Current health care of childhood bronchial asthma in Alexandria, Egypt

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الرعاية الصحية الراهنة في مجال الربو القصبي بين الأطفال في الإسكندرية، مصر

آمال باسيلي وعادل زكي وإيهاب حافظ الصاوي ورامز بدواني وجياني تونيوني

خلاصة: أجريت دراسة مقطعية في العيادات الخارجية لجميع مستشفيات الأطفال المتخصصة بالإسكندرية. وكان غرض الدراسة وصف الرعاية الصحية المقدمة إلى الأطفال المصابين بالربو، ومدى اتفاقها مع الإرشادات العلاجية الحديثة. وقد تبين أن نمط معالجة حالات الربو كان يتميز بنقص ملموس في استعمال الأدوية الوقائية في حالات الربو المزمن، المتوسطة أو الوخيمة، وقلة استعمال طريقة الاستنشاق في تناول الأدوية، والإفراط في وصف الستيرويدات القشرية لأغراض الوقاية فيما بين السورات الحادة للربو الخفيف. أضف إلى ذلك أن تقدير الوظائف الرئوية (سرعة جريان الذروة) نادراً ما كان يجرى.

ABSTRACT A cross-sectional study was conducted in the outpatient clinics of all specialized children's hospitals in Alexandria. The aim was to describe the health care delivered to children suffering from asthma and how far it complied with recent therapeutic guidelines. The pattern of asthma management was characterized by a significant underuse of prophylactic drugs in moderate/severe chronic asthma, underuse of the inhalation mode of delivery, and corticosteroids abuse as a prophylactic in between acute exacerbations in mild asthma. Also, assessment of pulmonary function (peak-flow rate) was rarely performed.

Prise en charge actuelle de l'asthme bronchique de l'enfant à Alexandrie (Egypte)

RESUME Une étude transversale a été réalisée dans les services de consultations externes de tous les hôpitaux d'enfants spécialisés à Alexandrie. Le but était de décrire les soins de santé dispensés aux enfants asthmatiques et de voir dans quelle mesure ils étaient conformes aux directives thérapeutiques récentes. La prise en charge de l'asthme se caractérisait par une sous-utilisation considérable de médicaments prophylactiques dans les cas chroniques modérés ou sévères, la sous-utilisation de l'inhalation comme mode thérapeutique d'administration et l'abus de corticoïdes à titre préventif entre les exacerbations dans les cas d'asthme bénin. Par ailleurs, une exploration fonctionnelle pulmonaire (débit expiratoire de pointe) était rarement effectuée.

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Introduction

Health care delivery to children with chronic diseases has received increasing attention in recent years [*1*]. Childhood asthma provides a singular opportunity to describe the quality of paediatric care as it affects a large number of children worldwide. For example, 4.3% of children in the United States are estimated to suffer from asthma according to the most recent National Health Interview Survey [*2*] and in Egypt it has been estimated to affect up to 8% of Egyptian children [*3*]. In view of the magnitude of bronchial asthma in the Eastern Mediterranean region, the importance of optimal health care in order to achieve the best therapy outcome was recently emphasized [*4*].

Asthma exacerbations, with their associated functional morbidity and added medical costs, are often preventable with treatment currently available [*5*]. In spite of variations in practice, the past few years have seen the emergence of new strategies for preventing and treating exacerbations [*6, 7*].

Non-steroidal anti-inflammatory drugs (NSAID), such as sodium cromoglycate, and inhaled corticosteroids, with or without chronic beta-agonist therapy, are recommended to prevent exacerbations. Systemic corticosteroids in combination with beta-agonists are the mainstays of treatment [*2*]. For young children with asthma, the use of a nebulizer at home is an effective delivery route for beta-agonists and cromolyn sodium [*8*].

Failure to receive ongoing preventive care for asthma has been shown to be associated with the limited availability of appropriate medications, and has been linked to increased rates of preventable hospitalizations [*9*].

