

## INTISARI

Karbon Monoksida Ekshalasi pada Anak Asma dan Rinitis Alergi

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**Latar belakang:** Asma pada anak ditegakkan berdasarkan gejala, temuan klinis, serta pemeriksaan spirometri. Pada praktik klinis, spirometri sulit diterapkan pada anak, sehingga diperlukan penunjang diagnosis yang objektif, mudah, murah dan tidak invasif. Karbon monoksida ekshalasi (eCO) merupakan biomarker inflamasi saluran napas yang meningkat pada asma dan rinitis alergi.

**Tujuan:** Untuk mengetahui perbedaan kadar eCO pada anak dengan asma, rinitis alergi, asma disertai rinitis alergi, dan kontrol.

**Metode Penelitian:** Kami melakukan penelitian *cross sectional* yang melibatkan anak berusia 13-14 tahun di DIY pada bulan Juni-Desember 2016. Status asma dan rinitis alergi ditentukan menggunakan kuesioner ISAAC dan eCO diperiksa menggunakan *smokerlyzer*. Uji Kruskal Wallis digunakan untuk mengetahui perbedaan kadar eCO antar kelompok, rasio prevalensi (RP) digunakan untuk mengetahui hubungan antara kelompok dengan kadar eCO lebih dari 4ppm, sedangkan Mantel Haenszel Odds Ratio (OR) digunakan untuk mengetahui hubungan antara derajat kekerapan serangan pada masing-masing kelompok dan kadar eCO lebih dari 4 ppm.

**Hasil:** Dari 450 anak, didapatkan asma 48 anak (10,67%), rinitis alergi 91 anak (20,22%), asma dengan rinitis alergi 67 anak (14,89%), dan kontrol 244 anak (54,22%). Kadar eCO kelompok asma dengan rinitis alergi lebih tinggi dibandingkan kontrol ( $p < 0,001$ ), asma ( $p = 0,006$ ), dan rinitis alergi ( $p = 0,001$ ). Kelompok asma disertai rinitis alergi mempunyai risiko kadar  $eCO > 4$  ppm (RP 1,84; IK95% 1,4-2,4;  $p < 0,001$ ) dibandingkan kontrol. Derajat kekerapan serangan ringan untuk keseluruhan subjek penelitian menaikkan risiko kadar  $eCO > 4$  ppm (OR 1,79; IK95% 1,07-2,99;  $p = 0,026$ ) dibandingkan kontrol, sedangkan kelompok asma disertai rinitis alergi dengan berbagai derajat kekerapan serangan menaikkan kadar eCO lebih dari 4 ppm, yaitu: subjek yang tidak ada serangan dalam 12 bulan terakhir (OR 2,65; IK95% 1,28-5,5;  $p = 0,009$ ), kekerapan ringan (OR 3,66; IK95% 1,47-9,07;  $p = 0,005$ ), dan kekerapan sedang (OR 3,66; IK95% 1,04-12,86;  $p = 0,043$ ) dibandingkan kontrol.

**Kesimpulan:** Kadar eCO pada anak asma dengan rinitis alergi lebih tinggi dibandingkan anak asma saja, rinitis alergi saja, dan anak tanpa asma dan tanpa rinitis alergi.

**Kata kunci:** CO ekshalasi, asma, rinitis alergi

## ABSTRACT

Exhaled Carbon Monoxide in Pediatric Asthma and Allergic Rhinitis

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**Background:** Asthma in children is established based on symptoms, clinical findings, and spirometry examination. In clinical practice, spirometry is difficult to apply to children, so it is necessary to support an objective, easy, inexpensive and non-invasive diagnosis. Exhaled carbon monoxide (eCO) is an inflammatory airway biomarker that increases in asthma and allergic rhinitis.

**Objective:** To determine differences in eCO levels in children with asthma, allergic rhinitis, asthma accompanied by allergic rhinitis, and control.

**Research Methods:** We conducted a cross-sectional study involving children aged 13-14 years in DIY in June-December 2016. Status of asthma and allergic rhinitis was determined using the ISAAC questionnaire and eCO was examined using a smokerlyzer. Kruskal Wallis test used to establish the differences of eCO level among groups, then prevalence ratio (RP) used to find the relation between the group and eCO level >4ppm, the Mantel Haenszel Odds Ratio (OR) used to find the relation between degrees of attack in each group and the possibility to have eCO level >4ppm.

**Results:** Out of 450 children, 48 asthma (10.67%), allergic rhinitis 91 children (20.22%), asthma with allergic rhinitis 67 children (14.89%), and control 244 children (54.22%). The level of eCO of the asthma group with allergic rhinitis was higher than the control ( $p < 0.001$ ), asthma ( $p = 0.006$ ), and allergic rhinitis ( $p = 0.001$ ). Asthma with allergic rhinitis group had a risk of eCO levels >4 ppm (RP 1.84; 95%CI 1.4-2.4;  $p < 0.001$ ) compared to controls. The degree of mild attack frequency for all study subjects increased the risk of eCO levels > 4 ppm (OR 1.79; 95%CI 1.07-2.99;  $p = 0.026$ ) compared to controls, whereas the asthma group accompanied by allergic rhinitis with varying degrees of attack frequency increased eCO levels >4 ppm: subjects without attacks in the last 12 months (OR 2.65; 95%CI 1.28-5.5;  $p = 0.009$ ), mild frequency (OR 3.66; 95%CI 1.47-9.07;  $p = 0.005$ ), and moderate frequency (OR 3.66; 95%CI 1.04-12.86;  $p = 0.043$ ) compared to controls.

**Conclusion:** Exhaled CO levels in children with asthma with allergic rhinitis are higher than those with asthma alone, allergic rhinitis only, and children without asthma and without allergic rhinitis.

**Keywords:** Exhaled CO, asthma, allergic rhinitis