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ORIGINAL PAPER

Telemetric Detection of Chronic Obstructive Pulmonary Disease and Investigation of Quality of Life for People Working in Shipbuilding Industry

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ABSTRACT

Introduction: Chronic Obstructive Pulmonary Disease (COPD) has a significant impact on quality of life-related health. **Aim:** It was the detection of Chronic Obstructive Pulmonary Disease by using telemetric methods and the investigation of the quality of life for people working in Shipbuilding Industry compared with a control group. **Methods:** A group of one hundred men working in the shipbuilding industry aged 51.8 ± 8.2 years old and a control group of one hundred men of the general population aged 51.1 ± 6.4 years were studied. All participants completed the General Health Questionnaire – 28, the Fagerstrom test and a form with demographic characteristics. Pulmonary function test results were electronically sent to a specialist for evaluation. **Results:** People working in the shipbuilding zone had significantly lower values (p<0.001) in FVC, FEV1 and FEV1/FVC compared with the general population participants. Worse social functionality was exhibited by workers in the shipbuilding zone, people with elementary education, unemployed and by those suffering from comorbidities (p <0.001). **Conclusions:** Health level and its individual dimensions are both associated with health self-assessment and occupational and economic status. The coexistence of chronic diseases and smoking dependence affects emotion and social functioning of individuals.
Key words: Chronic Obstructive Pulmonary Disease, Quality of life, Telemetry.

1. INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a life-threatening disease characterized by airflow limitation, which is not fully reversible. The World Health Organization (WHO) estimates that 210 million people worldwide suffer from COPD. Despite prevention efforts, the disease appears to be increasing and predictions show that in 2030 it will be the third cause of death. COPD is responsible for a large number of visits to doctors, outpatient departments and hospitals. It has been recorded as the 8th leading cause of years lived with disability in men and 7th in women in the United States of America (1). Reduction in expiratory flow is slow, progressive and associated with an abnormal inflammatory response of the lungs to irritating particles or gases (2).

COPD affects the entire body and nowadays is considered a multi systemic disease, since it is one of the leading causes of death in the world with high levels of hospitalization and significant financial cost (3). Smoking is the main causative factor of COPD, while other factors deemed to act aggravatingly and contribute to its occurrence is air pollution and occupational exposure to industrial pollutants (dust, chemicals, fumes, irritant gases, smoke). Hnizdo E. et al., found that COPD percentage caused by the working environment was calculated as 19.2% overall and 31.1% among those who never smoked (4). The diagnosis of COPD is done by spirometry which is a simple but basic examination in the context of respiratory function testing. The use of spirometry with telemetric data transmission may allow early diagnosis of the disease and facilitate the initiation of medication (5). In patients with chronic diseases such as asthma, diabetes and COPD, the use of telehealth methods can reduce hospital admissions without increasing mortality, but with increasing people's quality of life (6).

Quality of life is a highly individualized concept associated with health and formed mainly by health status (physical and psychological), functionality, knowledge of the disease, health habits, use of services, social support system and by the individual's adaptive capacity, financial situation and educational level (7). We can quantify it by using measurement tools, such as questionnaires, and find the correlation that probably exists between the objective laboratory data on the health status of people with COPD and the subjective perception that affects one's personality. The purpose of this study was the detection of Chronic Obstructive Pulmonary Disease by using telemetric methods and investigation of the quality of life for people working in Shipbuilding Industry by a control group.

2. METHODS

Sample – Participants

A group of one hundred people working in the Shipbuilding Industry (SI) was studied as well as a control group of one hundred people of the general population. All were middle aged men and constituted a convenience sample.

Data were collected on demographic characteristics, education, marital status, smoking dependence and personal medical history. Additionally, data were collected on employment status, self-assessment of health and use of health services. Independence in everyday life activities and quality of life were assessed by using St. George's Respiratory Questionnaire and smoking habit by using Fagerstrom test (8, 9). St. George's Respiratory Questionnaire is a questionnaire designed to assess the relationship of pulmonary disease with quality of life associated with health and wellbeing. The average time to fill it out ranges from 10 to 15 minutes depending on age and educational level of the individual. The questionnaire provides a sum total and scores for individual symptoms (cough, sputum, wheezing, dyspnea, their frequency and duration), activities (which cause or are limited by dyspnea) and impacts (in a wide range of social functioning and mental disorders as a result of airway obstruction). The lowest score represents a better quality of life.