The aim of this cross-sectional study was to describe the current health care for bronchial asthma in outpatient clinics in Alexandria, Egypt. The study is part of a larger one describing the health care delivered to children suffering from chronic diseases. The study was performed within the framework of the Italian-Egyptian Cooperation Project in the Medical Research Institute, Alexandria University, Egypt.

The specialized government hospitals providing outpatient and inpatient services for children in Alexandria include the University Hospital, three Ministry of Health hospitals delivering medical care to preschool and uninsured children and the Student's Health Insurance Hospital providing medical care to schoolchildren.

Subjects and methods

A total of 250 children aged ≤15 years who were diagnosed as having bronchial asthma in the ambulatory setting at all specialized children's hospitals in Alexandria were reviewed over a period of 4 months in 1997 (50 cases from each health facility).

The patients and their parents (mainly the mothers) were interviewed using a pretested questionnaire that included information about age, sex, date of first diagnosis, previous diagnosis, health care provider, diagnostic tests performed since diagnosis, drugs prescribed on a routine basis and during exacerbation of symptoms within the last year, changes in drug prescription, the reasons given for such a change, and the compliance of patients as regards the prophylactic and therapeutic management.

Asthma severity was determined according to the following criteria [*8*].

- Mild asthma: brief symptoms less than once a month, asymptomatic between

episodes and responsive to adequate doses of bronchodilators given ≤ three times a week

- Moderate asthma: symptoms less than once a week, or chronic symptoms but not affecting growth or development
- Severe asthma: frequent exacerbations, frequent nocturnal symptoms, symptomatic between episodes and severe attacks requiring oral or intravenous steroids

Compliance was assessed by direct questions about the intake and availability of medicines during acute attacks or between acute exacerbations. The care givers were also asked check questions about the types of drugs taken, dosage, duration of the drug intake and the time taken to finish a bottle or inhaler. Compliance with the prophylactic management also included questions about avoidance of precipitating factors. Comparing the direct and check questions enabled the doctors to give a final judgment about compliance, whether the patient was compliant or non/poorly compliant.

Simple descriptive statistics were used to present our data. Analysis of data was performed using the chi-squared test and Z test for the purpose of comparison between groups. The statistical package used for description and analysis of our data was *SPSS* (version 6.11).

Results

Table 1 shows the distribution of asthmatic children attending the outpatient department of the hospitals according to age, sex, reason for the visit and severity of asthma. Asthma occurred more in males (62.4%) and in those ≤ 5 years of age (51.2%). The majority of children suffered from mild or moderate asthma. Only 8.8% were severe asthmatics. Factors found to precipitate acute asthmatic attacks were, in decreasing order: respiratory infections, temperature variations, exercise, dust, smoking, seasonal variations, carpeting and pets (Figure 1).

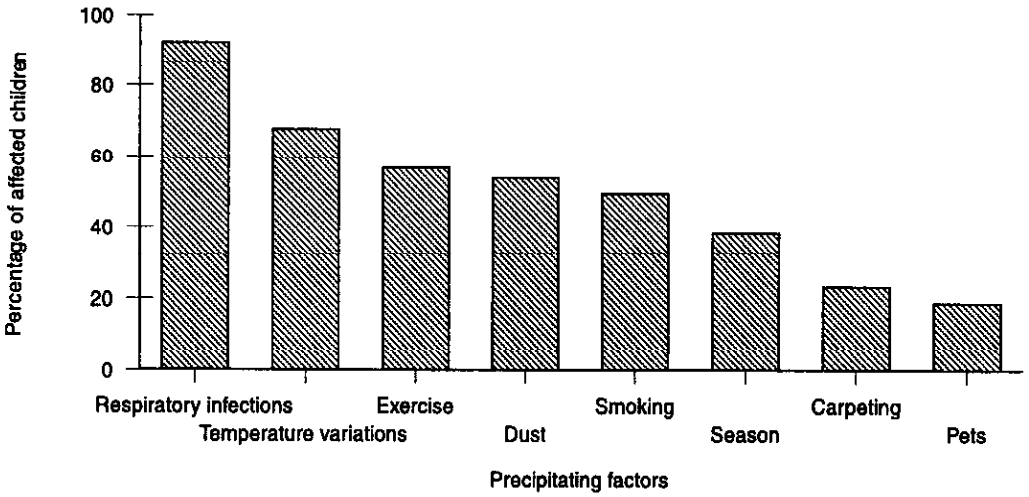

Figure 1 **Factors precipitating acute asthmatic attacks among asthmatic children**

