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Case Report

Health-care conditions in elementary schools and teachers' knowledge of childhood asthma

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Background: For the adequate control of asthma in school-age children, it is recommended that teachers, school health personnel and administrators should have sufficient knowledge of how to manage asthma during school hours.

Aim: To investigate asthma health care in elementary schools, and teachers' knowledge of childhood asthma and its management.

Methods: The extent of knowledge of childhood asthma in 2779 teachers in 141 elementary schools (children aged 6–14, grades 1–8) in Bursa, the fourth largest city in Turkey, was evaluated. Section I comprised questions about asthma health-care in schools, Section II teachers' knowledge of the main characteristics of asthma and Section III (Likert Scale) teachers' detailed knowledge of the signs, triggering factors, treatment and general knowledge of asthma.

Results: The findings of Section I demonstrated that the organisation of health-care for asthma in schools was insufficient. Of the teachers questioned, 14.7% were not even aware and only 1% and 9.6% of the teachers had been made aware by school health personnel and school records, respectively, of asthmatic children. Only 27.3% of the teachers stated that they were responsible for the health of an asthmatic child. The majority of teachers (70%) said that asthmatic children could use the medication (e.g. inhalers) themselves. In Section II, there were between 44.1% and 75.5% correct answers, while in Section III this figure ranged from 3.3% to 78.4%. The correct answer rate was 60.4% for Sections II and III combined. The results of Sections II and III showed that the teachers' knowledge of asthma was poor in many respects. Teachers who stated that they had asthma or had first-degree relatives with asthma, or those with 10 or more years' experience provided significantly more correct answers in Sections II and III combined than did those without these characteristics ($P < 0.001$).

Conclusions: There is a need to improve and standardise health care for asthma (asthma management policies) in schools. The implementation of asthma education programmes for teachers and other staff responsible for pupils' health should result in better control of this common disease.

Keywords: Asthma, Children, Health care, Knowledge, Teacher, School, Survey

Introduction

Asthma is one of the most common chronic childhood diseases worldwide and its life-time prevalence ranges between 5 and 21%.^{1–3} According to the International Study of Asthma and Allergies in Childhood (ISAAC), the life-time prevalence of childhood asthma in Turkey is 6.5–17.8%.^{4,5} As the prevalence and burden of childhood asthma are high in many countries, there is growing interest in community-based approaches (school- and home-based interventions) to the management of childhood asthma.^{6,7}

Given the large number of asthmatic children and the fact that children spend much of their time in school, it is emphasised that asthma management should be optimised in the school environment.¹ Asthma awareness, observation of the signs of asthma, recognition of potential asthma attacks and implementing the necessary treatment are essential to the adequate management of asthma in schools. Furthermore, delayed response or reluctance by teachers, school health personnel and administrators to provide medical assistance may result in increased morbidity and mortality.⁸ Moreover, asthma in childhood can have a negative impact on quality of life, participation in sports and school attendance and performance.⁹

Guidelines on the treatment and management of school children with asthma make a number of

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important recommendations for teachers and other responsible school staff.^{1,10,11} The asthma diagnosis and treatment guide published by the Global Initiative for Asthma (GINA 2012) suggested that specific recommendations for childhood asthma and its management should be given to school teachers and daily activities including exercise should be one of the indicators of good asthma management.¹⁰ The report by the European Academy of Allergy and Clinical Immunology/Global Allergy and Asthma European Network (EAACI/GA²LEN) on the management of asthma and allergic diseases in schools includes avoiding allergens, training those who are responsible for children in emergency intervention, and increasing the capability of school teachers and school nurses to commence the initial treatment of asthma.¹ Good collaboration between doctors, parents, children and school staff (teachers, school health personnel and administrators) is recommended.¹ Despite these recommendations, health care of asthmatic children in schools (teachers' awareness, communication between parents, teachers and other responsible school staff concerning asthma and written action or management plans) has been investigated in only a few studies.^{12–16} A number of studies undertaken in the past few decades, especially in developed countries, have found that teachers' knowledge of asthma in general was poor.^{15–23} There have been few studies of teachers' knowledge of asthma in low- and middle-income countries.^{24–26}

The aim of this study was to assess the knowledge levels of teachers about childhood asthma and to analyse the health-care conditions in elementary schools. In an effort to obtain more accurate results, a large study population was investigated and the survey forms were specifically designed to measure the parameters of health-care conditions and teachers' level of knowledge.

