The Value of Nose and Throat Swab Cultures in Managing the Attacks of Asthmatic Children*

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The use of antibiotics as symptomatic treatments of asthmatic children has not been well defined. The reason for this is probably that the bacteria themselves may affect an asthmatic patient both as an infectious agent and an allergen. It is not always possible to differentiate between the two. When it is infection, typical symtoms may be found. Attacks are worse during the winter and have a tendency to recur periodically. Fever can be high or low grade but examination of these children for infection sometimes gives no positive results. Cultures of the nose and throat can be negative for pathogens with a normal hemogram. However, mothers report that the children respond to antibiotics.

It is known that children who wheeze with each infection are allergic to their own becteria and that these patients may benefit from the addition of bacterial vaccine to hyposensitization treatment.[1] Asthma or rhinitis symptoms can be induced within 24-48 hours following the excessive administration of bacterial vaccine.[2] Patients may develop bacterial or viral infection which aggravate and prolong asthmatic symptoms. These patients with bacterial allergy are ill from March to Nowember with bronchitis. In these patients, infection is superimposed on a congested respiratory mucosa. This becomes clearer when we remember that infants

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or children have smaller effective anatomical airways. Therefore any degree of swelling of the mucosa of the respiratory tract will increase the congestion of the airway.[3]

After infection, the mucosa of the respiratory tract gains altered reactivity to the bacterial product. In addition to delayed hypersensitivity, as in tuberculosis, immediate type sensitivity is also developed by infection antigens. Skin tests are not significant in this type of hypersensitivity. They are found to be irritative and non-allergic in many cases.

The purpose of this paper is to study the value of taking nose and throat swabs in the evaluation of the use of antibiotic treatment for asthmatic children and to find out if there is any correlation between the nose and throat flora and symptoms of these patients.

Materials and Methods

The patients studied were selected from among asthmatic children who were examined at the Pediatric Allergy Clinic of Hacettepe Faculty of Medicine during the year 1968–69. A total of 119 cases were studied from the clinic and a school and their ages ranged from 3 to 16 years.

169 pairs of swabs were taken; 83 were from patients clinically well at time of examination (Group I). Of these 48 were male and 35 female. 36 swabs were taken from unwell children (Group II). In this group there were 21 males and 15 females. 50 non-asthmatic children, 34 male and 16 female made up the control group (Group III).

The age and sex distribution of the children in all three groups is given in Table I. In order to rule out cross-infection in the hospital, the control group was chosen from among children who had not been recently hospitalized; they were all obtained from primary school children. The nose and throat swabs were taken by a doctor and quickly transported to the Bacteriology Department of Hacettepe Faculty of Medicine. Cultures of the nasal cavities were taken by passing a cotton swab over the middle and inferior turbinates and inocul ating the collected material into blood agar plates. Cultures of the nasopharynx were taken in a similar way by passing a cotton swab into the nasopharynx. Attention was paid to avoid contact of the loop with the mouth of pharynx. Gaging was also avoided when the swab was passed over the inferior meatus because it has been noted that nasopharyngeal secretion flows into the inferior meatus posteriorly.

Antibiotic sensitivity tests are done by the standard conventional method using discs on some of the culture and the coagulase +, staphlococcus and sensitivity pattern for each organism read. Sensitivity gradings are reported as sensitive or resistant.

TABLE I

THE AGE SEX DISTRIBUTION OF THE THREE GROUPS

Children condition	Number of children studied	Age (Years) 0–4		5–10		11–16	
		0 ↓	0+	0 ↓	0+	0 ↓	0+
Non-symptomatic asthmatic children	83	11	6	30	17	17	9
Symptomatic asthmatic children	36	9	4	10	6	4	3
Control group (Non asthmatic children)	50	2	2	15	20	6	5

Results

Tables II and III show the number of species of potential pathogens isolated from the nose and throat swabs from two other groups of asthmatic children. As can be seen, the nasal carrier rate for coagulase-positive staphylococcus aureus organisms is 51.7 percent in group 1 and 33.3 percent in group 2. The same organisms from the throat swabs revealed 22.9 percent in group 1, and 27.7 percent in group 2.

TABLE II

FLORA OF NOSE AND NASOPHARYNX IN 83 ASTHMATIC CHILDREN WITH NO SYMPTOM

GROUP I

Microorganisms	Nose		Nasopharynx	
	Number	Percent %	Number	Percent %
Staphylococcus aureus (Coagulase)	43	51.7	19	22.9
Staphylococcus albus	4	4.7	3	3.6
Streptococcus B hemolyticus	3	3.6	25	30.1
Streptococcus A hemolyticus	7	8.4	31	37.3
Streptococcus non hemolyticus	1	1.2	6	7.2
Coliform bacilli	2	2.4	2	2.4
Pyocyaneus	2	2.4	3	3.6
Neisseria pharyngitis	26	31	59	71
Pneumococcusi	1	1.2	1	1.2
No growth	5	6	1	1.2

The interesting fact is the higher incidence rate of staphylococcus among the group of asthmatic children with no symptoms. Again, from the tables there is a striking similarity in the numerical distribution of or-

TABLE III

FLORA OF NOSE AND NASOPHARYNX IN 36 ASTHMATIC CHILDREN WITH SYMPTOM

Microorganisms	Nose		Nasopharynx	
	Number	Percent %	Number	Percent %
Staphylococcus aureus (Coagulase +)	12	33.3	10	27.7
Staphylococcus albus	5	14.1	4	11.1
Streptococcus B hemolyticus	3	8.3	9	25
Streptococcus A hemolyticus	5	14	7	19.4
Streptococcus non hemolyticus	–	–	3	8.3
Coliform bacilli	2	6.1	3	8.3
Pyocyaneus	–	–	–	–
Neisseria pharyngitis	20	61.1	25	69.1
Pneumococcus	–	–	–	–
No growth	2	6.1	4	11.1

ganisms in the two groups. The control group showed a significant number of streptococci in the throat swabs. 46 percent have B hemolyticus streptococcus and 20 percent A hemolyticus streptococcus (Table IV). These readings can be interpreted as showing a streptococcic epidemic in this primary school.

