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Asthma prevalence and risk factors analysis in Tricity university students' group

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Abstract

Introduction: Asthma is the most prevalent chronic disease in a young and middle age population worldwide. It is also one of the main reasons for the lost working days and lost days at school. Several epidemiological surveys have evidenced an increase in the prevalence of asthma in Poland. This trend is further evident in urban areas such as Tricity (Gdańsk, Sopot, Gdynia). The aim of the study was to assess the prevalence of the disease as well as the risk factors affecting the university student population.

Material and methods: Two surveys were distributed electronically to students of the four major universities in Tricity. The first survey contained nine questions concerning asthma diagnoses and symptoms. The second survey, which evaluated the occurrence of identified risk factors, was sent to students who answered the first survey. Asthmatics also received an Asthma Control Test (ACT). The results were analyzed using the Statistica 10 software. Study group consisted of 1380 students: 1031 (75%) women and 349 (25%) men; the average age was 22.2.

Results: Asthma was diagnosed in 138 students (9.6%), additionally 76 students (5.5%) reported asthmatic symptoms; however, these students had no previous diagnoses. Asthma tended to occur more frequently in students living in poorly maintained houses (19%) ($p = 0.06$), in contrast to those living in a normal environment (10%). According to their ACTs, 81% of diagnosed patients reported that their asthma was well-controlled.

Conclusions: Asthma is becoming an important issue for Tricity students. Educational activities aimed at raising university students' awareness regarding asthma treatment and control should be implemented.

Key words: asthma, universities, students, prevalence, risk factors

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Introduction

Asthma has become an important issue for developed societies around the world, being the most prevalent chronic disease and the major factor for the lost days at work and school. It has also been proven that the prevalence of asthma has increased in Poland and the province of Pomerania during recent decades [1]; however, this figure has not reached the levels reported in Great Britain [2]. Many studies involving university students have demonstrated that asthma can lead

to other conditions such as depression, sleeping disorders or alcohol abuse [3, 4]. The beginning of university studies is usually associated with moving to a new place of living. For young adults, this often means poorer self-management of various diseases and poorer access to medical care, which may cause the underdiagnosis of newly occurring asthma symptoms and poorer control of the disease. The aim of this study was (1) to assess the level of asthma control and (2) risk factors for the suboptimal course of the disease among university students.

Material and methods

Tricity, being the most important Pomeranian agglomeration, including the city of Gdańsk, Sopot and Gdynia, was chosen for the study. Two surveys were distributed via e-mail among the students of the Gdańsk Medical University, the Gdańsk University of Technology, the University of Gdańsk and the Gdańsk University of Physical Education and Sport in the period from 04.2011 to 12.2011. The first survey consisted of nine questions concerning past asthma diagnoses, wheezing, and other typical asthma symptoms: dyspnoea, shortness of breath, chest tightness and coughing (list of questions in Table 1). Typical asthma symptoms were considered according to Expert Panel Report 3 coordinated by National Heart, Lung, and Blood Institute [5]. Students who confirmed wheezing as well as at least one out of the four typical asthma symptoms and reported symptoms early in the morning were considered asthmatic. The students' demographic data, including age, gender, academic year and department, were also recorded. The second survey

was sent to all respondents and consisted of sixteen questions concerning identified risk factors such as smoking, place of birth, physical activities, place of residence, pets, stress and seasonal symptoms of allergic rhinitis. The respondents were divided into two groups, depending on asthma diagnoses (question 2). The group of respondents diagnosed with asthma also received the Asthma Control Test (ACT) — a reliable survey tool used in asthma control assessment [6]. ACT consists of 5 questions concerning asthma symptoms. For each question patient may receive from 1 to 5 points which indicate level of asthma control. The maximum score of 25 points reflects total control. The data were analyzed using the Statistica 10.0 (Statsoft USA, Tulsa) software program. The study was approved by the Independent Bioethics Commission in Medical University of Gdańsk