Methods

The study included all 141 elementary government (public) schools (with a total of 3050 teachers) in the centre of Bursa, which is the fourth largest city in Turkey with a population of 1.3 million. In Turkey, elementary school-children are aged between 6 and 14 (grades 1–8) and elementary education is compulsory. Approval for this study was obtained from the Ethics Committee of Uludag University, Medical Faculty and the Provincial Directorate of National Education in Bursa also approved the participation of all government elementary schools. All the 12 private elementary schools were excluded from the study because of failure of approval. At the beginning of the study, we were informed by the Provincial Directorate of National Education that, since it was not legally required, teachers and elementary school

staff had received no formal education on asthma management, and schools had no formal asthma management strategies. A part-time or full-time nurse (health staff) was available in only eight (5.6%) schools and school nurses receive no special training on how to manage asthma and allergic conditions. Nurses and school administrators were not included in the study.

The survey forms consisted of three different sections with a total of 42 questions in all and included the teachers' demographic data (age, sex, length of teaching experience).

Section I Survey (Table 1)

The Section I survey included questions related to health care in schools for childhood asthma and was adapted and modified (two questions were added) from the survey forms developed by Hill *et al.*¹² which were later modified by Snow *et al.*¹³ There is no information to date on the validity of these surveys, and there are no validated questionnaires on this subject in the literature.^{12,13} The Section I survey consists of five questions enquiring whether and how teachers became aware of asthmatic children in their classes, who was responsible for the health of an asthmatic child, how asthma medications (inhalers, etc.) were used for asthmatic children and whether they knew what to do in the case of an asthma attack in school. An additional two questions asked whether they themselves or a first-degree relative had asthma and the teacher's own perception of their level of knowledge of asthma.

Section II Survey (Table 2)

The Section II survey contained eight true/false questions to assess the teachers' knowledge of the main characteristics of asthma. It was based on questions and statements adapted and modified from previous studies using similar but unvalidated surveys.^{15,21,24,26} The correct scores were totalled and calculated as a percentage (potential range 0–100%).

Section III Survey (Table 3)

In the Section III survey, there were 27 detailed questions about the signs of asthma, triggering factors, treatment and general knowledge of asthma which were adapted from the previously validated KASE-AQ (Knowledge, Attitude, and Self-Efficacy Asthma Questionnaire) survey.^{23,25,27} The questions were answered using a five-point Likert Scale: 1=strongly disagree, 2=disagree, 3=not sure, 4=agree, 5=strongly agree. For all of the 27 questions in the Section III survey, a score of 4 or 5 was accepted as the correct answer. However, eight questions (questions 4, 5, 6, 12, 20, 22, 23 and 26) of the total 27 had negative meanings so these were scored differently as follows: 1=strongly agree 2=agree, 3=not sure, 4=disagree, 5=strongly disagree.

Table 1 Section I: Status of asthma-related health-care in schools (n=2779 teachers)

Questions	n (%)
1. Have you been informed if any of the students in your class has asthma?	
Yes	2370 (85.3)
No	409 (14.7)
2. How do you become aware that a student has asthma?	
Student/parent	2462 (88.6)
Doctor's note	144 (5.2)
School health personnel	28 (1.0)
School records	266 (9.6)
Not informed	97 (3.5)
3. Who is responsible for the health of an asthmatic child in your school?	
Teacher	758 (27.3)
Principal	119 (4.3)
School health personnel	214 (7.7)
Family	1759 (63.3)
No idea at all	486 (17.5)
4. How are asthma medications (inhalers, etc.) used for asthmatic children at your school?	
By child himself (herself)	1945 (70)
With help of the teacher	292 (10.5)
With help of health staff	155 (5.6)
No idea at all	661 (23.8)
5. What would you do if one of your asthmatic students suffered shortness of breath?	
Contact his (her) physician	153 (5.5)
Contact his (her) family	1067 (38.4)
Give inhaler medications to improve breathing	892 (32.1)
Enable the child to take his (her) own medication himself (herself)	139 (5)
Send him (her) to school health staff	128 (4.6)
Call an ambulance	180 (6.5)
All of the above	569 (20.5)
6. Do you or any first degree relative in your family have asthma?	
Yes	497 (17.9)
No	2282 (82.1)
7. Your knowledge level about asthma*	
Sufficient	1437 (51.7)
Insufficient	1342 (48.3)

Teachers were allowed more than one response in questions 2–5; * teachers' self-perception of their knowledge of asthma.

