Management of childhood asthma in the emergency department

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ملخص الربو هو المرض الالتهابي الاكثر شيوعا بين الاطفال, أصبحت معدلات الاعتلال والوفيات من الربو عند الأطفال مشكلة في السنوات الأخيرة، في معظم الأحيان بسبب عدم كفاية الإدارة العلاجية.تفاقم الربو لدى الأطفال يمثل اكثرمن 1.800.000 زيارات لغرف الطوارئ كل عام. وقد أجريت هذه الدراسة بهدف تقييم كيفية معالجة الربو في المجتمع، والتدابير التي يمكن اتخاذها لتحسين الرعاية. ولهذه الغاية، أجرينا دراسة استطلاعية تشمل 216 مريضا من الأطفال الذين تتراوح أعمارهم ما بين 2 و 15 عاما الذين تقدموا إلى قسم الطوارئ للأطفال بمستشفى الأم والطفل محمد السادس في مركش عام 2014 . لقد وجدنا ان 83,8% من لاطفال قد تعرضوا مسبقا الى نوبة الربو, كان التاريخ الشخصي والعائلي للربو و / أو الحساسية موجودة في أكثر من نصف الأطفال (57%). كما وجدنا أن المواد المسببة للحساسية كانت من المسببات الرئيسية (94٪) لهذه النوبات. وكان سبب الزيارات الطبية اما السعال في 104 طفلا، او ضيق التنفس قدم من قبل 84 طفلا أو كليهما وغالبا ما يرتبط ضيق التنفس والسعال مع تشخيص الربو. اما بالنسبة للفحص السريري فقد كان جميع الاطفال يعانون من الصفير عند التنفس بنسبة (100٪) و التنفس السريع لذا 63.4٪ تحسنت حالة 85.6٪ من المرضى، و تلقوا العلاج في العيادات الخارجية. الربو عند الاطفال لازال تشخيصه و علاجه غير كافيين,نوبات ضيق التنفس والصفير تسهل التشخيص .باستثناء الفحص بالاشعة السينية للصدرالتي تعد ضرورية هناك الفحص لوظائف الرئة الذي يفيد في السيطرة على الربو مع الاسرارعلى التوعية عند كل فحص. لا يجب علينا فقط تناول الدواء لتخفيف نوبات الربو لذا الاطفال، ولكن يجب أيضا ضبط نمط حياتهم لمنع تكرار هذه النوبات.
الكلمات الأساسية الربو-الطفل-مستعجلات-تدبير.

Abstract Asthma is the most common chronic disease in childhood. The morbidity and asthma mortality have become a problem in recent years, the most often due to inadequate therapeutic management. The work described in this study was directed at learning more about how asthma is managed in the community, and steps that can be taken to improve the management of these conditions. For this goal, we performed a prospective study with 216 patients; the population studied included children between the ages of 2 and 15 who presented to ED in The Mother-Child Hospital (UH Mohamed VI) Marrakech over one year from January to December 2014. We found that The majority of the patient (83.8%) had already developed an asthma attack The personal and family history of asthma and /or atopy are present in more than half of the patients (57%). We also found that the allergens were the main precipitating factors (94%). the reason for consultation was cough in 94% of children. In Clinical examination, all patients had wheezes (100%) followed by Polypnea (63.4%). The treatment of choice was nebulization of salbutamol used for (96.3%) of children, followed by injection Corticotherapy (56%) and oral corticotherapy (50%). Antibiotics were prescribed for 127 children (58.8%). In the result of this management 85.6% of patients presented an improvement and received ambulatory treatment. Childhood asthma remains under diagnosed and subcontracted it must be evoked as soon as the respiratory symptoms are repeted. In addition to the thoracic radiography which must be required systematically, the respiratory functional exploration not only contributes to the control of asthma but also for the evaluation of the effectiveness of the treatment prescribed, without forgets education during each consultation. Adhering to asthma regimes implies not only taking medications to relieve asthma attacks, but also adjusting their life styles in order to prevent asthma attacks.
Keywords asthma-children-emergency-management.

