

ON ASTHMA IN CHILDREN

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Asthma is a condition characterized by a recurrent cough and a wheezing type of dyspnoea in which most of the difficulty, but not all, appears to occur during expiration. It may manifest itself as an acute paroxysm which lasts from a few minutes to several hours, or it may become severe and persistent, in which case it is termed status asthmaticus. In other cases it may be present in a sub-clinical form. It occurs in subjects who have an over-excitability of mucosa and musculature of the bronchial tree. It thus represents a 'non-specific' reaction occurring in a wide variety of diseases and as a reaction to many factors such as allergens, infections, and reflex physical and psychic stimuli that have no effect on normal subjects. The limits of the term 'asthma' are therefore nebulous in many respects.

The rôle which these various factors play, and their relative importance, has long been a subject of controversy among clinicians, and opinions are largely influenced by the orientation of the attending physician. The majority of clinicians tend to disregard the 'non-specific' nature of this reaction and those who consider 'allergy' to be the basic factor seek relentlessly for evidence of hypersensitivity to a foreign substance by skin testing against different known allergens. In contrast, the psychiatrist is often able to discover only psychic stimuli as the basic aetiological factor in the history given by the asthmatic patient. Bignall¹ stated that 'skin testing seldom aids in the diagnosis and treatment of asthma. It is generally more profitable to explore the patient's mind and his environment than lungs, sinuses and hypersensitivity reaction'.

In an attempt to clarify the issue from the viewpoint of the clinician with no particular orientation to the subjects of allergy or psychiatry, 68 children suffering from asthma were clinically investigated, analysing the histories given by the parents and patients.

METHOD

There was no selection of cases, except on the basis of age. Only children over 6 years of age were investigated. Fifty-eight of the patients attended the outpatient department at the Bristol Royal Hospital for Sick Children, and the remaining 10 were seen in the wards. The method of examination was the same throughout. A history was taken with special reference to the frequency and severity of the asthmatic attacks, the number of days absent from school because of these, the frequency and amount of any anti-asthmatic medicaments used, the presence of associated symptoms such as cough, listlessness and anorexia. The general comments of the mother and child, the relationship between parent and child, and possible psychological and emotional factors responsible for or aggravating the asthmatic attacks, were noted. In addition, the following data were recorded—the child's age and

sex; the age at the onset of the 'wheezing'; the duration of the history of asthma; the occurrence of any past or present eczema, hayfever or an 'allergic' history; the presence of a family history of asthma, and the number of children in the family.

A complete physical examination was then carried out with special reference to the respiratory system. A note was made of any chest deformity such as Harrison's sulci, kyphosis of the thoracic vertebrae, 'pigeon-chest' deformity, or 'barrel-shaped' chest. Evidence of obstructive emphysema was looked for and any adventitious sounds on auscultation noted.

Depending on the history and physical findings, the 68 cases were classified into 3 clinical groups, using the following criteria:

Group I. Asthmatics with a history of wheezing continuing for days without relief from bronchodilator drugs or other treatment. These children usually gave an additional history of cough, listlessness and anorexia. On examination, all showed signs of severe obstructive emphysema, expiratory and/or inspiratory wheezing, and diminished breath sounds. Of the 11 children in this group, 9 were admitted to the ward, and 2 were treated as outpatients.

Group II. Asthmatics with a history of 2-3 attacks of wheezing a week, but who were relatively well between attacks. In the majority of these cases, the child had to be kept away from school during at least some of the attacks. On examination, most of them had auscultatory evidence of expiratory difficulty such as wheezing and prolonged expiration. Other adventitious sounds, such as crepitations, were sometimes present, depending on the severity of the condition at the time of the examination. Signs of obstructive emphysema such as 'barrel-shaped' chest with hyper-resonance and diminished cardiac dullness were often present. Twenty of the 68 cases were classified in this group.