The study was conducted between October 2011 and February 2012. Teachers were given written information about the purpose of the study and of a total of 3050, 2874 teachers who agreed to participate signed informed consent. Surveys were filled out completely by 2779 (96.7%) of the 2874 teachers. A total of 1044 (37.6%) participants were male and 1735 (62.4%) female, with a median age (range) of 37.6 years (22–66), and the median (range) length of experience was 13.2 years (1–40) (≤ 10 years, $n=1260$, 45.3%; >10 years, $n=1519$, 54.7%).

Statistical analyses

Statistical analyses were undertaken using SPSS 13.0 (Chicago, IL, USA) with the collaboration of the Department of Biostatistics of the Medical Faculty,

Uludag University. Definitive values were given as mean (SD), median, minimum, and maximum values. Categorical variables were expressed as frequencies and percentages. The Mann–Whitney U-test was used for statistical comparisons. $P<0.05$ was accepted as statistically significant.

Results

Section I: Health care for asthma in elementary schools (Table 1)

14.7% of teachers were unaware of asthmatic children in their class and only 1% and 9.6% of teachers were informed of the children's condition by school health personnel (nurses) and school records, respectively. While 27.3% of teachers stated that they were responsible for the health of an asthmatic child in

Table 2 Section II: Teachers' correct/false responses to questions on the main characteristics of asthma (n=2779)

Questions	Correct n (%)	False n (%)
1. Asthmatic individuals can feel completely normal except during attacks of shortness of breath	1972 (70.9)	807 (29.1)
2. Asthma is a disease characterised by narrowing of the airways	1897 (68.3)	882 (31.7)
3. Exercise can result in asthma complaints	1311 (47.2)	1468 (52.8)
4. A child with a complaint of cough only could be asthmatic	1226 (44.1)	1553 (55.9)
5. Asthmatic children must use asthma medications regularly	1981 (71.3)	798 (28.7)
6. Asthmatics must use bronchodilator drugs to improve breathing	2099 (75.5)	680 (24.5)
7. Other allergic diseases can occur more frequently in families of those with allergic asthma	2011 (72.4)	768 (27.6)
8. Patients with allergic asthma are more likely to have allergic rhinitis than normal individuals	1942 (69.9)	837 (30.1)

their class, 17.5% reported that they had 'no idea at all'. The majority of teachers (70%) stated that the asthmatic child could use the asthma medications (e.g. inhaler) by themselves and 23.8% of teachers had 'no idea at all' about the use of asthma medication. In cases of shortness of breath (acute asthma attack), the teachers' responses were very different and there was no standard approach. The overall results of the Section I survey illustrate that asthma management in schools was, in many respects, not adequate (i.e. awareness of and information about asthmatic children, responsibility for children with asthma, use of asthma medication, which initial steps to take in the event of an asthma attack).

Section II: Teachers' knowledge of the main characteristics of asthma (Table 2)

The rates of correct answers given to the eight true/false statements varied between 44.1% and 75.5%. Teachers' knowledge of the main characteristics of asthma was variable, and overall scores were not high. The statement with the lowest rate (44.1%) of correct answers was 'a child with a complaint of cough only could be asthmatic.' There was also poor knowledge of the relationship between exercise and asthma: the rate of correct answers to the statement 'exercising can result in asthma complaints' was

47.2%. The statement with the highest number of correct responses was 'asthmatics must use bronchodilator drugs to improve breathing during shortness of breath attacks' (75.5%). Overall, teachers' knowledge of the general characteristics of asthma was not satisfactory, particularly regarding cough as a symptom and the relationship between exercise and asthma.