The questionnaire assessing the degree of nicotine dependence (Fagerstrom test) was used to provide a meaningful picture of smoking habit. It is a questionnaire easy to fill out, with its composite score of 10 points indicating the maximum nicotine dependence.

Study Design –Research Tools

All individuals underwent spirometry and wireless medical devices were used in conjunction with means of web access and software for biomedical parameters telemetry service. The telemetry system used is a web application based on the new generation telemedical devices of automatic measurement and wireless transmission of biological signals.

Data were stored in an electronic page which was accessed by the specialist physician who recorded the COPD diagnosis. Diagnosis was based on symptoms and spirometry findings and airway obstruction was staged according to GOLD guidelines. Participants were asked to make at least three attempts and the highest values of FEV1 and FVC were used to classify the severity of the degree of airway obstruction.

Statistical analysis

Descriptive and inferential analysis was performed Depending on indications, Student's t-test or Mann-Whitney nonparametric test was used to compare quantitative variables between two groups. Respectively, parametric analysis of variance (ANOVA) or Kruskal-Wallis nonparametric test was used to compare quantitative variables between more than two groups. Bonferroni correction was used to counteract type I error Pearson's chi-squared test or Fisher's exact test was used to compare proportions where necessary. Spearman's or Pearson's (r) correlation coefficient was used to control the relationship between two quantitative variables. The level of statistical significance was set at 0.05 and SPSS 17.0 statistical software was used in the analysis.

3. RESULTS

Characteristics of Participants

The mean age of workers and general population group was 51.8 ± 8.2 and 51.1 ± 6.4 years with 25.1 ± 11.5 and 25.46 ± 10 years duration of smoking, respectively. There was a significantly higher percentage of workers in the general population (75%) compared with the corresponding percentage in the group of people who worked in the shipbuilding zone (62%). The working years in the two groups were 10 ± 3 and 25.4 ± 8.7 respectively.

Fagerstrom score of participants did not differ between the two groups, as well as their smoking dependence level.

The following diseases were found in the general population in order of frequency: arterial hypertension 12%, COPD 10%, heart diseases 9%, orthopedic problems 2%, diabetes mellitus 6% and other 7%. Respectively, in the shipbuilding industry workers were found: arterial hypertension 7%, COPD 13%, heart diseases 4%, orthopedic problems 7%, diabetes mellitus 4% and other 7%.

No participant was found in stage IV in the general population group and 3 persons respectively were found in the group of people working in the shipbuilding industry, according to GOLD guidelines. The workers in the shipbuilding zone had significantly lower values ($p < 0.001$) in FVC, FEV1 and FEV1/FVC compared with the participants of the general population. There was no significant difference in COPD stage of participants depending on their workplace, although most workers in the zone had advanced-stage COPD compared with the general population **(Table 1).**

Quality of life

Significantly higher score in *¨Symptoms and Activity¨* dimensions was found in the workers in the shipbuilding industry, those with basic education and non-actively working during this period. Health evaluation as moderate/poor and comorbidity are also associated with high score in these particular dimensions of life quality ($p < 0.001$). Also, people who were hospitalized during the last year and those diagnosed with III-IV COPD stage had significantly higher values in *Symptoms and Activity score,* compared to participants with I-II stage. There was a significant difference in Symptoms score depending on smoking dependence. Participants with low smoking dependence had significantly lower scores compared with participants with high smoking dependence ($p = 0.016$).

	Group				P Mann-Whitney
	General population		People working in Shipbuilding Industry		
	mean score ±SD	Median (int. range)	mean score ±SD	Median (int. range)	
FVC, mean score ±SD Median (int. range)	4.1±1	3.9 (3.5–4.6)	3.4±1.4	3.2 (2.2–4.4)	<0.001*
FEV1, mean score ±SD Median (int. range)	0.8±0.3	0.9 (0.8–1)	0.8±0.2	0.8 (0.6–1)	0.003
FEV1/FVC, mean score ±SD Median (int. range)	0.9±0.1	0.9 (0.8–0.9)	0.8±0.1	0.8 (0.8–0.9)	<0.001

Table 1. *Spirometric findings in cases and controls. *Student's t-test **Pearson's x test +Fisher's exact test*

Participants who visited a general practitioner more than 3 times during the last year had significantly higher values in *Activity score* compared to participants who visited him/her 1-2 times and to participants who did not visit him/her at all (p = 0.002 and p = 0.008 respectively) (Table 2).

