

Knowledge of primary school teachers about asthma: a cross-sectional survey in the Umdoni sub-district, KwaZulu-Natal

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Abstract

Background: Asthma is one of the most common chronic respiratory conditions affecting young children. It is estimated that asthma affects 20% of schoolchildren in South Africa. The school setting represents “home” for most children, and teachers are recognised as *in loco parentis*. Therefore, it is imperative that primary school teachers have sufficient knowledge of asthma and its management, in order to be able to make rational and safe decisions about the children in their care. This study was undertaken to assess the levels of asthma knowledge and its management among primary school teachers.

Method: Data were collected from 226 consenting schoolteachers in 19 randomly selected primary schools in the Umdoni sub-district of KwaZulu-Natal, using a cellular telephone Mobile Researcher® application. A total of 55 questions relating to knowledge of asthma were posed, together with questions about motivation for, and confidence in managing, an asthma emergency.

Results: Overall, 38.5% of teachers were able to answer < 50% of the knowledge questions correctly. Teachers’ level of asthma knowledge was not significantly associated with age, gender, years of teaching experience, educational qualification, or contact with an asthmatic individual (p-value = 0.153, p-value = 0.870, p-value = 0.070, p-value = 0.082 and p-value = 0.176, respectively). Areas of particular concern included knowledge regarding the signs and symptoms of a severe acute asthma attack, asthma medication and management, and asthma and sports.

Conclusion: This study demonstrates deficiencies in teachers’ knowledge of asthma, which will need to be addressed if they are to safely discharge their duty of care. Teachers are supportive of in-service training in asthma management.

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Introduction

The World Health Organization (WHO) has reported that, worldwide, approximately 235 million people are asthmatic, and that asthma poses an economic burden which is expected to surpass that of tuberculosis and human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS) combined.¹ Asthma is one of the most common chronic respiratory conditions affecting young children.² According to the executive summary of the 2005 Global Initiative for Asthma (GINA) Dissemination Committee report, South Africa had the twenty-fifth highest asthma prevalence, and the fifth highest fatality rate, amongst the 5-34 year age group, worldwide.³ In 2007, the International Study of Asthma and Allergies in Childhood (ISAAC) steering committee report indicated that South Africa had the twelfth highest prevalence of children with asthma aged 12-14 years, worldwide.⁴ It is estimated that asthma affects 20% of schoolchildren in South Africa.⁵ The prevalence of asthma among primary school children in Durban, KwaZulu-Natal,

is reported to be 51.6%.⁶ An increase in asthma prevalence in rural children has also been reported in South Africa.⁷

The school setting represents “home” for most children, where teachers are recognised as *in loco parentis*.⁸⁻⁹ Previous studies in Australia, Turkey, Hong Kong and Denmark have highlighted questions about teachers’ knowledge of asthma, and the impact of care afforded to asthmatic children at schools.⁸⁻¹¹ Asthma education is absent in most teachers’ training curricula.¹² A study conducted in the United States to identify asthma deaths in schools between 1990-2003, found that inappropriate reactions of school personnel may have played an important role in the deaths of asthmatic schoolchildren.¹³

Evidence from similar settings in other countries suggests that there are gaps in teachers’ knowledge of asthma, and the practice of care rendered to asthmatic schoolchildren.^{11,14-16} Teachers are often unaware of the possible use of preventive medication, prior to sports and exercise.^{10,15} The school environment may also be hazardous for the asthmatic

schoolchild, and contain abundant trigger factors such as dust mites, fumes and chalk dust.¹⁷ Schoolteachers often have poor knowledge of the trigger factors associated with acute asthma attacks.¹⁸ However, teachers have a crucial role to play in the care of asthmatic schoolchildren.¹⁹ In the absence of the school nurse, and in the event of an asthma emergency, the schoolteacher will have to make decisions to assist the asthmatic schoolchild.¹⁹

Across sub-Saharan Africa, chronic noncommunicable diseases, such as asthma, are often sidelined as a result of “competing” conditions, such as infectious diseases and malnutrition.²⁰ In South Africa, studies on asthma in children have traditionally focused on the issues of prevalence, trends in asthma admissions, morbidity and mortality.²¹ Therefore, little is known about teachers’ knowledge of asthma in South Africa. This study was undertaken to assess the levels of asthma knowledge, and its management among primary school teachers. The healthcare needs of children from rural communities are often overlooked.^{22,23} Rural schools may experience more difficulties than urban schools in ensuring effective asthma management for their asthmatic schoolchildren.^{22,23} Recently, the Minister of Health, Dr Aaron Motsoaledi, announced a reprioritisation of the South African school health programme.²⁴ Teachers have great potential to promote health within the school environment.²⁵ This study also attempted to establish whether teachers require in-service training on the management of asthmatic children. This could contribute to keeping children healthy, and improving the standard of their health at school.²⁶