Section III: Teachers' detailed knowledge of the signs, triggers, treatment and general knowledge of asthma (Likert Scale) (Table 3)

The rates of correct responses to questions (correct answer was accepted as a score of 4 or 5 in all 27 questions) ranged from 3.3% to 78.4%. The mean (SD) total asthma knowledge score was 99.7 (10.2) (73.9%) (predicted total score limits, 27–135 and 99.7/135, 73.9%). In questions 1–6 on the signs of asthma, 64.6% and 48.7% of teachers, respectively, responded correctly to the questions on shortness of breath and wheezing as the most recognised asthma symptoms. Interestingly, a majority of teachers had limited knowledge that sneezing, fever and sore throat were not linked to signs of asthma (10.7%, 16.4% and 17.2%, respectively). In questions 7–16 on asthma triggers, exercise and laughing were the least-known triggers of asthma. Moreover, only 42.2% of teachers

Table 3 Section III (Likert scale): Teachers' detailed knowledge of asthma (n=2779)

Questions	Correct* n (%)	Median	Mean (SD)
What are the signs of asthma?			
1. Shortness of breath	1799 (64.6)	5	4.5 (0.7)
2. Cough	1144 (41.2)	4	4.2 (0.8)
3. Wheezing	1352 (48.7)	4	4.3 (0.8)
4. Sneezing	297 (10.7)	2	2.6 (1.2)
5. Fever	456 (16.4)	3	3.2 (1.1)
6. Sore throat	477 (17.2)	3	3.2 (1.1)
What factors trigger asthma?			
7. Exercise	254 (9.1)	3	2.9 (1.3)
8. Stress, anxiety	694 (25)	4	3.7 (1.1)
9. Cold weather	594 (21.4)	4	3.6 (1.1)
10. Laughing	203 (7.3)	2	2.4 (1.3)
11. Contact with domestic animals (cat, dog)	1027 (37)	4	4.1 (0.9)
12. Contact with other asthmatic children	1173 (42.2)	4	3.7 (1.3)
13. Smoking	1840 (66.2)	5	4.5 (0.7)
14. Viral infection (influenza, etc.)	1295 (46.6)	4	4.2 (0.8)
15. Allergens (mites, pollens, moulds, cockroach, etc.)	1892 (68.1)	5	4.6 (0.6)
16. Air pollution (exhaust, etc.)	1928 (69.4)	5	4.6 (0.6)
Which medications are used in the treatment of asthma?			
17. Corticosteroid medication (inhaler, spray, etc.)	1326 (47.7)	4	4.2 (0.9)
18. Breathing improving medications	1793 (64.5)	5	4.5 (0.6)
19. Oxygen	1335 (48.0)	4	4.2 (0.9)
20. Antibiotics	381 (13.7)	3	2.9 (1.2)
21. Breathing exercise	83 (3.3)	2	2.2 (0.9)
22. Quail egg, herbs, natural therapy, etc.	297 (10.7)	3	2.8 (1.1)
Please answer the following questions about asthma:			
23. Asthma is contagious	2040 (73.4)	5	4.4 (1.0)
24. Asthmatic child can perform sports	547 (19.7)	4	3.7 (0.9)
25. Smoking worsens asthma	2067 (78.4)	5	4.6 (0.6)
26. Microbes cause allergy	147 (5.3)	2	2.2 (1.0)
27. Asthma is related to heredity	798 (28.7)	4	3.7 (1.1)

For questions 4, 5, 6, 12, 20, 22, 23 and 26, the Likert Scale scoring system was: 5, strongly disagree; 4, disagree; 3, not sure; 2, agree; 1, strongly agree; * a score of 4 or 5 was accepted as the correct answer in the Likert Scale (minimum 1 point, maximum 5 points).

knew that 'contact with other asthmatic children' was not a trigger. The questions with the most correct responses were about air pollution and allergens (69.4% and 68.1%, respectively). In questions 17–22 on the treatment of asthma, 'breath improving medications' received the most correct answers (64.5%) and 'breathing exercises' received the fewest (3.3%). In questions 23–27 on general knowledge of asthma, the statement of 'smoking worsens asthma' was the best known with the highest rate of correct responses (78.4%), not only in this sub-section, but in the whole of Section III. However, very few teachers replied correctly that microbes (infectious diseases) did not cause allergy (correct answer rate 5.3%). In addition, only 19.7% of responses to the statement 'asthmatic child can perform sports' were correct. The results of the Section III survey demonstrate that teachers' detailed knowledge of the signs, triggering factors and treatment and their general knowledge of asthma was generally poor.