Table 1 **Characteristics of 250 asthmatic children attending outpatient clinics**

Characteristic	No.	%
Age (years)		
≤ 5	128	51.2
5–10	76	30.4
10–15	46	18.4
Sex		
Male	156	62.4
Female	94	37.6
Reason for the visit		
Routine	52	20.8
Acute attack	198	79.2
Severity of asthma		
Mild	102	40.8
Moderate	126	50.4
Severe	22	8.8

Diagnostic care

The diagnostic tests performed are shown in Table 2. X-ray was the diagnostic test most commonly carried out followed by stool analysis and tuberculin test. The three tests were more frequently prescribed in severe asthma. There was a significant difference between the performance of X-ray, stool analysis and tuberculin test within the grades of asthma severity. Assessment of pulmonary function (peak-flow rate) and skin tests to determine allergies were rarely performed.

When the mothers were asked about their understanding and awareness of the diagnosis provided by the doctors about their child's sickness prior to their child being confirmed as asthmatic, the majority (Table 2) said that they had been told that their child had asthma. A further 9.2% had been diagnosed and treated as wheezy bronchitis and 4.4% as common cold, bronchitis or bronchiolitis. A further 17.2% had attended hospital or sought medical care because of chest trouble without the child being diagnosed as asthmatic or without the

Table 2 **Diagnostic care delivered to 250 asthmatic children in the ambulatory setting according to the degree of severity of symptoms**

Diagnostic care	Mild (n = 102)		Moderate (n = 126)		Severe (n = 22)		Total[a] (n = 250)		χ^2
	No.	%	No.	%	No.	%	No.	%	
Diagnostic test									
X-ray	30	29.4	67	53.2	16	72.7	113	45.2	20.2[b]
Stool analysis	21	20.6	30	23.8	10	45.5	61	24.4	6.1[c]
Peak-flow rate	1	1	1	0.8	1	4.5	3	1.2	2.3
Tuberculin test	15	14.7	22	17.5	14	63.6	51	20.4	28.03[b]
Skin test	1	1	0	0	0	0	1	0.4	1.5
Diagnosis as perceived by mothers									
Asthma	76	74.5	82	65.1	15	68.2	173	69.2	2.36
Wheezy bronchitis	3	2.9	20	15.9	0	0	23	9.2	13.73[b]
Common cold, bronchitis, bronchiolitis	5	4.9	4	3.2	2	9.1	11	4.4	1.7
Non-specific	18	17.6	20	15.9	5	22.7	43	17.2	0.64

[a] *A child might have been subjected to more than one test or to none at all.*
[b] *P < 0.001* P < 0.05

Table 3 **Drugs prescribed in the ambulatory setting according to the severity of symptoms of bronchial asthma**

