

Exercise-induced asthma in adolescents: Challenges for physical education teachers

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Abstract

Asthma is the most common chronic medical condition that school-teachers are likely to encounter among their pupils. This study aimed to identify the needs of physical education teachers in dealing with adolescents with exercise-induced asthma, study their self-reported knowledge of asthma and identify future topics for education about exercise-induced asthma. A questionnaire was drawn up on the basis of the requirements that had emerged in the course of interviews with 18 physical education teachers. One hundred and six physical education teachers at secondary schools in the city of Trondheim and colleges in Sør-Trøndelag County in Norway answered the questionnaire (65% response rate). Eighty-two physical education teachers (78.1%) had pupils with asthma in their sports classes, and 89.4% answered positively regarding their need for advice on teaching pupils with asthma. Twenty-seven (25.9%) reported that they had sufficient knowledge to teach adolescents with asthma. Topics about asthma, its management and activities suitable for asthmatics were given high priority by the teachers.

Keywords

physical activity, education, teaching, health, asthma

Introduction

Asthma is the leading chronic disease among children and adolescents in most industrialized countries,¹⁻³ occurring in around 5%-15% of the paediatric population,⁴ and potentially restricting their daily activities and causing absenteeism from school.⁵ In a Norwegian study, the prevalence of asthma was one in every five 10-year-old children in Oslo.⁶ It is thus also the most common chronic medical condition that school-teachers are likely to encounter among their pupils.⁷

Exercise is one of the most common stimuli that may reduce airflow, and exercise-induced asthma occurs in up to 90% of asthmatics.⁸ However, although exercise is a powerful trigger of asthma symptoms, sustained training that increases aerobic performance lessens the prospect of an asthma attack by reducing the ventilatory requirements for any activity. Children and adolescents with asthma should therefore be helped to enjoy the benefits of an active lifestyle.^{8,9}

Teachers who are in daily contact with their pupils need to be aware of the problems posed by adolescents with asthma. However, studies have shown that teachers have only limited knowledge of asthma and its management.^{7,10-20} A study of more than 4000 adolescents and 1000 teachers in Australian high schools revealed that knowledge of asthma was low

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among both students with and without asthma and their teachers. Specific knowledge about preventing and treating exercise-induced asthma was poor. The results demonstrated that educating not just asthmatics but also teachers about asthma is important.^{10,21} Asthmatic adolescents are a distinct group of patients with different problems and needs from those of healthy children and adults.¹ To be effective, education must therefore be developmentally appropriate, addressed to specific needs and readily available to the adolescent.²²

Physical education teachers in particular play an important role in education and in motivating pupils with asthma to participate in physical activities, but little focus has been placed on this group. Knowledge of exercise-induced asthma among physical education teachers is therefore important if they are to be capable of offering asthmatic adolescents physical education appropriate to their needs.

The hypothesis of this study is that knowledge of exercise-induced asthma is limited among physical education teachers, and that a better understanding of asthma management and training programmes for asthmatics is needed in order to optimize the education of adolescents with exercise-induced asthma.

The aim of the study was to identify the needs of physical education teachers who educate adolescents with exercise-induced asthma in secondary schools and colleges. We also wished to study their self-reported knowledge of asthma and to identify future topics for education about exercise-induced asthma.

Methods

To identify the needs of physical education teachers who educate pupils with exercise-induced asthma and identify education topics for them, we employed a combination of interviews and a questionnaire survey.²³ This method has been found to be suitable for identifying the overall needs of users, and it has previously been used to develop requirements for physical activity.^{24,25} The interviews focused on the needs encountered by physical education teachers in their work with asthmatic pupils. These needs were transformed into requirements before the questionnaire was developed. The idea of using the interview method before development of the questionnaire survey was to access points of view that we would not otherwise have obtained, in order to give us better insight into the teachers' situation.

Interviews

Eighteen physical education teachers from six schools participated in the interviews. The main criterion for inclusion was that the participants should work as a physical education teacher. In order to collect data from subjects with different experiences, we included physical education teachers of both sexes and with teaching experience from various levels; primary schools (6-12 years), secondary schools (13-15 years) and colleges (16-18 years). The open-ended interviews, which took approximately 1 h, were performed using a combination of focus groups, including two to four subjects and five individual interviews. The interviews were conducted by two scientists, where one questioned the interviewees and the other transcribed the statements made by the participants.

