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PREVALENCE OF ASTHMA SYMPTOMS IN ATHLETES IN THE REGION OF GDANSK (POLAND)

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Abstract. Background: Continuous growth in the prevalence of obstructive diseases, including asthma, has been observed in recent years. The increase is observed both in subjects not practicing any sport and in professional athletes. In the latter asthma is surely underestimated. The aim of the study was to evaluate the prevalence of asthma symptoms in athletes in region of Gdańsk (Poland). Materials and Methods: Young sportsmen from the Centre of Sport Medicine in Gdansk were included in the study between 2005 and 2006. Data were collected during routine prophylactic visits. International Union Against Tuberculosis and Lung Disease (IUATLD) Asthma Questionnaire was used to evaluate the prevalence of asthma symptoms. Questionnaire was enriched by questions concerning age, gender, sports practiced, training experience, influence of physical activity, smoking, coexistence of other allergic diseases. Results: 376 athletes, including 128 females (34%) and 248 males (66%), aged 14-27 years (mean age 17 years, SD±2.71) were examined. At least one exercise-related asthma symptom was observed in 38 athletes (10.1%). The most common symptoms were: chest tightness (31.9%), dyspnoea after exercise (29.8%), cough (21.3%), wheezing (17%). Coexistence of other allergic diseases (allergic rhinitis, conjunctivitis) was revealed in 46 patients (12.2%). Smoking was reported by 38 athletes (10.1%, 33 males, 5 females) including 31daily smokers (8.2%) and 7 occasional smokers (1.9%). All daily smokers reported symptoms of exercise-induced asthma. Symptoms were significantly more common in subjects under age of 18 (23 subjects – 6.1%) than older ones (15 subjects – 4.0%) ($P<0.001$, χ^2 Pearson test=14.04) and in females compared to males ($P<0.05$, χ^2 Pearson test = 4.79). Conclusion: Symptoms of asthma are frequent among the athletes in the northern region of Poland, particularly in subjects under 18. Smoking and other coexisting allergic factors might be associated with symptoms of asthma in athletes of Gdansk. Questionnaire studies are helpful in detection of asthma symptoms.

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Introduction

In the last decades, a continuous increase in the prevalence of asthma has been observed worldwide [10]. Two big international epidemiological studies conducted in the late 1990s showed that asthma is particularly frequent among children and teenagers. The ISAAC study (International Study of Asthma and Allergies in Children) found asthma-like symptoms in 10.2% of children aged 6–7 and 11.3% of children aged 13–14 [14]. The ECRHS study (European Community Respiratory Health Survey) including young adults (between 22 and 40 years of age) showed, however, quite a significant variation (from 1.3% to 9.8%) in the prevalence of asthma, depending on the part of the world inhabited [9].

In Poland, asthma epidemiology was assessed by Małolepszy *et al.* [17] during the AIRE study. Out of 14701 subjects, 2988 children aged 3-16 and 11713 adults aged 17-80 from 10 centres were included in the analysis. The percentage of asthma in these groups was 8.6% and 5.4%, respectively. There are only scarce data evaluating whether the overall increase in the prevalence of asthma reflects also an increased prevalence of the disease among sportsmen.

It is supposed that asthma in athletes is underestimated and data published so far need completing [8]. In northern Poland (Pomerania), this issue has not yet been investigated.

Aim of the study: The aim of the study was to evaluate the prevalence of asthma symptoms in professional sportsmen in the region of Gdansk (Poland).

Materials and Methods

Young sportsmen from the Centre of Sport Medicine in Gdansk were included in the study between 2005 and 2006. They were examined during routine prophylactic visits required for health certificates. Sportsmen were not patients of this medical centre.

Asthma symptoms were assessed with the use of the International Union Against Tuberculosis and Lung Disease (IUATLD) Asthma Questionnaire [1,7]. Questions concerned age, gender, sport discipline, training intensity (hours per day/week, number of training sessions per week), exercise-related asthma symptoms, smoking status and coexisting diseases (particularly allergic diseases). Informed consent was obtained before inclusion in the study. Children were assisted by two qualified nurses while replying to the questionnaire. During

prophylactic visits all participants were examined by a sport medicine specialist. Physical examination, blood pressure, resting electrocardiogram were performed. The data from questionnaire were confronted with additional tests results.

All the results collected were subjected to formal evaluation in analyses adequate to the medical experimental configuration. In the statistical analysis, χ^2 test and χ^2 Pearson statistic were applied.

