

## Prevalence of Beta-hemolytic Streptococcal Pharyngitis and Mclsaac Scoring Among Children Attending a Primary Care Clinic in Malaysia

Malezya'da Birinci Basamak Kliniğine Devam Eden Çocuklarda Beta-hemolitik Streptokokal Farenjit ve Mclsaac Skorlama Prevalansı

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### ABSTRACT

**Background:** Beta-hemolytic streptococci remained the important cause of acute bacterial pharyngitis. This study aims to determine the prevalence of beta-hemolytic Streptococcal pharyngitis and the correlation of positive throat culture with the clinical parameters.

**Materials and Methods:** A prospective cross-sectional study was conducted involving 90 children from a primary health care clinic. Throat swab specimen was obtained from each child and sent to the microbiology laboratory for bacterial culture. Mclsaac score was used as the scoring system for pharyngitis.

**Results:** The majority of the children were boys (N=53, 58.9%) and most of the children belonged to the preschool age group (N=42, 46.7%). Throat culture was positive in 11 children. The prevalence of beta-hemolytic streptococcal pharyngitis was 12.2%. Group A and Group B Streptococci were isolated in 5 children each and one child had Group C streptococci. Positive throat culture was significantly correlated with the Mclsaac score of at least 4 and the absence of cough ( $p<0.05$ ).

**Conclusions:** Non-GAS pharyngitis was slightly more common than GAS pharyngitis. Mclsaac score of 4 and more is perhaps helpful to differentiate between bacterial and viral pharyngitis.

**Keywords:** Antimicrobial stewardship, pharyngitis, preschool children

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### ÖZET

**Amaç:** Beta-hemolitik streptokoklar, akut bakteriyel farenjitin önemli nedeni olmaya devam etti. Bu çalışma, beta-hemolitik Streptokokal farenjit prevalansını ve pozitif boğaz kültürünün klinik parametrelerle ilişkisini belirlemeyi amaçlamaktadır.

**Yöntem:** Bir birinci basamak sağlık kliniğinden 90 çocuğu kapsayan prospektif bir kesitsel çalışma yapılmıştır. Her çocuktan boğaz sürüntü örneği alındı ve bakteri kültürü için mikrobiyoloji laboratuvarına gönderildi. Farenjit skorlama sistemi olarak Mclsaac skoru kullanıldı.

**Bulgular:** Çocukların çoğunluğu erkek (N=53, %58,9) ve çocukların çoğu okul öncesi yaş grubuna aittir (N=42, %46,7). 11 çocukta boğaz kültürü pozitif. Beta-hemolitik streptokokal farenjit prevalansı %12.2 idi. Grup A ve Grup B Streptokoklar 5'er çocuktan izole edildi ve bir çocukta Grup C streptokok vardı. Pozitif boğaz kültürü, Mclsaac skorunun en az 4 olması ve öksürük olmaması ile anlamlı olarak korele idi ( $p<0.05$ ).

**Sonuç:** GAS dışı farenjit, GAS farenjitine göre biraz daha yaygındı. 4 ve üzeri Mclsaac skoru, bakteriyel ve viral farenjit arasında ayırım yapmak için yardımcı olabilir.

**Anahtar Sözcükler:** Antimikrobiyal yönetim, farenjit, okul öncesi çocuklar

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## INTRODUCTION

Sore throat or acute pharyngitis remains among the most common reason patients visit to general practitioner clinic. It is mainly caused by viruses. However, bacterial infection particularly beta-hemolytic Streptococci either Group A or non-group A remains among the most important bacterial cause of acute pharyngitis that required proper antibiotic therapy. Group A Streptococci (GAS) can be cultured from the throat swab specimen. The incidence of swab positive GAS was reported around 13 per 100 child-years in children between ages 5 to 12 years (1).

As pharyngitis is commonly caused by a virus, prescription of antibiotics can increase the risk of unnecessary antibiotics prescriptions leading to resistance. Several clinical scoring systems were developed to help clinicians determine those children with acute pharyngitis that require antibiotic therapy. Mclsaac scoring system is one of the most commonly used clinical criteria (2). It is perhaps important to highlight the important features that may be able to differentiate between bacterial and viral causes of acute pharyngitis. Thus, this study was conducted mainly to determine the prevalence and useful clinical features to determine beta-hemolytic streptococcal pharyngitis in a primary care setting.