Résumé L'asthme est la maladie inflammatoire chronique la plus fréquente dans la population pédiatrique. La morbidité et la mortalité de l'asthme chez l'enfant sont devenues préoccupantes ces dernières années, le plus souvent dues à une prise en charge thérapeutique inadéquate. Les exacerbations de l'asthme pédiatrique représentent plus de 1.800.000 visites aux services des urgences chaque année. La présente étude a été effectuée avec comme objectif d'évaluer la façon dont l'asthme est pris en charge dans la communauté, et les mesures qui peuvent être prises pour améliorer cette prise en charge. Pour ce but, nous avions réalisé une étude prospective incluant 216 patients; la population étudiée comprenait des enfants entre les âges de 2 et 15 ans qui se sont présentés aux urgences pédiatriques de l'Hôpital Mère-Enfant du CHU Mohamed VI de Marrakech durant l'année 2014. Nous avions constaté que la majorité des patients (83,8%) avaient déjà développé une crise d'asthme. L'histoire personnelle et familiale de l'asthme et / ou d'atopie était présente dans plus que la moitié des enfants (57%). Nous avions constaté également que les allergènes étaient les principaux facteurs déclenchants (94%). Le motif de consultation était la toux chez 104 enfants, la dyspnée présenté par 84 enfants ou les deux. La dyspnée et la toux ont été souvent associées avec le diagnostic de l'asthme. A l'examen clinique, tous les patients avaient des râles sibilants (100%) et de la polypnée (63,4%). Le traitement de choix était la nébulisation de salbutamol utilisé pour 96,3% des enfants, suivie par la corticothérapie injectable (56%) puis orale (50%). Les antibiotiques ont été prescrits chez 127 enfants (58,8%). Sur le plan évolutif, 85,6% des patients avaient présenté une amélioration et avaient reçu un traitement ambulatoire. L'asthme de l'enfant reste sous-diagnostiquée et sous-traitée, le diagnostic de l'asthme de l'enfant est essentiellement clinique, il doit être évoqué dès que des signes respiratoires se répètent. Outre la radiographie thoracique qui doit être demandée systématiquement, les explorations fonctionnelles respiratoires aident au contrôle de l'asthme, et l'évaluation de l'efficacité du traitement prescrit sans omettre l'éducation lors de chaque consultation. Il faut non seulement prendre des médicaments pour soulager les crises d'asthme, mais également ajuster leur mode de vie afin de les prévenir.
Mots clés asthme-enfant-urgences-prise en charge.

Introduction

Asthma is the most common chronic disease in childhood,, which affects >6.6 million children in the United States characterized by airway obstruction and hyperresponsiveness. Asthma most often starts early in life and has variable courses and unstable phenotypes which may progress or remit over time (1). Morbidity and asthma mortality in children have become a problem in recent years,(2) the most often due to inadequate therapeutic management.

Treatment of an asthma exacerbation is complex, involving a temporal and multi-disciplinary evaluation and reevaluation to adjust asthma medications and make a disposition decision. It is challenging to provide

standardized care in a fast-paced and overcrowded environment like the ED.
The evolution of asthma is relatively unknown. Indeed, 40%-50% of children followed for asthma will not be bothered by this disease as adults and nearly 50% of children follow for asthma will not disappear than disease after puberty (2).
The goal of this study is to assess the management of asthma and make an asthma care protocol in the pediatric ED to help standardize care and reduce time to disposition decision.

Patients and methods

This work is a prospective study of children aged between 2 and 15 years, presented to the pediatric emergency department (ED) of University Hospital Mohamed VI Marrakech over one year from 1st January to 31 December 2014. This study included data collected through the exploitation records, filled out by duty doctors. We had simple and univariate data, processed by Microsoft Excel in duration of two weeks after consulting the epidemiological Laboratory of the Faculty of Medicine and Pharmacy Marrakech.

