

Serum S100B protein: a useful marker in obstructive sleep apnea syndrome

Stężenie białka S100B w surowicy jako przydatny wskaźnik w zespole obturacyjnego bezdechu podczas snu

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Abstract

Background and purpose: We aimed to underline the importance of serum S100B protein as a useful biochemical marker in patients with obstructive sleep apnea syndrome (OSAS).

Material and methods: Forty-three newly diagnosed patients with OSAS (median apnea-hypopnea index [AHI, events/hour]: 37.5 [range 11.3-137]) and 25 subjects with AHI < 5 (median AHI: 4.4 [range 0.7-4.8]) were included in the study. Serum S100B protein level was tested in serum samples taken after polysomnography in both groups and the difference between OSAS patients and the control group regarding that level was assessed. In addition, the association of S100B protein serum level with age, body mass index, AHI, mean O₂ saturation percentage during sleep, minimum O₂ saturation value (%) at the end of the apneas, and the time spent at an O₂ saturation less than 90% were analyzed in the OSAS patient group.

Results: Median serum S100B protein level was 133.7 pg/mL (range 20.97-230.70 pg/mL) in patients with OSAS and 16.1 pg/mL (range 10.1-22.9 pg/mL) in the control group ($p < 0.005$). Serum S100B protein level did not correlate with any studied variable ($p > 0.05$ for each correlation coefficient).

Conclusions: Serum S100B protein level is increased in patients with OSAS and may be a useful biochemical marker in those patients.

Streszczenie

Wstęp i cel pracy: Celem pracy było podkreślenie znaczenia stężenia białka S100B w surowicy jako przydatnego wskaźnika biochemicznego u chorych na zespół obturacyjnego bezdechu podczas snu (*obstructive sleep apnea syndrome* – OSAS).

Materiał i metody: W badaniu wzięło udział 43 chorych ze świeżo rozpoznanym OSAS [mediana wskaźnika bezdechów/spłyconych oddechów, AHI (epizody na godzinę): 37,5 (zakres: 11,3–137)] oraz 25 osób z AHI < 5 [mediana: 4,4 (0,7–4,8)] stanowiących grupę kontrolną. W obu grupach zmierzono stężenie białka S100B w surowicy pobranej po wykonaniu polisomnografii i sprawdzono różnicę w tym zakresie między grupami. Ponadto w grupie chorych na OSAS określono korelację między stężeniem białka S100B w surowicy a wiekiem, wskaźnikiem masy ciała, AHI, średnim wysyceniem krwi tętniczej tlenem podczas snu, najmniejszym wysyceniem krwi tętniczej tlenem na zakończenie okresu bezdechu oraz czasem, w którym wysycenie krwi tętniczej tlenem wynosiło < 90%.

Wyniki: Mediana stężenia białka S100B w surowicy wyniosła 133,7 pg/ml (zakres: 20,97–230,70 pg/ml) u chorych na OSAS oraz 16,1 pg/ml (zakres: 10,1–22,9 pg/ml) w grupie kontrolnej ($p < 0,005$). Stężenie białka S100B w surowicy nie korelowało z żadną ocenianą zmienną ($p > 0,05$ dla każdego współczynnika korelacji).

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Key words: S100B protein, obstructive sleep apnea syndrome, marker.

Wnioski: Stężenie białka S100B w surowicy jest zwiększone u chorych na OSAS i może być przydatnym wskaźnikiem biochemicznym u tych pacjentów.

Słowa kluczowe: białko S100B, zespół obturacyjnego bezdechu podczas snu, znacznik.

Introduction

Obstructive sleep apnea syndrome (OSAS) is characterized by episodic apnea/hypopnea due to upper airway obstruction during sleep. This syndrome is usually associated with increased cardiovascular morbidity and mortality [1]. Patients are diagnosed with OSAS if the value of the apnea-hypopnea index (AHI), obtained through polysomnography (PSG), exceeds 5. The prevalence of OSAS is approximately 2% in women and 4% in men [2]. Upper respiratory tract obstruction in OSAS occurs due to a predisposition for pharyngeal collapse caused by a small lumen or increased extraluminal pressure. Upper respiratory tract obstruction is thought to be an effect, rather than a cause, which is triggered by a factor of central origin [3]. The pathophysiological mechanisms in OSAS include nocturnal intermittent hypoxia, apneas, increased sympathetic tone, inflammation, and oxidative stress.

Obstructive sleep apnea syndrome causes various problems, from simple snoring to serious pulmonary, cardiovascular, endocrine, and psychiatric disorders. Patients with OSAS experience daytime sleepiness, impaired memory, disordered cognitive functions, and difficulty in performing their daily activities.

In recent years, interest in the analysis of neurobiochemical markers, such as S100B protein, glial fibrillary acidic protein, and neuron-specific enolase, for various central nervous system diseases has been gradually increasing [4]. S100B protein is a member of the S100 family. The S100 family, which performs many intracellular and extracellular regulating activities, is a broad subgroup of calcium binding proteins [5]. The members of this protein family interact with many effector proteins, regulate enzyme activities, affect the structure of the cytoskeleton, and ensure cell growth, cell differentiation and calcium homeostasis. S100B protein is coded via the 22.3 locus of chromosome 21 [6]. S100B is produced principally by astrocytes and has autocrine and paracrine effects on glia, neurons and microglia [7].

In recent studies, a correlation was found between the size of the infarct resulting from ischemic brain damage and the serum S100B protein level [8,9], and it is

possible to use protein S100B measurements to monitor stroke treatment [10]. Increased S100B levels in cases of hypoxia are similar to those noted in traumatic damage. In a few recent studies performed in OSAS patients, increased serum S100B protein levels were found [11,12].

In the current study, the serum S100B protein levels of patients with OSAS were measured and compared with the control group. We also aimed to demonstrate the relationship between serum S100B protein levels and sleep-related variables such as AHI values, mean O₂ saturation during sleep, minimum O₂ saturation value at the end of the apnea and the time spent at an O₂ saturation below 90% in patients with OSAS.

Material and methods

Patients

In total, 68 patients (26 women) who presented to the sleep outpatient clinic in the Chest Diseases Department of Diskapi Yıldırım Beyazıt Training and Research Hospital between January 2011 and July 2011 with complaints of snoring, witnessed apnea at night and excessive daytime sleepiness were enrolled in the study. Patients with comorbid diseases, acute infections, malignancies, recent myocardial infarction, recent surgery, chronic use of sleep-affecting drugs (such as hypnotics), alcohol intake, restless leg syndrome, sleep phase disorder, and/or periodic leg movements during sleep were excluded from the study.

The study was planned in compliance with the Helsinki Declaration and with the recommendations of our hospital's ethics committee. All patients signed a voluntary informed consent form before the study commenced.

Methods

Demographic data, smoking habits and alcohol consumption habits of the patients in the study were investigated. A detailed physical examination was performed in each patient, and height, body weight and neck cir-

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