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RESULTS FROM THE SCREENING FOR COPD PERFORMED AMONG THE CITIZENS OF STARA ZAGORA

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ABSTRACT
The chronic obstructive pulmonary disease (COPD) is a fatal disease, which impede breathing. According to the epidemiological data, 210 million people worldwide have suffered from COPD. COPD is a disease that can be prevented and treated. However despite the high incidence of COPD the people awareness is extremely insufficient - 75% of all ailing people do not know that have suffered from this disease. In this respect on the day of the fight against COPD (19.11.2009) with assistance of Medical Faculty and Department of Internal Medicine at the University Hospital, Trakia University was conducted a screening for COPD among urban population of Stara Zagora. Although the screening covered only a small part of the citizens of Stara Zagora (186 individuals), it has proved its effectiveness giving opportunity new cases among persons having no clinical symptoms for COPD to be found. The collected data indicated clearly about the gravity of the situation for COPD and risk factors and determined the requirment people to be informed about the risk factors for development of COPD and other chronic lung diseases.

Key words: COPD, risk factors, spirometry, screening method

INTRODUCTION

The chronic obstructive pulmonary disease (COPD) is a fatal disease, which impede breathing. According to the epidemiological data, 210 million people worldwide have suffered from COPD. During the year of 2005 more than 3 million people have died from COPD, which is about 5% of all death people in this year (1-3). Almost 90% of all cases have occurred in countries with low living standard. The main reason for development of COPD is tobacco smoke (smoking and secondary inhale of smoke) (1, 3). At the present time COPD affects men and women almost equally, because of raising number of female smokers (mainly in countries with high living standard).

COPD is a disease that can be prevented and treated. At a rough estimate, if no measures are taken to reduce the risk of developing COPD, especially in struggle against smoking, the overall mortality from COPD in the next 10 years will exceed 30% (4). It is considered that until 2020 COPD will be the third main reason (post heart attack and stroke) causing death among human population (5). Despite the high incidence of COPD the people awareness is extremely insufficient - 75% of all ailing people do not know that have suffered from this disease.

Character of diseases

The chronic obstructive pulmonary is a disease of the lungs characterized by limitation of airflow in the air-ways – partially or completely irreversible. Restriction of airflow

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is due to inflammation of lung tissue caused by the inhalation of gases and particles from the environment (6). COPD includes two main components - chronic bronchitis and pulmonary emphysema. Chronic bronchitis is defined as the presence of inflammation in the air-ways results in coughing and phlegm lasting at least 3 months in two consecutive years. In chronic bronchitis occurs restructuring of the air-way wall, which results in narrow entrance of bronchial tubes. This leads to permanent restriction of air flow in them (2, 7).

Pulmonary emphysema is a permanent expansion of pulmonary alveoli (sacs), resulting in destruction of elastic fibers in their walls. The destruction of alveolus walls cause collapse of all small air-ways (bronhioli), which effects in violation of the lungs function (8, 9).

Diagnosis (10)
It is based on anamnesis and examination of the lungs ventilation function. The diagnose needs to be confirmed by respiratory test, that shows the inhale and exhale quantity of air by a person, and what accordingly is the speed of the air (10). Because of that COPD develops slowly, it is often diagnosed in people around and over 40 years of age.

To assess the reversibility of obstructive disorders of pulmonary ventilation is made pharmacological test. Baseline FEV1 is important to compare the same parameters after 30-40 minutes after inhalation of sympathomimetic / 400 mg or cholinolityc / 80 mg / broncholitics or a combination of different mechanism of action. Increase of FEV1 over 12-15% or over 200 ml is an indicator of reversibility of bronchial obstruction. Bronchial asthma is characterized by high air volume, and for COPD – by minimum raises. This sample is a part of criteria for diagnosis of COPD .

Risk factors for COPD
Risk factors for COPD may be internal (factors by the human organism) and external (environmental factors) (3, 11). The main external risk factor that causes COPD is smoking. About 15% of all smokers develop the disease. Because of this some people call COPD “the smoker’s disease” (3).

Other risk factors are: contaminated ambient air, frequent respiratory infections, intensive and prolonged exposure to harmful substances in the work environment (dust and chemicals), sociological-economical status (for example - low intake of antioxidant vitamins A, C and E and others), gender, age and others (1).

