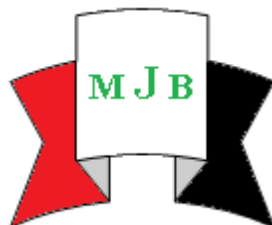


The Carriage Rate of Nasal *Staphylococcus aureus* in Persistent Allergic Rhinitis Patients

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Abstract

In this study (158) nasal swabs were collected from patients attending Asthma and Allergy Center, AL-Hilla Teaching Hospital and Private clinic in Hilla city. The study included two groups: Persistent Allergic Rhinitis Group and healthy subjects as Control Group to study the correlation between nasal carriage rate of *Staphylococcus aureus* (*S. aureus*) and the development of symptoms of Persistent Allergic Rhinitis Patients. It was found that the rate of isolated *S. aureus* was higher in Persistent Allergic Rhinitis Group 85.9% in comparison with Control Group 28.8% and the incidence of Persistent Allergic Rhinitis in 10-20 year age group was higher than other age groups 29.5%. Isolated *S. aureus* was higher in male 92.9% than in female 77.8%, as well as symptoms of Persistent Allergic Rhinitis and the rate of incidence of *S. aureus* were decreased with proceeding in age and symptoms showed high rate in 10-20 year age group.

Antibiotics sensitivity test of *S. aureus* showed that all isolates were highly sensitive to Vancomycin, and moderately sensitive to Oxacillin 84.4 % and Ciprofloxacin 58.9%.

الخلاصة

تم في هذه الدراسة جمع (١٥٨) مسحة انف من المرضى المراجعين لمركز الحساسية والربو ومستشفى الحلة التعليمي وعيادات خاصة في مدينة الحلة تضمنت مجموعتين: مجموعة التهاب الانف التحسسي المزمن ومجموعة الأشخاص الأصحاء (مجموعة السيطرة) لدراسة العلاقة بين نسبة بكتريا الـ *S. aureus* في الانف لهؤلاء المرضى وتطور اعراض مرض التهاب الانف التحسسي المزمن. لقد وجدنا بان نسبة بكتريا الـ *S. aureus* هي اكثر لدى مرضى التهاب الانف التحسسي المزمن ٨٥,٩% مقارنة بمجموعة السيطرة ٢٨,٨%. كذلك وجدنا بان نسبة حدوث التهاب الانف التحسسي المزمن في الفئة العمرية ١٠-٢٠ سنة هي اكثر من باقي الفئات ٢٩,٥%. بكتريا الـ *S. aureus* المعزولة كانت اكثر لدى الذكور ٩٢,٩% مقارنة بالاناث ٧٧,٨%, بالإضافة الى ان اعراض التهاب الانف التحسسي المزمن ونسبة حدوث الـ *S. aureus* تقل مع تقدم العمر كما اظهرت الاعراض اكثر نسبة في الفئة العمرية ١٠-٢٠ سنة.

العينات المعزولة اخضعت لاختبار فحص الحساسية للمضادات الحيوية وقد اظهرت جميعها حساسية عالية لعقار Vancomycin ١٠٠% و كانت حساسة ايضا لعقاري oxacillin ٨٤,٤% و Ciprofloxacin ٥٩,٩%.

Introduction

S. aureus has long been recognized as an important pathogen in human disease. Due to an increasing number of infections caused by methicillin-resistant *S. aureus* (MRSA) strains, therapy has become problematic. Therefore,

prevention of staphylococcal infections has become more important. Carriage of *S. aureus* appears to play a key role in the epidemiology and pathogenesis of infection. The ecological niches of *S. aureus* are the anterior nares. In healthy subjects, over time, three patterns of carriage can be

distinguished: about 20% of people are persistent carriers, 60% are intermittent carriers, and approximately 20% almost never carry *S. aureus*. [1,2].

Rhinitis is a global problem and is define as the presence of at least one of the following : congestion, rhinorrhea, sneezing, nasal itching, and nasal obstruction. The two major classifications are allergic and nonallergic rhinitis. Allergic rhinitis occurs when an allergen is the trigger for the nasal symptoms. Nonallergic rhinitis is when obstruction and rhinorrhea occurs in relation to nonallergic, noninfectious triggers such as change in the weather, exposure to caustic odors or cigarette smoke, barometric pressure differences, etc [3]. In Western countries between 10–25% of people annually are affected by allergic rhinitis[4].

Allergic rhinitis may also be classified as Mild-Intermittent, Moderate-Severe intermittent, Mild-Persistent, and Moderate-Severe Persistent. Intermittent is when the symptoms occur <4 days per week or <4 consecutive weeks. Persistent is when symptoms occur >4 days/week and >4 consecutive weeks [5]. In such individuals, the allergen triggers the production of the antibody immunoglobulin E (IgE) causing the release of inflammatory mediators such as histamine (and other chemicals)[6].

Patients and Methods

One hundred fifty eight nasal swabs were collected from patients attending Asthma and Allergy Center, Hilla teaching Hospital and Private clinic in Hilla city. They were divided into two groups 78 Persistent Allergic Rhinitis Group and 80 healthy subjects as Control Group.

