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Evaluation of Epworth Sleepiness Scale in Patients with Bronchial Hyperreactivity without Airway Obstruction

Havayolu Obstrüksiyonu Olmayan Ancak Bronşhiperreaktivitesi Olan Hastalarda Epworth Uykululuk Skalasının Değerlendirilmesi

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ABSTRACT

Objective: Obstructive sleep apnea syndrome (OSAS) has been shown to be associated with inflammation of both the upper and lower respiratory tracts which were indicative for bronchial hyperresponsiveness (BHR). We aimed to investigate the sleep complaints as a manifestation of OSAS in patients who were tested for BHR with metacolin in our immunology and allergy clinic.

Materials and Methods: A retrospective cross sectional study was performed. Recorded data consisted of patients who were tested for metacolin BHR evaluation of asthma without airway obstruction (include occupational), chronic cough etiology and allergic rhinitis before planned subcutan immunotherapy. The patients were questioned with telephonically about daytime sleepiness, sleep disruption, snoring, choking and apnea using Epworth Sleepiness Scale (ESS).

Results: Of the 250 recorded patients 181 patients were contacted. 73 male and 108 female patients were included in the study. The mean age was 37.8 ± 12.4 years, BMI was 26.9 ± 5.1kg/m2, the mean ESS scores were 3.92 ± 3.9, BHR was positive in 59 (32.6%) patients. Shortness of breath and chronic cough were significantly higher in BHR positive patients but ESS score was not significantly higher. While 15.3% of the BHR positive patients have excessive daytime sleepiness (ESS >10), it was only 6.6 % in the BHR negative patients (P=0.06).

Conclusion: The patients with BHR that have not yet developed airway obstruction with high score of ESS, endication of polysomnography circle can be narrowed, the waiting period for the test can be shortened and the spread of the disease can be prevented.

Key Words: Bronchial hyperreactivity, sleepiness, Obstructive sleep apnea syndrome (OSAS)

ÖZET

Amaç: Obstrüktif uyku apne sendromunun (OSAS), bronş hiperreaktivitesinin (BHR) göstergesi olan üst ve alt hava yolu inflamasyonu ile ilişkili olduğu gösterilmiştir. Çalışmamızda immunoloji ve alerji kliniğimize metakolin ile BHR testi yapılan hastalarda OSAS'ın göstergesi olan uyku ile ilişkili şikayetleri araştırmayı amaçladık.

Gereç ve Yöntem: Çalışmamız retrospektif kesitlel bir çalışmadır. Kaydedilen data havayolu obstruksiyonu olmayan astım düşünülen (mesleksel astım dahil), kronik öksürük nedenininin saptanması ve allerjikrinit olan hastalarda subkutan immunoterapi öncesi BHR'sinin değerlendirilmesi gibi nedenlerle metakolin ile bronkoprovakasyon testi yapılan hastalardan oluşuyordu. Hastalar Epworth Uykululuk Skalası (ESS) ile gündüz uykululuk, horlama, uyanma, boğulma hissi ve apne açısından telefonla sorgulandı.

Bulgular: Kayıtlı 250 hastadan 181 hastaya telefonla ulaşılabildi. Çalışma 73'ü erkek 108'i kadın olmak üzere 181 hastadan oluşuyordu. Yaş ortalaması 37,8±12,4 (13-66) yıl, BMI 26,9 ± 5.1kg/m2, ESS skoru 3,92±3,9 idi ve BHR 59 (%32,6) hastada pozitifti. Nefes darlığı ve kronik öksürük BHR pozitif olan hastalarda anlamlı olarak yüksek bulundu fakat ESS skoru anlamlı olarak yüksek değildi. BHR pozitif olan hastalarda aşırı gündüz uykululuk (ESS>10) sıklığı %15 iken, BHR negative olan hastalarda %6,6 bulundu (P=0.06).

Sonuç: Havayolu obstruksiyonu henüz gelişmemiş BHR'si olan ve ESS skoru yüksek olan hastalarda polisomnografi endikasyon çemberi daraltılıp test için bekleme periyodu kısaltılabilir ve hastalik tablosunun oturmasi önlenebilir.

Key Words: Bronşial hiperreaktivite, Obstrüktif uyku apne sendromu (OSAS), uykululuk

Introduction

Methacholine challenge testing (MCT) is a method of assessing airway responsiveness. MCT is often considered when patients have asthma symptoms but have not variable airway obstruction measured with post bronchodilator test, 4 weeks after anti-inflammatory treatment, PEF variability or the

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difference of spirometric measurments between visits. It is also a valuable tool in the evaluation of occupational asthma to distinguish cough variant asthma from other chronic cough etiologies. Most of the asthmatic patients have bronchial hyperresponsiveness (BHR) (1,2). However, BHR is also seen in a wide variety of other diseases, including allergic rhinitis, chronic airway obstruction (COPD), smoking history, bronchitis and bronchiectasis. (3,4).