## MATERIALS and METHODS

### Patient

A prospective cross-sectional study was conducted whereby the throat swab specimen was collected from children between ages 3 to 15 years old. The specimen was collected between 1<sup>st</sup> September 2018 until 31<sup>st</sup> March 2019. The written informed consent was taken from the parents. We excluded children whom we failed to take throat swab specimens because of poor cooperation and children who had recently received antibiotic therapy for at least two weeks before this presentation. This study was conducted in an urban primary care clinic in Kuala Lumpur, Malaysia. The children were categorized into three age groups; age between 3 to 6 years as preschool, 7 to 12 years as primary school and more than 12 years as a secondary school. This classification was based on the common age where the child enrolled in the school in Malaysia.

### Data collection

Baseline epidemiological data was collected from each child. Mclsaac scoring system was used for the determination of clinical scoring in all patients. The scoring system was as shown below:

Criteria	Point
Temperature > 38°C	1
No cough	1
Tender anterior cervical lymphadenopathy	1
Tonsillar swelling or exudate	1
Age 3-14 year	1
Age 15-44 year	0
Age ≥ 45 year	-1
Total score	

The data about antibiotic prescription was also acquired.

### Specimen

We took the throat swab specimens in the primary care clinic during clinic consultation. Each child will see the attending doctor in the consultation room. Throat swab procedure was taken by well-trained staff nurses with more than 10 years of working experience. All swabs were then transported to Microbiology Laboratory in Amies transport medium.

### Microbiology

The throat swab specimen was then cultured onto sheep blood agar and incubated aerobically at 37°C in 5% CO<sub>2</sub> for 24 hours. The bacitracin antibiotic disc was placed on the primary striking. The blood agar plate was then inspected for the growth of beta-hemolytic bacterial colonies. We identified the bacterial isolate as *Streptococci* spp. based on gram stain reaction of gram-positive cocci in the chain, negative catalase test and presence of a zone of inhibition around bacitracin antibiotic disc. The Lancefield grouping was determined using latex agglutination commercial kit (PathoDextra™ Strep Grouping Kit; Thermo Fischer Scientific; Oxoid, Basingstoke, United Kingdom).

### Statistical analysis

The prevalence of beta-hemolytic streptococci was calculated based on the number of positive throat swab cultures over total throat swab specimen cultured, then times 100. The categorical data were then analyzed by chi-square and a p-value of < 0.05 was taken as statistically significant.

### Ethical statement

This study had been reviewed and approved by the Research and Ethical Committee of the Universiti Kebangsaan Malaysia Medical Centre with approval number FF-2018-122.

## RESULTS

### Demographic and clinical features of the patients.

Ninety children were included in this study period and predominantly boys than girls (53 versus 37, 58.9% versus 41.1%). Most of them were preschool groups (N=42, 46.7%). Fever was the most important clinical complaint in 49 children (54.4%) followed by the sore throat in 36 children (40%). The detail of the data was as shown in Table 1.

**Table 1:** Demographic and clinical features of children with acute pharyngitis.

Age		Frequency	Mean
Overall			
Gender	Male	53	7.32+/-4.03 years
	Female	37	7.27+/-3.91 years
Parameters		Frequency	Percentage (%)
Gender	Male	53	58.9
	Female	37	41.1
Age group	Preschool	42	46.7
	Primary school	34	37.8
	Secondary school	14	15.6
Main complaint	Fever	49	54.4
	Sore throat	36	40
	Others	5	5.6
<b>Clinical examinations</b>			
Body temperature	<38°C	66	62.2
	38°C and more	34	37.8
Cough	Yes	55	61.1
	No	35	38.9
Cervical lymphadenopathy	Yes	16	17.8
	No	74	82.2
Enlarged tonsil	Yes	58	64.4
	No	32	35.6
<b>Microbiological result</b>			
Positive throat culture	Yes	11	12.2
	No	79	87.8
Bacteria isolated	Group A Streptococci	5	5.5
	Non-Group A Streptococci	6	6.7
<b>Antibiotic therapy (after consultation with the attending doctors)</b>			
Received antibiotic treatment	Yes	17	18.9
	No	73	81.1

Correlation between positive throat culture and clinical parameters in Mclsaac score.

A significant correlation was found between positive throat culture with overall Mclsaac score of at least 4. When we further analyzed on each clinical parameter of the Mclsaac Scoring System, absence of cough was noted to be

significantly correlated with positive throat culture. We also noted that, significant proportion of patients with positive throat culture was prescribed with antibiotic than those with negative throat culture. The analysis was done by chi-square and the result was as shown in Table 2.