Results

The most frequent age of the asthma crisis in our study was between 2-6 year (59.25%) and an average age of 6.32 years, with a sex ratio of 1.5 with male predominance (60%). The socioeconomic level was medium in (55%) of the cases and the residents were unhealthy in 23.1% of cases.

Table I: Distribution of patients according to their personal history

Personal history	percentage
Followed for asthma	52%
Previous asthma attack	83.8%
Previous treatment	63.8%
Personal atopy	44%
Respiratory infection	65.27%
chronic vomiting	8.7%

More than half of the patients (57%) had a family history of asthma and/or atopy, most frequently in mothers (29%). In our study we found that the allergens were the main precipitating factors (94%) followed by physical exercise 81.9% than passive smoking 51.85%.
The reason for consultation was: cough (104 children), dyspnea (84 children) or both (28 patients).

Table II: Distribution of patients according to their functional signs

Functional signs	Percentage
Dyspnea	97,9%
Dry cough	94%
Rhinorrhea	58,8%
Wheezing	30%
Sweating	12%
Cyanosis	3%
Disturbance of conscience	2%

Table III: Distribution of patients according to clinical signs

CLINICAL SIGNS	Percentage
polypnea	63.4%
Fever	32.9%
distended chest	38%
tachycardia	14.3%
subcutaneous emphysema	1.4%
decreased breath sounds	6%

C-reactive protein (CRP) and complete blood count (CBC) were requested respectively in 52 (24%) and 65 (30.1%). The chest X-ray was performed in 151 cases (69.9%) with the following results: normal in 24%, thoracic distension in 53% and infection focus in 43% of our patients.
The treatment of choice was nebulization of salbtamol used for (96.3%) of children followed by injection Corticotherapy (56%) then oral Corticotherapy (50%). Antibiotics were prescribed for 58.8% of our children.
The crisis severity was classified to mild in 80%, moderate in 18% and severe in 2% of the cases. We found also that 28.7% of children had regular follow of their asthma. The rest of the patients were distributed among poor compliance (26.8%), not followed (17%) and disregarded (27.5%).
Finally we found that 185 children (85.6%) presented an improvement and received ambulatory treatment, 27 (12.5%) had been hospitalized on pediatric service A and only 4 (1.9%) was admitted in Intensive Care Unit (ICU).

Discussion

The prevalence of asthma increased by approximately 5% annually in recent years. In December 2009 Asthma Insights and Reality in Maghreb (AIRMAG) found that the prevalence of children with asthma ranged from 3.5% in Tunisia, 4.4% in Morocco, and 6.4% in Algeria. The prevalence of asthma in the region of Safi was 3.4% in 2010 (3).
Numerous potential risk factors have been studied in relation to the development of asthma. Atopy is frequently identified as a strong risk factor for the development of asthma (4). Our study objectified that 44% had a personal or family history of atopy. Martinez et al studies in USA found the influence of several genes including one major gene transmitted respectively by an autosomal co-dominant and autosomal recessive (5). In our study, the family history of asthma and/or atopy

was recorded in more than half of cases, most frequently in mothers (29%).

Air pollution and viral infections are well-established triggers for asthma exacerbations (6), recent studies have found that over 80% of wheezing episodes were associated with viral respiratory infections (7). In more than 60% of these children, the respiratory syncytial virus (RSV) was detected. The close link between bronchiolitis induced by viruses and the development of asthma has been demonstrated in several studies (8). In our study, more than half of the children (57%) followed for asthma had a history of recurrent respiratory viral infections. The study of Platts-Mills et al showed, in patients allergic to dust mites, improved clinical signs and decreased bronchial hyperresponsiveness (BHR), after a sojourn of two months in a hospital without mites (9). In our study, we found that the allergens were the main precipitation factors, present in 94% of our patients.

