Sleep apnoea involves iron homeostasis regulation

V. Manolov1, O. Georgiev1, V. Pencheva-Ganeva2, V. Vasilev2, R. Grozdevova2, I. Petkova2, K. Tzatchev3, H. Hajdjidjova1, L. Trayanova1
1Dept. of Clinical Laboratory, Medical University, Sofia, Bulgaria; 2Dept. of Pneumopediatrics of Internal Diseases, Medical University, Sofia, Bulgaria; 3Clinical laboratory Ramus, Sofia, Bulgaria; 4Dept. of Immunology, NCIPD Sofia, Bulgaria; 5Dept. of Neurology, Medical University, Sofia, Bulgaria; 6Dept. of Medical Genetics, Medical University Sofia, Bulgaria

PURPOSE / OBJECTIVES

Epidemiology of obstructive sleep apnoea (OSA) impasses by symptoms caused by immunological reactions and/or direct obstruction of airflow through upper respiratory tract during sleep. Epidemiologically increased mortality from OSA is established. Main OSA symptoms are tiredness, sleep habits disturbances and somnolence. Obstruction of oronasal cavity and mouth, difficulty, interrupted breaths, respiratory pauses, apnoea, restless sleep, drowsiness, and irritability. During measurement sometimes in subject of sleep. These changes lead to decreased longevity of patients with OSA. Hypersomnia (OSAHS) is considered a relevant condition for the evaluation of sleep apnoea patients.

Hypersomnia in OSA patients is related to iron homeostasis through iron mobilization from erythrocyte mass, iron turns into arteriosclerotic type of lesions. Different studies shows e.g. in diabetes in arteriosclerotic in patients. Hepcidin is exclusively formed from medullary (bone) through the transsponder pathway. Elevation hepcidin is in independent, endocrinologically factor for arteriosclerotic vascular diseases. This aim of our study is to assess the connection between iron metabolism disturbances in OSA, and arteriosclerotic changes of carotid arteries (maximal)

MATERIALS & METHODS

All OSA patients with known vascular arteriosclerotic evidence were included in the study. Changes were tested by biochemical blood tests (Hb, Hct, ferritin, MCH, MCHC, transferrin, iron saturation, total iron binding capacity, ferritin, hepcidin, TIBC, vitamin B12) and hepcidin in the blood serum of OSA patients with arteriosclerotic changes in carotid arteries. Complete blood cell count (CBC), electrolyte analysis (Na, K, Mg), serum iron and total iron binding capacity (TIBC), serum transferrin, hepcidin and hepatic iron quantified for non-invasive evaluation.

Heppicism, iron deficiency (micronutrient, iron deficiency anemia (IDA), fasting glucose and creatinine tests were included in the study of OSA patients and control group.

For hematological, biochemical and immunological parameters analysis by Siemens Healthineers Diagnostics reagents used. Hepcidin test was performed by commercially validated ELISA method. Average age of included OSA patients was 41.5 ± 5.8 years, for the control group: 43 ± 6.6. The study was on the ethical principles of the Helsinki declaration.

During statistical analysis established results were presented as mean average ± SD for parameter distribution.

Patients’ correlation and paired tests were used for estimation of significance and correlation between values. Level of P<0.05 was considered as statistically significant.

RESULTS

Evaluation of hepcidin is still a novelty in our routine practice although some studies show role of hepcidin in arteriosclerosis in OSA patients. Our findings contribute to clarification of hepcidin role in arteriosclerotic changes in obstructive sleep apnea patients, and might be helpful in right therapeutic choice of accompanying metabolic disturbances. We established increased serum hepcidin levels in OSA patients with arteriosclerotic changes in carotid arteries (P<0.005).

The connection between hepcidin concentration and hepcidin/ferritin ratio with presence of arteriosclerotic plaques and ABI, confirms hepcidin role in arteriosclerosis process. In our study we found significant positive correlation between serum hepcidin levels and ABI and IMT in OSA patients with arteriosclerotic changes in carotid arteries (P<0.01 and P<0.05).

SUMMARY/CONCLUSION

During desaturation episodes, oxygen is subject of chronic anoxia, which leads to decreased nitric oxide (NO) levels, increased interleukin 6 and immune response factors. These changes lead to increased inflammation, arterial hypertension, metabolic syndromes, and others diseases occurrence, risk of brain vascular changes increases.

Increased hepcidin was found in OSA patients with arteriosclerotic changes in carotid arteries, which is consistent with previously published observations. The connection between hepcidin and hepcidin/ferritin ratio with presence of arteriosclerotic plaques and ABI, confirms hepcidin role in arteriosclerosis process. In our study we found significant positive correlation between serum hepcidin levels and ABI and IMT in OSA patients with arteriosclerotic changes in carotid arteries (P<0.01 and P<0.05).