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The Syndrome of Sleep Apnea in the Elderly Suffering from COPD and Live in the County of Attica, Greece

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ABSTRACT

Introduction: Chronic Obstructive Pulmonary Disease (COPD) and obstructive sleep apnea syndrome are two diseases, which often coexist in one person. The sleep apnea is often caused by an interruption to breath when sleeping, due to an obstruction of the upper airway during inhalation, causing chronic snoring, morning headaches, increased body weight, blood pressure and sleepiness during the day. **Aim:** The purpose of this study is to investigate the extend of this problem among a large group of elderly people living in the Attica Basin. **Material and Methods:** Material of the study was 500 people aged 70 and above years old, including 274 men and 226 women. Data collection was facilitated with the use of an anonymous questionnaire with the purpose to identify patients with apnea, after a personal interview with the researcher. Data analysis was performed with the use of the statistical package SPSS 17. **Results:** Based on their responses to the questionnaires, it was found that 98.0% of the participants have abnormal sleepiness during the day. The 35.4% of them show no apnea, while 36.0% of the sample suffer from mild sleep apnea. It is important though, the fact that about one out of three seniors, 28.6%, shows sleep apnea in a high risk level. **Conclusions:** COPD is a complex disease that occurs in a large proportion of the elderly. Emphasis should be given on early diagnosis and treatment of sleep apnea syndrome, in order to improve the quality of the elderly life.

Keywords: COPD, Obstructive Sleep Apnea, Daily Sleepiness, elderly.

1. INTRODUCTION

COPD includes chronic bronchitis and pulmonary emphysema, having as a common feature the blockage of the lung airways, thus reducing significantly the airflow at the end and trapping the air inside. The obstruction initially causes decline in lung function, leading to decreased breathing, especially after severe fatigue. Moreover, everyday life of elderly is often disturbed by exacerbations of the disease, caused by frequent pulmonary infections (1,2).

The main characteristic of COPD is a progressive airway obstruction; however the term COPD often refers to a separate group of diseases concerning their pathophysiology, which share common causes, such as smoking and air pollution, leading to a common result of obstruction. The obstruction in COPD is irreversible, but some patients have a low degree of reversibility after administration of bronchodilators and cortisone drugs, that is why often appear common characteristics with chronic asthma, where air-

way obstruction may be improved (3-5). The elderly consist a vulnerable age group, with many special needs. Several times, those elderly suffering from COPD apparently show complications in breathing, during sleep that characterize sleep apnea syndrome. Apnea is defined as the cessation of breathing, of the airflow, in a sleeping person, at least for 10 seconds, causing electrocerebral "awakening" and drop of the saturation of hemoglobin in oxygen. If the cessation of airflow is accompanied by lack of respiratory movements in the chest and abdomen, and there is no aspiratory effort, then the apnea is characterized as central, where, on the contrary, if there is respiratory activity in the chest or both, and the inhalation effort is growing during apnea, then it is characterized as obstructive.

The term sleep apnea is usually laboratory, in contrast with the term Sleep Apnea Syndrome, which, in addition to apnea, requires the appearance of clinical symptoms. To show the clinical manifestations of the syndrome usually

are required more than 15 apneas per one hour of sleep, and vary depending on the chronic status, the number and severity of apnea. At the beginning, clinical symptoms are of low significance or absent, but later on, as COPD progresses, apneas increase, leading to more severe symptoms (6-8).

The main clinical symptoms of the COPD include (6, 9-11):

- Sleepiness during the day: It is the most important and troublesome symptom seen in an elderly patient with COPD. Often patients complain that they have not slept for several hours and that they fall asleep during daily activities. This is because the nocturnal sleep is disturbed and interrupted by apneas. People who have an increased level of daytime sleepiness should be advised to avoid driving, in order to prevent accidents.
- Snoring: It is a sound generated during sleep by the vibration of the walls of the pharynx and soft palate. The vibration is caused due to the difficulty of access to air through a clogged throat. Along with sleepiness are the main symptoms of the syndrome and the type of snoring can help in diagnosis, since the instability in frequency and intensity, suggest the presence of the Syndrome of Obstructive Sleep Apnea.
- Obesity: The Syndrome occurs more often in people with increased body weight, and therefore fat tissue in the neck.
- Frequent night urination: it forces sufferers to interrupt their sleep and occasionally to have involuntary loss of urine. This is due to release of natriuretic factor from the dilatation of the sinuses and to a pressure of the urinary bladder, caused by increased abdominal pressure during obstructive apnea.
- Night sweats: Are often due to the restless sleep and due to the intense respiratory efforts during sleep.
- Morning headaches, irritability and memory decline: Patients awake with a feeling of dizziness, headaches and dry mouth. In more severe cases, there is a memory degradation, concentration and observation. Trying to overcome the drowsiness and the sense of inferiority because of the symptoms, usually leads to depressive symptoms and stress disorders.
- Decreased Sexual Activity: Men often face sexual problems due to loss of libido and sense of helplessness.

