

UDC 616.233-002.2:614.253.8

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# Prevalence of undiagnosed chronic obstructive pulmonary disease among individuals considering themselves healthy

**Key words:** *chronic obstructive pulmonary disease, early diagnostics, the prevalence of COPD, cough, shortness of breath*

In recent years, we have witnessed an increase in incidence of chronic respiratory diseases. A special place among them belongs to chronic obstructive pulmonary disease (COPD), which represents a significant medical and social problem [1]. According to the World Health Organization (WHO), today about 210 mln people throughout the world are suffering from this disease [3].

Until recently, no reliable information on the prevalence of COPD has been available in Ukraine, as the disease has not been considered as a separate nosological unit in accounting and statistical reporting documentation. Allocation of COPD to a separate statistical count has already presented a significant result. If 377,267 cases of COPD were registered in 2006, in 2010 the figure arrived at 420,083, which means that 42,816 cases were first diagnosed ones [2]. However, according to preliminary data of unofficial statistics, current epidemiological situation is characterized by 7 % incidence of COPD in Ukraine, or approximately 3 mln people [4]. Upon that, disability and mortality rates are rising fastest, especially in men of working age.

The problem of diagnostics and treatment of COPD is highlighted in Order of the Ministry of Health of Ukraine No. 555 dated 27.06.2013, according to which COPD is considered a frequent disease that may be prevented and treated, characterized by persistent, usually progressive limitation of airway patency and associated with abnormal chronic inflammatory response of respiratory tract and lung to impact of harmful particles and gases.

Despite substantial media profile and widespread introduction of spirometry, the problem of diagnosing COPD is still one of challenging issues. First, patients do not immediately seek treatment upon the appearance of such

symptoms as shortness of breath and cough. Second, the emergence of these symptoms is often associated with the development of cardiac symptoms. Third, most general practitioners underestimate the importance of risk factors, thus contributing to COPD diagnostics well in moderate and severe stages of the disease.

Therefore, the works that demonstrate true prevalence of undiagnosed COPD and develop algorithms for diagnostics and screening of patients for further examination present topical and up-to-date agenda.

**Objective of the study:** to establish the prevalence of undiagnosed COPD at different stages among individuals, regularly subjected to medical examinations, and considered themselves healthy.

## Materials and methods

The study was conducted in several phases. In the first phase, we surveyed patients using the original questionnaire developed on the basis of GOLD questionnaires (2012, 2015) and Order of MOH of Ukraine No 555 dated 06.27.2013. [5, 6]. The questions therein allow allocating patients depending on the severity of clinical manifestation of respiratory symptoms and COPD risk factors according to a total score (Table 1).

We questioned 525 people over 35 year-old, who had no history of any chronic respiratory diseases, mean age –  $(46.7 \pm 6.3)$ , including 291 men (55.4 %), the average age –  $(46.7 \pm 6.3)$  and 234 women (44.6 %), average age –  $(56.7 \pm 4.7)$ . All survey subjects worked in organized group and regularly, twice yearly, held medical examination.

Minimum score under the questionnaire identified in our survey was 10, while the maximum one was 29 points. The average score was  $(19.4 \pm 1.6)$  points, medial – 18,

COPD Early Diagnostic Questionnaire					Table 1
COPD Diagnostic Questionnaire					
Full Name _____ Gender _____					
Address _____ Telephone _____					
Answer questions listed below, highlighting a number in the top right corner of the square					
1) → Indicate your age (underline)					
Under 40 1	41-49 2	50-59 3	60-69 4	>70 5	
2) → Have your relatives suffered from chronic obstructive pulmonary disease or asthma?					
No one 1 suffered	Relatives through 2 father or mother	Brothers, sisters, 3 children	Father or mother 4	Father and mother 5	
3) → Smoking history ( underline)					
Non-smoker 1	Less than 5 years2	5 – 10 years 3	11 – 20 years 4	21 – 30 years 5	
4) → How often have you suffered from cough? ( underline )					
Never 1	Hardly ever 2	Sometimes 3	Often 4	Very often 5	
5) → Do you feel shortness of breath with little exertion (stair climbing, fast walking)?					
Never 1	Hardly ever 2	Sometimes 3	Often 4	Very often 5	
6) → Have you suffered from acute respiratory infections, bronchitis, flu this year?					
1 time 1	2 times 2	3 times 3	4 times 4	5 times 5	
7) → Have you ever felt wheezing and chest tightness?					
No 1	Hardly ever 2	Sometimes 3	Often 4	Very often 5	
8) → Could you may be coughing, wheezing, sneezing when exposed to certain smells, dust, perfume, and aerosols?					
No 1	Hardly ever 2	Sometimes 3	Often 4	Very often 5	
9) → Have you ever had a runny nose, itching, rash on the body when taking medicines, insect bites, and meals?					
No 1	Hardly ever 2	Sometimes 3	Often 4	Very often 5	
10) → Have you ever had cough or breathing tightness when coming from a warm room to cold or from cold to a warm one?					
No 1	Hardly ever 2	Sometimes 3	Often 4	Very often 5	
Calculate total score _____					
The Questionnaire was developed according to Order of the MoH of Ukraine No. 555 dated 27.06.2013					