The nasal swabs were inoculated on culture media (Trypticase soy agar (TSA) with 5% sheep blood agar, Mannitol salt agar) and incubated at 37°C for 24hr. Traditional biochemical tests were used for final identification of bacterial isolates. The traditional method for differentiating *S. aureus* (coagulase positive) from coagulase-negative staphylococci in the laboratory has been the tube coagulase test (TCT). This test has been modified for direct detection of the organism from blood cultures in 2 h by using the blood culture broth [7,8].

Some antibiotic disks: (Vancomycin, Oxacillin and Ciprofloxacin) were used to show the effect of them on isolated bacteria using disk diffusion method. Suspension with bacteria was swabbed over a Mueller-Hinton agar. Discs impregnated with various antibiotics are placed onto agar and incubated for 24 hours at 37 °C. Zones of inhibition of bacterial growth, measured around discs, were compared with those in the Clinical and Laboratory Standards Institute (CLSI) guidelines [9].

Statistical analysis

Data was analyzed by using Chi-square (for comparison of groups of the study in table -1- and to analyze data of age and symptom in table-2. Student's unpaired t –test was used to analyze data of sex in table -3-. A P-value <0.05 was considered statistically significant [10].

Results and Discussion

Nasal carriage of *S. aureus* contributes to airway inflammation and allergic response in patients with allergic rhinitis [11]. This study was designed to investigate the frequency of nasal *S. aureus* carriage in Persistent Allergic Rhinitis patients and its possible influence on their symptoms in comparison with healthy subjects as control group . 78 non

smoker patients with Persistent Allergic Rhinitis (matched for age , sex and symptoms) and 80 non smoker healthy subjects were chosen in this study, For all subjects rhinoscopy was done, the Persistent Allergic Rhinitis group showed high nasal carriage rate of *S. aureus* 85.9% in comparison with control group 28.8% ($P<0.001$ highly significant difference) as illustrated in Table -1.

Nasal *S. aureus* actively modulated the immune reaction in persistent allergic rhinitis patients by promoting local IgE production as well as patients with allergic rhinitis suffering from ulceration of nasal mucosa; this may lead to increase colonization of *S. aureus* in nose [16]. The anterior nares have been shown to be the main reservoir of *S. aureus* in both adults and children.

The *S. aureus* is transmitted to nares by contaminated hands and from surfaces where it can survive for months[12].

Table -2 shows the carriage rate of nasal *S. aureus* which was higher 31.3% in (10-20) year age group in comparison with other age groups. Persistent carriage of *S. aureus* is more common in children than in adults [13].

The symptoms also were higher 29.5% in (10-20) year age group in comparison with other age groups. Total immunoglobulin E levels increased with age until (14-15) years, and declined thereafter (14). Allergic rhinitis (AR) is characterized by one or more symptoms including sneezing, itching, nasal congestion, and rhinorrhea [15], so the symptoms in table 2 represent one or more of sneezing, itching, nasal congestion, and rhinorrhea. Allergic diseases of the airways, including asthma and allergic rhinitis, remain highly prevalent with associated symptoms placing considerable restrictions on the

physical, emotional, and social functioning of the affected individual. It is now recognized that immunoglobulin E (IgE) plays a central role in mediating the allergic response that follows exposure to allergens after an initial process of sensitization [16].

Both of nasal *S. aureus* carriage rate and symptoms in Persistent Allergic Rhinitis patients showed high prevalence in (10-20) year age group and decrease as the age proceed. Table -3 shows the nasal carriage rate of *S. aureus* in male 92.9% which was higher than female 77.8% ($P<0.05$ significant difference). So we recommend that *S. aureus* carriage must be screened on regular intervals in Persistent Allergic Rhinitis . Nasal *S. aureus* carriage follow-up and treatment is a process that will protect patients from more severe clinical pictures. Antibiotics sensitivity tests showed high sensitivity 100% of *S. aureus* to Vancomycin and in lesser degree of other antibiotics as showed in Table -4.

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Table 1 Distribution of Nasal *S.aureus* carriage rate in Patients and Control Groups.

<i>S. aureus</i>	Persistence Allergic Rhinitis		Control Group		Total	
	No.	%	No.	%	No.	%
+	67	85.9	23	28.8	90	56.96
–	11	14.1	57	71.2	68	43.04
Total No.	78	100	80	100	158	100 %

P<0.001

Table 2 Distribution of Nasal *S.aureus* carriage rate in Persistent Allergic Rhinitis according to the age and symptoms.

Persistent Allergic Rhinitis Group	Age(year)										Total	
	10-20		21-30		31-40		41-50		51-60			
	No.	%	No	%	No	%	No	%	No	%	No.	%
+ <i>S.aureus</i> . isolates	21	31.3	17	25.3	15	22.4	9	13.5	5	7.5	67	100
Symptoms: (coughing,sneezing, and itching)	23	29.5	19	24.3	16	20.5	12	15.4	8	10.3	78	100

P<0.05

Table 3 Distribution of Nasal *S.aureus* in Persistent Allergic Rhinitis according to sex.

Sex	Persistent Allergic Rhinitis				Total No.
	Postive		Negative		
Male	39	92.9%	3	7.1%	42
Female	28	77.8%	8	22.2%	36

P<0.05

Table 4 Antibiotics susceptibility of isolated *S. aureus* to different antibiotics.

Antibiotics	Result				Total No.
	Sensitive		Resistant		
	No.	%	No.	%	
Vancomycin	90	100	0	0	90
Oxacillin	76	84.4	14	15.6	90
Ciprofloxacin	53	58.9	37	41.1	90