

Allergen avoidance at high altitude and urinary eosinophil protein X

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Urinary eosinophil protein X (U-EPX) has been suggested as a valid alternative to the measurement of eosinophil proteins in serum for the purpose of monitoring airway inflammation and the efficacy of therapy in

Abbreviations used

BHR: Bronchial hyperresponsiveness
S-EPX: Serum eosinophil protein X
U-EPX: Urinary eosinophil protein X

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asthmatic patients.¹ This study was designed to evaluate whether U-EPX levels may be used to monitor the efficacy of allergen avoidance in children with allergic asthma.

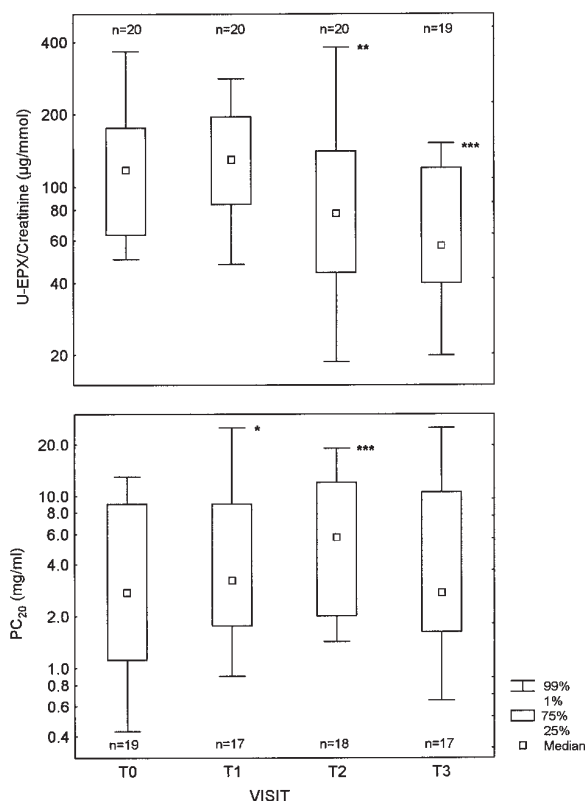


FIG 1. Changes in U-EPX and PC₂₀ during the study period. (* $P < .05$; ** $P < .01$; *** $P < .001$).

METHODS

Twenty asthmatic children (age, 8 to 13 years) sensitized to mite allergen were evaluated at the Istituto Pio XII (Misurina BL, Italy) at an altitude of 1756 m, where a mean level of group I mite antigens of less than 0.04 µg/g of dust was repeatedly measured. The study was performed out of season for pollens. None of the children was allergic to furred pets. None of them had respiratory infections in the month before the study. Before the study, the children had been living for at least 3 months in areas of Northern Italy where the mean level of group I mite antigens has been repeatedly measured to be about 15 µg/g of dust (unpublished data).

The study was approved by the local ethics committee, and the children and their parents gave informed consent.

Measurement of airway responsiveness to methacholine (bronchial hyperresponsiveness [BHR]) and urine and blood collection for determination of serum eosinophil protein X (S-EPX) were performed at inclusion (T0) and after 2 weeks (T1), 1 month (T2), and 2 months (T3) of stay at high altitude. Spot urine samples were collected in the morning and in the evening, and blood samples were collected in the morning only and immediately frozen at -20°C . EPX was measured by competitive RIA (Pharmacia & Upjohn AB, Diagnostics, Uppsala, Sweden) with a sensitivity of less than 3.23 µg/L; the interassay and intra-assay coefficient of variation was less than 10.

Data were analyzed by ANOVA, the Duncan post hoc test, and the Pearson correlation test after log-transformation of values as appropriate.

RESULTS

U-EPX was reduced from T0 to T3 ($P < .000003$, as determined by ANOVA; $P < .0015$ at T2; Fig 1). U-EPX

was higher in morning compared with evening samples (at inclusion, geometric mean [95% range], 114.9 µg/mmol [31.7 to 415.7 µg/mmol] vs 79.3 µg/mmol [27.9 to 225.3 µg/mmol]; $P < .001$).

S-EPX did not change significantly during the study period.

At T0 and at all visits combined, there were significant correlations ($r = 0.552$, $P = .011$; $r = 0.522$, $P < .0000001$, respectively) between morning U-EPX and S-EPX.

PC₂₀ methacholine was significantly improved during stay at high altitude ($P < .0039$ as determined by ANOVA; at T1 $P < .015$; Fig 1). During the study, there was a negative relation between individual changes in PC₂₀ and U-EPX ($r = 0.293$, $P < .033$, as determined by ANOVA within-cell regression).

DISCUSSION

Kristjansson et al¹ showed that U-EPX, serum eosinophil cationic protein, and peak expiratory flow values were reduced after 3 months of therapy with inhaled budesonide, thus suggesting that U-EPX levels may be used to monitor the effect of treatment in asthmatic children. The usefulness of measurement of U-EPX in assessing the inflammatory process and in the management of asthma was also suggested.²

The present study shows a significant reduction in U-EPX during 2 months of house dust mite avoidance. BHR was significantly reduced at T1 and at T2, whereas U-EPX reduced more gradually, reaching statistical significance only at T2. At T3 an increase in BHR level has been observed, whereas U-EPX maintained a trend to the reduction. This discrepancy may be possibly explained by the different cell types and mediators in asthma³ or by a dissociation between airway inflammation and BHR.⁴ Furthermore, it has to be considered that, in addition to allergen avoidance, children in this study were also less exposed to nonspecific factors, such as pollutants and passive smoke. The increase in BHR, but not of U-EPX, at T3 was concomitant with some minor viral infections in the study group. If this observation is confirmed by other studies, U-EPX could be suggested as a more specific indicator of allergen exposure/avoidance than BHR. Furthermore, the determination in the urine appears to be particularly advantageous, allowing at-home collection of samples without the discomfort of drawing blood.

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