and interquartile range – 12 and 24. 78 % subjects with Tiffeneau index > 70 % scored 10–14, while only 21 % scored 15–18 points. To make a prognosis of no bronchial obstruction syndrome, the optimal score of the questionnaire is < 15 points. For individuals with Tiffeneau index ≤ 70 %, the optimal score for diagnosing the bronchial obstruction syndrome ranges within 19–25 points. With due regard to this, we used score > 18 points as a diagnostic criterion for bronchial obstruction syndrome in the future. The prognosis informativity of such value was equal to 94 %, sensitivity – 91 %, and specificity – 100 %.

In the next phase, subjects scored 18 and over underwent spirometry and bronchodilator test using salbutamol, 400 µg and were surveyed under a Modified Medical Research Council (mMRC) Dyspnea Scale, the COPD assessment test (CAT) in order to determine COPD clinical group according to Order of the Ministry of Health of Ukraine No. 555 dated 27.05.2013. The study involved 136 patients aged 38 to 77 (average age – 51.5 ± 0.8). Gender and age characteristics of the patients are presented in Table 2.

The study population involved 81 (59.6 %) men and 55 (40.4 %) women. The ratio of men and women was 1.5 to 1.0 ( $p = 0.006$ ). The age distribution of the patients demonstrated statistically significant dominance of patients under 50 ( $p < 0.0001$ ) and the lowest portion of subjects over 70 ( $p < 0.006$ ).

Statistical analysis of the results was performed on a PC under methods of variation statistics using MicroSoft Excel

Gender and age characteristics of patients			Table 2
Description	Total (n = 136)		
	In absolute figures	%	
Male	81	59.6	
Female	55	40.4	
35–50 year-old	80	58.8	
50–59 year-old	36	26.5	
60–69 year-old	16	11.8	
Over 70	4	2.9	

2003 and StatSoft Statistica v. 6.1 software (License version No.VHHR901E246022FA is owned by the Medical-Diagnostic Center of Pyrohov Memorial National Medical University, Vinnytsia, according to the recommendations (O. Rebrov, 2006). Statistically important were considered comparison results with error probability  $p < 0.05$ .

### Results of the study

Among 525 surveyed subjects, 216 (41.2 %) patients were found symptoms of chronic nonspecific respiratory diseases, including 115 (53.2 %) female, and 101 (46.8 %) male patients, with prevailing age under 50 both in men and women.

A detailed examination of 136 patients from the group with high risk of COPD using computer spirometry revealed decline of Tiffeneau index ( $FEV_1/FVC$ ) under 70 % in 79 (58.1 %) patients, regarded as the first diagnosis of COPD. 57 patients (41.9 %) scored 18 or more under the questionnaire, were not verified the diagnosis of COPD (Fig. 1).

Among patients diagnosed with COPD, 44 (55.7 %) subjects were office workers and 35 (44.3 %) subjects were manual workers. 23 (16.9 %) patients reported good material status, an average one – 92 (67.6 %) patients, bad material status reported 19 (14.0 %) and a very bad – 2 (1.5 %) patients.