Staging of COPD by GOLD (2009) (10)
Stage I: mild
FEV1/FVC < 0.70; FEV1 80% predicted

Stage II: moderate
FEV1/FVC < 0.70; 50% FEV1 < 80% predicted

Stage III: severe FEV1/FVC < 0.70; 30% FEV1 < 50% predicted

Stage IV: very severe
FEV1/FVC < 0.70; FEV1 < 30% predicted *or* FEV1 < 50% predicted plus chronic respiratory failure*

On the day of the fight against COPD (19.11.2009) with assistance of Medical Faculty and Department of Internal Medicine at the University Hospital, Trakia University was conducted a screening for COPD among urban population of Stara Zagora.

The aim of the that screening was to find out persons suspected for this disease and to investigate the influence of some risk factors for prevalence of COPD and other chronic lung diseases in the Stara Zagora.

METHODS

All surveyed persons primarily were self-evaluated for risk of COPD by questionnaires containing 5 questions. The suspected once according to the self-assessment test were examined by performing the spirometric examination with a field spirometer Vitalograph COPD-6^{MT} Model 4000. The spirometric evaluation at the Clinic of Internal Medicine, University Hospital was performed using Viasys^{TM} Flow Screen. The demographic, physiological and spirometric data were collected and further they were analyses using StatView^{TM} v.4.53. for Windows (Abacus Concepts, Inc.). The descriptive statistical tests, including the mean, standard deviation, and median, were calculated according to the standard methods. The frequencies of distribution in contingency tables were analyzed using $\chi 2$ test and Fisher’s exact test. The differences of the quantitative variables between 2 or more independent groups were analyzed with ANOVA test

followed by PostHoc test or with Mann-Whitney U test and Kruskal-Wallis test. The correlation between two quantitative variables was assessed by linear correlation analysis or Spearman rank correlation test. Analyses with $p<0.05$ were considered statistically significant.

RESULTS

Spirometric assessment

There were 184 persons, who attended the screening: 109 women and 75 men. Information about family history was obtained for 168 persons: 23 individuals announced a family history for COPD and 17 for lung cancer.

The assessed spirometric values of all surveyed persons were as the following: the mean of FEV1 % predicted was 85.79±21%, ranging from 21-140 and the mean of FEV1/VFC (%) was 95.60±18% ranging from 43 to 133.

Based on the field spirometric assessment and the accepted criteria for diagnosis of COPD (10), we determined the suspected for COPD screened individuals: 12 (6.8%) had FEV1/FVC <70% and 60 (33.3%) showed FEV1<80% pr. Individuals with spirometric values covering the criteria for diagnosis of COPD were 10 (5.5%) that we evaluated as suspected for COPD **(Figure 1)**. All individuals both suspected and non-suspected were invited to the Clinic of Internal Medicine of University Hospital for examination and final diagnosis.

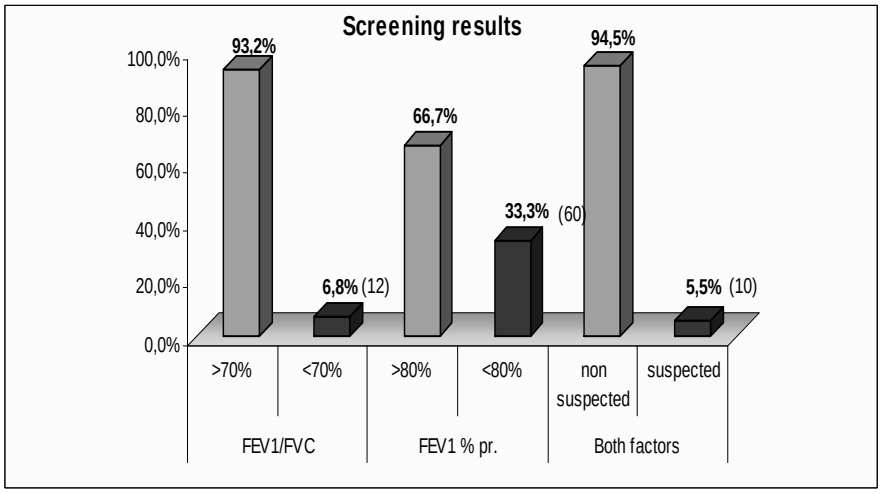


Figure 1. Defining of suspected for COPD individuals passed the screening according to the spirometric values.

