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Title: A phenotype of onset of adult asthma with co-morbid rhinitis

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Body: Background: Asthma is heterogeneous with respect to onset of the disease but there is limited data on the proportions of patients with varying phenotypes. We hypothesized that onset of asthma might be associated with onset of rhinitis Methods: A cross sectional, multicentre survey including 1,617 questionnaire responses was conducted in doctor-diagnosed asthma. The data were collected using a pre-designed structured questionnaire concerning self-reported rhinitis, and a clinical examination for atopic status. This categorization was compared to one in which patients were grouped using a K-means clustering technique with log linear modelling and cross-tabulation. Results: 1,303 (80.6%) of the 1,617 subjects had adult asthma. The total prevalence of self-reported rhinitis was 50.3% in the adult asthmatics. This clinical categorization was validated by comparison with a categorization in which patients were grouped by unsupervised k-means cluster analysis. Seven clusters were further identified: cluster 1 (10.6%): child-onset asthma existing 14-year before rhinitis; cluster 2 (14.0%): rhinitis existing 4-year before adult-onset in their twenties; cluster 3 (15.3%): rhinitis existing 8-year before adult-onset in their forties; cluster 4 (10.4%): rhinitis existing 12-year before adult-onset in their sixties; cluster 5 (14.4%): child-onset asthma without rhinitis; cluster 6 (18.0%): adult-onset asthma in their forties without rhinitis, and cluster 7 (17.3 %): adult-onset asthma in their sixties. Conclusion: Patients with adult asthma show different phenotypes of the onset. This approach to categorization more appropriately reflects the likely multiple pathophysiological processes involved in adult asthma.