Teachers' specific characteristics and their impact on the level of knowledge about asthma (Table 4)

The combined correct answer rate for Sections II and III was 60.4%. The rates of correct answers in Sections II and III combined were evaluated according to teachers' specific characteristics. Teachers who stated that they themselves or a first-degree relative had asthma, or those with 10 or more years of teaching experience had significantly higher rates of correct answers in Section II and III combined than those without these characteristics ($P < 0.001$). In addition, teachers who stated in Section I that their level of knowledge of asthma (based on self-perception) was sufficient, answered 65.1% of the questions correctly while those who stated that their knowledge was insufficient answered 58.5% of the questions correctly in Section II and III ($P < 0.001$). Teachers' specific characteristics ('teachers who stated they themselves or a first-degree relative had asthma' and 'teachers with 10 or more years of teaching experience') had a significantly positive effect on their knowledge of asthma.

Discussion

For the adequate management of asthma in school-children, it is essential that teachers and other staff have sufficient knowledge of asthma and that the health care in schools is satisfactory.^{15,19,22}

There are few studies of health care of asthmatic school-children,^{12–16} and this one is the first to investigate asthma health care in Turkish elementary schools. The results demonstrate that teachers' awareness of asthmatic students and communication between parents, teachers and other school staff are insufficient. Similarly, knowledge of the use of asthma medication and of what initial steps should be taken when a child has an asthma attack is poor. Despite some minor differences, the findings of the present study are generally similar to those of a study of 156 teachers in five elementary schools in New York, USA¹³ and another study in Nottingham, UK¹² of 291 teachers (both used very similar surveys on health care). A more recent study of 320 teachers in 25 New York elementary schools emphasised that school policy and administrators need to support teachers pro-actively in becoming aware of the asthma status of their students and in working to prevent asthma attacks.¹⁵ For the appropriate management of asthma, there has to be collaboration between teachers, school nurses, school administrators, the child, their parents and doctors.¹

Another important element of organising asthma health-care is to ensure that children can be instructed in how to use their inhalers correctly and when an inhaler should be used during school hours. Use of medication should be supervised by teachers or other responsible staff when necessary or at specific times during the day.¹² Some previous studies have reported that such assistance was less than satisfactory in schools. In the first-mentioned New York study, teachers reported that students took the inhaler medication by themselves and did not know how asthma inhalers were to be used (34% and 30.1%, respectively).¹³ However, in a study in London, 67% of teachers stated that the use of an inhaler was under their control.²¹ In the current

Table 4 Combined Sections II and III: Teachers' characteristics

			Correct* (%)		
Characteristics		<i>n</i>	Median	Range	<i>P</i> [†]
Asthma (in own or family history)?	Yes	497	67.4	27.9–90.7	<0.001
	No	2282	60.4	25.5–93.0	
Duration of teaching career	> 10 yrs	1519	62.7	25.5–93.2	<0.001
	≤ 10 yrs	1260	60.4	25.5–90.7	
Knowledge of asthma [‡]	Sufficient	1437	65.1	25.0–93.0	<0.001
	Insufficient	1342	58.5	25.5–90.7	

*Correct answer was accepted as a score of 4 or 5 in Section III; [†] statistical comparison of median values; [‡] teachers' perception of own knowledge about asthma; Range, minimum/maximum.

study, approximately two-thirds of teachers stated that children used inhaler medication by themselves, while 23.8% said they had 'no idea at all' on this topic (Table 1). It is possible to conclude that teachers in this study were reluctant to take the initiative in the use of inhalers, but there is an obvious need for teachers and other school staff to provide more assistance to children in their use of asthma medication (e.g. inhalers).

This study found that teachers have inadequate information about the main characteristics of asthma (Section II), how to recognise its (Section III) symptoms and trigger factors, and how to treat it; correct answer rates ranged between 44.1% and 75.5% and 3.3% and 78.4% in Sections II and III, respectively. Similarly, previous studies (using different survey forms) from mainly developed countries have concluded that teachers in general had insufficient knowledge about asthma.^{15–23} Previous studies investigating teachers' knowledge of asthma using survey forms similar to the Section II forms we used have reported that, although teachers' knowledge is generally poor, it was relatively better on some particular subjects.^{15,20,21,24,26} Studies similar to the current one found that teachers' knowledge was particularly poor on some asthmatic symptoms and on the relationship between exercise and asthma.^{16–20,22}