At the beginning of each interview, participants were given a verbal explanation and written consent forms about the purpose of the study, and they were told that their participation was voluntary. A semi-structured interview guide was developed and used to ensure consistency of the core questions. The questions asked were about experiences of teaching pupils with asthma, asthma attacks and medication, activities for pupils with asthma, specific problems and aspects of teaching pupils with asthma, and about the training and wishes of physical education teachers in this area.

Requirements

The 250 subjective statements from the interviews passed through a multi-stage-selection process²³ that reduced them to 42 statements in response to the question: "What are the most important criteria regarding teaching adolescents with exercise-induced asthma?" Seven people from different professions (medical doctors specialising in lung medicine, physical education teachers, a physiologist and representatives of asthma organisations) participated in the selection process, which identified the most important statements regarding to user needs and future topics for education about exercise-induced asthma. The subjective statements were transformed into user requirements, and by the end of this stage the most important requirements had been structured and could be used as the basis for the questionnaire study.

Questionnaire study

A questionnaire was drawn up on the basis of the requirements that had emerged in the course of

Table 1. Characteristics and teaching experiences of the physical education teachers participating in the questionnaire survey (N = 106).

Variable	Respondents (n = 106) %	Secondary school (n = 59) %	College (n = 47) %
Sex			
Female	46.2	47.5	44.7
Male	53.8	52.5	55.3
Age group (years)			
<30	14.2	22.0	4.3
30–39	39.6	49.2	27.7
40–49	29.2	15.3	46.8
≥50	17.0	13.6	21.3 ^a
Position (n = 105)			
Teacher	6.7	8.5	4.3
Schoolteacher	72.4	76.3	67.4
Sixth-form teacher	20.0	13.6	28.3
Other	1.0	1.7	0.0
Education in physical education			
None	14.2	25.4	0.0
¼–½ yr in teacher training	17.9	30.5	2.1
Basic courses	22.6	18.6	27.7
Intermediate subject	33.0	16.9	53.2
Master's degree	8.5	1.7	17.0
Other	3.8	6.8	0.0 ^a
Teaching experience as a physical education teacher (years)			
0–5	33.0	52.5	8.5
6–10	18.9	16.9	21.3
11–15	11.3	13.6	8.5
>15	36.8	16.9	61.7 ^a
Working hours per week as a physical education teacher			
0–5	46.2	71.2	14.9
6–10	25.5	23.7	27.7
11–15	11.3	3.4	21.3
>15	17.0	1.7	36.2 ^a
Number of pupils taught physical education weekly (n = 105)			
0–50	42.9	61.0	19.6
51–100	32.4	33.9	30.4
101–200	11.4	3.4	21.7
>200	13.3	1.7	28.3 ^a

^a Significant differences between groups ($P < 0.05$).

the previous stages of in-depth interviews and transformation of statements into user requirements. The questionnaire consisted of two parts: the first comprised general questions about the teachers' characteristics; their level of education, teaching experience and the number of pupils that they taught (Table 1). The second part focused on teaching pupils with exercise-induced asthma. In order to gather teachers views and identify their needs in dealing with adolescents with exercise-induced asthma, they were asked to respond to 15 statements about teaching, asthma and physical activity. The teachers were asked to rate each item on a 5-point scale, ranging from

strongly agree to strongly disagree (Figure 1). They also answered a separate question about their needs for further training in dealing with pupils with exercise-induced asthma. Those who answered "yes" were asked to prioritise one third of the topics they found most important (Figure 2). Our results regarding knowledge of asthma are based on the physical education teachers self-report.