The diagnosis of obstructive sleep apnea syndrome takes place by studying the elderly patients in a special workshop during sleep, while recording parameters of sleep and the respiratory function. For the staging of sleep, EEG is recorded, along with the eye movements, with an electrocardiogram, the movements of chest and abdominal wall, the airflow in the nose and mouth, the saturation of hemoglobin and the body position during sleep. Other methods that help assess the functioning of the position and the degree of airway obstruction during sleep are the imaging methods of computing and Magnetic Resonance Imaging (MRI), fluoroscopy and ultrasound. The only non-imaging method, but also the only one that directly assesses the functional competence in multiple sites of upper airways, is the measurement of the differential pressure across the palate until the rinofarynx (12-14).

In order to choose the appropriate way of disease management, the severity of the clinical picture, the study's findings in sleep centers, as well as patients' severity of COPD must be taken into account. Treatment of sleep apnea syndrome targets to increase the pharynx's lumen diameter during sleep.

These treatments may be generic, non-invasive, and in many difficult cases, surgical. These include (12, 15-17).

- Reduction of body weight, because obesity is an aggravating factor in the obstruction of the upper airway, during sleep.
- Avoidance of alcohol consumption by patients with COPD and Syndrome of Obstructive Sleep Apnea, especially before bedtime.
- Education of the patient to take a side position rather than a supine position during sleep.
- Continuous Positive Airway Pressure (CPAP): It consists the continuous provision of positive air pressure in the upper airway through the nose, by a special device. The result is to prevent the collapse and therefore a total obstruction. The CPAP device assists the normal function of the entire airway, using bigger pressure than the atmospheric one, so that at no stage and point becomes negative, creating thus a respiratory "splint" that keeps the upper airway free.
- Nasopharyngeal Tube: It can help directly, simply, safely and effectively all patients, bypassing the airway obstruction during sleep.
- Surgical interventions often take place, including the permanent tracheotomy, and nose, jaws and throat surgery, aiming to keep free the upper airway.

Quality of life is an important factor of assessing recovery of patients suffering from COPD. The recovery can take place either in specialized medical units, whose primary purpose is to address the problem, such as sleep centers, or through properly designed programs implemented at home by a group of health professionals, whose main concern is the identification, diagnosis and treatment of the problem, alongside with the application of appropriate techniques. Also are required efficient teaching methods for patients and their carers, towards an active participation in the selection and application of a suitable therapeutic approach.

2. MATERIAL AND METHODS

The sample of this study was composed of 500 elderly individuals (274 men and 226 women), aged from 70 years old and above. All participants were selected from the "Open Centers for The Elderly", which are located in various municipalities of Greater Athens. All patients completed a specialized anonymous questionnaire, with a personal interview with the investigator, after a clear explanation of the purpose of this study.

During the investigation, spirometry was carried out by using a portable spirometer, MIR SPIROBANK, while the parameters examined were FEV1, FEVC, and particularly the ratio FEV1/FEVC. This ratio was also used for the classification of the disease. To investigate the occurrence of apnea in people suffering from COPD were also used, specialized and standardized questionnaires, such as the "Berlin Questionnaire" and "Epworth Sleepiness Scale".

		Classification of COPD (GOLD)									Total		
		MILD			MODERATE			SEVERE			N	Row %	Col %
		N	Row %	Col %	N	Row %	Col %	N	Row %	Col %			
Sex	Men	46	16.8%	37.4%	221	80.7%	61.0%	7	2.6%	46.7%	274	100.0%	54.8%
	Woman	77	34.1%	62.6%	141	62.4%	39.0%	8	3.5%	53.3%	226	100.0%	45.2%
	Total	123	24.6%	100.0%	362	72.4%	100.0%	15	3.0%	100.0%	500	100.0%	100.0%

Table 1. Classification of the COPD, regarding the Sex, by using GOLD scale

Contingency tables were used for the relationship between categorical variables, using Fishers' exact test (for tables 2x2) and Person's Chi square test (for all other dimensions of contingency tables), as appropriate. Data processing, along with statistical analysis and visualization was performed by using the statistical package SPSS 17.