In *¨Impact score¨* dimension, a significantly higher score (p < 0.001), corresponding to more problems of social conciliation, was exhibited by those who considered their health as moderate/poor, suffered from a chronic disease and were diagnosed with III-IV COPD stage. In "*Total score"*, participants who had visited a general practitioner more than three times during the last year had significantly higher values in *Total score* compared both to participants who had visited him/her 1-2 times and to those who had not visited him/her at all (p = 0.004 and p = 0.001 respectively) (Table 3). A significant positive correlation was observed between the score of participants in dimensions under study of quality of life with age, years of smoking and values of FVC, FEV1, FEV1/FVC and Fagerstrom score (p < 0.001) (Table 4).

		Symptoms score		Activity score	
		Median (int. range)	P Mann-Whitney	Median (int. range)	P Mann-Whitney
Group	General population	21.2 (5.9–43.3)	0.003	17.4 (5.3–39)	0.041
	People working in Shipbuilding Industry	35.3 (18.1–47.7)		23.2 (11.5–41.7)	
Educational level	Basic/Primary	32.2 (15.5–50.9)	0.048	24.4 (12.4–47.6)	0.002
	Secondary & Tertiary	24 (7.1–39.2)		14.3 (6–36.1)	
Current employment status	Working	24.9 (6.4–38.2)	0.020	18.2 (6.2–36.4)	0.145
	Unemployed	35.3 (15.2–54.6)		23.4 (7.5–48.6)	
According to you, your health is:	Moderate/poor	43.1 (32.1–60.5)	<0.001	41.4 (23.3–59.5)	<0.001
	Good / excellent	21.2 (6.2–33.3)		11.2 (5.3–24.4)	
Other chronic diseases:	No	17.4 (5.1–33.3)	<0.001	11.8 (5.9–23.4)	<0.001
	Yes	37 (24.3–56)		35.4 (12.5–49.3)	
Contact frequency of participants with a GP in the last 6 to 12 months	0	22.1 (5.9–36.9)	0.003★	18.1 (6.9–36.4)	0.005★
	1-2 times	28.9 (10.3–38.8)		17.4 (6–36.2)	
	Over 3 times	43 (27–64.1)		35.4 (12.5–54.4)	
Hospital admission last year:	No	24.7 (6.4–45.3)	0.001	17.4 (6.2–41.4)	0.004
	Yes	37.5 (35.3–50.6)		35.4 (17.4–78.9)	
Smoking addiction	Low	18.1 (4.9–35.3)	0.045★	17.4 (6–35.4)	0.223★
	Moderate	24.7 (9–45.3)		20.9 (6.3–47.7)	
	High	32.1 (14.1–53.7)		18.7 (11.1–39.5)	
COPD stage	I-II	36.9 (24.7–50.6)	<0.001	30.3 (17.4–47.7)	<0.001
	III-IV	60.5 (43–69.5)		66.2 (44.3–92.5)	

Table 2. *Symptoms score, Activity score, self-reported health and use of health services indicators. ★Kruskal-Wallis test*

		Impact score		Total score	
		Median (int. range)	P Mann-Whitney	Median (int. range)	P Mann-Whitney
Group	General population	5.2 (0–19.3)	0.147	11.8 (5.6–25.4)	0.048
	People working in Shipbuilding Industry	7.8 (0.5–24.1)		18.6 (10.2–35.5)	
Educational level	Basic/Primary	8.6 (2.1–25.1)	0.031	18.9 (9.1–35.5)	0.004
	Secondary & Tertiary	4.6 (0–16.7)		12 (4.5–23.9)	
Current employment status	Working	4.6 (0–17.6)	0.023	13 (6.1–25.1)	0.041
	Unemployed	10.8 (1.9–22.8)		20.7 (8.5–35.5)	
According to you, your health is:	Moderate/poor	18.3 (5.8–40.4)	<0.001	26.6 (16.8–50.2)	<0.001
	Good / excellent	4.1 (0–11.3)		10.7 (4.6–19.1)	
Other chronic diseases:	No	1.9 (0–8.5)	<0.001	9.5 (4.6–18.7)	<0.001
	Yes	15.5 (4.3–34.4)		22.5 (12.5–46.5)	
Contact frequency of participants with a GP in the last 6 to 12 months	0	4.3 (0–9)	0.001★	12.1 (6.1–20.4)	0.002★
	1-2 times	6.1 (0–26.7)		16.2 (5.7–29.1)	
	Over 3 times	17.9 (6.2–29.9)		26.6 (13–37.7)	
Hospital admission last year:	No	6 (0–18.6)	0.003	12.6 (5.8–27)	0.001
	Yes	17.6 (4.3–38.9)		21.7 (14.8–59.3)	
Smoking addiction	Low	7.8 (0–18.1)	0.772★	11.1 (2.1–26.6)	0.249★
	Moderate	8.4 (0–22.8)		17.9 (6.2–31.7)	
	High	5.2 (1.4–23.9)		16.8 (8–28.1)	
COPD stage	I-II	15.8 (4.6–27.8)	<0.001	22.1 (17.6–36.4)	<0.001
	IIII-IV	45.4 (15.3–73.1)		57.2 (30.1–80.6)	