Obstructive sleep apnea syndrome (OSAS) is characterized by reduction of dilator muscles function during sleep, which causes sleep disruption, snoring, choking, frequent awakenings, insomnia, poor sleep and daytime sleepiness. Several studies have confirmed that patients with asthma, allergic rhinitis, COPD, HT, DM and high BMI are more prone to develop OSAS (5-8). OSAS has been shown to be associated with inflammation of both the upper and lower respiratory airways (9). It is also well documented that inflammation of the airways can affect the bronchial hyperreactivity (10). BHR was found in patients with OSAS at the rate of 22% and 25% in the studies of Köktürk and Lin respectively on the other hand there were no correlation between BHR and disease severity in the same studies (11,12). OSAS and inflamatory airway diseases such as allergic rhinitis, asthma, COPD can share a common cause of predisposing factors, they can be independent forms or they can be comorbidities worsening the clinical condition with common inflammatory process.

We aimed to investigate the sleep complaints as a manifestation of OSAS in patients who were applied to our immunology and allergy clinic for metacolin BHR testing with no airway obstruction, to evaluate asthma (including occupational), chronic cough etiology and airway responsiveness in patients with allergic rhinitis before planned subcutan immunotherapy (SCIT).

Materials and Methods

Study Design: A retrospective cross sectional study was performed in Sureyyapaşa Thorax and Thorax Surgery Training and Research Hospital's Department of Immunology and Allergy. The study was approved by our Hospital Committee.

We aimed to reach 250 patients without airway obstruction (FEV1/FVC>%80) who had been perfomed metacolin BHR test because of asthma symptoms such as episodic breathlessness, wheezing, cough, chest tightness without variable airway obstruction, chronic non productive cough persisting for longer than eight weeks, allergic rhinitis thought to start SCIT and evaluation of occupational asthma in our immunology and allergy department. The test results were recorded together with skin prick test results, demographic data, smoking history, respiratory semptoms, body mass index (BMI) (kg/m2) and comorbidities as diabetes mellitus (DM), hypertension (HT). The patients were questioned with telephonically about daytime sleepiness, sleep disruption, snoring, choking and apnea using Epworth Sleepiness Scale (ESS).

Bronchoprovocation test: The 5-breath dosimeter method (Koko dosimeter, nSpire Health, Longmont, Colorado) was used according to guidelines from the American Thoracic Society. The test included 5 steps respectively: diluent only, 0.0625, 0.25, 1.0, 4.0 and 16.0 mg/ml. Inhalation was stopped when FEV1 decreased by 20% from its baseline value. If the cumulative dose causing a 20% decrease in FEV1 (PD20 [provocative dose] methacholine) was <16 mg/ml, the methacholine challenge test was diagnosed to be positive or have BHR. All foods and drugs which can affect the test results were discontinued before the test (13).

Epworth Sleepiness Scale (ESS): The ESS is basic, eight item self-administered scale which is widely used in clinical practice to quantify the level of daytime sleepiness. The total score range is 0-24 and excessive daytime sleepiness is considered when score is more than 10 (14).

Statistical Analysis: Results are expressed as mean ± standard deviation (SD). Significance of difference between presence of BHR and ESS score, age and BMI were investigated with "Mann Whitney U test", for categorical parameters "Chi-square test" were used. The relation between PD 20 with ESS score and BMI were investigated with "pearson correlation test" in patients with BHR. The statistical analysis were performed using the SPSS program (SPSS Inc., IL, USA) and p values were analyzed using two tailed; statistical significance was considered if p values were less than 0.05.

Results

The recorded data include 250 patients who were tested for BHR. Of the 250 patients 181 patients were reached and were asked about their sleep symptoms over the telephone. 73 male and 108 female patients were included in the study. The mean age was 37.8 ± 12.4 (13-66) years BMI was 26.9 ± 5.1kg/m2, ESS scores were 3.92 ± 3.9, BHR was showed in 59 (32.6 %) patients. Causes of testing BHR, and demographic characteristics

of patients were given in table 1. The comorbidities like DM, HT and BMI were similar in ESS >10 and <10 patients; but there were significant positive correlations between ESS score and BMI (r= 0.13, p=0.03). Among respiratory symptoms; shortness of breath and chronic cough were significantly higher in BHR positive patients; sleep symptoms including ESS score were not significantly higher in the BHR positive patients. While 15.3 % of BHR positive patients have excessive daytime sleepiness (ESS >10), only 6.6% of BHR negative patients have. (P=0.06) (Table 2). There were no significant correlations between PD 20 values and BMI and ESS score in the patients with BHR according to Pearson correlation analyses (Table 3).

