



REVIEW ARTICLE



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## Antistreptolysin O (ASO) titer amongst Yemeni students aged 16-18 years in Hodeida, Yemen

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### Abstract

**Aim:** To estimate antistreptolysin O (ASO) titers among students in Hodeida, Yemen.

**Methods:** A cross-sectional study was performed on 600 apparently healthy students at secondary school, aged 16-18 years of age. A clustering sample design was used. Six schools, equal for girls and boys, were randomly selected. One hundred students from each school were selected and ASO tested.

**Results:** ASO titer positivity was 44%. 21.5% of males and 22.5% of females were positive, and 28% of males and 28% of females were negative. This proportion is high compared to other studies, which range from 3.7% to 28.8%, 38.6% in schools from Grenada, and 34% in neighboring Saudi Arabia. This is likely to be due to the high prevalence of rheumatic fever and rheumatic heart disease (36 per 10,000), which is higher in Yemen than in neighboring countries (24 per 10,000).

**Conclusion:** 44% of Yemeni students aged 16-18 have positive ASO titers, which are high compared to other local and international studies. Doctors, other health providers, and health policy makers need to be aware of this fact.

**Keywords:** Antistreptolysin O (ASO), poverty, health provider, malaria, respiratory diseases, rheumatic fever

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## INTRODUCTION

Serological diagnosis of group A streptococcal infections is based on the immune responses against the extracellular products streptolysin O (ASO), deoxyribonuclease-B (anti-DNase B), hyaluronidase, NAD<sup>+</sup>-glycohydrolase (anti-NADase), and streptokinase<sup>(9,15,19,14)</sup>. ASO is useful in the diagnosis of streptococcal infections and their complications, and during follow-up, as well as in evaluating the effectiveness of treatments<sup>(13, 8,20,17,5)</sup>. ASO is helpful when the throat culture technique is ineffective or when the patient has already taken antibiotics. Since impoverished societies cannot afford other tests, such as throat culture, ASO is the only available test for diagnosing streptococcal infection. Significant findings have shown that an ASO-positive measurement might be used in conjunction with throat culture to identify group A streptococcus (GAS) carriers<sup>(17,3)</sup>. This study attempts to determine the proportion of ASO-positive titers among students in Hodeida, Yemen, where many outbreaks of parasitic diseases (such as malaria) and respiratory diseases (such as streptococcal infections) occur each year. Differential diagnosis can be difficult, and there are few Yemeni studies addressing this issue. The aim of this study was to determine the extent of the problem and its impact on health.

### The Hodeida Situation

Hodeida one of the most impoverished cities in Yemen. The health situation in Hodeida is critical, since doctors are not able to provide accurate diagnoses for even common conditions. Over diagnosis of malaria is a serious concern that further complicates this situation<sup>(10)</sup>, because the infection from this parasitic disease mimics streptococcal infection. Both physicians and health providers must know the extent of streptococcal carriers to overcome this and decrease over diagnosis of malaria.

## METHODS

We performed cross-sectional study among school students between the ages of 12 and 16 years in the three districts of Hodeida, Yemen. One hundred students were tested in each school. The serological test was used and the results were interpreted by specialist technician to avoid false positive results. We received written consent from the Education Department in Hodeida and verbal consent from each student. The serological test was performed in the schools and the schools were provided with the results of the tests, as well as information about prevention and treatment of the affected cases. Statistical analysis was performed using a two tailed-test for the samples, with mean=1.48, SD=0.50, SEM=0.020, P-value (two-tailed) <0.0001, and significance ( $\alpha=0.05$ )

### The proportion of positive carriers

The proportion of positive cases (male and female cases combined) was 44% of the total sample, and the proportion of negative cases was 56% of the total sample (Table1).

### Sex distribution

21.5% of males and 22.5% of females were positive carriers and 28% of males and 28% of females were negative carriers (Table2).

## RESULTS AND DISCUSSION

Our study demonstrates that the proportion of ASO-positive titers in students aged 16-18 is 44%. 21.5% of males and 22.5% of females were positive and 28% of males and 28% of females were negative. This rate represents a higher percentage than that published in other studies and meta-analyses. According to published data, 29 of the 266 articles retrieved met all the inclusion criteria in children of all ages who presented with a sore throat, and the pooled prevalence of gas infection was 37%(16). Additional studies have demonstrated the prevalence of asymptomatic throat carriage of group A beta-hemolytic streptococci (GABHS) at between 3.7% and 28.8%(15). In one study from Grenada, the proportion of school children with positive ASO titers was 38.6% (19). The high rate of 44% observed in our study may be due to socio-economic factor(s) and reflect the high prevalence of rheumatic fever and rheumatic heart disease, both of which, when combined, have a prevalence of 36 per 10,000, which is higher than the prevalence reported in neighboring countries(18,6,11,4). The prevalence of rheumatic heart disease is 24 per 10,000 in school children (aged 6-15 years) in neighboring Saudi Arabia, and the carrier rate of beta-hemolytic streptococci in Saudi Arabia is 34 % (2). Finally, we conclude that the rate of asymptomatic throat carriage of group A streptococcus using ASO titer in Hodeida, Yemen (44%) is very high. Consequently, doctors, other health providers, and health policy makers should be aware of this fact.

### RECOMMENDATIONS:

Doctors, other health providers, and health policy makers should be aware about the high rate of possible streptococcal carriers; the ASO test, like the malaria test, should be considered for any streptococcal-like diseases or for suspected malaria cases to improve the diagnostic services in the health sector and in an impoverished country like Yemen. This will also help in early prevention and treatment of rheumatic heart disease, decreasing morbidity and mortality of cardiovascular disorders.

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## TAKE-HOME MESSAGE:

The proportion of ASO-positive titers among Yemeni students aged 16-18 is 44%.

This is a high percentage compared to other local and international studies, which range from 3.7% to 28.8%, and 38.6% in schools from the island of Grenada and 34% in Saudi Arabia (a country that neighbors Yemen).

The high rate observed in our study (44%) reflects the high prevalence of rheumatic fever and rheumatic heart disease (36 per 10,000) in Yemen, which is higher than that reported in Saudi Arabia (24 per 10,000).

An ASO test, like the malaria test, should be considered for any streptococcal-like diseases or suspected malaria cases in order to improve the diagnostic services in the health sector.

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