Results

1380 students answered the first survey (i.e. approximately 2% of the target 67 942 student population). There were 1031 (75%) women and 349 (25%) men. The average age was 22.23 (ranging from 18 to 36). A group of 138 students (9.6%) reported having been diagnosed with asthma at some point in their medical history. Another group of 76 (5.5%) students reported having suffered from asthma symptoms, though they were never diagnosed. While the asthma diagnosis rate was similar for both women and men (9.8% and 10.8% respectively), women reported asthma-related symptoms more frequently (21% for women and 13% for men). The prevalence of asthma-related symptoms is presented in Figure 1. Symptoms

Table 1. List of questions used in first survey. Questions have been translated to English

1. Have you ever suffered from asthma?
2. Was asthma diagnosed by a physician?
3. Have you ever had difficulties with breathing?
4. Have you ever had shortness of breath after exercise?
5. Have you ever had shortness of breath while at rest?
6. Have you ever heard wheezing while breathing?
7. Have you ever felt chest pressure?
8. Have you ever had attack of non-productive cough?
9. Did any of these symptoms wake you up during night or at dawn?

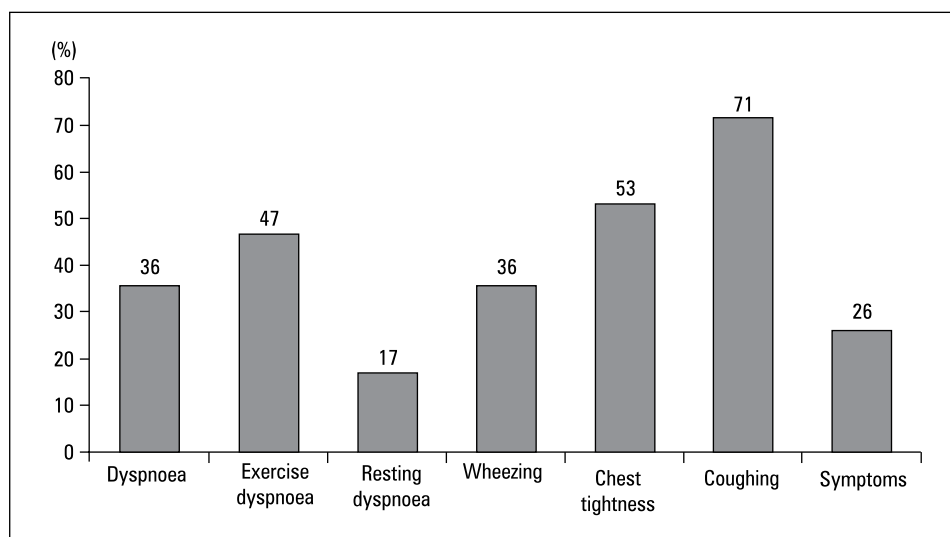


Figure 1. Prevalence of asthma-related symptoms

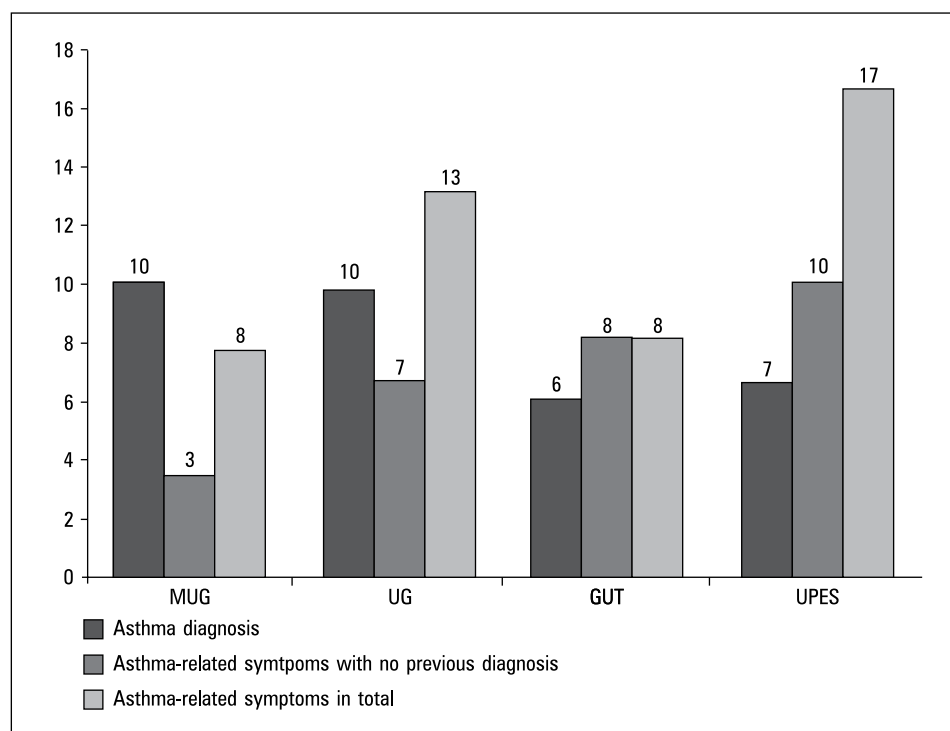


Figure 2. Prevalence of asthma and asthma-related symptoms according to responders' university: Medical University of Gdańsk (MUG), University of Gdańsk (UG), Gdańsk University of Technology, University of Physical Education and Sport (UPES). Light grey bars show the symptoms of asthma in both patients with and without previous diagnosis. In subjects with diagnosed asthma these data may show uncontrolled asthma