3. RESULTS

Male patients consist of the 54.8% of the sample while women were 45.2%. Table 1 presents the Classification of the COPD, regarding the Sex, by using GOLD scale.

According to Table 1, there was found a statistically significant difference in the stratification of mild COPD. In specific there were found 62.6% mild female cases and 37.4% mild male cases. The results differ in the case of moderate COPD, where men developed higher rates (61% versus 39%). There is no statistically significant difference between the genders among severe cases of COPD (Table 1). Almost all elderly people of the sample (98%), have reported to not suffer from any sleepiness during the day (table 2).

According to the Berlin Questionnaire, which was used to assess the existence of apnea among the population, the 28.6% of the elderly appear to suffer from a high risk level of apnea, at a rate of 36.0% they suffer from a lower risk of apnea, while the 35.4% suffer from no apnea at all (table 3).

According to Table 4, a large proportion of respondents (66.4%), stated that they had not received home care for their treatment, but they believe that such an option would help them manage their health problem. On the other hand, at a rate of 12.0%, participants believe that even homecare services could not have helped them. Finally, 21.6% of the sample, received home help, and found out that they have been provided with a satisfactory help.

There was found statistically significant relationship between the existence of severe COPD among elderly people who have low risk of apnea. No other statistically significant relationship was found (table 5). As far as the daily sleepiness by gender is concerned, there was found no statistically significant difference between the two genders, both in normal and in high-risk sleepiness of the elderly during the day (table 6). It was also found that men are more likely to suffer from apnea, in comparison to women. (table 7).

			Sleepiness	
			N	%
	Normal		490	98.0%
	High Risk		10	2.0%
	Total		500	100.0%

Table 2. Level of Daily Sleepiness using Epworth Sleepiness Scale

			Apnea	
			N	%
	No apnea		177	35.4%
	Low risk		180	36.0%
	High Risk		143	28.6%
	Total		500	100.0%

Table 3. Investigation of Apnea using Berlin Questionnaire

		Home Care	
RESPONSE	N	%	
I did receive home care for my disease and it quite helped	52	10.40%	
I did receive home care for my disease and it helped my very much	56	11.20%	
I didn't receive home care but I think it would help me with my health problem	332	66.40%	
I didn't receive home care but I think it wouldn't help me with my health problem	60	12.00%	
Total	500	100.00%	

Table 4. Providing Home Care to the Elderly Suffering from COPD and Apnea

4. DISCUSSION

According to the findings of the study, elderly participants consist a vulnerable group with significant health problems and with difficulties in their daily lives. No significant statistical difference between the two genders is observed, as far as the prevalence of the under investigation disease is concerned. One possible explanation have a longer life expectancy rate than men (18).

As far as the classification of COPD is concerned, by gender, it was found that women suffer from COPD more frequently than men, and even more often they suffer from

		Classification of COPD (GOLD)									Total		
		MILD			MODERATE			SEVERE			N	Row %	Col %
		N	Row %	Col %	N	Row %	Col %	N	Row %	Col %			
Apnea	No apnea	48	27.1%	39.0%	126	71.2%	34.8%	3	1.7%	20.0%	177	100.0%	35.4%
	Low Risk	40	22.2%	32.5%	129	71.7%	35.6%	11	6.1%	73.3%	180	100.0%	36.0%
	High Risk	35	24.5%	28.5%	107	74.8%	29.6%	1	.7%	6.7%	143	100.0%	28.6%
	Total	123	24.6%	100.0%	362	72.4%	100.0%	15	3.0%	100.0%	500	100.0%	100.0%

Table 5. Classification of COPD (GOLD) in correlation with the appearance of Apnea

		Gender						Total		
		Men			Women			N	Row %	Col %
		N	Row %	Col %	N	Row %	Col %			
Sleepiness	Normal Sleepiness	273	55.7%	99.6%	217	44 %	96 %	490	100.0%	98%
	High Risk Sleepiness	1	10 %	0.4%	9	90 %	4 %	10	100.0%	2.0%
	Total	274	54.8%	100 %	226	45 %	100 %	500	100.0%	100.0%

Table 6. Daily Sleepiness by Gender

		Sex						Total		
		Men			Women			N	Row %	Col %
		N	Row %	Col %	N	Row %	Col %			
Apnea	No Apnea	77	43.5%	28.1%	100	56.5%	44.2%	177	100.0%	35.4%
	Low Risk	109	60.6%	39.8%	71	39.4%	31.4%	180	100.0%	36.0%
	High Risk	88	61.5%	32.1%	55	38.5%	24.3%	143	100.0%	28.6%
	Total	274	54.8%	100.0%	226	45.2%	100.0%	500	100.0%	100.0%

Table 7. Prevalence of Apnea by Gender

mild COPD, while men show more often symptoms of moderate COPD, than women. There is not any statistically significant difference in the case of severe COPD between the two genders.