The sentivitiy tests for coagulase staphylococcus were done on the two asthmatic groups and results are summarized in Table V.

TABLE IV

FLORA OF NOSE AND NASOPHARYNX IN 50 HEACK'S NON – ASTHAMATIC CHILDREN

GROUP III

Microorganisms	Nose		Nasopharynx	
	Number	Percent %	Number	Percent %
Staphylococcus aureus (Coagulase +)	3	6	2	4
Staphylococcus albus	–	–	–	–
Streptococcus B hemolyticus	–		23	46
Streptococcus A hemolyticus	–		10	20
Streptococcus nonhemolyticus	–		–	
Coliform bacilli	–		–	
Pyocyaneus	–		1	2
Neisseria	3	6	41	82
Pneumococcus	–		–	
No growth	1	2	2	4

TABLE V

THE RESULTS OF ANTIBIOTIC SENSITIVITY OF COAGULASE-POSITIVE STAPHYLOCOCCUS AUREUS ISOLATED FROM SWABS

Antibiotics	Asthmatic children in well condition		Asthmatic children in asthmatic attack	
	Number	% percent	Number	% percent
Rifamycin	37	59	15	68
Oxytetracycline	20	32	9	40.9
Chlorenphenicol	26	42	6	27
Erythromycin	31	50	8	36
Oxacillin	1	1.6	–	
Penicillin	28	45	4	18
Ampicillin	12	19	4	18
Novobiocin	–		2	9
Streptomycine	14	22.6	2	9
Sigmamycine	–		2	9

Discussion

Aas[4] and his friends made a study in 1967, demonstrating the incidence of staphylococcus aureus to vary between 6 and 66 percent in asthmatic children, in crisis. In another study made by Fontana,[5] the incidence of streptococcus pneumoniae was found to be around 1 percent in children in asthmatic crisis.

Box[6] and his colleagues demonstrated that the incidence of streptococcus pneumoniae was about 96 percent among normal children and asthmatic children, in or out of crisis. The probable reason for the enormous difference in these finding can be explained by differences in swab-taking techniques and the probability of local bacterial epidemics.

A similar study was done by Sanders[7] and friends in London in 1968. A total of 303 pairs of nose and throat swabs were taken; 97 from asthmatic children and 32 from non-asthmatic children. The results were compared and it was concluded that the pattern of pathogenic bacterial flora of the nose and throat in asthmatic children does not difter significantly when they are well or in crisis.

McGovern[3] mentioned that children who develop a respiratory infection or infection of another type start wheezing although there is no change in the pollen count. He suggested that the mechanism could be due to the fact that (1) the patient may be allergic to the type specific protein of the infectious agent, (2) infection of the respiratory tract may cause increased mucosa edema, (3) the general stress caused by the infection

may lower the patient's threshhold to withstand an asthmatic attack. These suggestions explain why we obtained pathogen free swabs in some cases of infectious asthma.

In perennial allergic symptoms (all year round asthma and allergic rhinitis), infection tends to have a threefold role; direct infection, secondary infection and infectious allergy. In perennial symptoms, infectious allergy is to be suspected because the organism (antigen) may be always present.

The flora of the upper respiratory tracts of non asthmatic children was studied by Goldman[8] and his friends. In 1954 they studied the bacteriologic and clinical interpretation of the flora of the nose and nasopharnx of children. They concluded that the nasal flora of fifty non asthmatic children contained chiefly small numbers of non pathogenic microorganisms. Staphylococcus albus B was prevalent. The only potential pathogen found in normal nasal secretion with any regularity was staphylococcus aureus A. Streptococcus viridans was the most frequently encountered pathogen in the swabs of the nasopharynx of these children. Similar studies were done by Box[6] and his colleagues in 1961. From 480 infants and children with and without acute respiratory tract infection, pneumococcus, staphylococcus aureus, hemophylus species and beta hemolyticus streptococcus pathogens were isolated. They observed that swabs of single sites yielded an incomplete assessment of upper respiratory tract carrier of these four organism. They also concluded that a distinction could not be made on the basis of qualitative or quantitative growth of these organisms on cultures. Comparisons of the results of frequency and nature of the flora of the nose and throat between non-symptomatic and symptomatic children show little or no difference. The apparently anomalous differences can be attributed to swab-taking techniques or a local epidemic. Our control group was selected from an outside community in no way associated with the hospital, thus ruling out the possibility of hospital cross infection. It is possible that some of these respiratory infections are due to viruses; however, virus studies were not done this time.

There are no strict rules for using antibiotics in the treatment of asthmatic patients and as it is not always possible to differentiate an asthmatic attack from a respiratory infection, allergists are inclined to use antibiotics with frequency.

In some patients, the withholding of antibiotic treatment may result in the complication of an infection leading to otitis media or bronchopneumonia. In others, the use of antibiotics may cause a drug allergy or may make no difference to the clinical course.

Conclusion

The nose and throat cultures of 119 asthmatic children were studied both during and after asthmatic attack. The results were compared with cultures from non symptomatic children from a different community.

It was concluded that the pattern of pathological flora from the upper respiratory tract of asthmatic children does not differ in any significant way whether the patient is in asthmatic attack or not. The incestigations were carried out by standard methods and it is concluded that the taking of nose and throat cultures does not assist the diagnosis of which bacterial allergen initiates an asthmatic attack.

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