Results

A total number of 376 athletes were examined, including 128 women (34%) and 248 men (66%), aged 14-27 (mean age 17 years, SD±2.71) (Table 1). Patients were divided into two subgroups: aged under 18 and over 18 years of age. The most commonly practised sport disciplines were: team sports - 199 patients (football - 56, volleyball - 55, basketball - 39, handball - 26, rugby - 23), athletics - 81, karate - 23, hockey - 15, tennis - 15, rowing - 13, fencing - 11, swimming - 10, wrestling - 9.

Table 1
Population characteristics

	All participants	Age <18	Age >18
		Age	
min	14	14	19
max	27	18	27
mean	17.0	15.9	21.9
SD	2.71	1.21	2.32
median	16.0	16.0	23.0
		Gender	
women	128 (34.0%)	104 (33.5%)	24 (36.4%)
men	248 (66.0%)	206 (66.5%)	42 (63.6%)
sum	376	310	66

The presence of at least one asthma symptom during or immediately after training was reported by 38 (10.1%) subjects. The prevalence of asthma symptoms in relation to the disciplines of sport is presented in Fig. 1. The most common symptoms were: chest tightness (32%), exercise-related dyspnoea (28%), cough (21%), wheezing (17%). Asthma-related symptoms were more frequent in the individuals aged under 18 (23 subjects – 6%) than in the older group (15 subjects –

4%); P<0.001, Pearson's χ^2=14.04, and more frequent in women than in men; P<0.05, Pearson's χ^2 =4.79 (Figs. 2 and 3).

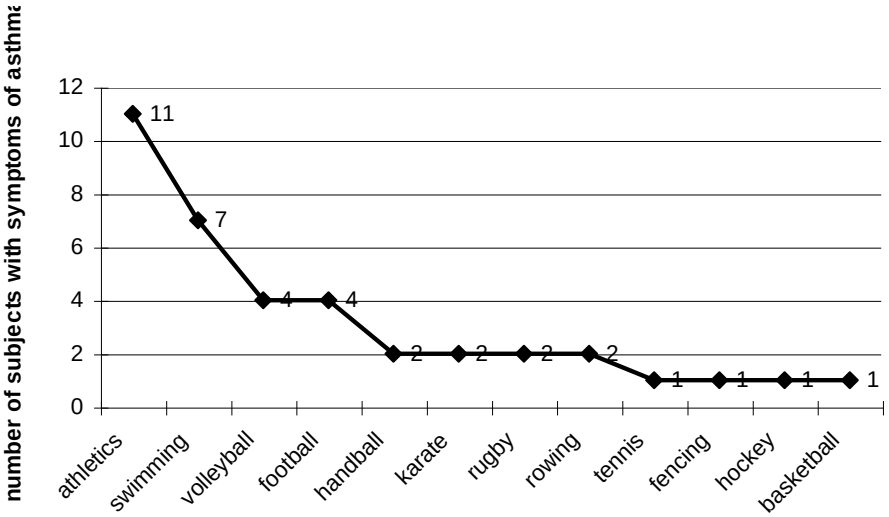

Fig. 1
Prevalence of asthma symptoms in relation to sport discipline

Training intensity ranged from 1 to 7 days a week (mean training intensiveness - 4 days a week, from 1 to 5 hours daily) and was reversely correlated with the frequency of asthma symptoms (P<0.05, t statistics=2.24).

The coexistence of other allergic diseases (allergic rhinitis and conjunctivitis) was found in 46 patients (12.2%). They were diagnosed more often in women (24 – 6.5%) than in men (22 –5.9%) (P<0.01, Pearson's χ^2 =7.68).

Cigarette smoking was reported by 38 (10.1%) respondents (5 women, 33 men). It was significantly more common in men (P<0.01, Pearson's χ^2 =7.98). Thirty-one (8.2%) subjects were daily smokers, while 7 (1.9%) smoked occasionally. In the subgroup aged under 18, 5 patients smoked regularly and 22 sporadically. In the subgroup aged over 18, there were 2 daily and 9 occasional smokers.

Smoking history varied from 1.5 years to 10 years, mean value 3.8 years SD±2.28. All the smokers reported exercise-related asthma symptoms. The difference between smokers and non-smokers was statistically significant (P<0.001, Pearson's χ^2 =14.31).

