

## Abstract

**Background:** Research into the effects of asthma treatments on the extra-pulmonary symptoms of severe asthma is limited by the absence of a suitable questionnaire. The aim was to create a questionnaire suitable for intervention studies by selecting symptoms that are statistically associated with asthma pathology and therefore may improve when pathology is reduced.

**Methods:** Patients attending a specialist asthma clinic completed the 65-item General Symptom Questionnaire (GSQ-65), a questionnaire validated for assessing symptoms of people with functional disorders. Lung function (FEV1%) and cumulative oral corticosteroids (OCS) calculated from maintenance dose plus exacerbations were obtained from clinic records. Pathology was represented by the two components of a principal component analysis (PCA) of FEV1% and OCS. LASSO regression was used to select symptoms that had high coefficients with these two principal components and occurred frequently in severe asthma.

**Results:** 100 patients provided data. PCA revealed two components, one where FEV1% and OCS were inversely related and another where they were directly related. LASSO regression revealed 39 symptoms with non-zero coefficients on one or more of the two principal components from which 16 symptoms were selected for the GSQ-A on the basis of magnitude of coefficient and frequency. Asthma symptoms measured by asthma control questionnaires were excluded. The GSQ-A correlated 0.33 and -0.34 ( $p = 0.001$ ) with the two principal components.

**Conclusion:** The 16 item GSQ-A assesses the frequency of a heterogeneous group of symptoms that are associated with pathology as measured by the statistical combination of FEV1% and OCS.