Method

A cross-sectional survey was conducted among the schoolteachers employed at 19 randomly selected primary schools in the Umdoni sub-district of KwaZulu-Natal. The study frame was constructed from a registry of all primary schools provided by the Department of Education. The registry included 25 primary schools, employing a total of 389 schoolteachers. Based on the assumption that 50% of teachers would have limited knowledge of asthma, i.e. a score of < 50% in the knowledge section of the survey, and a 10% level of precision, a sample size of 19 clusters (schools) and a total of 190 responses was determined [using RightSize version[®] 2.0.0.0.2 (2002) software]. The 19 selected schools employed 276 teachers.

An asthma knowledge questionnaire was developed, in consultation with a paediatric asthma specialist, and based on previous examples from the literature.^{7,8,12,13,17,25} The questionnaire comprised 55 questions to determine asthma knowledge, each allowing a “true”, “false”, or “unsure” option. The “unsure” option, which was included to circumvent guessing, was rated as a lack of knowledge. A score of 1 was allocated for a correct answer, with 0 for a wrong answer, or an “unsure” response. A score of

< 50% correct answers to the questions was defined as limited knowledge. Teachers’ motivation to care for, and assist, asthmatic children, was explored by questioning them about their personal perceptions towards managing asthmatic children (their personal perceptions of their own asthma knowledge, concerns for asthmatic children, their confidence in assisting an asthmatic child during an asthma attack, their preferred plan of action for uncontrolled asthma in children, and their rating of the need for in-service training on asthma). The level of support within the school environment was assessed through questions about school health nurse visits and resources (asthma policy, assessment and medication-delivery tools). In addition, schoolteachers were asked about previous training in asthma management, and the use of a metered-dose inhaler (MDI).

After an initial pilot phase to ensure face validity and improve the contents of the instrument, the questionnaire was administered by a researcher and two trained fieldworkers, using a cellular telephone Mobile Researcher[®] application, provided by Clyral. Responses were obtained in face-to-face interviews, after obtaining informed consent from individual schoolteachers. The completed questionnaires were then uploaded using a general packet radio service to a web-based database, cleaned, exported and analysed, using SPSS version 15.10 (SPSS). All statistical tests were performed at the 0.05 level of significance.

Permission to conduct this study was obtained from the KwaZulu-Natal Department of Education and the principals of the selected schools. Ethical clearance was obtained from the biomedical research ethics committee of the University of KwaZulu-Natal (BE089/09).

Results

Consent was provided by 226/276 (81.9%) schoolteachers in the sample. Respondents were predominantly female (88.9%), with a mean age of 43 [standard deviation (SD) 8.2, range 18-64] years. The majority (82.3%) were ranked as class teachers, and 41.6% reported having more than 10 years of teaching experience. Although only 14/226 (6.2%) declared that they were asthmatic, 46.5% knew of someone close to them who had asthma. Only six respondents (five females, one male) reported that they had received training in asthma care; three in the form of first-aid courses. Other sources of training on asthma care, mentioned by the other three respondents, included the school nurse or doctor, parents of asthmatic children, and the National Asthma Education Programme.

Overall, the mean score for knowledge of asthma was 30.3 (SD 9.3, range 2-51). Almost two-thirds (61.5%) of the participants scored > 27 points, indicating > 50% correct answers for the asthma knowledge test. However, 38.5% of participants scored < 27 points (< 50%), which denoted limited knowledge of asthma and its management. Primary school teachers’ level of asthma knowledge was

not significantly associated with age, gender, years of teaching experience, educational qualification, or contact with an asthmatic individual (p-value = 0.153, p-value = 0.870, p-value = 0.070, p-value = 0.082 and p-value = 0.176, respectively). Almost all the participants (95.1%) thought that in-service training on asthma management was necessary for school personnel.

Table I depicts a selection of responses obtained in relation to general knowledge statements about asthma, the signs and symptoms of severe asthma attacks, and the trigger factors that exacerbate asthma. The majority of the participants (73.5%) knew that asthma is a common respiratory disease in children worldwide. However, 23% believed that asthmatic children have low intelligence quotient (IQ) levels. Almost a third (30.5%) was unsure about the association between asthma and allergies. Out of 10 questions on general knowledge, 69.5% answered ≥ 5 questions correctly. It is a concern that 63.3% could only correctly identify ≤ 3 symptoms of a severe acute asthma attack, out of six. The majority of respondents (75.7%) correctly identified ≥ 7 factors that exacerbate asthma from a total of 14 offered. Less than half of the teachers (42.5%), knew that exercise can trigger an asthma attack. There were a large number of unsure responses, including the response to the possible role of chalk dust, exercise, and stress (16.4%, 17.7% and 21.7%, respectively).

