data were analyzed by statistical package for social sciences (SPSS) software version 21. T independent sample T test, two way ANOVA, and Chi square test were done. P value ≤ 0.05 were considered as significant in comparative data.

RESULTS

The frequency of *S. pyogenes* was 28 (70%). The frequency was higher in females (87.5%) than males (43.75%) as seen in **Table 1**. The frequency of pharyngitis among age showed significant difference as shown in **Table 2**. The results of susceptibility of *S. pyogenes* (28 isolates) for antimicrobials agents were displayed in **Table 3**.

Table 1: Frequency of *S. pyogenes* pharyngitis among Gender

Gender	Frequency	P value
Male	7 (43.75%)	0.002
Female	21 (87.5%)	
Total	28	

The frequency is higher in females than males, p value < 0.05

Table 2: Distribution of infection according to age groups

Age group	Number	Frequency	P value
5-10	16	56.25%(9/16)	0.02
11-15	10	70% (7/10)	
16-20	14	85.71% (12/14)	
Total	40	28	

The frequency is differ among age group, p value < 0.05

Table 3: Susceptibility of *S. pyogenes* isolates to antibiotics.

Antibiotic	Sensitive	Resistance	Intermediate	Total	P value
AZ	16 (57.1%)	7 (25%)	5 (17.9%)	28	0.000
AMX	26 (92.9%)	2 (7.1%)	0 (0%)		
CD	9 (32.1%)	8 (28.6%)	11 (39.3%)		
P	28 (100%)	0 (0%)	0 (0%)		

The susceptibility of *S.pyogenes* to different antibiotics is differ , p value < 0.05.

DISCUSSION

Streptococcal pharyngitis is a one of the most health challenges worldwide especially in child [13]. Although *S. pyogenes* remained still sensitive to pencillin but it also considered a major health problem and may associated with autoimmune diseases [14].

In this study, the frequency of strep throat was 70%. The frequency is higher in females 87.5% than males 43.75%. This result disagree with Singh *et al.* and Khosravi *et al.* studies which reported the frequency of Streptococcal pharyngitis were 0.8% (2/237),

and 2.5% (25/100) respectively [11,15]. This difference may rise from the difference between sample size or study population and location.

Our data provided sufficient evidence to conclude that, there is a significant difference in frequency of streptococcal pharyngitis among age (Chi square test), P value less than 0.05. In our study, all *S. pyogenes* isolates were sensitive to Penicillin, and most of them were sensitive to Amoxicillin 92.9%. Also some were sensitive to azithromycin 57.1%, and clindamycin 32.1%. Our data suggests that, there is a significant difference (2 way ANOVA) between the susceptibility of *S. pyogenes* isolates to different antibiotics. This results agree with Singh *et al.* and Khosravi *et al.* studies which also were reported that all the strains were sensitive to Penicillin [11,15]. But also disagree with Khosravi *et al.* study as it reported the sensitivity of *S. pyogenes* isolates to azithromycin and clindamycin were 68% (17/25) for each one [15]. This difference may a result from the difference in study area. Sore throat is one of the most frequent illnesses, and the signs and symptoms of group A streptococcal and non-streptococcal pharyngitis overlap so broadly that accurate diagnosis base only clinical grounds is usually impossible. The particular concern, repeated inappropriately treated episodes of group A streptococcal pharyngitis or misuse of drugs can aid in development of drugs resistant that will limit the selections in treatment of streptococcal pharyngitis resulting in persistence of infection which may associate with a serious autoimmune diseases. Microbiological investigations can play a key role in the avoiding and limiting the extending of this problem.

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