were reported more frequently by women than men (21% and 13% respectively $p = 0.0007$). The occurrence of asthma diagnoses and symptoms were divided according to the respondents' universities (Fig. 2) and according to which academic year they studied (Fig. 3). The results differed slightly depending on the respondents' university. The highest asthma prevalence rate was observed in students from the Medical University of Gdańsk and the University of Gdańsk (10.5%), while the lowest rate was observed in students from the University of Technology (6.5%). On the other hand, the prevalence of symptoms with no previous diagnosis was the lowest for students of the Medical University of Gdańsk and the University of Gdańsk (3.5% and 6.2% respectively), while the highest was observed in students from the University of Technology and the University of Physical Education and Sport. The surveys were also categorized in terms of academic departments (24). The highest asthma prevalence was observed in the History Department at UG (19%) and the Medical Science Department at Medical University of Gdańsk (15%); however, most of the departments were not represented due to limited numbers of respondents from those departments, which meant that it was not possible

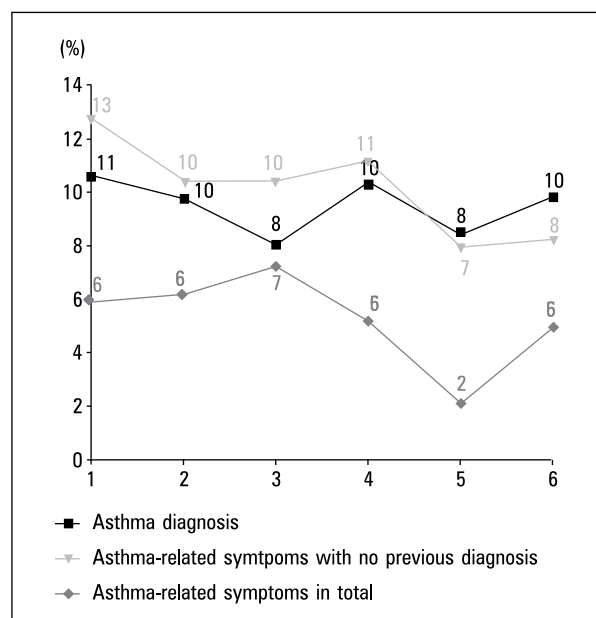


Figure 3. Prevalence of asthma diagnosis and asthma-related symptoms according to study year. Sixth studies year matches faculty of medicine

to accomplish a reliable analysis (only several answers per department). To analyse the impact of the students' academic year on asthma-related