As shown in Table II, 56.2% of teachers incorrectly believed that an antibiotic is used to relieve an asthma attack, and 31.0% also incorrectly thought that aspirin is used to relieve an asthma attack. Almost half of the teachers (48.7%) incorrectly believed that asthma medications are addictive, and weaken the heart. The majority of teachers (57.1%) were unsure of the side-effects of commonly used β -agonist relievers (identified by their common trade names). Only 22.1% of respondents were able to identify a spacer as an asthma medication delivery device. Overall, out of 11 questions regarding asthma medication and management, only 49.1% of the primary school teachers answered > 6 questions correctly. About a quarter (24.8%) of the respondents indicated that they knew how to use a MDI, but none could correctly indicate the correct steps in the use of an MDI.

Of particular relevance to the school setting, only 30.1% of respondents knew that swimming is an acceptable and beneficial sport for asthmatic children (Table III), while more than a third of schoolteachers (38.9%) thought that asthmatic children should avoid exercise and sports. Only 12.4% of teachers could answer all three questions about asthma and sports correctly.

Table I: Primary school teachers' responses to asthma knowledge questions (n = 226 for all questions)

	Correct answer	True n (%)	False n (%)	Unsure n (%)
General knowledge				
Asthma is a common respiratory disease in children worldwide	True	166 (73.5)	24 (10.6)	36 (15.9)
Allergies are associated with asthma	True	116 (51.3)	41 (18.1)	69 (30.5)
Asthmatic children have low IQs	False	52 (23.0)	108 (47.8)	66 (29.2)
Asthma is not curable	True	45 (19.9)	136 (60.2)	45 (19.9)
Asthma is controlled by appropriate medication	True	189 (83.6)	15 (6.6)	22 (9.7)
Asthma is an emotional disorder that needs psychological counselling	False	61 (27.0)	114 (50.4)	51 (22.6)
Signs and symptoms of a severe acute asthma attack				
Difficulty with speech	True	119 (52.7)	52 (23.0)	55 (24.3)
Agitation	True	123 (54.4)	35 (15.5)	68 (30.1)
Drowsiness	True	94 (41.6)	69 (30.5)	63 (27.9)
Chest and neck skin "pulled in"	True	137 (60.6)	26 (11.5)	63 (27.9)
Confusion	True	69 (30.5)	86 (38.1)	71 (31.4)
Blue discolouration of the lips	True	82 (36.3)	55 (24.3)	89 (39.4)
Common triggers of asthma				
Smoke	True	201 (88.9)	12 (5.3)	13 (5.8)
Chalk dust	True	161 (71.2)	28 (12.4)	37 (16.4)
Exercise	True	96 (42.5)	90 (39.8)	40 (17.7)
Cold weather	True	154 (68.1)	42 (18.6)	30 (13.3)
Common cold	True	154 (68.1)	31 (13.7)	41 (18.1)

Table II: Primary school teachers' responses to questions about asthma medication (n = 226 for all questions)

	Correct answer	True n (%)	False n (%)	Unsure n (%)
Antibiotics are used to relieve an asthma attack	False	127 (56.2)	43 (19.0)	56 (24.8)
Aspirin is used to relieve an asthma attack	False	70 (31.0)	65 (28.8)	91 (40.3)
Ventolin® or Asthavent® are used to relieve an asthma attack	True	153 (67.7)	6 (2.7)	67 (29.6)
Preventative medication is needed for most asthmatic children	True	161 (71.2)	24 (10.7)	41 (18.1)
Oxygen therapy is required in very severe asthma attacks	True	202 (89.4)	11 (4.8)	13 (5.8)
Ventolin® can cause a rapid pulse rate, palpitations and tremors	True	61 (27.0)	36 (15.9)	129 (57.1)

Table III: Primary school teachers' responses to questions about asthma and sports (n = 226 for all questions)

	Correct answer	True n (%)	False n (%)	Unsure n (%)
Asthmatic children should avoid exercise and sports	False	88 (38.9)	103 (45.6)	35 (15.5)
Preventative medication can be taken by the asthmatic child before exercise and sports	True	108 (47.8)	47 (20.8)	71 (31.4)
Swimming is the best sport for asthmatics	True	68 (30.1)	68 (30.1)	90 (39.8)

Discussion

Primary school teachers constitute an important resource in the care of asthmatic schoolchildren within the school environment. Although 61.5% of teachers scored > 50% for the asthma knowledge test, there are serious gaps in their knowledge of asthma and its management. It was striking that, in this mixed urban and rural sub-district of KwaZulu-Natal, only six of 226 teachers indicated that they had received training in asthma management. It is apparent that asthma is not a prioritised condition in terms of school health, despite its prevalence in the community. Elsewhere, 26.5% of teachers in Hong Kong and 60.1% of teachers in Denmark knew that the prevalence of asthma was high in their countries.^{10,11}

In this study, just over half (51.3%) of the teachers knew that allergies are associated with asthma, compared with 45.7% and 30.6%, in surveys conducted in Western Australia and England, respectively.^{8,15} The avoidance of allergens in the environment may improve asthma control.