In a similar survey, conducted in Beijing by Zhou YM et al (19), among 9.434 elderly people, coming from 7 provinces of China, it was found that 30% of the sample were patients diagnosed with COPD, while from the total sample, at a rate of 12.8% COPD was diagnosed in men, with only 5.4% in women. Another study conducted in Poland (20) in 2007, it is shown that among 603 elderly people, 22.1% suffered from mild COPD, with 10.9% of them suffering of moderate to severe type of COPD. The disease occurred more frequently in male smokers, 34% versus 22% in women.

Based on the results of the above studies, it is evident that the gender plays an important role in the prevalence of COPD, and along with smoking, exposure to inappropriate weather conditions and age, they form an unhealthy configuration that leads to a large extent to the existence of COPD among the elderly. It is also observed that the vast majority of the sample (98%) does not have any symptoms of sleep apnea, as daytime sleepiness. This does not mean that they do not have sleep apnea, as 36.0% of older people suffer from sleep apnea of low risk, 28.6% of them have high risk apnea, while one out of three seniors do not suffer from sleep apnea at all. There was found statistically significant relationship between the existence of severe COPD among elderly people who have low risk of apnea.

Two similar surveys carried out by Bixler et al, in 1998 and 2001, in Pennsylvania, found out that among 1741 adults, aged up to 99 years, obstructive sleep apnea syndrome occur at a rate of 24% among men and 9% among women (21,22). Another study conducted in Spain, showed sleep apnea syndrome occurs at a rate of 26.0% among men, and 28.0% among women (23).

According to what has been previously been reported, it can be proved that there is no limiting factor in the occurrence of apnea between the two genders. The obstructive sleep apnea syndrome may occur with the same frequency in both elderly men and women, and occurs more frequently

in people who suffer from COPD and other obstructive respiratory diseases.

Regarding the rehabilitation and participation in a program of home care, the majority of the sample (66.4%), stated that they do not take part in a specialized program, but they do believe a program like this would help considerably. Only at a rate of 21.6% did the respondents participate in a program and had already seen improvement to their health problems. It is striking though, that 12.0% of the elderly, state that they were unwilling to participate in a rehabilitation program, while they did not believe that a specialized program would be of any benefit regarding the amelioration of their symptoms. In a Canadian survey comprised of a sample of two patient groups (home care rehabilitation group and inpatient rehabilitation group), admissions into hospitals and emergency care departments were decreased significantly among the home care rehabilitation group, in a time span of three months (24). This group was also found to be more satisfied with the choice of a home care program. Similar are the results of another investigation that took place in Australia, 2005, among 60 persons (age>60 years). The sample attended a specialized 12 week home assistance program, which included specific exercises and patients/carers education. The program had positive effects to the patients' treatment (25).

5. CONCLUSIONS

In conclusion, it is understood that as the number of the elderly people, and their proportion in the general population increases, it is important to understand that specific changes must be made to support their efforts for well being and their active social life. Furthermore, most of the elderly people need to be independent to sufficiently take care of their daily problems. On the other hand, they do ask for quality services provided by the state (26-30).

An important step is the development of supportive social structures to monitor the elderly, in order to detect, prevent and facilitate their daily problems. It is important that the elderly can be provided with a supportive human environment, which can help them discuss about their prob-

lems and assist them in communicating their inner needs (31-33). Institutions such as the specialized Sleep Centers, Open Care Centers for the Elderly and specialized pulmonary rehabilitation home care programs are vital for people with disabilities with limited access to primary health care services (32, 34-36).

Imperative is considered the staffing of these special social support organizations, who should have specialized and appropriate, up to date knowledge and skills. The above skills are required so that the health professionals can be able to plan, organize and implement strategies for the emotional and social rehabilitation of patients.

It is also important the social policy of the state to move towards new directions. Specialized health professionals assisted by qualified volunteers can offer their services after attending special health promotion programs. These programs are provided by community nurses, social workers and other health professionals, with expertise in the dynamics of family and social environment of the elderly (37, 38).

Since aging is directly related to physical illness, loss of independence and self-care, entering the golden age is an important area of study in the current health system [39]. Living conditions, social and emotional status of the elderly and their participation in society, are issues that should be further studied. Therefore further research is required, not only to add extra years in the lifespan of older people, but also to improve the quality of life during their remaining years.

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