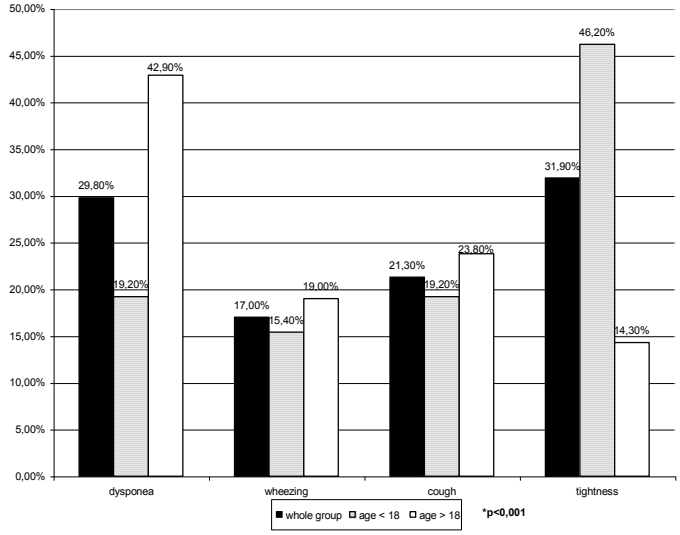

Fig. 2
Presence of asthma symptoms in athletes in the region of Gdansk (Poland)

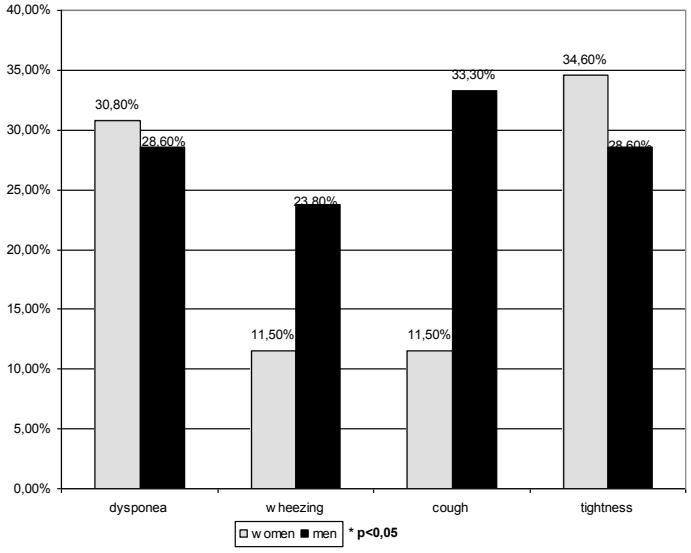

Fig. 3
Presence of asthma symptoms with regard to gender

Discussion

For many years an increase has been observed in the prevalence of asthma among children and adolescents. It is estimated that 1-18% of the population suffer from this disease in different parts of the world [5]. Exercise-related bronchoconstriction occurs in 90% of all asthmatics and in 11-50% of athletes with diagnosed asthma [19]. The mechanism of exercise-induced bronchoconstriction has not been precisely explained [4]. However, two hypotheses have been proposed: osmotic and vascular [3]. According to osmotic theory, what leads to the release of mediators constricting the smooth muscle of the bronchi is an increase in extracellular fluid osmosis in bronchial mucus during exercise (hyperventilation) [21]. According to the vascular theory, exercise-induced bronchoconstriction is related to a sudden broadening of the bronchial vessels after physical exercise [18]. Neither of the theories explains clearly all the processes present in the airways during exercise.

Several researchers observed a decrease in the prevalence of exercise-related bronchoconstriction. Probably, this results from better and sooner prophylaxis of asthma in children and youngsters [8]. The same phenomenon has been revealed in the population of athletes. Helenius *et al.* [11] reviewed 11 studies on the epidemiology of asthma in professional athletes. Asthma was diagnosed in 3.7 – 22.8% of them. The prevalence of the disease depended on the sport practised and the diagnostic criteria applied in the study. In 8 studies, a questionnaire was used as a basic tool while in others an exercise test and physical examination were additionally performed. The risk of asthma development was higher in athletes than in the non-training population. Langdeau *et al.* [15] revealed that asthma is more common in athletes compared to people having a sedentary lifestyle. Authors compared two populations: 100 athletes and 50 subjects with a sedentary lifestyle (less than two hours of physical activity per week). The study included a questionnaire concerning respiratory symptoms and family background, physical examination, skin prick tests and nonspecific methacholine challenge. The results showed airway hyperreactivity in 49% of athletes and 28% of the sedentary population (P=0.009).

As far as the region of the Gdansk is concerned, there are no current data available on asthma prevalence in professional athletes. Our pioneering study indicates that asthma symptoms are found in 10% of this population. This is in line with earlier Polish studies. Małolepszy *et al.* [17] estimates that 8.6% of children and 5.4% of adults not practising any sport suffer from asthma. In the Pomerania region, these numbers were: 13.0% and 4.5%, respectively, which makes the

northern Poland area of the highest morbidity in Poland. This is closely related to the high level of urbanisation and industrialisation in the agglomeration of Gdansk. In our study, a modified Asthma Questionnaire published in GINA guidelines was applied. The emphasis was put on commonly observed asthma symptoms. The correctness of the data received from the questionnaire was verified by two qualified nurses. Discrepancies found in the questionnaires were corrected on the basis of medical documentation.