Study population

A request to participate in the study was sent to all head teachers in sports in secondary schools in

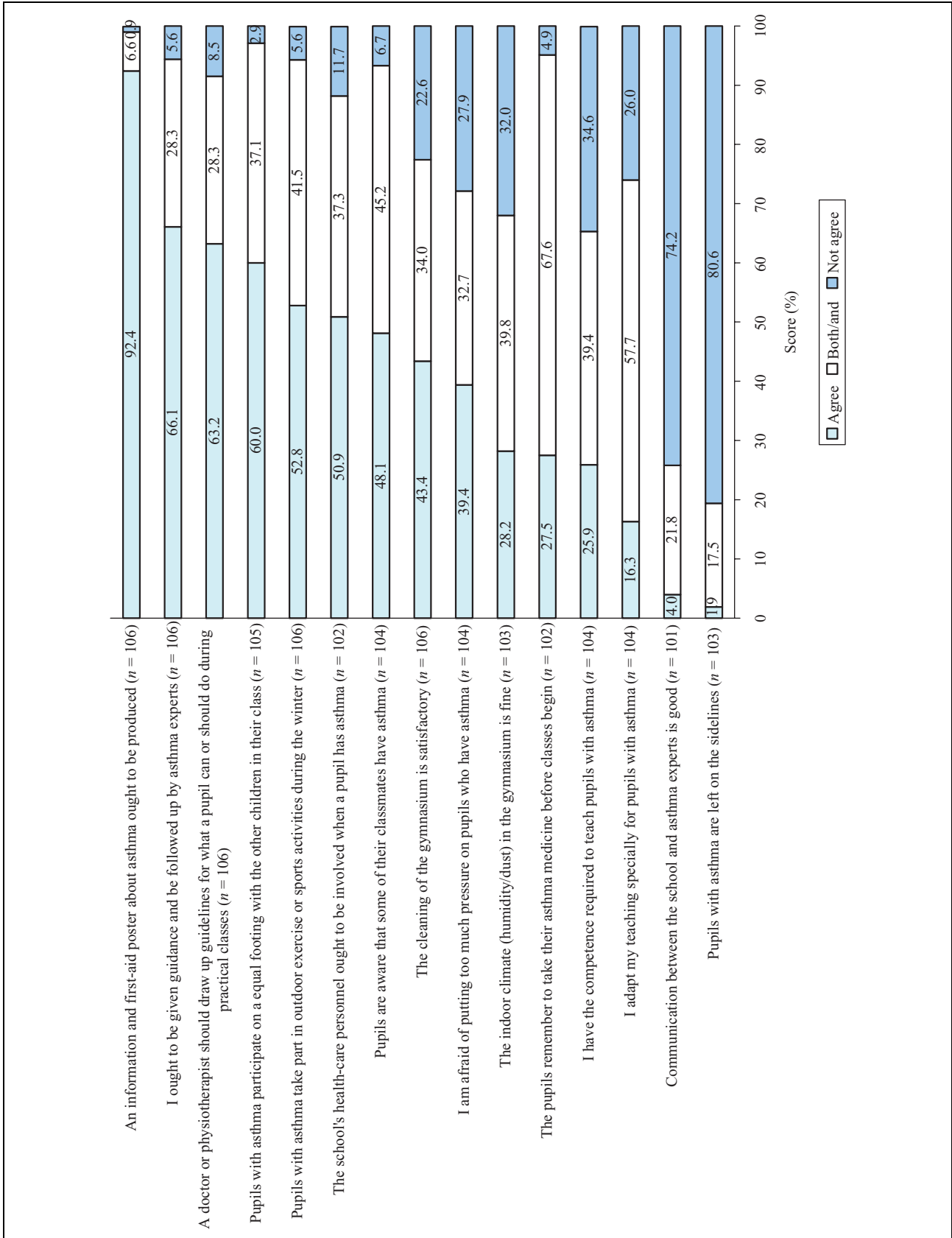


Figure 1. The degree to which physical education teachers agree with a series of statements about teaching asthmatic pupils.