Table 2. Second survey data summary with calculated risk factors of asthma development (odds ratio, confidence interval)

| Asthmatics | Second survey | Non-asthmatics | OR (CI) | p-value |
|------------|---|----------------|------------------|---------|
| 63 | Total answers | 423 | – | – |
| 12 (19%) | Men | 86 (20%) | – | – |
| 51 (81%) | Women | 337 (80%) | – | – |
| 22.5 | Average age | 22.1 | – | – |
| 2.8 | Average year of studies | 2.9 | – | – |
| 6 (9.5%) | Rural area origins | 81 (19%) | 0.44 (0.18–1.06) | 0.069 |
| 57 (90.5%) | Urban area origins | 342 (81%) | 0.44 (0.18–1.06) | 0.069 |
| 12 (19%) | Poorly maintained residence | 45 (10%) | 1.14 (0.60–2.13) | 0.060 |
| 5.4/10 | Average subjective level of stress | 5.9/10 | | |
| 27 (42%) | Allergic rhinitis | 68 (17%) | 3.91 (2.22–6.88) | < 0.001 |
| 9 (14%) | Smoking | 64 (15%) | 0.93 (0.43–2.00) | 1.000 |
| 4 (6%) | Pet cat in place of residence | 42 (10%) | 0.61 (0.21–1.78) | 0.490 |
| 1 (1,5%) | Pet birds in place of residence | 7 (1,6%) | 0.95 (0.13–6.65) | 1.000 |
| 57 (90%) | Central heating | 391 (92%) | 0.65 (0.27–1.55) | 0.613 |
| 22 (35%) | Carpets at place of residence | 156 (36%) | 0.91 (0.52–1.60) | 0.888 |
| 23 (36%) | Clothed furniture at place of residence | 135 (32%) | 1.22 (0.70–2.13) | 0.473 |

symptoms, the prevalence rate was calculated for each academic year. The percentage of students suffering from symptoms decreased from 12,7% for the first year students to 7,9% for the fifth year students (8,1% in the faculty of medicine). 489 out of 1380 students responded to the second survey (Table 2). Among them were 98 men (20%) and 388 women (80%). The symptoms of allergic rhinitis were found more frequently in the asthmatic population (42% vs. 17%) ($p < 0.0001$). The prevalence of allergic rhinitis was the most significant risk factor of asthma development (OR 3.9 [CI 2.2–6.8], $p = 0,000001$). Asthma tended to occur more frequently among students who lived in poorly maintained houses (19%), as opposed to those who lived in a normal environment (10%; $p = 0.06$). The majority of students (75%) undertook physical activity for 0.5–5 hours a week. Asthma did not have any significant impact on their capacity for exertion; however, 11% of asthmatics confirmed that asthma-related symptoms prevented them from participating in any physical training at all. 63 out of 138 asthmatic students responded to Asthma Control Test (ACT). The results showed uncontrolled asthma in 12 (19%) asthmatic students. 51 students (81%) reported that their asthma was well controlled, and among them 19 (30%) reported that it was totally controlled. Student with uncontrolled asthma declared slightly more symptoms in the first survey

(66%) compared to those with well-controlled disease. When comparing students with respect to their university, the well controlled disease was achieved more frequently by Medical University of Gdańsk students (27 of 30 students; 90% well-controlled asthma) in comparison with University of Gdańsk students (21 of 29 students; 42% well-controlled asthma) ($p = 0.052$). ACT results were worse in patients with allergic rhinitis (74% of well controlled asthma). 73 (15%) out of all the students that responded to the second survey reported smoking cigarettes. Surprisingly, the prevalence of smoking did not differ according to asthma diagnoses, and smoking did not have a significant impact on ACTs. No correlation between smoking and cough prevalence was observed ($p = 1.00$).

Discussion

The primary finding of our study was the high prevalence of asthma among university students who responded to our surveys, of whom about 35% did not have a proper diagnosis at the time of the study. The optimal control of the disease was observed in only 30% of the population, while in 19% lack of asthma control was found. Secondly we were able to identify factors influencing disease occurrence (allergic rhinitis, poor living conditions, lack of proper medical treatment due

to change of place of residence at the beginning of university studies). Epidemiological asthma studies usually estimate asthma diagnoses for just under 10% of the Polish population. According to the ECAP study (Epidemiology of Allergic Diseases in Poland), the prevalence of asthma in adults is 9% [7]. This 10% of diagnosed cases of asthma (with the discovery during this study of an additional 5.5% of patients suffering from symptoms but without a diagnosis) may be related to the fact that the respondents were of a younger age, given that the prevalence of asthma usually decreases in correlation with population age (11% for children according to the ECAP). Similar results were described in the United States among university students participating in a study by the American College Health Association (ACHA): with an asthma prevalence of 9.4% [8].