To provide the necessary assistance to asthmatic children, teachers and other school staff must be able to identify the symptoms and trigger factors, and have the necessary knowledge to initiate appropriate and timely treatment. Other studies (with surveys which are both similar and different to those in Section III of the current study) have also found generally low levels (with some differences in various respects) of asthma knowledge among teachers in the areas of symptom identification, trigger factors, and how to treat symptoms of asthma.^{15,19,22–26,28} Exercise can trigger asthma symptoms in a significant portion of asthmatic children. Consensus reports on asthma diagnosis and management have stated that asthmatic children should not avoid sports activities; on the contrary, they should be encouraged to exercise under appropriate conditions, after discussion of the type and environment of the exercise, and bronchodilator medication usage before exercise, etc.^{1,10,11} The rate of teachers who thought that exercise could trigger asthma was low in the current study (9.1% in Section III), and the rate of teachers who believed that children with asthma could exercise was also found to be low (19.7% in Section III). Almost all previous ones, as in this one, have reported that teachers' knowledge of the relationship between asthma and exercise was poor.^{14,17,25}

Very few studies have investigated the characteristic features of teachers that influence their knowledge of

asthma.^{14,19,25} It has been reported in one study that teachers with asthma have better knowledge of asthma than those without asthma.¹⁹ The current study also found that teachers with asthma or a first-degree relative with asthma had more knowledge of asthma than those who did not (Table 4). Interestingly, regardless of their self-perceived level of knowledge of asthma, the average overall knowledge level was lower than ideal, although those who claimed better knowledge scored significantly higher. Conflicting results have been reported in studies examining the relationship between length of teaching experience and knowledge of asthma. A study of primary school teachers in Vienna found a positive correlation between the length of teaching experience and attitudes towards asthma.¹⁴ However, another study reported no relationship between teaching experience and knowledge of asthma.²⁵ In the current study, it was determined that teachers with more than 10 years of teaching experience had relatively better knowledge of asthma (Table 4).

Since the management of children with asthma is a significant issue for schools, teachers and other staff responsible for pupils' health can play an important role in its management.^{8,29} Several studies have reported that educating teachers about asthma is of benefits to the children who are affected.^{8,29,30} An Australian study found that training teachers in asthma management and developing written school asthma policies led to improved recognition and management by teachers.³¹ A study in New Mexico (USA) suggested that teachers who were briefly educated in recognising asthmatic episodes had an improved ability to recognise them, and better knowledge of and ease with asthma medication.³² Education programmes for teachers and other responsible school staff should be implemented to improve collaboration between doctors, parents, teachers and school health personnel, thereby improving recognition of asthma symptoms, treatment of asthma in school, management of the disease, and ability to take the initiative by teachers and school administrators.^{7,12,13,19,30–32}

To the best of our knowledge, this is the first large study in the literature to have researched both teachers' knowledge of asthma and health care in schools for asthmatic children. To obtain detailed data, a survey consisting of three different sections was used. The Section III survey (Likert Scale) including detailed questions on asthma knowledge, is a validated and reliable instrument.²⁷ However, because of the lack of previously validated questionnaires, the use of the Section I and Section II surveys might constitute some limitations for the present study. Similar versions of the Section I^{12,13} and Section II surveys^{15,21,24,26} have been used

in other studies, which obtained similar results to those of the current study, although there is no information about their reliability and validity in literature.

In conclusion, this study demonstrates that health care for asthmatic pupils and teachers' knowledge of asthma were inadequate in many respects. There is a vital need to improve and standardise asthma health care (asthma management policies) in schools. Schools should implement effective asthma management policies which are standardised, sustainable and supported by official regulations. Asthma management policies should include the following: a system to provide awareness of and communication about asthmatic children as soon as they commence school; assistance in the use of asthma medication; and written action and management plans for the initial treatment of asthma attacks.

Since poorly informed teachers and other responsible staff may prevent the effective management of children with asthma, training by physicians on asthma management is recommended for all elementary school teachers, school nurses (ideally in all schools) and other responsible personnel. Asthma management training should include instruction in the identification of asthma signs, factors triggering an acute asthma attack, providing the necessary support for children's participation in exercise and sport, use of asthma medication and initiating treatment of an acute asthma attack. All these recommendations are important in providing adequate asthma management of school-children, which is an important public health problem.

Disclaimer statements

Contributors YC planned the study, designed the method, initiated the study, coordinated the analysis, interpreted the data, prepared the manuscript. SC coordinated the analysis, interpreted the data, prepared the manuscript. UC collected and entered the data, interpreted the data. AK planned the study, designed the method, initiated the study. NS planned the study, designed the method, initiated the study. All authors contributed to the final version. All authors have read and approved the final manuscript.

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