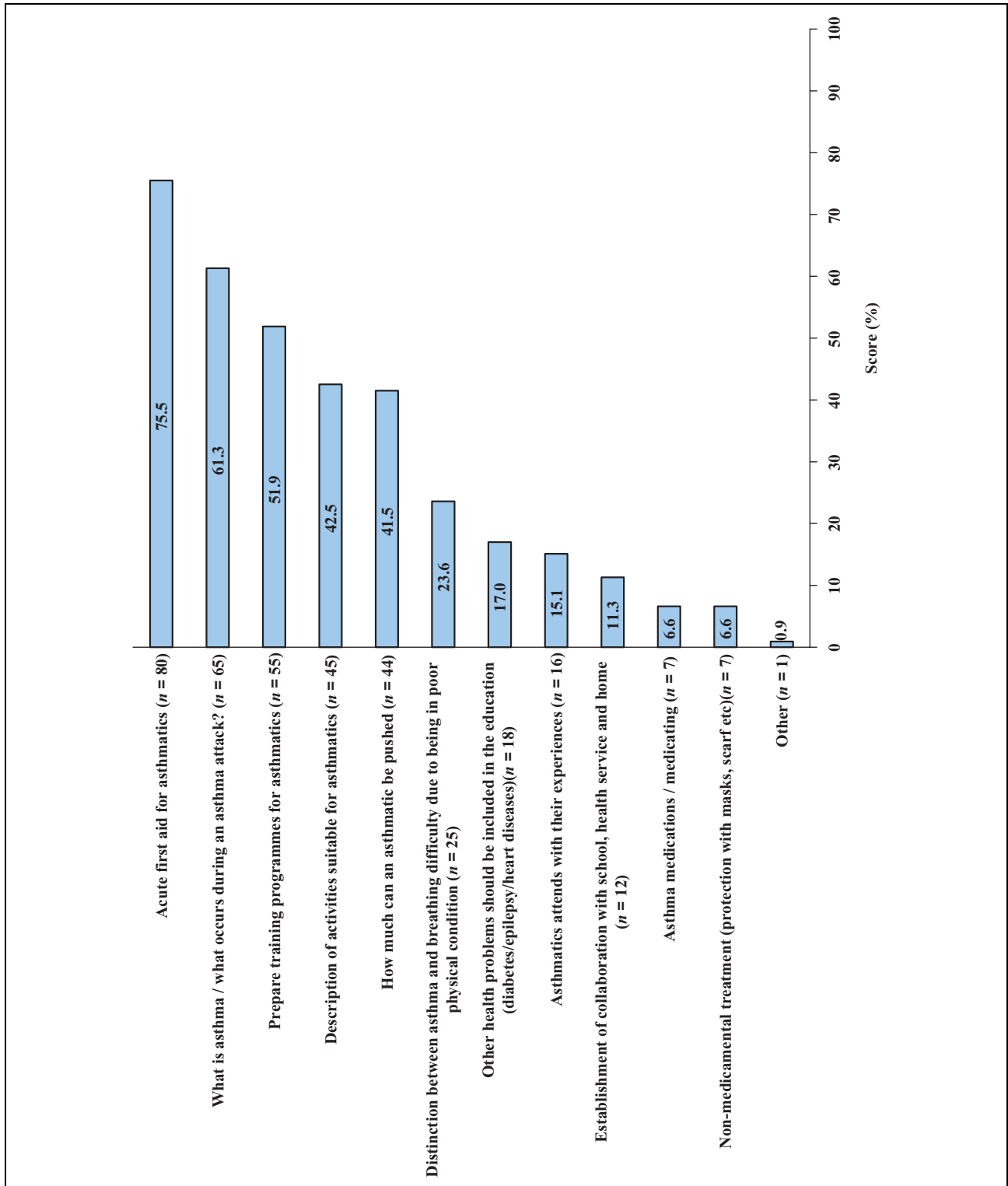


Figure 2. Prioritisation of requirements of the topics of the training programme: percentage of respondents who gave priority to each requirement.

the Trondheim and in colleges in Sør-Trøndelag County (teaching pupils from age 13-18). A total of 164 questionnaires were subsequently sent to

the head physical education teachers, who distributed them to the physical education teachers. Thirteen comprehensive schools received a total of

102 questionnaires and 16 colleges received 62 questionnaires.

Ethics

The study was approved by the Regional Research Ethics Committee in Medicine, Central Norway and the Norwegian Data Inspectorate.

Statistical analyses

Statistical analyses used the SPSS 14.0 statistical package. The outcome variables for the whole group were determined using frequency analyses. Comparisons of categorical variables (secondary schools vs. colleges) were analysed by the chi-square test. If one or more of the requirements for the chi-square tests were not met, Fisher's Exact Test was used.