Table 3. *Impact score, Total score, self-reported health and use of health services indicators. ★Kruskal-Wallis test*

4. DISCUSSION

Health professionals have recognized the need for early detection of COPD and introduced new ways to facilitate its diagnosis by using modern telehealth methods such as telemetric data transfer (10). Masa et al. argue that, if high quality spirometry could be performed online through a connection of the specialist to the Pulmonary Laboratory and the patient in a PHC structure by qualified personnel and high quality spirometer, possibly the problem of performing a reliable and qualitative spirometry would be resolved (11).

Spirometry with telemetric data transmission method was used in the present study and it was found that the prevalence of COPD in the general population was 10%. Similarly, in their study Tzanakis et al., found a prevalence of 11.6% in men and in an epidemiological study conducted by Sichleridis et al the prevalence of COPD was also estimated at 8.2% among men (12, 13).

The results of an epidemiological study conducted in Ireland from 1999 to 2001 on a sample of the general population aged 40-69 years showed that the prevalence of obstructive lung disease was 6.3% (14). In order to estimate the prevalence of COPD in this study, medical history, spirometry, a special respiratory symptoms questionnaire as in ours and dermal tests were used (15). Also, the BOLD (Burden of Obstructive Lung Disease) study that attempted to identify the preva-

		Symptoms score	Activity score	Impact score	Total score
Age	r	0,29	0,35	0,39	0,38
	P	<0,001	<0,001	<0,001	<0,001
Years of smoking	r	0,33	0,37	0,26	0,35
	P	<0,001	<0,001	<0,001	<0,001
FVC	r	-0,40	-0,51	-0,46	-0,51
	P	<0,001	<0,001	<0,001	<0,001
FEV1	r	-0,37	-0,46	-0,44	-0,47
	P	<0,001	<0,001	<0,001	<0,001
FEV1/FVC	r	-0,27	-0,24	-0,31	-0,28
	P	<0,001	0,001	<0,001	<0,001
FAGERSTROM SCORE	r	0,17	0,10	0,08	0,12
	P	0,019	0,178	0,288	0,105

Table 4. *Demograhic and spirometric correlations*

lence of COPD by using population sample from 12 different countries found that the prevalence of COPD was 11.8 ± 7.9% in men (16). It is noted that in our study the prevalence of COPD was estimated at 10% in the general population and 13% in people working in the shipbuilding industry and no statistically significant difference was observed between the two groups. It is well known that there are many factors responsible for COPD such as environmental pollution, occupation, place of residence and respiratory infections during childhood. In this study, it was not possible to study the effects of each of these factors, but probably the highest prevalence of COPD in the group of people working in the shipbuilding industry is due to overburdened environment because of occupational exposure. Although it is known that air pollution has a serious impact on respiratory symptoms, the relationship between pollution and COPD remains to be elucidated (17).

The results of our research showed that there was a significant positive correlation of the participants' score in the SGRQ scales with age, years of smoking and Fagerstrom Score. Regarding the presence of respiratory symptoms, limitation of activities and their impacts which affect the field of social functioning, results were similar in a research of Xydeas-Kikemenis et al. in a sample of 203 people working in the construction industry. It was observed that age and duration of working activity were strong determinants of mental problems incidence affected by the workload and the negative characteristics of the workplace (18). Pierrakos et al., in their work concerning the quality of life related to smokers and non-smokers health, find that high smoking dependence negatively affects the quality of life which is exacerbated when tobacco consumption increases (19).