Drugs prescribed	Mild (*n* = 102)		Moderate (*n* = 126)		Severe (*n* = 22)		Total[a] (*n* = 250)	
	No.	%	No.	%	No.	%	No.	%
During acute exacerbations								
Bronchodilators	98	96.1	120	95.2	21	95.5	239	95.6
Corticosteroids	47	46.1	70	55.6	15	68.2	132	52.8
Antihistamines	0	0	1	0.8	0	0	1	0.4
Cough medicines[a]	4	3.9	4	3.2	0	0	8	3.2
Oral antibiotics	2	2	10	7.9	0	0	12	4.8
Mucolytics	5	4.9	4	3.2	0	0	9	3.6
In between acute attacks								
Bronchodilators	57	55.9	71	56.3	20	90.9	148	59.2
Prophylactic anti-inflammatory	14	13.7	29	23	4	18.2	47	18.8
Corticosteroids (inhalation)	3	2.9	9	7.1	8	36.4	20	8
Corticosteroids (oral)	5	4.9	6	4.8	3[b]	13.6	14	5.6
Corticosteroids (unspecified mode)	1	0.98	0	0	0	0	1	0.4
Antihistamines	1	1	6	4.8	2	9.1	9	3.6
Cough medicines[a]	3	2.9	4	3.2	0	0	7	2.8
Oral antibiotics	1	1	3	2.4	0	0	4	1.6

[a] *Cough suppressants and/or expectorants*
[b] *Corticosteroids, oral and inhalation*
Prophylactic anti-inflammatory drugs = sodium cromoglycate and ketotifen fumarate

mother knowing the chest condition for which the child received care.

Therapeutic care

Treating physicians

Asthmatic children were managed solely by general paediatricians in 57.6% of cases (144 children). The remaining patients sought specialized care following initial management by general paediatricians and included 47 children (18.8%) who were managed by paediatric chest specialists in the University Hospital, 38 children (15.2%) who were managed by chest specialists and 21 children (8.4%) who were managed by allergists, mainly at the Student Health Insurance Hospital; more than half of this latter group (12 children) were referred by the adult chest specialists in the asthma clinic of the Student Health Insurance Hospital.

Treatment of acute asthmatic attacks

In total, 95.6% of the children received bronchodilators at almost equal percentages within the different grades of severity, while corticosteroids were given in about half of the cases (52.8%). Other drugs of no proven clinical efficacy in asthma management were given infrequently as shown in Table 3.

As regards the details of bronchodilators and corticosteroids prescribed during acute attacks, salbutamol inhalation given in the emergency department was used most frequently, followed by oral salbutamol and theophyllines. There was a significant difference in the use of parenteral

Table 4 **Details of drugs prescribed according to severity of bronchial asthma**

Drugs prescribed	Mild		Moderate/severe		*Z* test
	No.	%	No.	%	
During acute exacerbations					
Bronchodilators					
Salbutamol inhalation	53	37.1	86	41.1	0.6
Salbutamol oral	29	20.3	50	23.9	0.7
Theophylline oral	36	25.2	55	26.3	0.06
Theophylline parenteral	25	17.5	18	8.6	6.23[a]
Total prescribed	143	100	209	100	–
Corticosteroids					
Beclomethasone inhalation	8	16	7	7.8	2.3
Corticosteroids oral	19	38	49	54.4	3.5
Corticosteroids parenteral	23	46	34	37.8	0.9
Total prescribed	50	100	90	100	–
In between acute attacks					
Bronchodilators					
Salbutamol inhalation	2	2.4	15	10.4	5.1[a]
Salbutamol oral	31	36.5	56	38.9	0.13
Theophylline oral	46	54.1	61	42.4	2.97
Terbutalin oral	6	7.1	12	8.3	0.12
Total prescribed	85	100	144	100	–
Corticosteroids					
Beclomethasone inhalation	3	37.5	17	58.6	0.44
Corticosteroids oral	5	62.5	12	41.4	0.40
Total prescribed	8[b]	100	29	100	–
Prophylactic anti-inflammatory					
Sodium cromoglycate	1	7.1	4	12.1	0
Ketotifen fumarate	13	92.9	29	87.9	0
Total prescribed	14	100	33	100	–

[a] *$P < 0.05$*

[b] *In one case the mode of administration was not specified and was omitted from the analysis.*

theophylline between mild asthmatics and moderate/severe asthmatics. Corticosteroids were mainly prescribed as oral or parenteral corticosteroids (Table 4).

