The Association of Elongated Mineral Particles to Restrictive Lung Disease in Taconite Miners.

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BACKGROUND

We examined associations between cumulative exposure to elongated mineral particles (EMPs, aspect ratio ≥ 3:1 and length ≥ 5µm) and prevalent restrictive lung disease (RLD) assessed using spirometry in taconite industry workers.

METHODS

We conducted a cross-sectional study of current & former workers in the Minnesota taconite industry. From an initial sample of 3,313 workers, 1,045 participants had usable spirometry. Age, BMI, smoking status, gender and work history were assessed by questionnaires. Cumulative exposures to EMP (EMP/cc*years) were estimated based on job histories, historical and current measurements using NIOSH 7400 method (Phase Contrast Microscopy). Forced Vital Capacity (FVC) values less than lower limits of normal (5th percentile) for age, height, race and gender were used to determine RLD. Odds-ratios (OR) and 95% confidence intervals (CI) were estimated using multivariate logistic regression models.

RESULTS

Prevalent RLD was observed in 76 of the 1045 participants in this sample (7.27%). No association was observed between median cumulative exposure and prevalent RLD in either the crude (OR= 1.01, 95% CI= 0.96-1.06) or multivariate (OR=1.00, 95% CI=0.94-1.07) logistic models. RLD was associated with increased BMI (OR=1.13, 95% CI= 1.09-1.18) and current smoking status (OR= 2.81, 95% CI= 1.35-5.85) in the multivariate model.

CONCLUSIONS

These preliminary findings suggest that cumulative concentrations of total EMPs are not associated with RLD as measured by spirometry. In this population, BMI and current smoking were important covariates in the prevalence of RLD and should be considered in other exposure-specific analyses.

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