

Changing survival, memory cell compartment, and T-helper balance of lymphocytes between severe and mild asthma.

ABSTRACT

Background: Asthma is a complicated network of inflammatory reactions. It is classified into mild, moderate, and severe persistent asthma. The success of asthma therapy relies much on understanding the underlying mechanisms of inflammation at each stage of asthma severity. The aim of this study was to explore the differences in apoptotic potential, CD4/CD8 ratio, memory compartment, and T-helper (Th) 1 and 2 profile of peripheral blood lymphocytes (PBL) in patients with mild intermittent asthma and severe persistent asthma during exacerbation periods. Results: Four research lines were investigated and compared among mild asthmatics, severe asthmatics, and healthy groups by applying immunocytochemical staining of PBL. Antiapoptotic and proapoptotic proteins with Bcl-2/Bax ratio, CD4, CD8 markers with CD4⁺/CD8⁺ ratio, CD45RO⁺, CD45RA⁺ markers with memory/naïve ratio (CD45RO⁺/CD45RA⁺). Th2/Th1 cytokines balance represented by IL-4/IFN- γ ratio was measured by enzyme-linked immunosorbent assay (ELISA) for in vitro PBL cytokine synthesis. It was found that Bcl-2/Bax ratio was higher in severe than in mild asthmatics which in turn was higher than in healthy group. And memory/naïve ratio of PBL was higher in severe than in mild asthmatics. Moreover, memory cells, CD45RO⁺ and CD45RO⁺/CD45RA⁺ ratio were correlated directly with Bcl-2/Bax, in severe and mild asthma patients. In contrast, CD4⁺/CD8⁺ ratio was not changed significantly among healthy group, mild and severe asthmatics. However, CD8⁺ cells were correlated directly with memory cells, CD45RO⁺, in severe asthmatics only. Interestingly, the dominant profile of cytokines appeared to change from T helper 2 (Th2) in mild asthmatics to T helper 1 (Th1) in severe asthmatics where the lowest in vitro IL-4/IFN- γ ratio and highest IFN- γ were found. Conclusion: It was concluded that the underlying mechanisms of inflammation might vary greatly with asthma stage of severity. Mild intermittent asthma is mainly Th2 allergen-oriented reaction during exacerbations with good level of apoptosis making the inflammation as self-limiting, while in severe persistent asthma, the inflammatory reaction mediated mainly by Th1 cytokines with progressive loss of apoptosis leading to longer exacerbations, largely expanded memory cells, CD45RO⁺, leading to persistent baseline inflammation.

Keyword: Immunology; Allergology; Vaccine; Cytokines; Growth factors.