Assessment of the gender and of the age risk factors

We fund that surveyed women had significantly lower FEV_1 % of predicted compared to the men attended the screening **(Figure 2).**

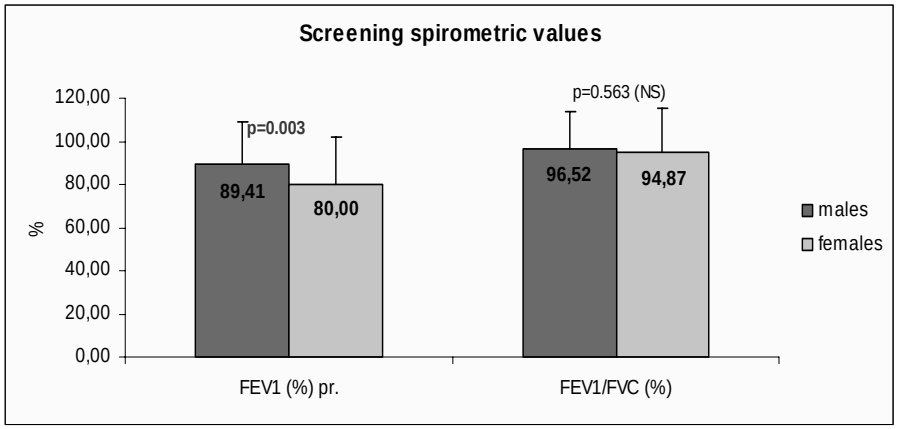
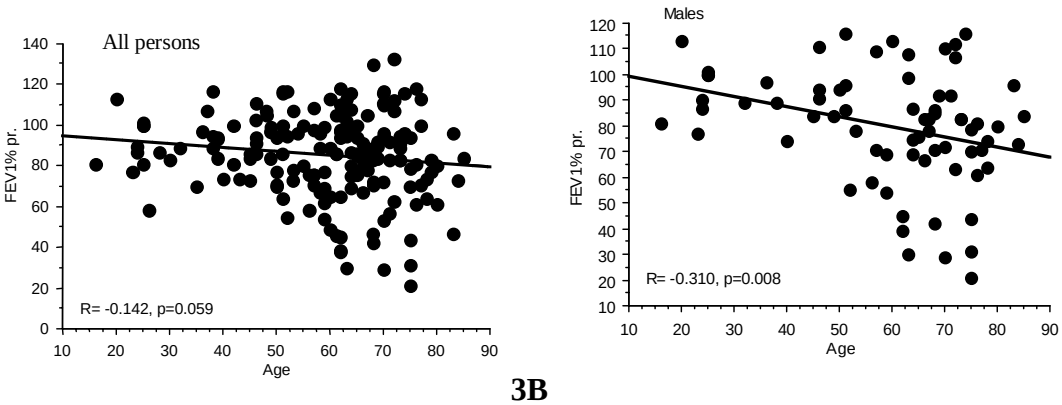


Figure 2. Spirometric values of females and males passed the screening.

The average age of screened persons was 59±15 years. The age of women and men was commensurable and varied between 25 and 83 years (mean of 58.8±12 years) among women and between 16 and 85 years (mean of 59.1±18 years) among men (p=0.896). We detected a marginal statistical trend for a very weak negative correlation between the age of the persons and FEV1% of predicted **(Figure 3A)**. It reached statistical significance among the group of men (p=0.008) **(Figura 3B)**.

