



Assessment of Airway Inflammation by Induced Sputum in Children with Persistent Asthma

Chandradeep Srivastava¹ · Anil Kumar Saroj¹ · Sandip Kumar² · Sunil Kumar Rao¹

Received: 10 December 2023 / Accepted: 1 January 2024 / Published online: 9 January 2024
© The Author(s), under exclusive licence to Dr. K C Chaudhuri Foundation 2024

To the Editor: This cohort study was carried on children aged 5–18 y, with persistent asthma and those who received inhaled corticosteroids (ICS) for 4 wk; children unable to induce sputum and those with inadequate sputum sample were excluded. At baseline and at 6 mo, sputum smear examination and spirometry were done. Sputum inflammatory phenotype were classified by presences of eosinophils and neutrophils [1]. The response to therapy was assessed by GINA levels of asthma symptom control and children were treated as per GINA guidelines 2020. One hundred and one children satisfied the inclusion criteria; 54 children (at baseline) and 44 children (at 6 mo) showed inflammatory cells in sputum smear. Sixteen (29.6%) children had a family history of asthma and 23 (42.5%) had allergic rhinitis. The median (IQR) of IgE was 209 (85, 258) and eosinophilic, neutrophilic, mixed-granulocytic and pauci-granulocytic phenotypes were 40 (74%), 8 (14.8%), 4 (7.4%) and 2 (3.7%) respectively at baselines. Acute (baseline) and controlled (at 6 mo) persistent asthmatic children showed 40 (74%) and 23 (71.8%) eosinophilic phenotype. Twelve (27.2%) uncontrolled asthmatic children demonstrated phenotypic variation at 6 mo and mixed-granulocytic phenotype accounted 50%. Eosinophil percentages were significantly reduced at 6 mo ($p=0.002$). The asthma control between eosinophilic and non-eosinophilic asthma was similar ($p=0.2$) and spirometry showed significant improvement at 6 mo ($p<0.05$).

We demonstrated similar four sputum inflammatory phenotypes in Indian children [1, 2]. Different immunopathological mechanisms may have similar airway inflammation in the same child over time [3] or airway inflammation is

subjected to change during exacerbation [4]. Similarly, we have also found eosinophilic phenotypes in acute and controlled persistent asthmatic children and phenotypic variation among same children during exacerbation at 6 mo. ICS can lead to reduced eosinophil count as demonstrated in the present study [2]. The asthma control was not related to sputum inflammatory phenotypes but spirometry can have a better correlation. Therefore, routine sputum cytology has a limited role in children.

Declarations

Conflict of Interest None.

References

1. Fleming L, Tsartsali L, Wilson N, Regamey N, Bush A. Sputum phenotypes are not stable in children with asthma. *Thorax*. 2012;67:675–81.
2. Pembrey L, Brooks C, Mpairwe H, et al. Asthma inflammatory phenotypes on four continents: most asthma is non-eosinophilic. *Int J Epidemiol*. 2023;52:611–23.
3. Fainardi V, Esposito S, Chetta A, Pisi G. Asthma phenotypes and endotypes in childhood. *Minerva Med*. 2022;113:94–105.
4. Tsang YP, Marchant JM, Li AM, Chang AB. Stability of sputum inflammatory phenotypes in childhood asthma during stable and exacerbation phases. *Pediatr Pulmonol*. 2021;56:1484–9.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

✉ Sunil Kumar Rao
drsunilrao21@gmail.com

¹ Division of Pediatric Intensive Care & Pulmonology,
Department of Pediatrics, IMS, BHU, Varanasi, UP, India

² Department of Pathology, IMS, BHU, Varanasi, UP, India