Isolation and Identification of Group A Streptococcal Infection Among Slum Children in the Age Group of 5-15 Years in Chennai - One Year Prospective Study

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Abstract

Objective: *To isolate Group A Streptococcal infection (GAS) from slum children in the age group of 5 to 10 years with or without evidence of throat infection dwelling in the slums of Chennai and to study their carrier state.*

Methods: *Children aged between 5–15 years from slum were enrolled in this study. Socio demographic details were collected and their clinical examinations were done to identify symptoms. Two throat swabs were collected from all the children irrespective of symptoms. Bacterial culture was carried out in blood agar and the isolation of GAS was confirmed using hemolysis on blood agar, streptococcal group identification kit and bacitracin sensitivity. Blood sample was tested for ASO antibody titre.*

Findings: *Group A streptococcus prevalence was isolated in 36% of slum population. Culture positive children were correlated with ASO antibody. Statistically significant correlation (p-value> 0.001) was observed between presence of antibody and culture positive. Recently infected children showed raised ASO antibody titre than the carrier. Major risk factors identified in GAS positive children were father's occupation, type of house, number of windows and the unhygienic conditions of the slum. 36% were infected with Group A Streptococcal infection, 9% infected with Group C, 6% Group B, 1% Group D, 0.1 and 0.3 Group F and Group G streptococcal infection.*

Conclusion: *The result shows that the prevalence of streptococcal infection was common among slum children but the prevalence of Group A streptococcus was high comparing to other groups of streptococcus. Socioeconomic status considered to be major associated risk factor for getting streptococcus infection.*

Key words: *Group A streptococcus, Socio Economic Status, Throat swab*

I. Introduction

Group A Streptococci (GAS) is one of the most significant pathogens responsible for causing tonsillitis and pharyngitis in both children and young adults. Clinical diagnosis and culture for the organisms help in the diagnosis of throat infection due to GAS. It is difficult to distinguish clinically as streptococcal and non-streptococcal infection of the throat and most of the physicians tend to over diagnose GAS infection and call for culture routinely. Though early diagnosis and treatment helps to prevent further complications such as rheumatic fever, acute glomerulonephritis and shortens the disease course and reduces the transmission of disease, but it may lead to unnecessary treatment with antibiotics in individuals who turn out negative on throat culture. The group A streptococcus (GAS) is a form of β-hemolytic Streptococcus responsible for most cases of sore throat/pharyngitis and rheumatic fever. Other types (B, C, D, F and G) may also cause throat infection. Sore throat remains a most common problem in children. In India isolation rates of GAS in children with pharyngitis have ranged from 4.2% to 13.7%[1,2] which are comparable to the rates reported from developed countries. However, studies of carrier rates in the communities have not been done, and it is the only factor which reflects isolation from symptomatic children in out patient clinics. In closed and crowded communities the rates of isolation and spread of GAS infection may be much higher. The prevalence of asymptomatic carrier of GAS in different parts of India has been reported to lie in the range of 11.2–34%[3,4]. The potential aims of treatment for streptococcus are reduction of symptoms and prevention of suppurative and nonsuppurative streptococcal sequlae mainly acute rheumatic fever. Hence, a prospective study was conducted to study the isolation of Group A Streptococcal (GAS) infection among children in the age group 5 to 15 years with or without evidence of throat infection dwelling in the slums of South Chennai.

II. Methods

Slums in Chennai corporation zones have been selected for this study. Six hundred children were enrolled after obtaining informed consent from the head of the household. Institutional Ethical Committee clearance was obtained for this study. All the children were screened for pharyngitis/tonsillitis and two throat swabs were collected from tonsillar area and posterior pharyngeal wall using sterile cotton swabs, and processed for the isolation of group A streptococci. Three ml of blood sample was collected to detect ASO antibody. Throat swabs were cultured in the 5% sheep blood agar plate for 24hrs at 37 ℃ under 5-10 per cent CO_2. After the incubation period, GAS was identified and confirmed by haemolysis on blood agar, Gram stain, colony morphology, catalase test, bacitracin sensitivity (0.04 units/disc). Then, the isolates were further examined for Lancefield grouping with rapid latex test. ASO antibody titer was done using RHELAX ASO kit. Statistical analysis was carried out using SPSS Vr 17. SES were given in frequencies and percentage. Categorical variables were compared with the chi-square test. Student's t-test and ANOVA were used to compare the risk factors, clinical symptoms and culture.

III. Results

Baseline demographic details of the slum population are tabulated in table 1. It shows, 69% working as daily wage labourer, 81% nuclear family, 40% having one child, 36% having two children and 22% having more than 2 children, 32% of them living in Kutcha house, 84% using toilet for defecation, 57% using corporation water for drinking .