Table 1. Demographic characteristics of patients

Variables	Patients tested for BHR and scored with ESS n=181 (%)
Age;years ± SD	37.8 ± 12.4
Sex; Male/Female	73/108
BMI; kg/m2 ± SD	26.9 ± 5.1
ESS ± SD	3.92 ± 3.9
BHR (+)	59 (32.6%)
Smoking history	37 (20%)
Shortness of breath	91 (50.3%)
Wheezing	40 (22.1%)
Chronic cough	63 (34.8%)
Allergic Rhinitis	48 (26%)
HT	6 (3.3%)
DM	9 (5%)

Abbreviations: BHR: Bronchial hyperresponsiveness, BMI: Body mass index, ESS: Epworth Sleepiness Scale, DM: Diabetes mellitus, HT: Hypertension.

Table 2. Comparison between patients with BHR and patients without BHR.

	BHR		
	Positive (n=59)	Negative (n=122)	p
Age	36.5 ± 12.9	38 ± 12.9	0.49
Sex (M/F)	38/21	70/52	0.42
BMI	26.5 ± 4.8	27.1 ± 5.3	0.6
Smoking History	12 (20.3%)	25 (20.5%)	1
Shortness Of Breath	37 (62.7%)	54 (44.3%)	0.02*
Allergic Rhinitis	17 (28.8%)	31 (25.4%)	0.72
Chronic Cough	27 (45.8%)	36 (29.5%)	0.045*
ESS (Mean±SD)	4.5 ± 5.2	3.6 ± 3.2	0.74
ESS>10 (n)	9 (15.3%)	8 (6.6%)	0.06

Abbreviations: BHR: Bronchial hyperresponsiveness, BMI: Body mass index, ESS: Epworth Sleepiness Scale. *Statistical significance p<0.05.

Table 3. Correlation between PD 20 value and BMI, ESS score in patients with BHR.

	PD20 value n=59	
	r value	p value
ESS	-0.17	0.096
BMI	-0.06	0.31

Abbreviations: BHR: Bronchial hyperresponsiveness, BMI: Body mass index, ESS: Epworth Sleepiness Scale.

Discussion

In the present study, shortness of breath and chronic cough were significantly higher in BHR positive patients, the percentage of patients with ESS (>10) was higher too but was not statistically significant. The severity of BHR was not correlated with BMI and ESS score according to Pearson correlation analyses. But to the extended

that rather than BMI, ESS score was more correlated with PD20 value. When we compare with and without excessive daytime sleepiness groups, there were no statistical significant viewpoint of BMI, HT and DM, but there is high correlation between ESS score and BMI.

In literature it was demonstrated that 25% of OSAS patients have BHR used maximum metacholin dose at 25 mg, they established 25% BHR in patients with OSAS (11). In a large cohort study of OSAS patients, %4 of OSAS patients has BHR to cold air (15). In another study which was conducted in Turkey, BHR was established at the rate of 44% with histamin (maximum 16mg), the presence and severity of BHR (PD20) were correlated with severity of sleep apnea (AHI) and BMI (16). But some studies did not found relation between severity of OSAS and BHR (11,17). Devoassoux et al. (18) found that continuous positive airway pressure (CPAP) can increase the BHR and they showed that at beginning BHR was 11%, at the first week of treatment 40% and at fourth week 33%.

The difference of our study from other studies is that; we aimed to determine if there is any difference and correlation between patients who have not just had airway obstruction but had BHR which is related airway inflammation and patients who were not yet diagnosed as OSAS but the sleep symptoms mainly ESS were begun. Although not meaningful, in patients with BHR the percentage of patients with 10<ESS were more than two times of patients without BHR; it may be due to airway obstruction which has not yet begun and not yet to be confirmed recognition of OSAS. We aimed in the following times to conduct polysomnography to the patients with detected risk factors and examine changings of BHR after CPAP treatment.

BHR can be a risk factor for OSAS, large scale studies are needed to determine the risk factor. The patients who have excessive daytime sleepiness and have BHR although does not have airway obstruction can be followed up closely and so endication of polysomnography circle can be narrowed, the waiting period for the test can be shortened and the spread of the disease can be prevented with pharmacological and non pharmacological approaches.

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