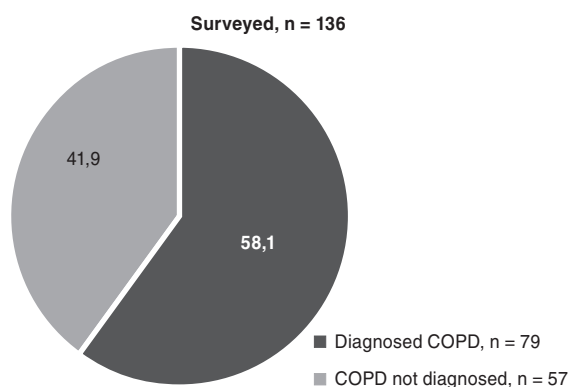


Fig. 1 Patients diagnosed COPD under results of spirometry

Comorbidity structure					
Comorbidity	Patients, diagnosed COPD (n = 79)		Patients, Not diagnosed COPD (n = 57)		P
	Abs.	%	Abs.	%	
Hypertension	30	38.0	24	42.1	0.62
Coronary heart disease	11	13.9	8	14.0	0.98
Myocardial infarction history	0	0	2	3.5	0.09
Diabetes mellitus	4	5.1	2	3.5	0.66
Thyroid disease	8	10.1	4	7.0	0.52
Peptic ulcer	21	26.6	7	12.3	0.04
Gallstone disease	8	10.1	2	3.5	0.14
Pancreatitis	35	44.3	9	15.8	0.0004
Pyelonephritis	18	22.8	9	15.8	0.31
Urolithiasis	20	25.3	11	19.3	0.40

Patients with average material status ( $p < 0.0001$ ) significantly prevailed in the study, while the most rarely met were patients with very poor material status ( $p < 0.0001$ ).

We assessed the structure of comorbidity in patients with first diagnosed COPD and in those without verified diagnosis (Table 3). We did not find any significant difference between incidence of comorbidity of the circulatory system (hypertension, ischemic heart disease), the urinary system (pyelonephritis, urolithiasis), and the endocrine system (diabetes, thyroid disease) in both groups of respondents. Patients with first diagnosed COPD had significantly higher incidence of digestive system pathology with peptic ulcer reported by 21 (26.6 %) patients with COPD, and by 7 (12.3 %) patients without COPD ( $p = 0.04$ ); chronic pancreatitis reported 35 (44.3 %) patients with COPD and 9 (15.8 %) patients without COPD ( $p = 0.0004$ ).

Among respondents first diagnosed COPD, 53 (67.1 %) individuals were smokers, including 7 (8.9 %) former smokers. The history of smoking (including former) was  $(15.07 \pm 0.95)$  years. Smoking index was 13.5 packs/years. These figures were significantly higher than those in the non-COPD group.

We assessed the incidence of cough among the patients surveyed (Fig. 2). We found that 77 (97.5 %) patients with first diagnosed COPD complained of cough. 76 people with COPD (96.2 %) among surveyed patients complained about shortness of breath with little exertion. We revealed, that 66 subjects (83.5 %) complained about feeling of wheezing and labored breathing. We estimated the incidence of wheezing among surveyed first diagnosed patients. 50 subjects (63.3 %) complained of this disease manifestation.

The degree of dyspnea was assessed under mMDR scale and patients scored 1 and 2 points – 38 subjects in each group (48 %) were found the largest population.

We divided patients with first diagnosed COPD in clinical groups. Group A – low risk of adverse events in the future, a small number of symptoms – 28 patients (35.4 %), group B – low risk of adverse events in the future, a large number of symptoms – 19 patients (24.0 %), group C – high risk of adverse events in the future, a small number of symptoms – 12 patients (15.0 %); and Group D – high risk of adverse events in the future, a large number of symptoms – 20 patients (25.3 %). It is worth noting patients with first diagnosed COPD (Fig. 3, 4).

