

SUMMARY

The doctoral dissertation consists of a series of four articles published in the journals: Journal of Breath Research (I), Advances in Medical Sciences (II), Acta Poloniae Pharmaceutica (III), and Biointerface Research in Applied Chemistry (IV) devoted to: (I) assessment of exhaled nitric oxide from the lower respiratory tract in children with respiratory diseases, (II) assessment of the level of exhaled nitric oxide from the upper respiratory tract in children with respiratory diseases, (III) the effect of fluticasone propionate on the concentration of nitric oxide in exhaled air from the upper and lower respiratory tract in children with asthma and/or allergic rhinitis, (IV) a comparative study of selected levels of biomarkers of oxidative stress in children with asthma and healthy children.

The measurement of nitric oxide (eNO) concentration in exhaled air from the upper and lower respiratory tract is currently being performed as a noninvasive marker of inflammation in respiratory diseases. Evaluation of eNO from the lower respiratory tract (fractional nitric oxide [FeNO]) and in the upper respiratory tract (nasal nitric oxide [nNO]) is considered a rapid method to aid in the diagnosis and control of the disease, as well as in the evaluation of the applied treatment. 724 children with respiratory diseases were included in the study. Study participants were recruited from the Allergology Clinic of the Provincial Hospital No. 2 in Rzeszów. Measurements of eNO from the lower and upper respiratory tract were measured using an electrochemical analyzer. Furthermore, the correlations between eNO and patient clinical parameters were assessed. Subsequently, the effect of corticosteroids treatment on eNO was assessed, as well as the level of selected markers of oxidative stress. The level of FeNO among patients with cystic fibrosis patients to the control group. A statistically significantly higher level of FeNO was found in patients with asthma, allergic rhinitis, as well as in patients with asthma and allergic rhinitis compared to healthy patients. Furthermore, elevated levels of nNO were found in children with allergic rhinitis, asthma, and allergic rhinitis. Statistical analyzes showed that the biomarker tested can be effective in differentiating selected disease entities (100% sensitivity and 100% specificity to distinguish allergic rhinitis and asthma with allergic rhinitis from healthy people). In addition, FeNO and nNO measurements have been shown to be helpful in assessing the effectiveness of corticosteroid treatment. Currently, many studies indicate that oxidative stress is involved in the pathogenesis of asthma. A reduced concentration of thiol groups, tryptophan content, and total antioxidant capacity were demonstrated in the serum of patients suffering from asthma. It is worth mentioning that no elevated concentration of

3-nitrotyrosine was observed in the serum of patients.

More research is needed, especially on the impact of individual factors on the level of eNO in children with respiratory diseases. Due to the fact that the eNO measurement method is inexpensive, painless, and quick, it can be helpful in conjunction with the recognition of clinical symptoms and common diagnostic methods in assessing inflammation.