Characteristics	Frequency	Percentage (%)
Age		
5-10yrs	313	52
11-15yrs	287	48
Sex		
Male	355	59
Female	245	41
Parents occupation		
Daily wages	415	69
Business	45	8
Fisheries	67	11
Government sector	24	3
Driver	40	7
Painter	9	2
Type of Family		
Joint	109	18
Nuclear	491	82
No of siblings		
"only" child	252	42
2 children	232	39
3 children	71	12
4children	21	5
5children	6	1
6children	18	3
Type of House		
Kutcha	193	32
Pucca	33	6
Semipucca	374	62
Proper ventilation		
Yes	235	39
No	365	61
Defecation		
Toilet	506	84
Open space	94	16
Source of Drinking Water		
Corporation water	341	57
Bore well /well/hand pump	259	43

Table 1: Baseline demographic characteristics of the slum population

Risk factors were compared with culture positive's, among the GAS positive's statistically significant association was seen with fathers occupation (p-value 0.014%) type of house (p-value 0.045%), Zone wise (p-value 0.000). Isolation of GAS rate was not significantly associated with number of children in the house, (p-value 0.944), number of rooms (p-value 0.274), Number of people sleeping in a room (p-value0.188), defecation (p-value 0.351) but significant association was found only with fathers occupation and number of windows (p-Value -0.014, 0.041). Other factors such as age (p-value 0.158), type of family (p-value 0.852), source of drinking water (p-value-0.311),weight of the children (0.281) and defecation(0.305) was not statistically significant compared with GAS isolation.(table-2)

Risk factors	p-value
Fathers occupation	**.014**
Type of family	.852
No of siblings	.944
Type of house	.045
No of rooms	.274
No of people sleeping in a room	.188
Proper ventilation	.161
No of windows	**.041**
Defecation	.305
Source of drinking water	.311
Clinical symptoms	.401
Zone	**.000**

Table-2: Comparison of risk factors with culture (p-value >0.001 considered as statistically significant)

There was a significant association between age of the children and culture positives (p-value >0.001). GAS infection was high in the age group of 10 years. If the age increased from 5yrs to 10yrs, infection rate is also increased but infection rate was decreasing from the age of 10yrs to 15yrs.(fig-1)

Fig-1-Prevalence of streptococcal infection among slum children
Age Vs Culture positive
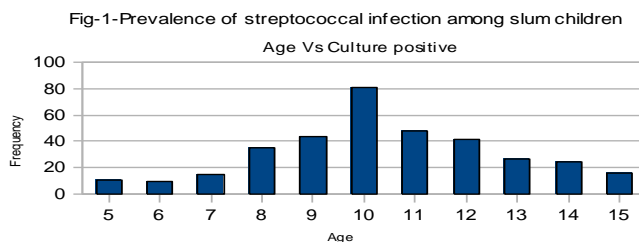
Of the total 321 culture positive's 93 (29%) were asymptomatic but culture positive's. Of which, 217 children were GAS positive and rest of them positive for other group of streptococcus. Among the GAS isolation, 15% were asymptomatic, 26% had tonsillitis only, and 13% had sore throat. Other group of streptococcus was also isolated as 6% GBS, 9% GCS and 1.5% mixed infection with all group of streptococcus was isolated. (table-3)

Symptoms	GAS	GBS	GCS	GDS	GFS	GGS	Mixed	Culture negative
Asymptomatic	51	17	18	2	1	1	3	94
Tonsillitis	82	5	1	1	0	0	0	15
Sore throat	43	4	6	2	0	0	0	28
Cough and cold	40	7	25	1	0	1	6	138
Fever	1	2	1	0	0	0	0	4
Total	217 (36%)	35 (6%)	51 (9%)	6 (1%)	1 (.1%)	2 (.3%)	9 (1.5%)	279 (47%)

Table-3: Distribution of streptococcal infection among slum children in correlation with symptoms

While comparing Chennai zones with streptococcal isolation, the rate of culture positive was high (17%) in zone four followed by zone three (13%), one, ten and nine(11%) and statistically significant (p-value0.000) difference was observed . Isolation of GAS positive was not significantly associated with presence of sore throat (0.219). (table-4)

Table -4: Comparison of ASO positive with sore throat.

		Sore throat		Total	p-value	Odds Ratio
		Present	Absent			
ASO	Positive	42	289	331		1.407
	Negative	25	242	267	0.124	
Total		67	531	598		

IV.   Discussion

In the present study, GAS was isolated in 36%, seems to be very high compare to other studies conducted in India previously. Those studies have reported that the carrier status of GAS was between 2.5-14.3% [1, 2,] 8.4% in Chennai[4], 2.3% in Vellore. The epidemiological picture of streptococcal infections in India is quite different from that of the developed countries, suggesting that may be some serotypes are much more common than others within a population in different geographical locations[5.] This study reports that the prevalence of GAS was not significantly different between males and females. Studies have reported that the prevalence of β-haemolytic streptococcal pharengitis was higher among females than among males in Delhi and other places in India[6, 7], others have reported that GAS pharengitis did not vary according to sex[8]. This study shows that the significant association was not observed while comparing ASO positivity with sore throat; it shows the children may be newly infected with streptococcal group.   In the present study, since, all the study populations were from similar socioeconomic status, statistically significant difference was observed only between father's occupation, and zones. It shows that poor income and hygiene conditions of the zone may play a significant role in spread of infection. Presence of other group of C and G streptococcus is genetically related to GAS, but the prevalence rate is very low and the clinical symptoms also mimics like GAS infection. [9]Other group of streptococcus may also carry virulence factor of GAS and is also a driving force for major complication like acute renal failure. To prevent this, awareness should be created to the slum population about the cleanliness, mode of transmission of the disease and also the government should take initiative to overcome this problem by providing clean drinking water, underground drainage system, sufficiently ventilated houses, and proper toilets in the slums.

V.   Limitations

The positive children did not have any follow up or given any treatment by the researcher. The report was submitted to corporation of Chennai for further action.

VI.   Acknowledgement

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