Results

Interviews

The results of the qualitative part of the study found that most physical education teachers had experience with teaching pupils with asthma, and many found this challenging in terms of participation, individual adaptations for warming-up procedures and type of activities. As one teacher pointed out: "It is more difficult to «push» children with asthma; we want them to try, but not to feel pressured" and "We do a lot of warming up to start with, and tell those that have asthma that this is very important. However, time is a problem." Another mentioned that: "The problem is that when they get tired, they will fall behind in the exercises, and then they may be left sitting out of things for a good while." Some teachers also commented on indoor climate (dust, dry air) and winter sports activities in cold dry air as problems for pupils with asthma. Several teachers mentioned the distress of having an asthma attack and the importance of prevention through correct use of medication. As one teacher commented: "Many of them take medicine when it is far too late. When we start to warm up they get an attack, and then they have to struggle with it for the rest of the period."

Most agreed that they did not have enough competence in dealing with asthma and asthma medications: As one teacher reported: "I am poorly prepared for an asthma-attack" while another said: "I would like to have some training in acute first-aid for asthmatics." Several teachers emphasized the importance of communication between the school and professionals:

"I need to be backed up by a doctor if I am to push pupils with asthma" and "What we want is a form from a doctor or a physiotherapist that tells us what they absolutely must not do, as well as what they can and should do."

Questionnaire study

A total of 106 physical education teachers returned the completed questionnaire. The response rate was 65% (58% for the secondary schools and 76% for the colleges). The teachers' characteristics are shown in Table 1.

Eighty-two (78.1%) physical education teachers knew of one or more asthmatic pupils in their sports classes, and forty-three (41.0%) had experienced pupils having asthma attacks during a lesson. No significant differences were found between the schools.

The highest-priority request of the physical education teachers ($n = 98/92.4\%$) was that an information/first-aid poster on asthma should be produced. This was followed by a wish for advice from experts on asthma ($n = 70/66.1\%$) and that a doctor/physiotherapist should produce guidelines about what pupils could do during sports lessons ($n = 67/63.2\%$). Sixty-three (60.0%) agreed that pupils with asthma participate in sports lessons on an equal footing with the other pupils and 83 (80.6%) disagreed that asthmatic subjects are left on the sideline (Figure 1). No significant differences between school categories were found.

Regarding the statements about teaching pupils with exercise-induced asthma and based on their self-reports twenty-seven (25.9%) of the physical education teachers agreed or fully agreed that they have sufficient knowledge to teach pupils with asthma, while 36 (34.6%) disagreed (Figure 1).

Ninety-three (89.4%) of the teachers responded positively to the question about whether they required training in teaching pupils with asthma. No significant differences between the secondary schools and colleges were found, even though college physical education teachers had been given significantly more courses/lectures through their work (23.4%) than their colleagues in secondary schools (1.7%). Figure 2 shows the priority topics for a training programme. "Acute first aid for asthmatics" was given the highest priority at both types of school, followed by "What is asthma/what occurs during an asthma attack" and "Prepare training programmes for asthmatics" (Figure 2). The method given highest priority was internal courses at their schools with external

lecturers ($n = 60/56.6\%$) followed by “Included in the basic education for teachers in physical education” ($n = 36/34.0\%$), “Written information material for private studies” ($n = 31/30.2\%$) and “Information from organizations working with asthma” ($n = 31/25.5\%$).

Discussion

The majority of the physical education teachers reported a need for more knowledge about exercise-induced asthma (89.4%), a necessity if we are to achieve stated goals regarding individualized education for all pupils, including asthmatic adolescents. The study also identified the physical education teachers' prioritized topics for an asthma education programme.

The questionnaire was developed from the results of interviews of 18 physical education teachers, which ensured that topics of importance to this group of teachers were covered in the questionnaire, including information about preparing training programmes for asthmatics and the description of activities suitable for asthmatics.