It is known that teachers often have misconceptions about asthmatic children and their academic abilities.¹⁵ Therefore, it was alarming that almost a quarter (23.0%) of the respondents thought that children with asthma had low IQ levels, compared to only 0.6% of teachers in the survey that was performed in Denmark.¹¹ The possibility that local teachers might treat known asthmatic children differently as a result cannot be ruled out.

The demonstrated knowledge of the trigger factors that can exacerbate asthma in children was reasonable. Performance was far better than that found in a study by Bell et al, namely that Irish teachers' knowledge of trigger factors associated with asthma was poor, as only 50% of teachers could identify two trigger factors related to asthma.¹⁹

Schoolteachers' knowledge of asthma and sports may

influence their practices in this regard. Therefore, it was of concern that less than half (46.5%) correctly indicated that asthmatic children should engage in sports and exercise. However, this figure was rather similar to that reported in a Danish study (32%).¹¹

Schoolteachers' ability to correctly identify the signs and symptoms of a severe acute asthma attack are critical if they are to handle this type of emergency in the school environment. Only 36.3% of Umdoni teachers were able to identify blue discoloration of the lips as a sign of a severe acute asthma attack. This is low when compared to the 53.6% and 88% of teachers who correctly identified blue discoloration of the lips as sign of a severe acute asthma attack, in studies conducted in Hong Kong and in New Zealand, respectively.^{10,27}

Furthermore, local schoolteachers share many misconceptions about the identity and role of asthma medication. It was a concern that almost half (48.7%) of the respondents believed that asthma medications are addictive, and weaken the heart. This could result in inaccurate information being conveyed to children, or even avoidance of the use of reliever medications when needed. Inaccurate information can result in teachers making incorrect decisions, and failing to assist the asthmatic child.^{28,29}

In a similar way to a study carried out in Hong Kong, more than half the schoolteachers incorrectly believed that antibiotics are used to relieve an asthma attack.¹⁰ However, the majority (67.7%) could identify a common "reliever" medication, as was the case in Hong Kong (85.4%), Denmark (56.3%) and Malaysia (62.5%).^{10,11,14}

In an attempt to address some of the weaknesses of previous studies, we expanded the range of questions about asthma medication, for example, asking about the use of spacer devices. Even though spacers would be expected to be used by children, very few local schoolteachers (22.1%) were able to identify the spacer as a device that is used to deliver asthma medication. In addition, this study was unique in asking respondents to correctly identify the steps to take when using an MDI. Although almost a quarter (24.8%) claimed to know how to use a MDI, none of the teachers could correctly identify the steps. This is alarming, because it brings into question the teachers' ability to assist an asthmatic child during an asthma attack, or to correctly supervise asthmatic children who need to administer doses of asthma medication by MDI during the school day. Of the six teachers who reported to have received asthma care training, only three stated that they knew how to use an MDI, and none of them correctly identified the steps to do so.

The respondents' misconceptions about aspirin were of particular concern. Aspirin may, in some patients, precipitate or worsen an asthma attack, which may be life-threatening.³⁰ Aspirin is also contraindicated in children for the management of pain or fever, particularly in those with viral infections.³¹

Conclusion

Primary school teachers' knowledge of asthma and asthma medication is deficient in many respects. Some of the misconceptions harboured by such teachers may result in unsafe practices. The positive response to potentially receiving asthma education in-service training may be a reflection of the fact that most teachers are aware that deficiencies exist in their knowledge.

Although conducted in only one sub-district of one province in South Africa, this study has confirmed many of the findings of similar studies in several other countries, in both developed, and developing countries. As the government's re-engineering of primary health care proceeds, it will be important to enhance school-based health promotion activities, including asthma education.

School health services are an integral part of primary health care, which can promote and support healthy environments for children with chronic diseases. This should include asthma education for a range of school personnel, and requires the active participation and support of both the Departments of Health and Education. Asthma education programmes for teachers can have a significant impact on the management of asthmatic children.^{26,32} The school health system has an important role to play in the care of children with chronic diseases, like asthma. School nurses, who are an integral part of school health, are also needed to assist in training teachers on how to deal with asthmatic children in the school environment.²⁸ There is an urgent need to develop, and implement, sound asthma policies in all schools.

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