

Correlation between the Ratios of House Dust Mite-Specific IgE/Total IgE and Asthma Control Test Score as a Biomarker of Immunotherapy Response Effectiveness in Pediatric Allergic Asthma Patients

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Abstract : Background: Allergic asthma, caused by IgE-mediated allergic reactions, remains a global health issue with high morbidity and mortality rates. Immunotherapy is the only etiology-based approach to treating asthma, but no standard biomarkers have been established to evaluate the therapy's effectiveness. This study aims to determine the correlation between the ratios of serum levels of HDM-specific IgE/total IgE and Asthma Control Test (ACT) score as a biomarker of the response to immunotherapy in pediatric allergic asthma patients. Patient and Methods: This retrospective cohort study involved 26 pediatric allergic asthma patients who underwent HDM-specific subcutaneous immunotherapy for 14 weeks at the Pediatric Allergy Immunology Outpatient Clinic at Saiful Anwar General Hospital, Malang. Serum levels of HDM-Specific IgE and Total IgE were measured before and after immunotherapy using Chemiluminescence Immunoassay and Enzyme-linked Immunosorbent Assay (ELISA) method. Changes in asthma control were assessed using the ACT score. The Wilcoxon Signed Ranked Test and Spearman correlation test were used for data analysis. Results: There were 14 boys and 12 girls with a mean age of 6.48 ± 2.54 years. The study showed a significant decrease in serum HMD-specific levels before immunotherapy [9.88 ± 5.74 kuA/L] compared to those of 14 weeks after immunotherapy [4.51 ± 3.98 kuA/L], $p = 0.000$. Serum Total IgE levels significant decrease before immunotherapy [207.6 ± 120.8 IU/ml] compared to those of 14 weeks after immunotherapy [109.83 ± 189.39 IU/mL], $p = 0.000$. The ratios of serum HDM-specific IgE/total IgE levels significant decrease before immunotherapy [0.063 ± 0.05] compared to those of 14 weeks after immunotherapy [0.041 ± 0.039], $p = 0.012$. There was also a significant increase in ACT scores before and after immunotherapy (each 15.5 ± 1.79 and 20.96 ± 2.049 , $p = 0.000$). The correlation test showed a weak negative correlation between the ratios of HDM-specific IgE/total IgE levels and ACT score ($p = 0.034$ and $r = -0.29$). Conclusion: In conclusion, this study showed that a decrease in HDM-specific IgE levels, total IgE levels, and HDM-specific IgE/total IgE ratios, and an increase in ACT score, was observed after 14 weeks of HDM-specific subcutaneous immunotherapy. The weak negative correlation between the HDM-specific IgE/total IgE ratio and the ACT score suggests that this ratio can serve as a potential biomarker of the effectiveness of immunotherapy in treating pediatric allergic asthma patients.

Keywords : HDM-specific IgE/total IgE ratio, ACT score, immunotherapy, allergic asthma

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