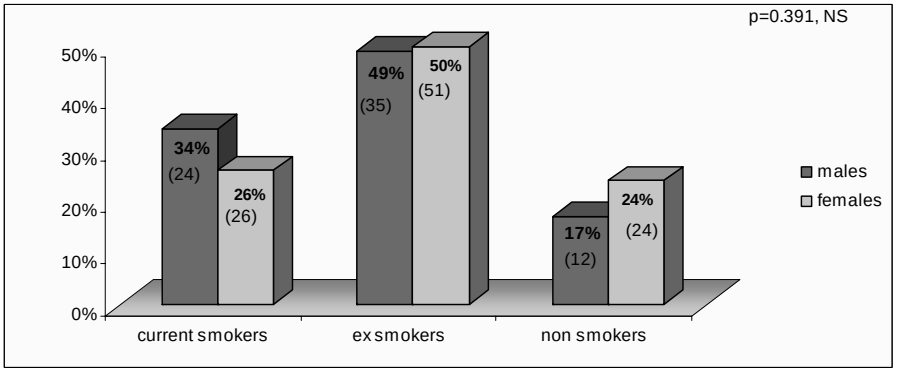


3A **3B**

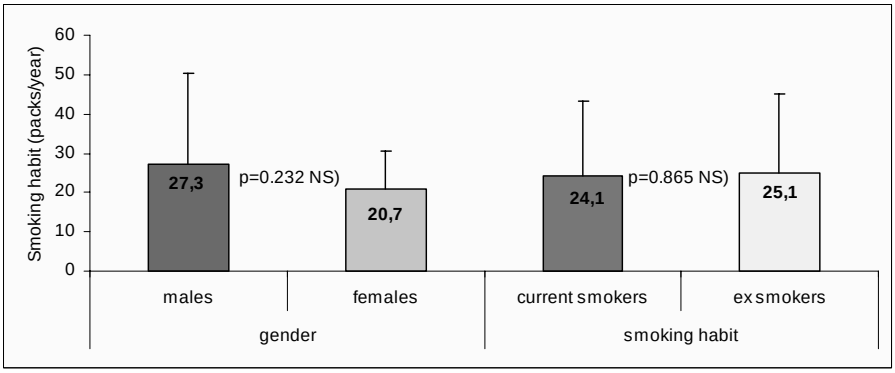
Figure 3. Correlation of spirometric values (FEV_1) with the age of all surveyed persons (3A) and only of males included in the screening (3B)

Assessment of smoking as a risk factor

The highest percentage of non-smokers is among women 24% vs. 17% in men. Former smokers were half of each group of surveyed persons divided by gender; whereas the current smokers were 34% of men and 26% of women **(Figure 4A)**. Men had worse, although not statistically significant, smoking habits evaluated as packs per year compared to female **(Figure 4B)**, whereas there was no difference in the number of smoked cigarettes by former and current smokers **(Figure 4B)**.



4A



4B

Figure 4. Figure 4. The proportion of nonsmokers, current and ex-smokers among the surveyed men and women (4A) and the smoking habits of smokers evaluated as packs per year (4B).

When we correlated the number of smoked cigarettes with the obtained spirometric values we obtained a trend for a very weak negative correlation with VEF1 % pr. (R=-0.170, p=0.260). This negative correlation appeared to be stronger among smoking men (R=-0.281) **(Figure 5)**, although it did not reach statistical significance (p=0.155).

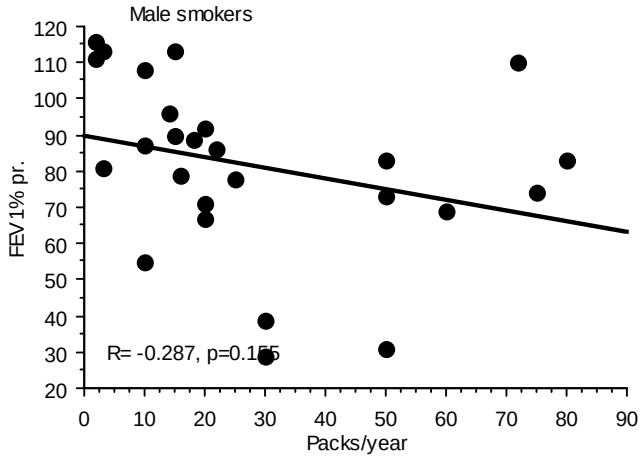


Figure 5. Correlation of the of spirometric values (FEV1) with smoking habits of male smokers evaluated as packs per year.

