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Sputum colour assessment and clinical outcomes in bronchiectasis: data from the EMBARC Registry

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Objective: Investigate the relationship between sputum colour, a biomarker of neutrophilic inflammation, and long term outcomes in bronchiectasis.

Methods: A 4-point sputum colour chart (Murray scale) was used in the EMBARC registry which reviews bronchiectasis patients annually to collect long term outcome data.

Results: 19324 patients were enrolled from 31 countries. 13484 patients reported regular sputum expectoration with a sputum colour grade. 5541 had mucoid sputum (40.4%), 5380 mucopurulent (39.9%), 2486 purulent (18.4%) and 177 severe purulent (1.3%). Patients with more purulent sputum had higher BSI scores, lower FEV1, and more frequent chronic infection including with *P.aeruginosa*. During 5 years follow-up, baseline sputum colour was strongly predictive of future exacerbations. Compared to patients with mucoid sputum (1.0 reference), those with more purulent sputum experienced more exacerbations (IRR1.26 95%CI 1.19-1.33, 1.45 95%CI 1.36-1.55 and 1.54 95%CI 1.26-1.89, all $p<0.0001$ - figure). Similar results were observed for severe exacerbations (hospitalisation)(IRR1.29 95%CI 1.19-1.39, 1.73 95%CI 1.58-1.90 and 2.01 95%CI 1.54-2.63, all $p<0.0001$). Mortality significantly increased with increasing sputum purulence, HR1.12 95%CI 1.01-1.24, $p=0.027$ indicating a 12% increased risk of death for each 1point increase in sputum purulence.

Conclusion: Sputum colour is a simple biomarker associated with future outcomes.

BIM, n=245	Cough	Sputum	Breathlessness	Tiredness	Daily Activity	Overall health	Control	Exacerbation
BHQ	-0.513**	-0.501**	-0.800**	-0.789**	-0.793**	-0.733**	-0.586**	-0.567**
QoL-B	-0.451**	-0.366**	-0.805**	-0.682**	-0.702**	-0.654**	-0.491**	-0.498**
Physical								
Role	-0.387**	-0.356**	-0.625**	-0.635**	-0.717**	-0.685**	-0.533**	-0.525**
Vitality	-0.335**	-0.235**	-0.644**	-0.774**	-0.577**	-0.571**	-0.452**	-0.451**
Emotion	-0.132*	-0.165*	-0.378**	-0.425**	-0.351**	-0.397**	-0.267**	-0.248**
Social	-0.469**	-0.384**	-0.436**	-0.453**	-0.470**	-0.477**	-0.410**	-0.498**
Treatment Burden	-0.357**	-0.378**	-0.369**	-0.375**	-0.466**	-0.439**	-0.377**	-0.337**
Health	-0.402**	-0.405**	-0.665**	-0.692**	-0.724**	-0.738**	-0.592**	-0.584**
Symptoms	-0.634**	-0.626**	-0.707**	-0.642**	-0.730**	-0.659**	-0.548**	-0.545**
r<0.3 low correlation		r = 0.3-0.49 moderate correlation		r = 0.5-0.69 strong correlation			r≥0.7 very strong correlation	
Convergent validity. Correlations r, shown alongside corresponding P-values. *P<0.05, **P<0.01								

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