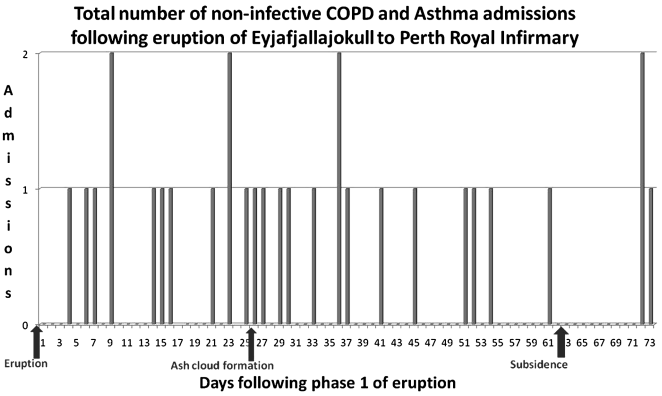

Abstract P120 Figure 1 Total number of non-infective COPD and asthma admissions following eruption of Eyjafjallajokull to Perth Royal Infirmary.

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P121 FEASIBILITY OF PERFORMING VALID SPIROMETRY IN RURAL INDIA: PRELIMINARY RESULTS FROM A POPULATION STUDY ASSESSING THE PREVALENCE OF COPD

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Introduction Spirometry remains the cornerstone in the diagnosis of Chronic Obstructive Pulmonary Disease (COPD). Little is known regarding the determinants and prevalence of COPD in rural India. We undertook a population-based study in Howrah District, West Bengal,India at a community-based primary care clinic of a voluntary organisation to test the feasibility of spirometric estimation of the prevalence of COPD.

Methods Spirometry was performed on all adults >35 years attending the clinic. Questionnaire data (capturing respiratory symptoms, occupation, tobacco smoking history, indoor stove use) were gathered for each subject. All spirometric data were examined by an independent UK-based clinical scientist.

Results Spirometry was performed in 315 patients over 3 months; 18% (58/315) of measurements were deemed good quality as per ERS guidelines; 45% (143/315) had the correct shaped curve; hence 64% (201/315) of all spirometries were deemed adequate for FEV_1 analysis. Poor quality traces were noted in 36% (n=114) and hence were excluded from analysis. Of the adequate spirometries (n=201, mean age 51 years (SD 12.1); 39% male), 84 (42%) were normal, 102 (51%) exhibited mild airflow obstruction, 12 (6%) moderate airflow obstruction and 3 (1.5%) severe airflow obstruction according to British guidelines. Difference in FEV_1% predicted between never/ex smokers and current smokers was significant (p=0.029). Indoor stove use was ubiquitous in this population and did not correlate with FEV_1 percent predicted.

Conclusion In a rural Indian setting, valid spirometry can be obtained in two-thirds of adult patients attending a community clinic with 58% of patients in this sample exhibiting at least mild COPD with a history of current smoking being associated with the development of airflow obstruction.

Respiratory physiology: old and new concepts

P122 THE USE OF IMPULSE OSCILLOMETRY (IOS) TO STUDY FRACTAL SCALING AND SAMPLE ENTROPY IN AIRWAY RESISTANCE TIME SERIES IN SEVERE ASTHMA

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Introduction Severe asthma affects airway calibre and can be monitored using IOS. Sample entropy (SampEn) is a measure of complexity and is defined as the probability that sequences of patterns (template size) in time series which are initially closely related, that is, within a fraction of the standard deviation (tolerance level) of the time-series remain so within subsequent time frames. Fractal scaling is a measure of self similarity and scale invariance measured in a time-series and quantifies the memory found within as a consequence. We hypothesised that fractal scaling and SampEn will be useful in characterising severe asthma.

Methods 66 GINAstage 4–5 severe asthmatics (Mean(Sem) age; 54.1(1.4), Sex M:F; 31:35, post-bronchodilator FEV_1% predicted; 81.02 (2.7)%) and 27 Controls (Mean(Sem) age; 48.4(2.2), Sex M:F;9:18, post-bronchodilator FEV_1% predicted; 108.2 (2.8)%) were recruited. Impulse oscillometry was performed at 5–35 Hz, with impulses triggered every 0.2 s for 150 s, at baseline and 15 min after 400 mcg inhaled salbutamol. Detrended fluctuation analysis was used to derive the fractal scaling exponent α_1. SampEn was derived using a custom program. SampEn and α_1 were both obtained from airway resistance at 10 Hz over the 150 s time-series. Triplicate measurements of 150 s were repeated in 18 randomly selected asthmatics from our cohort after 6 months.

Results SampEn was significantly increased compared to controls (Abstract P122 Table 1) and correlated significantly with exacerbation frequency from the previous 12 months (Asthma Baseline- p=0.007, rs=0.3; Post-Bronchodilator- p=0.009, rs=0.3). Fractal scaling was also found to be present in airway resistance in severe asthma (α_1=0.94 (0.03)) and showed an inverse relationship with SampEn (p=0.0352, r=−0.4). Increased SampEn was associated with worse ACQ scores (p=0.027, rs=0.3) and lower AQLQ scores (p=0.023, rs=−0.2). SampEn measurements were repeatable (an Intra-class correlation of 0.74) in the triplicate series. In keeping with other studies, airway resistance was significantly increased in severe asthma.

Conclusions SampEn a measure of complexity is (1) increased in severe asthma (2) a repeatable measure (3) associated with a lower quality of life and exacerbation frequency. The ability of this technique to monitor asthma stability and to predict future exacerbations by stochastic modelling needs to be explored.

Abstract P122 Table 1

Asthma n=66 Controls n=27	Baseline		Post-bronchodilator	
	Controls	Asthma	Controls	Asthma
Resistance at 10 Hz (KPa/(l/s))	0.34(0.02)	0.48(0.02)†	0.31(0.02)*	0.42(0.02)* †
SampEn	0.09(0.02)	0.16(0.02)†	0.09(0.02)	0.12(0.01)† *

Mean (sem) data.
*Comparison against baseline p<0.05.
†Comparison against control p<0.05.
*/†Paired t-tests/equivalent. R10-approximated to total airway resistance in our cohort and had a coherence of 0.9, SampEn: template size=2 and tolerance level=0.2.