Assessment of body weight as a risk factor

Based on the collected data for weight and height of the surveyed individuals we calculated the their body mass index and divided them in groups according to the accepted criteria: for men: BMI <20 – low weight; 20 > BMI <24.9 - normal weight; 25> BMI <29.9 –overweight; and BMI> 30 – obesity: for women: BMI <19 – low weight; 19 > BMI <23.9 - normal weight; 24> BMI <29.9 –overweight; and BMI> 30 – obesity. The mean BMI of men was 27.61±16 varying between 18.5 and 37.1 (median of 27.5), and the mean BMI of women was very close, 27.71±27 and varied between16.76 and 50.2 (median of 27.2) **(Figure 6).**

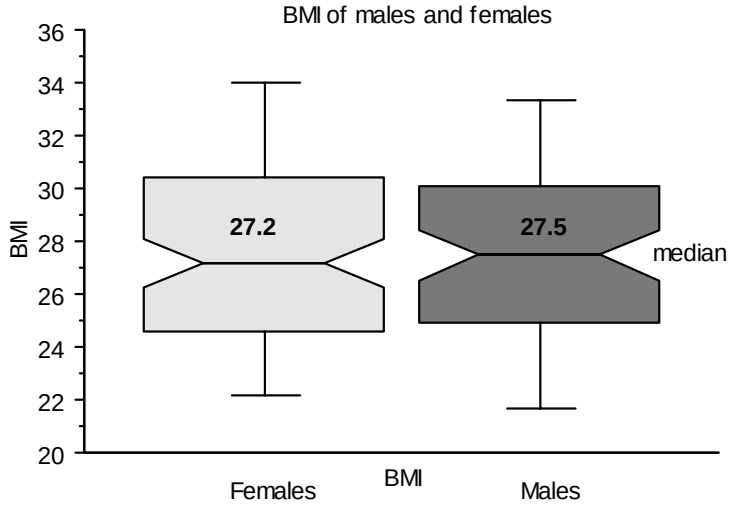


Figure 6. Comparison of BMI of males and females included in the screening for COPD.

We observed that most of the individuals of both sexes were overweight 49% of men and 48% of women. In addition a quite high proportion of the surveyed persons were also obese: 29% of men and 26% of women **(Figure 7).** Low body weight was found in only 3% of men and women.

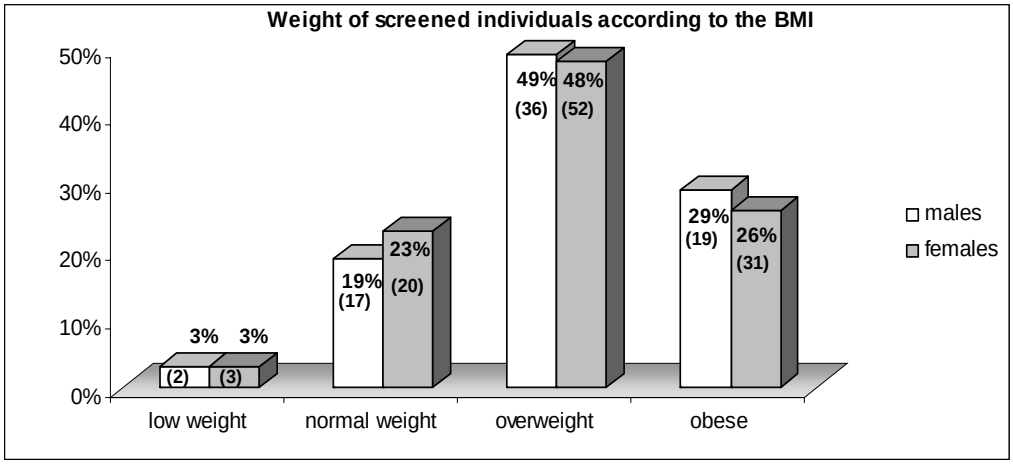


Figure 7. Frequencies of low weight, normal weight, overweight and obesity among the screened men and women.