Treatment in between acute attacks

Between acute exacerbations, whenever it was needed to abort acute attacks or before allergen exposure or exertion, bronchodilators were given in 59.2% of cases (90.9% of severe asthmatics, 55.9% and 56.3% of mild and moderate asthmatics respectively) (Table 3). Prophylactic anti-inflammatory drugs (ketotifen fumarate or sodium cromoglycate) were given in only 18.8% of cases. Corticosteroids were given in 14.0% of cases (in half of severe asthmatics, in 11.9% of moderate and in 8.8% of mild

asthmatics). Antihistamines, cough medicines and oral antibiotics were rarely prescribed between acute attacks.

The details of the prophylactic therapeutic treatment show that salbutamol and theophyllines were mostly used in their oral formulation. There was a significant difference in the use of salbutamol inhalation between mild asthmatics and moderate/severe asthmatics. Corticosteroids were prescribed in the three formulations, namely nebulized, inhaled (inhaler) and oral. Sodium cromoglycate constituted only a small percentage of the prophylactic anti-inflammatory drugs prescribed (Table 4).

Compliance with the symptomatic and prophylactic management

Only 2.8% of children were judged by the doctors to be noncompliant or poorly compliant with the symptomatic management during acute attacks, while 38.4% were judged to be so with the prophylactic management, which included the avoidance of precipitating factors as well as the use of preventive drugs.

The majority of children (169, 67.6%) were not given any medication unless prescribed by their doctors, 87 children (34.8%) were given previous prescriptions by their care givers without prior consultation, 13 children (5.2%) were advised by pharmacists and only 3 children (1.2%) by non-medical people.

Confirmation of the last prescription

The last prescription was confirmed in 150 cases (60%) and modified in 100 cases (40%). The modifications consisted of changes in dosage, mode of administration, cancellation or addition of some drugs, i.e. stepping-up or stepping-down of therapy according to the clinical condition of the child.

Discussion

In our study, through an effective network of collaborative doctors, a representative cohort of chronically sick children was obtained. It is worth mentioning that this is the first population in the Eastern Mediterranean Region which has been subjected to a detailed description of diagnostic and therapeutic care provided to chronically sick children.

In our study, asthma occurred more commonly in boys than girls (ratio 1.7:1). Half the cases occurred before the age of 5 years and decreased in frequency thereafter. Our finding on the relative frequency of the clinical categories of asthmatic children and the predominance of the moderate type of asthma is similar to the results of other Eastern Mediterranean countries [*10*].

In the majority of our patients, acute respiratory infections were the most common precipitating factor of acute asthmatic attacks. This is in accordance with other reported studies [*10,11*]. Temperature variations were the second most common precipitant of acute asthmatic attacks. Dust exposure was responsible for more than half of acute attacks (53.6%) compared with 65.7% in asthmatic Qatari children [*11*]; both rates are remarkably high compared with a low percentage (15.4%) in Thai children [*12*]. In Qatar this was related mainly to the tradition of using incense at home, while in Alexandria, several factors such as air pollutants, heavy traffic and problems of industrialization could provide a possible explanation. Exercise and smoking were the triggering factors for acute attacks in about half of the cases, which indicates that health education for asthma is either inadequate or ineffective. Seasonal asthma was found to be the cause in 38.4% of acute attacks. Furthermore, floor carpeting and pets were found in almost a quarter

of households in spite of the presence of a sick child in the family.

As regards previous diagnoses, we found there was a greater tendency now to label a child as having asthma than in the past (in the 1980s) [*13*] as 69.2% (173/250) of our patients were labelled as asthmatics, only 9.2% were diagnosed as wheezy bronchitis and 4.4% as common cold, bronchitis or bronchiolitis. Half of this latter group were mild asthmatics which explains the possible confusion in diagnosis.

Failure to label a child as having asthma deprives the child of receiving adequate treatment and is linked with increased morbidity from asthma. There is a belief among certain doctors that wheezy bronchitis is a separate entity, while in fact there seems to be little value in trying to differentiate between the two conditions when management is identical [*14–16*].