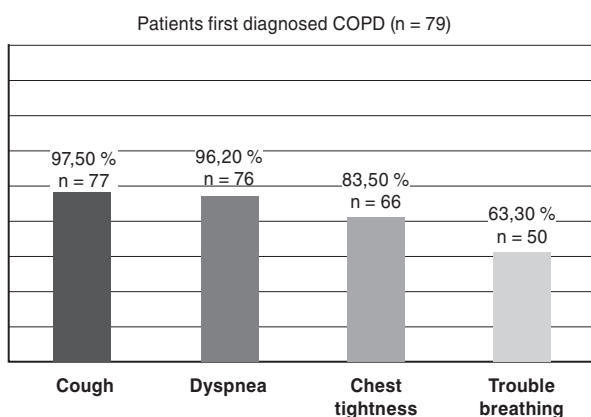


Fig. 2. COPD manifestations in patients with first diagnosed COPD

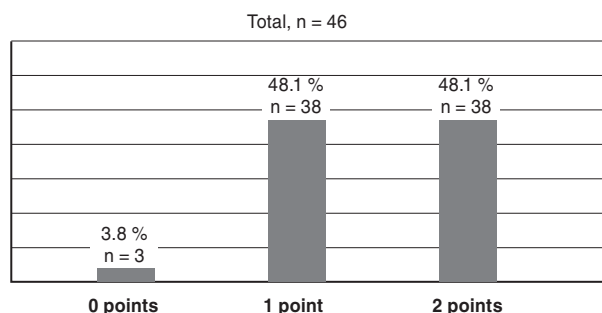


Fig. 3. Degree of dyspnea under mMDR in patients with COPD, average score ( $1.44 \pm 0.07$ )

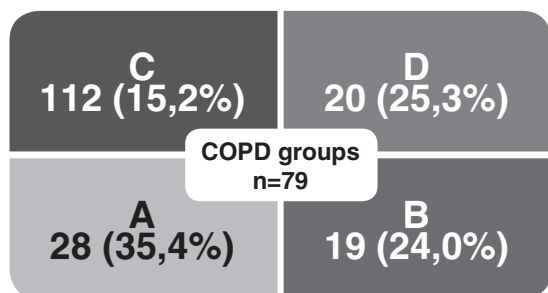


Fig. 4. Clinical groups of patients with first diagnosed COPD

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## Conclusions

Given that COPD is a leader in the world in prevalence, mortality, disability and has an adverse effect on quality of life, early diagnosis of the disease is crucial for further treatment of the pathology.

We found that among individuals, who regularly underwent medical examinations, 216 people (41.1 %) presented various respiratory symptoms while answering a questionnaire. Among these patients, 79 (58.1 %) individuals were first diagnosed COPD under the results of spirometry.

Therefore, our analysis suggests of significant number of people with undiagnosed COPD. So, 14.9 % of individuals who regularly pass medical examinations had undiagnosed COPD. These patients complained of cough, shortness of breath, difficulty breathing, and improper management by general practitioners. 59.0 % of these patients were diagnosed COPD A and B, while 41 % of patients — C and D.

The results of the study will allow us developing, scientifically substantiating and implementing the original questionnaire for selecting patients for subsequent functional examination at health care institutions.

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## ПОШИРЕНІСТЬ НЕДІАГНОСТОВАНОГО ХРОНІЧНОГО ОБСТРУКТИВНОГО ЗАХВОРЮВАННЯ ЛЕГЕНЬ СЕРЕД ОСІБ, ЩО ВВАЖАЮТЬ СЕБЕ ЗДОРОВИМИ

Н.В. Черепій

### Резюме

Попри суттєву інформаційну активність, широке впровадження спірографії, проблема діагностики хронічного обструктивного захворювання легень (ХОЗЛ) залишається однією з актуальних. По-перше, при появі таких симптомів, як задишка та кашель, пацієнти не одразу звертаються за медичною допомогою. По-друге, поява цих симптомів часто асоціюється з розвитком симптомів серцево-судинних захворювань. По-третє, більшість лікарів загальної практики недооцінюють значення факторів ризику, що сприяє діагностиці ХОЗЛ у більшості випадків середнього ступеня тяжкості та тяжкого.

**Мета роботи:** встановити поширеність недіагнованого ХОЗЛ різних стадій серед осіб, що регулярно проходять медичні огляди та вважають себе здоровими.