When comparing the BMI of suspected and unsuspected persons, we observed a trend that suspects for COPD individuals had higher BMI. This finding was statistically significant in the group of women: the suspected women had significantly higher BMI than the others, while among men such a difference was not observed **(Figure 8).**

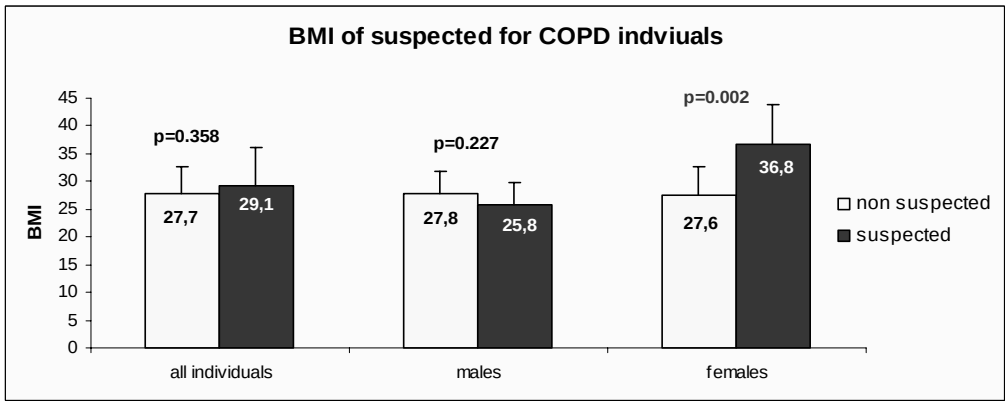


Figure 8. Comparison of BMI between non-suspected and suspected for COPD screened persons.

Among the group of individuals passed screening conducted by us, we found that gender is a significant factor associated with the risk of COPD: 9.9% of the men were suspected, whereas only 2.8% of the women had spirometric values directing for COPD **(Figure 9)**. There was also a tend showing that obesity might be considered as risk factor for COPD. Interestingly, the smoking habit did not show any association with the frequency of suspicion of COPD **(Figure 9)**.

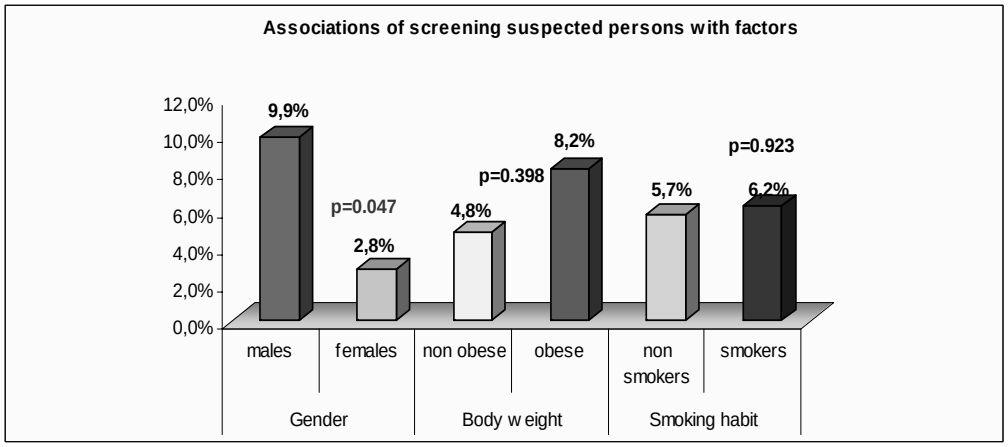


Figure 9. Associations of studied risk factors with the frequency of suspected persons defined by the screening method.

Sensitivity and specificity of screening

As we mentioned above all individuals, both suspected and non-suspected who passed the screening procedure, were invited to the Clinic of Internal Medicine of University Hospital for medical examination and final diagnosis. From them 18 persons responded and were examined by specialist pulmonologist. Two of them were found suffering from Bronchial asthma, 9 from COPD, and the rest of 7 individuals were healthy.

A test/screening is considered reliable, if it provides valid and sustainable results and accurately categorizes individuals into groups with and without disease, which is measured by its sensitivity and specificity. Based on the results obtained during the screening and that after the medical examination, we found that the performed screening has a sensitivity of 18.2% and specificity of 71.4%. Respectively, the positive prognostic value was 50% whereas the negative prognostic value was 35.7%.

CONCLUSIONS

No matted that screening covered only a small part of the citizens of Stara Zagora, the collected data indicates clearly about the gravity of the situation. It is required people to be informed about the risk factors for development of COPD and other chronic lung diseases. The screening method has proved its effectiveness giving opportunity new cases among persons having no clinical symptoms for COPD to be found.

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