Parental smoking is a significant risk factor for acute lower respiratory tract infections in infants, and the development of wheezing and asthma in children. In our population, 51.8% of asthmatic children were exposed to parental smoking (10).

The classic triad of asthma includes cough, wheeze, and dyspnea. However, patients often present with only 1 of these symptoms which can make diagnosis challenging. In our study, Dyspnea was found in 97.9% and dry cough in 94% of children.

Pediatric status asthmaticus (PSA) is a medical emergency warranting prompt recognition and intervention. A status asthmaticus or severe asthma exacerbation is defined as an acute episode that does not respond to standard treatment with short acting b2-agonists and corticosteroids. In a USA cohort, admission for status asthmaticus between 1992 and 2006 approximately halved from 1.92 to 0.93 per 1000 children. In contrast, ICU care related to asthma increased from 0.09 to 0.31 per 1000 patients. In our study, 4 patients presented a status asthmaticus and were admitted to ICU.

The clinical expression of Exercise induced asthma (EIA) is that of asthma attack whose only characteristic is to follow an exercise. Typically, it occurs in the exercise, in a subject with normal respiratory function, and reaches its maximum intensity 5 to 10 minutes after cessation of exercise (11). In our study, the physical exercise induced asthma attacks was found in 81.9% of children.

Although, diagnosis of asthma is clinic, chest X-ray is requested systematically to eliminate false asthma. The chest X-ray was performed in 69.9% in our children.

The respiratory function test is the examination that enables both better diagnostic approach to asthma and therapeutic monitoring. The use of peak respiratory flow has been widely adopted for monitoring patients with asthma. Reduced peak flow measurements do not differentiate between obstructive and restrictive diseases, spirometry and sometimes measurement of lung volumes are necessary to distinguish the two (12). In our study, both of them (FEV and PEF) are not yet available in the emergency department

Treatment of asthma should be started immediately. The goals of therapy include correction of hypoxemia, rapid reversal of airway obstruction, and treatment of inflammation. Short-acting b-agonists are the recommended first-line therapy for the acute asthma exacerbation. A meta-analysis including 21 pediatric studies and more than 2000 children demonstrated that in acute asthma spacers were as effective as nebulizers in limiting hospitalization rates and reducing the time spent in emergency department (13). In our study, the majority of children (96%) used nebulized salbutamol. Corticosteroids are recommended for asthma exacerbations that are incompletely responsive to inhaled beta-agonists. In our study, the use of oral corticosteroids was found in the half of children (50.5%). For antibiotics, The recent National Asthma Education and Prevention Program Expert Panel Report indicates that antibiotics are not currently recommended for the treatment of acute asthma exacerbations except when fever, purulent sputum or clear evidence of infection are present. We saw in our study a significant use of the antibiotic in the treatment of asthma in more than half (58.8%) of the cases. In addition to these treatments, the magnesium sulfate is a potential therapeutic agent in asthma because of its bronchodilating effect on smooth muscle cells and reduction of the neutrophilic burst associated with inflammation. In our emergency department, the magnesium sulfate was not used in any of our patients.

Asthma control refers to control of the clinical manifestations of the disease, and it is the ultimate goal of asthma management. There is a clear relationship between asthma severity and asthma control (14). In our study, we found that 62 children (28.7%) had regular control of their asthma.

The long-term prognosis of asthma remains relatively unknown as there are few prospective studies from childhood to adulthood. The Blair Study of 200 asthmatic children showed that two-thirds of children with mild asthma had an excellent state twenty years later: life is normal, their attacks are absent or rare and very sensitive to bronchodilators (15). In contrast, two-thirds of severe asthma remain so 20 years later.

Conclusion

In light of our results, it is clear that there was no specific protocol for the management of asthma attack in our pediatric ED. We found that there were certain key aspects of the management of childhood asthma that were being overlooked. We speculated that a local

asthma educational programme intended to reduce the number of ED visits for asthma exacerbations. Further prospective studies are needed to corroborate this hypothesis.

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