In contrast, SGRQ scales showed a high negative correlation with spirometric results (FEV1%, FVC% and FEV1/FVC) and thus, as values of the above measurements of the participants increase, the respective score implying better quality of life decreases. The studies of Ståhl χ. and Ketelaars CA., in patients with COPD also demonstrate that the quality of life is positively correlated with good respiratory function while it is burdened with advancing age and disease (20, 21). A moderate correlation of FEV1 values with health level and life quality emerges from the studies of Aibar Arregui et al., (22) and Pereira et al. (23).

In our study, comorbidities showed a significant positive correlation with all subscales of quality of life, as supported by many researchers, to the extent that the disease has physical and psychosocial impacts on the overall situation of the individual and chronic patient is observed living under conditions acting bindingly as to his/her quality of life (24). Overall, the coexistence of chronic diseases burdens the person mainly with organic and functional problems, frequent hospitalizations, continuous medical visits and examinations and secondarily with social, psychological and occupational problems that affect his/her quality of life (25).

Educational level and occupational status have significant positive correlation with all SGRQ scales. Participants with basic educational level had higher scores in scales of symptoms, impacts, activities and overall, as in the study of Dimitropoulos et al., in which people with lower educational level had a more aggravated symptoms scale compared to the more educated participants (26). Based on that, people with low educational level tend to occupy lower-paid jobs in the labor market and often those associated with exposure to harmful for health factors (27).

In our study, admission to hospital during the last year is significantly correlated with the quality of life scales and is partially consistent with the studies of Dimitropoulos et al., and Miravitlles et al., where patients with more than two admissions to hospital during the last year had worse scores in all scales, but without statistical correlation (26, 28).

The contact frequency of participants (> 3 times) with a general practitioner in the last 6 to 12 months was positively correlated with the quality of life scales and is consistent with the results of the study of Tountas et al., of whom 37% of the sample under study had visited a doctor >1 time in the previous month (29).

The loss of employment (unemployment) and self-assessment of health as moderate/poor in our study were statistically significantly associated with higher score in almost all scales of the quality of life questionnaire. Our findings are consistent with those of Zimmer et al., who argue that active employment is a determinant of subjective evaluation of health status (30).

5. CONCLUSION

Educational level, occupational status and presence of chronic diseases affect the quality of life of individuals, while "low" self-assessment of health, increased frequency of visits to a general practitioner and repeated admissions to hospital are associated with social dysfunction and reduced quality of life. Telemetric diagnosis of COPD can become a method of choice in a community environment, but requires enhancement of education and training of health professionals that are going to perform it.

CONFLICT OF INTEREST: NONE DECLARED.

REFERENCES

1. Nowak D, Berger K, Lippert B, Kilgert K, Caeser M, Sandtmann R. Epidemiology and health economics of COPD across Europe: a critical analysis. Treat Respir Med. 2005; 4: 381-395.
2. GOLD, Global Initiative for Chronic Obstructive Lung Dis-