**Матеріали та методи дослідження.** Нами встановлено, що серед осіб, які регулярно проходять медичні огляди, 216 (41,1 %) осіб, за результатами анкетування, пред'являють різні респіраторні симптоми, характерні для захворювань органів дихання. Серед цих пацієнтів у 79 (58,1 %) за результатами спірографії було вперше діагновано ХОЗЛ. Серед опитаних, у яких було вперше діагновано ХОЗЛ, 53 (67,1 %) особи палили, у тому числі 7 (8,9 %) були колишніми курцями. Стаж паління (у тому числі і в колишніх курців) становив  $(15,07 \pm 0,95)$  року. Індекс паління становив 13,5 пачко/років. Ці показники суттєво вищі, ніж у групі без ХОЗЛ.

В групі осіб, що регулярно проходять медичні огляди, частота недіагнованого ХОЗЛ становить 14,9 %. Ці пацієнти пред'являли скарги на кашель, задишку, утруднене дихання, що не оцінювались лікарями. Причому у 59,0 % діагновано ХОЗЛ групи А та В, тоді як у 41 % осіб – групи С та Д.

Отже, наш аналіз дозволяє стверджувати, що існує суттєвий прошарок осіб з недіагнованим ХОЗЛ. Результати проведених досліджень дозволяють розробити, науково обґрунтувати та впровадити в діяльність закладів охорони здоров'я оригінальну анкету, що дасть змогу вчасно виявляти пацієнтів на ранніх стадіях ХОЗЛ для подальшого функціонального обстеження.

**Ключові слова:** хронічне обструктивне захворювання легень, рання діагностика, поширеність ХОЗЛ, кашель, задишка.

*Науково-практичний журнал «Астма та алергія», 2017, № 1*

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## РАСПРОСТРАНЕННОСТЬ НЕДИАГНОСТИРОВАННОГО ХРОНИЧЕСКОГО ОБСТРУКТИВНОГО ЗАБОЛЕВАНИЯ ЛЕГКИХ СРЕДИ ЛИЦ, СЧИТАЮЩИХ СЕБЯ ЗДОРОВЫМИ

Н.В. Черепий

### Резюме

Несмотря на существенную информационную активность, широкое внедрение спирометрии, проблема диагностики ХОЗЛ остается одной из актуальных. Во-первых, при появлении таких симптомов, как одышка и кашель, пациенты не сразу обращаются за медицинской помощью. Во-вторых, появление этих симптомов часто ассоциируется с развитием симптомов сердечно-сосудистых заболеваний. В-третьих, большинство врачей общей практики недооценивают значение факторов риска, что способствует диагностике ХОЗЛ в большинстве случаев средней степени тяжести и тяжелого.

**Целью** нашей работы является установить распространенность недиагностированного ХОЗЛ различных стадий среди лиц, которые регулярно проходят медицинские осмотры и считают себя здоровыми.

Нами установлено, что среди лиц, которые регулярно проходят медицинские осмотры, 216 (41,1 %) человек, по результатам анкетирования, отмечают различные респираторные симптомы, характерные для заболеваний органов дыхания. Среди этих пациентов у 79 (58,1 %) по результатам спирометрии было впервые диагностировано ХОЗЛ. Среди опрошенных, у которых впервые диагностировано ХОЗЛ, 53 (67,1 %) человека курили, в том числе 7 (8,9 %) были бывшими курильщиками. Стаж курения (в том числе и у бывших курильщиков) составлял  $(15,07 \pm 0,95)$  года. Индекс курения составил 13,5 пачко/лет. Эти показатели существенно выше, чем в группе без ХОЗЛ.

В группе лиц, которые регулярно проходят медицинские осмотры, частота недиагностированного ХОЗЛ составляет 14,9 %. Эти пациенты предъявляли жалобы на кашель, одышку, затрудненное дыхание, что не оценивалось врачами. Причем у 59,0 % диагностировано ХОЗЛ группы А и В, тогда как у 41 % лиц – группы С и Д.

Итак, наш анализ позволяет утверждать, что существует значительная прослойка лиц с недиагностированным ХОЗЛ. Результаты проведенных исследований позволяют разработать, научно обосновать и внедрить в деятельность учреждений здравоохранения оригинальную анкету, что позволит своевременно выявлять пациентов на ранних стадиях ХОЗЛ для дальнейшего функционального обследования.

**Ключевые слова:** хроническое обструктивное заболевание легких, ранняя диагностика, распространенность ХОЗЛ, кашель, одышка.

*Научно-практический журнал «Астма и аллергия», 2017, № 1*

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