Diagnostic tests were not performed for asthma *per se* but rather to rule out other diseases such as tuberculosis and parasitic infestations. However, almost half of the children (45.2%) were subjected to a chest X-ray. This indicates the need to rationalize the health resources by substituting such an unspecific diagnostic procedure with prophylactic management.

Skin tests, useful in detecting causal allergens as they have been proven to be positive in 80%–95% of cases as reported by other studies [*10,17*], were performed in only one case in our study. Furthermore, assessment of pulmonary function was rarely performed (1.2%) in our study, although thorough evaluation of the asthmatic child using a peak-flow meter or periodic spirometry is essential to assess the degree of chronic illness as abnormal results indicate a need to increase prophylactic therapy. Optimization of therapy cannot be achieved if spirometry is omitted from evaluation [*18*].

The recent guidelines on asthma management recommend treating acute severe asthma with nebulized bronchodilators and systemic corticosteroids [*2*]. In our study, self-reporting of medication use showed that there was an underuse of inhaled bronchodilators as they constituted only 37.1% and 41.1% of bronchodilators given to asthmatic children in mild and moderate/severe asthma respectively, while oral and parenteral bronchodilators were given more frequently during acute attacks. Similarly, there was an underuse of corticosteroids in general, which were given mainly orally and parenterally.

As regards prophylactic management, while inhaled sodium cromoglycate is nowadays recognized as the drug of choice for preventing acute attacks, followed by inhaled corticosteroids in moderate to severe asthma in case of failure of this first line [*2,19*], it was taken by only 18.8% of the patients, and the main prophylaxis was in the form of oral ketotifen fumarate, a drug of doubtful efficacy and lacking a steroid-sparing effect in the maintenance treatment of childhood asthma [*20,21*].

Furthermore, oral corticosteroids used in between attacks constituted 62.5% and 41.4% of the corticosteroids used in mild and moderate/severe asthma respectively, while nebulized and inhaled beclomethasone constituted 58.6% of corticosteroids taken as prophylaxis in moderate to severe asthma. There was also corticosteroids abuse in 8.8% of mild asthmatics.

Drugs of no proven clinical efficacy in asthma management, such as antihistamines, cough medicines, mucolytics and antibiotics were used only to a limited extent, which is an indicator of rational drug use.

We can, therefore, conclude that the pattern of asthma management in Alexandria,

Egypt (excluding the private sector) is characterized by the following:

- underuse of the prophylactic drugs in moderate/severe chronic asthma;
- underuse of the inhalation mode of delivery which is of better clinical efficacy and safety than the oral route currently used in chronic asthma;
- corticosteroids abuse as a prophylactic drug in between acute exacerbations in mild asthma;
- appropriate management of acute attacks with nebulized bronchodilators and corticosteroids in moderate to severe asthma in the emergency room.

It would be appropriate to give an overview of the constraints met by the doctors, as, even though they are acquainted with the recent guidelines in asthma management, there are many obstacles to following them, such as the high cost of inhaled prophylactic drugs on the market and cultural barriers as they are dealing with the disadvantaged sector of the community.

The profile of asthma management described in our study is very similar to a recent study undertaken in 24 countries in Asia and Africa which indicated that asthma patients do not receive adequate treatment because the required drugs are not available or are prohibitively expensive [*22*].

Our study has provided formally controlled data on therapeutic and diagnostic practices related to asthma in children in Egypt which can be compared with the emerging international guidelines in the field. Such data are indispensable in planning future initiatives on asthma control. In the second phase, it will allow us to study the impact of health education on altering doctors' and care givers' attitudes to child management, which will be investigated in our ongoing project on the evaluation of the current health care of childhood chronic diseases.

In conclusion, having assessed the quality of heath care provided to asthmatic children in Egypt, we consider there is a real need to establish an Eastern Mediterranean cooperative surveillance network with paediatricians interested in asthma and/or chronic paediatric conditions.

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