Group III. Asthmatics who were well at the time of examination with a history of absence of wheezing in the preceding weeks. These children took part in all games at school with no apparent impairment of pulmonary function. Sixteen of the 37 children in this group had been free of symptoms for more than 3 months, and 3 others for more than 2 years. On examination there was very little to find apart from evidence of past respiratory disease such as 'pigeon chest', 'barrel-shaped' chest, Harrison's sulci, etc. On auscultation no adventitious sounds were heard, apart from an occasional rhonchus and perhaps some prolongation of expiration.

The distribution of the 68 cases was as follows:

16 girls	{	Group I — 5
		Group II — 4
		Group III — 7
52 boys	{	Group I — 6
		Group II — 16
		Group III — 30

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RESULTS

Data on the average age, average age at onset and average duration of the asthma in the 68 children are given in Table I.

TABLE I. AVERAGE AGE OF PATIENTS, AVERAGE DURATION OF ASTHMA, AND AVERAGE AGE AT ONSET OF WHEEZING (IN YEARS)

	Group I	Group II	Group III
Average age	10.16 (7 ⁸ / ₁₂ - 15)	10.22 (6 ⁵ / ₁₂ - 15)	11.7 (7 ⁷ / ₁₂ - 15 ² / ₁₂)
Average duration	6.91 (5 ¹ / ₁₂ - 13)	7.02 (10 ¹⁰ / ₁₂ - 12 ⁴ / ₁₂)	8.5 (1 ³ / ₁₂ - 12)
Average age at onset of wheezing	3.25 (2 ¹ / ₁₂ - 11)	3.2 (0 ⁹ / ₁₂ - 9)	3.2 (0 ⁹ / ₁₂ - 12)

Among the 68 children, chest deformity was noted in 4 (36%) of Group I cases, 11 (55%) of Group II cases, and 9 (24%) of Group III cases. This gives a total of 24 (35%) cases in the 68 asthmatics examined.

From the history and findings of the 68 cases the aetiological factors present in the 3 groups were analysed. In Table II the results obtained are expressed, firstly, as the percentage of the number of cases in each group

TABLE II. AETIOLOGICAL FACTORS IN HISTORY AND FINDINGS

	Group I	Group II	Group III	Average % for all cases
Family history of asthma	36% (4)	35% (7)	43% (16)	40
'Allergic history'	73% (8)	75% (15)	68% (25)	72
Colds	82% (9)	75% (15)	35% (13)	55
Psychological factors	91% (10)	70% (14)	27% (10)	50
Combination of factors	82% (9)	56% (13)	46% (17)	57
Hayfever	54% (6)	45% (9)	18% (9)	34
Eczema	36% (4)	45% (9)	30% (11)	35
Only child	27% (3)	20% (4)	24% (9)	24
No. of cases in group	11	20	37	68

having a positive history or in whom a specific aetiological factor was found and, secondly, as a percentage of the total number of cases examined.

Skin-sensitivity tests were carried out and recorded in 45 of the 68 patients over a number of years. These tests showed that in 25 of the 45 cases (53%) positive results against one or more allergen were recorded. A history of 'eczema', usually present within the first 2 years of life and preceding the asthma, was recorded in 35% of the asthmatics. The 'eczema', however, probably included atopic dermatitis, seborrhoeic dermatitis, contact dermatitis, infectious eczematoid and nummular eczema. An 'allergic history' was obtained in 73% of Group I, 75% of Group II and 68% of Group III cases, i.e. a history including one or more of the following: a family history of asthma, a history of hayfever in the patient, a definite seasonal variation in the severity of the asthma unrelated to infections, and a positive skin test.

In 39 of the 68 cases (57.3%) a combination of two or more aetiological factors played a part in precipitating the attack of wheezing (Table III). However, in a certain number of cases only one factor could be incriminated.

From the past histories and notes available on earlier physical findings, many of the present Group III cases would have been classified in Group II or Group I at past

TABLE III. SINGLE AETIOLOGICAL FACTORS

Factors	Group I	Group II	Group III	Total
Colds	9% (1)	20% (4)	25% (9)	20.6% (14)
Allergy	(0)	15% (3)	30% (11)	20.6% (14)
Psychological factors	9% (1)	(0)	(0)	1.5% (1)
No. in group	11	20	37	68

attendances. The mothers were questioned directly whether their children's asthma was getting better and their answers are given in Table IV.