Wheezing was a main asthma symptom according to the ECAP study, with a rate of up to 12.8% of the urban population [7]. Studies involving university students in Serbia, Turkey and Thailand found symptom prevalence rates of 4%, 7% and 10% respectively [9–11]. According to our data, 35% of university students have experienced wheezing. The reason for this discrepancy can be explained by looking at the data collection methodology. In the aforementioned studies, questions related to asthma symptoms were limited to the year just before the assessment, whereas in our study, symptoms that had occurred at any time were taken into account.

The majority (75%) of respondents were women, as previously mentioned, which is no surprise as ca. 60% of university students in the region are females [12]. In addition, similarly to data from other studies, women respond to mail surveys more frequently [13]. High symptom prevalence among female subjects may be explained by previous findings that focused on gender differences in asthma, which showed that, among patients suffering from mild but persistent asthma, women reported a lower level of control of their condition. It is therefore generally accepted that male patients, in spite of more severe bronchial obstruction, reported a level of asthma control similar to that of female patients [14].

The ECAP study showed a significant relationship between living conditions and the occurrence of asthma-related symptoms [7], which was also observed in results presented hereinabove. However, a decade after the ECAP completion, this risk factor is now much less significant, given that living conditions in Poland have been improving during this period [7, 15].

The differences in asthma and asthma-related symptoms occurrence according to subject's university may be a result of the better medical education and greater awareness regarding symptoms among the Medical University students.

The trend of lowering asthma-related symptoms throughout the time of studies can be explained by taking into account the students' better access to medical care whilst living at a new residence during their studies at the university. Moreover, as previously mentioned, asthma prevalence rates usually decrease in correlation with a population's average age.

The percentage of smokers (15%) was low in comparison with values published by the Central Statistical Office in Poland for the entire population (29%). This low percentage is no surprise, given that smoking usually affects older, less educated and socioeconomically deprived populations [16, 17]. The prevalence of smoking did not differ according to asthma diagnoses, which is a surprise, given that one would expect that patients suffering from asthma would refrain from smoking. However, educational activities should be planned for smoking asthmatics.

According to recent data, the most important risk factor affecting asthma occurrence is allergic rhinitis [18, 19]. The ECAP study found the prevalence rate of the disease to be 30% in adults [7]. Similarly, in accordance with the presented data, 30% of students suffering from allergic rhinitis were diagnosed with asthma. These facts may suggest that patients suffering from allergic rhinitis should be tested for asthma. In addition, the proper treatment of allergic rhinitis may prevent the onset of asthma or improve asthma control.

The ACT questionnaire was sent to the students who reported an asthma diagnosis in their medical history. As suspected, the results were better for the Medical University University of Gdańsk students, which may confirm the impact of education on disease control. Although a lack of disease control was observed, these results are still satisfying in comparison to other populations. Well-controlled asthma was observed in 59% of the French population, 36% of Italians and in 53% of Spanish adult patients. This difference may be partially explained by the young age of the study's respondents, as older patients usually receive achieve ACT scores [20]. Surprisingly smoking did not have a significant impact on asthma control levels in our study. Nevertheless, tobacco is considered a risk factor in terms of the severity of asthma [21, 22].

Limitations

Finally, several flaws of the study should be mentioned. Only 2% of Tricity students responded to the first survey, which may not represent the entire target population. Also, students who had previously suffered from asthma-related health issues were more likely to respond to an e-mail survey concerning asthma. Gender difference in internet survey responses has been discussed above.

Conclusions

Asthma is an important issue for the university student population in Tricity. The prevalence rate is considerably higher among those students at the beginning of their education and those studying at the Faculties of History and Medical Sciences. Further activities should be implemented in order to support better education of students, as well as the improved organisation of student healthcare, as these appear to be the most important factors in terms of the diagnosis and control of asthma.

Conflict of interest

The authors declare no conflict of interest.

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