Allergy and sport: In athletes, asthma often coexists with atopy [6,16]. It has been observed particularly in subjects training outdoors in spring and summer (long-distance and cross-country runners, football players), as well as swimmers. During training, they are exposed to high concentrations of aeroallergens which float in the air and may induce the development of other allergic diseases (e.g. allergic rhinitis and conjunctivitis). In the water, swimmers are exposed to compounds of ozone or chlorine which may cause irritation of the mucosa. This provokes eosinophylic inflammation in the airways and bronchial hyperreactivity leading to the development of asthma [23]. The coexistence of asthma and other allergic diseases may affect negatively their training plans and scores achieved during the competitions. As well as nasal congestion, also rhinorhea, lacrimation and oedema deteriorate their quality of life.

Helenius *et al.* [12] examined 162 athletes (71 long-distance runners, 49 speed and power athletes and 42 swimmers) as well as 45 healthy controls. Atopy was detected in 35 (49%) long-distance runners, 21 (43%) speed and power athletes and 21 (50%) swimmers and only 16 (36%) healthy controls.

Allergic rhinitis is also a common disease among athletes. Alarant *et al.* [2] described its symptoms in 26% of athletes training various sports compared to 20% in the control group. In the same group of 446 patients, allergic conjunctivitis was diagnosed in 3.6 % compared to 5.6% in the control group. Both allergic rhinitis and conjunctivitis were more frequent in women. Małolepszy (4) estimates the prevalence of allergic rhinitis at the level of 5.4% in the Polish adult population and 8.9% in children, and, in the region of Pomerania, 4.6% and 2.9%, respectively. Compared to Alarant's study, ours indicates that allergic rhinoconjunctivitis is twice as common. It was found in 46 (12.2%) patients, significantly more often in women than in men.

Smoking and sport: Exposure to tobacco smoke is a risk factor of exercise-related asthma attacks and an additional factor deteriorating health status. It has been proven that substances found in the smoke destroy epithelium in the airways. This, in turn, makes patients more prone to allergen penetration, increases their allergenicity and leads to immunisation [20]. Smoking adolescents report

respiratory symptoms (breath shortening, increased secretion in the airways) three times more often than non-smokers. In the smoking group, alcohol consumption is more common as well [22]. Links between smoking and sport were investigated in a Norwegian study [13] conducted between 1995 and 1997 in the population aged 13-19. Among 6811 participants, 1342 were smokers and 10% of them smoked daily. Smokers were less physically active than non-smokers. Moreover, smoking teenagers tended to cease training every sport earlier than non-smokers. Although a smaller group of patients was included in our study, the results are similar. Smoking athletes reported exercise-related asthma symptoms (10.1%). During data collection, reluctance to answer questions concerning smoking was observed. As the questionnaires were filled in under the supervision of a nurse, it may be assumed that a number of patients denied their real smoking status. This can be easily explained because, in the commonly applied health belief model, smoking is considered harmful, even by smokers.

Doping and sport: Prevalence of asthma is significantly higher in athletes compared to general population [11,19]. This problem should be analysed in two aspects. On the one hand professional sport promotes development of exercise-induced asthma symptoms. On the other hand simulating asthma symptoms enables legal consumption of some antiasthmatic drugs ($ß_2$-mimetics, steroids). These substances are generalny considered pharmacological doping agents. Their usage by asthmatic athletes is strictly limited and supervised. The list of forbidden drugs is modified regularly. Currently World Anti-Doping Agency (WADA) allows administration of these drugs by inhalation only [24]. They can be used only by athletes with diagnosed asthma confirmed by a specialist in pulmonology or sport medicine. This procedure aims at increasing athletes' safety and eliminating unnecessary antiasthmatic therapy which could be introduced to improve their physical efficiency.

Conclusions

Symptoms of asthma are frequent among the athletes in the northern region of Poland, particularly in subject under 18. The development of asthma symptoms in athletes is influenced by numerous factors, such as atopy, coexisting allergic diseases, smoking and sport discipline. Interactions between these factors are still being analysed. This study confirms earlier suppositions that the prevalence of asthma is fairly high, particularly in younger athletes, aged under 18. Smoking and the coexistence of other allergic diseases significantly affect the development of asthma symptoms in this group.

Questionnaire studies are always associated with a particular possibility of a mistake resulting from wrong answers. However, they remain efficient tools in studies on risk factors of asthma and coexisting diseases are helpful in the prevention of these illnesses.

Modified IUATLD Asthma Questionnaire is also a valuable tool in detection of asthma symptoms.

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