Many of the mothers of Group III cases volunteered that the improvement commenced at or after the age of 10 years. This was particularly so in those cases with

TABLE IV. SEVERITY AND FREQUENCY OF THE ATTACKS OF ASTHMA

Group	Improvement	Same	Deterioration
I	0	3 (27.3%)	8 (72.7%)
II	1 (5%)	6 (30%)	13 (65%)
III	34 (92%)	2 (5.4%)	1 (2.6%)

past histories of severe asthmatic attacks. The mother's story of the past severity of the disease was confirmed in 24% of the Group III cases by the residual chest deformity.

DISCUSSION

This sample of 68 asthmatics can probably be regarded as representative in their severity and age distribution of asthmatics over the age of 6 years who attend the outpatient department of any children's hospital. Thus 16.2% were classified as severe cases (Group I), 29.4% as moderately severe (Group II), and 54.4% as mild cases (Group III). Therefore, more than half the asthmatic children who attended the hospital had, at the time they were seen, very mild asthma. Many of these children had suffered severe asthma in the past as judged from the available clinical notes at the hospital, the histories given by the mothers and the presence of severe residual chest deformity. It is difficult to draw any conclusion about the natural history of asthma from such a small series, but from the data obtained the impression was gained that the majority of asthmatics will show improvement in their condition—usually after the age of 10-12 years. This impression is in agreement with the findings of Rackeman and Edwards² who believe that nearly all children can become free of asthma by about the age of 15 years. On the other hand, it must be pointed out that other workers^{3,4} maintain that few ever lose the affliction.

The male predominance of 3:1 is higher than has been reported in other series^{2,5} which gave figures showing a male predominance of 2:1.

The average incidence of 'eczema' is given in Table II as 35%. Under this term many conditions are probably included, such as atopic dermatitis, seborrhoeic dermatitis, contact dermatitis, infectious eczematoid dermatitis and nummular eczema. According to many mothers the wheezing started sometime after the remission of the 'eczema' at the age of approximately 24-30 months. In a smaller number of cases the infantile eczema continued as flexural eczema. The presence of the 'eczema' seemed to have no relationship to the subsequent severity or prognosis of the asthma.

The findings in this relatively small series suggest that

in any asthmatic child a combination of factors usually operate in bringing on an asthmatic attack or in precipitating the asthma. This is especially seen in Group I (82%) and Group II (56%), but also to a lesser but still significant extent in the milder Group III cases (46%). In 25% of Group III patients, infection, and in 30%, 'allergy', brought on the asthmatic attacks (Table III). This would suggest that where a single aetiological factor, such as infection or 'allergy', is responsible for the asthma, the prognosis is better than in those with multiple aetiology. In only 1 case out of the 68 was the asthma thought to be purely psychological in origin, indicating the rarity with which such factors, *per se*, cause asthma in children.

Emotional Factors

Emotional and psychological factors are extremely difficult to assess, especially in the Group III cases. In this mild type of asthma, factors which were regarded as playing a part were often associated with adverse matrimonial or home circumstances. The other sibs in the family were usually free of asthma. It is therefore debatable whether one should regard these factors as of any significance in the milder type of asthmatic, where a clear-cut history of allergy or a cold precipitating the asthma could be obtained. In the more severe Groups I and II, emotional factors generally play a part in bringing on or perpetuating an attack. These were present in 91% of Group I cases and 70% of Group II cases as compared with 27% of Group III cases. These emotional disturbances were usually present in both the parents and the child, although it is often difficult to decide on the sequence of events. It must be stressed that in all the Group I and II cases (with one exception) the asthmatic attacks could again be linked with allergic and/or infective factors. These factors always operate in the child for a varying period before emotional and psychological factors start to play a rôle in the pathogenesis of the disease. That emotional and psychological factors should become important is perhaps not surprising in the light of the often frightening and disturbing nature of an attack, both to child and parent. Salter,⁵ writing in 1868, noted that 'the horrors of the asthmatic paroxysm far exceed any bodily pain; the sense of impending suffocation, the agonizing struggle for life, are so terrible that they cannot be witnessed without sharing in the sufferer's distress'. In a susceptible home environment ('soil') the impact of an attack ('seeds') may result in a chain of parent-child relationships. The 4 major types met with are perhaps best demonstrated by the following comments made by the psychiatrist who interviewed mother and child in 4 different cases:

1. C.N.: 'The mother is pleasant and friendly but has lost her "sense of touch". She is afraid to do the wrong thing. The child showed no enthusiasm when her mother came to visit her in hospital except to look in the paper bags she had brought, to find out what was in them'.

2. J.B.: 'The attitude of the mother is that of over-protection and she refuses to admit that her boy is a normal child. She wants to treat him as an invalid, which only exacerbates his condition'.

3. J.T.: 'The mother is tense and nervous. She feels she cannot afford to let the child disobey her and gets very upset when she is rude to her. The patient enjoys being seen and is inclined to be neat and tidy. The patient is emotional

but with too strong a control; she sets herself high standards and cannot afford to fail'.

4. The fourth type of case, which is not often seen but often quoted, is the type perhaps best described by Salter⁵ who discussed a little boy who found in his disease a 'convenient immunity from correction. "Don't scold me", he would say if he had incurred his father's displeasure. "or I shall have asthma"; and so he would; his fears were correct as they were convenient'.

However, the overall impression obtained, as far as psychological factors in children are concerned, is similar to that of Bray⁹ who stated that 'psychic factors may promote allergic responses only in a person who is primarily allergic'.

Allergic Factors

An 'allergic history' was obtained in approximately 70% of the cases with approximately the same incidence in the different groups. The findings therefore suggest that 'allergy' is probably the major factor responsible for asthma in children. The successful management of allergic disease depends on recognizing the causative agents and eliminating them from the patient's environment. The recognition of the offending allergen and the subsequent management is, however, a different matter and not under discussion here.

Infective Factors

Colds or other infections precipitated severe attacks of asthma in 82% and 75% of Group I and Group II patients respectively. These findings are in agreement with Chobot *et al.*⁷ who concluded that chronic focal infection was one of the most important causes of asthma, followed by the inhalation of allergens, with food playing a subordinate rôle to both. For practical purposes the infection should be treated as early as possible when the attack fails to clear rapidly on the usual bronchodilator therapy in Group I and II cases.

Suggested Aetiological Classification

The rôles that infective, allergic and psychological factors play in children (in their proper perspective) can be grouped in accordance with the classification suggested by Wittkower:⁸

1. Asthmatics whose clinical manifestations can be sufficiently accounted for on an organic basis. The majority of cases in children, especially the milder types (Group III), can be classified under this heading.

2. Asthmatics about whom positive psychiatric evidence indicates that emotional states have led to physiological changes which are identical with those observed in purely allergic disease. This is extremely rare in children.

3. Asthmatics in whom evidence of both specific hypersensitivity (or organic basis for the disease) and emotional states exists and in whom, owing to a clear correlation between emotional and clinical manifestations, it must be assumed that the emotional disturbances act as a catalyst to a dominant allergic predisposition. The majority of children with severe asthma (Groups I and II) fall in this category.

The more asthma is studied the more difficult it becomes not to develop too rigid ideas on the aetiology of the condition. This attitude, together with the vast amount of literature on asthma, can still best be summarized in the words of Salter⁵ nearly 100 years ago: 'Asthma is a disease about whose pathology more various

and discrepant ideas prevail than about any other disease that could be named, and to this day, if we appeal to the written opinions of living authors, its absolute nature must be considered as still *sub judice*'.

SUMMARY

1. The cause of asthma is usually not clear-cut. Multiple causes, especially in the more severe type of asthma, are the rule.

2. Colds or infections, followed closely by allergic factors, are the most important causes of asthma. They often occur in combination in the same patient.

3. Psychological or emotional difficulties *per se* very seldom cause asthma in children. These factors, however, commonly influence the course of the asthma once it is established.

4. The tendency of asthma in children is towards recovery.

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