ease. Global Strategy for the diagnosis, management and prevention of COPD, 2004. www.goldcopd.org
3. Spencer S, Cleverly PM, Sherwood Burge P, et al. Health status deterioration in patients with chronic obstructive pulmonary disease. Am J Respir Crit Care Med. 2001; 163: 122 -128.
4. Hnizdo E, Sullivan PA, Bang KM, Wagner G. Association between COPD and Employment by Industry and Occupation in the US Population: A Study of Data from the Third National Health and Nutrition Examination Survey. American Journal of Epidemiology 2002; 156: 738-746. http://aje.oxfordjournals.org/content/156/8/738.full.pdf+html
5. McDowell JE, Hanna BM, McKeown GC, Tate S. Telehealth: A Useful Strategy in the Management of COPD? Am J Respir Crit Care Med. 2009; 179: A238.
6. McLean S, Protti D, Sheikh A. Telehealthcare for long term conditions. BMJ. 2011; 342: 374-378.
7. Yfantopoulos J, Sarris M. Health related quality of life. Measurement methodology. Archives of Hellenic Medicine. 2001; 18: 218-229.
8. Jones PW, Quirk FH, Baveystock CM. The St. George's Respiratory Questionnaire. Resp Med. 1991; 85: 25-31.
9. Heatherton TF, Kozlowski LT, Frecker RC, Fagerstrom K. The Fagerstrom Test for Nicotine Dependence: a revision of the Fagerstrom Tolerance Questionnaire. British Journal of Addiction. 1991; 86: 1119-1127.
10. Field MJ. Telemedicine: A guide to assessing telecommunications in health care, Washington, DC: National Academy Press 1996; 239-252.
11. Masa JF, Gonzalez MT, Pereira R, Mota M, Riesco JA, Corral J, Zamorano J, Rubio M, Teran J, Farre R. Validity of spirometry performed online. Eur Respir J. 2011; 37: 911-918. http://erj.ersjournals.com/content/37/4/911.long
12. Tzanakis χ, Anagnostopoulou U, Filaditaki V, et al. Prevalence of COPD in Greece. Chest. 2010; 125: 892-900.
13. Sichletidis LT, Chloros D, Tsiotsios I, Kottakis I, Kaiafa O, Kaouri S, Karamanlidis A, Kalkanis D, Posporelis S. High prevalence of smoking in Northern Greece. Prim Care Respir J. 2006; 15: 92-97.
14. Murtagh E, Heaney L, Gingles J, Shepherd R, Kee F, Patterson C, MacMahon J. Prevalence of obstructive lung disease in a general population sample: the NICECOPD study. Eur J Epidemiol. 2005; 20: 443-453.
15. Fishman AP, Elias JA et al. Fishman's Pulmonary Diseases and Disorders, Fourth Edition, McGraw-Hill Prof Med/Tech, 2008.
16. BOLD Study. BOLD Study, Available at: www.boldstudy.org
17. Petty TL, Weinmann GG. Building a national strategy for the prevention and management of and research in chronic obstructive pulmonary disease: National Heart, Lung, and Blood Institute workshop summary. JAMA. 1997; 277: 246-253.
18. Xydea-Kikemeni A, Aloumanis P, George G, Ktenas E. Workers' in the construction sector morbidity. Greek Medical Journal. 2003.
19. Pierrakos G, Michopoulou E, Kondili I, Ganas A, Sarris M. Health-related Quality of Life of Smokers and Non-Smokers. NOSILEFTIKI. 2011; 50: 203-213.
20. Ståhl χ, Lindberg χ, Jansson SA. Rönmark E, Svensson K, Andersson F, Löfdahl CG, Lundbäck B. Health-related quality of life is related to COPD disease severity. Health and Quality of Life Outcomes. 2005; 3: 56.
21. Ketelaars CA, Schlosser MA, Mostert R, Huyer Abu-Saad H, Halfens RJ, Wouters EF. Determinants of health-related quality of life in patients with chronic obstructive pulmonary disease. Thorax. 1996; 51: 39-43.
22. Aibar Arregui MA, Laborda Ezquerra K, Conget Lopez F. Relationship between objective data and health-related quality of life in COPD patients. An Med Interna. 2007; 24: 473-477.
23. Pereira ED, Pinto R, Alcantara M, Medeiros M, Mota RM. Influence of respiratory function parameters on the quality of life of COPD patients. J Bras Pneumol. 2009; 35: 730-736.
24. Dew HA, Simmons R. The advantage of multiple measures of quality of life. Scand J Urol Nephrol. 1990; 11: 23-30.
25. Koulouri A, Roupa Z, Sotiropoulou P, Skopelitou M. Mood disorders and handling of daily routine in patients with diabetes mellitus type II. Rostrum of Asclepius. 2009; 8: 255-269.
26. Dimitropoulos C, Theodorakopoulou E, Kopitopoulou A, Nikolaou A, Tsapas C, Koulouris N, Ntanos I, Kosmas E. The health related quality of life of Greekpatients with chronic obstructive pulmonary disease. PNEUMON. 2013; 2: 127-151.
27. Scambler G, Blane D. Inequality and social class. In G. Scambler (Eds.), Sociology as applied to medicine. Philadelphia: Elsevier Science Limited. 2003; 107-123.
28. Miravitlles M, Ferrer M, Pont A, et al. Effect of exacerbations on quality of life in patients with chronic obstructive pulmonary disease: a 2 year follow up study. Thorax. 2004; 59: 387-395. http://thorax.bmj.com/content/59/5/387.full.pdf+html
29. Tountas Y. Health services in Greece (1996-2006) Athens: Center for Health Services Research; 2008.
30. Zimmer Z, Natividad J, Lin H, Chayovan N. A cross-national examination of the determinants of self-assessed health. Journal of health and Social Behavior. 2000; 41: 465-481.