**Table 2:** Correlation between throat culture results and clinical parameters.

Parameters		Positive Throat Culture		P-value*
		Yes	No	
<b>Mclsaac Score (Overall)</b>	<4	6	68	0.01
	≥4	5	11	
<b>Assessment of each Mclsaac Score clinical criteria:</b>				
Body Temperature	<38°C	7	49	0.918
	≥38°C	4	30	
Cough	Yes	1	54	0.001
	No	10	25	
Cervical lymphadenopathies	Yes	4	12	0.085
	No	7	67	
Enlarged tonsil	Yes	8	50	0.540
	No	3	29	
<b>Antibiotic prescription after consultation with the attending doctors:</b>				
Received antibiotic	Yes	5	12	0.016
	No	6	67	

\*P-value of <0.05 is considered as significant

**DISCUSSION**

The current communication showed that the overall prevalence of beta-hemolytic streptococcal pharyngitis was 12.2% while group A Streptococci (GAS) was implicated in 5.5% of the cases. In contrary to previous studies, we demonstrated that non-GAS pharyngitis was more prevalent than GAS. A study among Egyptian children reported the prevalence of GAS pharyngitis was 42.2% while non-GAS was only 10.6% (3). Similarly, another study in Yemen, also reported that GAS pharyngitis was more prevalent than non-GAS with a prevalence of 35.3% and 1.8% respectively (4). However, we also noted of a similar finding of non-GAS was more common than GAS pharyngitis in a study from a tropical country, with the prevalence of non-GAS of 28.8 cases/100 child-year versus GAS of 14.7 cases/100 child-year (5). Among the non-GAS pharyngitis, group C Streptococci was among the most common type isolated as showed by previously (6,7). Interestingly, we found that group B Streptococci as the most common non-GAS among our population and its prevalence was similar to GAS pharyngitis. The clinical significance of group B streptococci is not well established but it was reported previously whereby they noted that patients with group B streptococcal pharyngitis were noted to be more likely had enlarged tonsils, exudate and tender enlarged anterior cervical lymph nodes (8). The GAS prevalence in this study was noted to be higher than another study in Taiwan (5.5% versus 4.1%) (9).

We noticed that the absence of cough was more likely to be associated with positive throat culture for beta-hemolytic streptococcal pharyngitis. This was also noted in several previous studies and this feature was described as an important clinical feature to be absent in GAS pharyngitis (4,6,9,10). However, other clinical features such as purulent tonsils, enlarged cervical glands, and duration of illness of less or equal to three days were also more commonly encountered in GAS than non-GAS pharyngitis (6). Clinical features like headache, fever, pharyngeal exudates and cervical lymphadenopathies were more commonly found in all streptococcal pharyngitis than in viral infection (6).

We noted that the Mclsaac score of at least 4 was significantly associated with a positive throat culture. Ba-Saddik et al. previously described that the score of 4 and 5 markedly improved specificity (4). Perhaps, this criterion may also be able to differentiate between GAS and non-GAS pharyngitis because clinical features as the absence of cough, cervical lymphadenopathies, and enlarged tonsils were more likely to present in GAS than non-GAS (9). Thus, this contributed to a higher score in GAS pharyngitis. However, we noted that they were also patients with a Mclsaac score of less than 4 that had positive throat culture and similarly those with Mclsaac score of 4 and 5 but with a negative throat culture. We also noted that all patients with a Mclsaac score of at least 4 received antibiotic therapy regardless of the throat culture result. The antibiotics given were mainly amoxicillin-clavulanic acid and ampicillin.

Several limitations were noted in this study that includes this study was conducted in a single center and in an urban area whereby it may not be necessarily reflecting the overall picture of GAS and non-GAS pharyngitis among Malaysian children. It was also noted that in some children we were not able to take the throat swab specimen either because of non-consented by the parents or uncooperative during throat swab taking that may affect our prevalence of GAS or non-GAS.

**CONCLUSION**

In conclusion, we showed that our prevalence of GAS pharyngitis was lowered than many of the previous reports and we also demonstrated that perhaps non-GAS pharyngitis was more prevalent than GAS. Mclsaac score of at least 4 showed a significant correlation with positive throat culture thus initiating antibiotic therapy in this patient may be warranted.

**Conflict of interest**

No conflict of interest was declared by the authors.

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