

## ABSTRAK

**Pendahuluan:** Paparan debu kapas pada industri tekstil meningkatkan masalah bisinosis. Bisinosis adalah gangguan pernapasan kronis yang berkaitan dengan endotoksin pada debu kapas. Paparan debu kapas dapat mengaktifasi sistem inflamasi tubuh salah satunya *nitric oxide* dan dalam kondisi kronis dapat menyebabkan gangguan fungsi paru.

**Tujuan:** Penelitian bertujuan untuk menganalisis hubungan antara kadar fraksional nitrit oksida (FeNO) dan fungsi paru (FEV1, FVC, FEV1/FVC) pada pekerja yang terpapar debu kapas.

**Metode:** Penelitian adalah studi observasional dengan metode *cross sectional*. Kriteria inklusi adalah pekerja berusia lebih dari 18 tahun, sudah bekerja minimal enam bulan, dan menandatangani informed consent. Kriteria eksklusi adalah mempunyai riwayat pekerjaan yang diperkirakan menimbulkan penyakit saluran nafas (perkayuan, pertambangan, asbestos), komorbid (asma, penyakit paru kronis, tumor paru, efusi pleura, pneumonia, gagal jantung, penyakit hati, penyakit ginjal). Kadar FeNO dinilai menggunakan alat Vivatmo pro dan nilai FEV1, FVC, serta FEV1/FVC dinilai menggunakan spirometri. Subjek penelitian dilakukan pengambilan sampel setelah bekerja minimal 1 hari.

**Hasil:** Subjek penelitian yang memenuhi kriteria penelitian didapatkan 71 responden. Nilai mean FeNO  $23,35 \pm 12,61$  ppb dengan nilai median 26 (5-65) ppb. Nilai mean FEV1  $91,41 \pm 11,17$  dan nilai median 91 (69-117). Nilai mean FVC  $87,58 \pm 13,03$  dan nilai median 86 (62-125). Nilai mean FEV1/FVC  $88,31 \pm 10,01$  dan nilai median 89,30 (50,7-117,0). Gejala bisinosis didapatkan pada 37 subjek penelitian dan 34 subjek penelitian tidak memiliki gejala bisinosis. Uji analisis bivariat FeNO dengan gejala bisinosis didapatkan hubungan bermakna (30,19 vs 15,91;  $P=0,001$ ). Analisis bivariat FeNO dengan FEV1 didapatkan hasil korelasi negatif ( $r=-0,259$ ) yang signifikan ( $p = 0,029$ ). Analisis bivariat FeNO dengan FVC didapatkan hasil korelasi negatif ( $r=-0,053$ ) yang tidak signifikan ( $p = 0,231$ ). Analisis bivariat FeNO dengan FEV1/FVC didapatkan hasil korelasi negatif ( $r=-0,017$ ) yang tidak signifikan ( $p = 0,885$ ).

**Kesimpulan:** FeNO dengan gejala bisinosis pada pekerja pabrik yang terpapar debu kapas mempunyai hubungan yang signifikan. FeNO dengan FEV1 mempunyai hubungan korelasi negatif yang signifikan pada pekerja pabrik yang terpapar debu kapas. FeNO dan FVC, FEV1/FVC tidak ditemukan hubungan korelasi yang signifikan.

**Kata kunci:** bisinosis, debu kapas, FeNO, Spirometri

## ABSTRACT

**Introduction:** Exposure to cotton dust in the textile industry increases the incidence of byssinosis. Byssinosis is a chronic respiratory disorder associated with endotoxins found in cotton dust. Exposure to cotton dust can activate the body's inflammatory system, including the production of nitric oxide, and in chronic conditions may lead to impaired lung function.

**Objective:** This study aims to analyze the relationship between fractional exhaled nitric oxide (FeNO) levels and lung function (FEV1, FVC, FEV1/FVC) in workers exposed to cotton dust.

**Methods:** This was an observational study with a cross-sectional design. Inclusion criteria were workers aged over 18 years, with a minimum of six months of work experience, and who had signed an informed consent form. Exclusion criteria included having a history of work associated with respiratory diseases (such as woodworking, mining, asbestos exposure), and comorbidities (such as asthma, chronic lung disease, lung tumours, pleural effusion, pneumonia, heart failure, liver disease, or kidney disease). Fractional nitric oxide levels were measured using the Vivatmo pro device, while FEV1, FVC, and FEV1/FVC values were assessed using spirometry. Sampling was conducted after workers had worked for at least one day.

**Results:** A total of 71 respondents met the study criteria. The mean FeNO value was  $23.35 \pm 12.61$  ppb with a median of 26 (5–65) ppb. The mean FEV1 was  $91.41 \pm 11.17$  with a median of 91 (69–117). The mean FVC was  $87.58 \pm 13.03$  with a median of 86 (62–125). The mean FEV1/FVC ratio was  $88.31 \pm 10.01$  with a median of 89.30 (50.7–117.0). Byssinosis symptoms were found in 37 respondents, while 34 had no symptoms. Bivariate analysis between FeNO and byssinosis symptoms showed a significant relationship (30.19 vs. 15.91;  $p = 0.001$ ). Bivariate analysis between FeNO and FEV1 revealed a significant negative correlation ( $r = -0.259$ ,  $p = 0.029$ ). Bivariate analysis between FeNO and FVC showed a negative but non-significant correlation ( $r = -0.053$ ,  $p = 0.231$ ). Bivariate analysis between FeNO and FEV1/FVC showed a negative but non-significant correlation ( $r = -0.017$ ,  $p = 0.885$ ).

**Conclusion:** There is a significant association between FeNO levels and byssinosis symptoms in factory workers exposed to cotton dust. FeNO levels also show a significant negative correlation with FEV1 in this population. However, no significant correlation was found between FeNO levels and FVC or FEV1/FVC.

**Keywords:** byssinosis, cotton dust, FeNO, spirometry