A weakness of this study is the relatively small study population for a questionnaire survey ($n = 106$). However, the study targeted a well-defined group of teachers (physical education teachers), who are limited in numbers at each school. The questionnaire survey was self-administered, and the questionnaires were completed by teachers in their own time, which may have reduced the response rate. A possible bias is that only head teachers who distributed the questionnaires and physical education teachers who were interested in the issue of exercise-induced asthma responded. If this is the case, our results may have overestimated the importance of some of the responses. Although the study population was small, there is no reason to believe that these results are not valid to general population of physical education teachers in Norway.

Although the distribution of teacher ages, training in physical education, teaching experience as a sports teacher, working hours per week as a sports teacher and the number of pupils taught differed between the teachers in the two school categories, no differences were found in terms of their needs and priorities. This suggests that knowledge of exercise-induced asthma is limited at different levels in the school system, as has been confirmed by previous studies. However, unlike most earlier studies, which have focused on primary schoolteachers,^{7,12-14,16,18-20} this study dealt

only with physical education teachers in secondary schools and colleges. Physical education teachers as a group are particularly likely to witness asthma symptoms and asthma attacks among their pupils, since physical activity is a strong asthma-provoking factor and many asthmatics experience exercise-induced asthma.

Our results regarding knowledge of asthma among physical education teachers are based on their self-reports rather than on questionnaire surveys of their knowledge of and attitudes to asthma, as reported in other studies.^{7,12-14,16,18-20} However, the results of our study, where only about a quarter of the respondents agreed that they have sufficient knowledge for teaching asthmatic pupils, are in line with other studies that have concluded that knowledge about asthma among schoolteachers is low.^{7,13-14,16,18-20} Limited knowledge of asthma therefore seems to be relevant among primary school teachers as well as for physical education teachers in secondary schools and colleges.

The goal for general asthma management is to achieve normal levels of health and activity,²⁶ in which physical activity is an important contributing factor that makes physical education teachers particularly important in meeting the specific needs of the asthmatic pupil. Sixty-three (60.0%) of the teachers agreed that asthmatics take part in the sport lessons on an equal footing with their healthy peers. This was also found in another study of 254 teachers who gave sports lessons.¹⁷ In that study, 60% of the teachers also reported that their asthmatic pupils participated in gymnastics lessons at school, and most of the teachers in their study assessed their knowledge about the disease as reasonably good.

In our study, as much as 93 (89.4%) of the physical education teachers confirmed the need for training in teaching pupils with asthma although 25.9% of the teachers thought they had sufficient knowledge about the topic. The wish for more information about asthma is also reported in other studies. In a study of 76 class teachers in Southampton, the great majority (86%) wanted more information about asthma¹² and in a study of 164 school teachers from Perth, 91.5% felt that they did not know enough about asthma.¹⁴

Of the topics suggested, “Acute first aid for asthmatics” and “What is asthma/what occurs during an asthma attack” were given the highest priorities. This may reflect the fact that many of the teachers have witnessed asthma attacks during their school lessons and are worried about having asthmatics in their

classes, given their lack of knowledge about asthma. On the question about how the training should be given, most teachers gave highest priority to internal courses given by external lecturers.

A number of seminars for schoolteachers, including the above-mentioned topics, have been developed and found to be valuable. It has been shown that even short 2-hour seminar courses improve knowledge of childhood asthma.²⁷ A 3-hour-programme on asthma was found helpful for teachers¹⁶ and a teacher-led asthma education programme in secondary schools had direct beneficial outcomes.²⁷ In addition to general information about asthma and management, our study has demonstrated that an asthma education programme for physical education teachers should also include information about preparing training programmes for asthmatics and descriptions of activities suitable for asthmatics. These topics were also given high priority by physical education teachers.

In conclusion, our findings demonstrate that according to self-reports, knowledge of exercise-induced asthma is limited among physical education teachers and that they wish to know more about this subject. In addition to the most common topics on asthma and its management, topics on training programmes and activities suitable for asthmatics should be provided. Internal courses in schools, given by external lecturers, would be preferred by teachers

Asthma and allergies are emerging as important public-health problems,²⁸ and the results from this and previous studies should have implications for policymakers. In order to improve asthma knowledge among physical education teachers, the survey recommends implementing asthma education programmes in schools and/or in teacher training courses. Teachers of physical education in particular should be given training in dealing with exercise-induced asthma.

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