Occupational Risk Factors For Airflow Limitation In The Multi-Ethnic Study Of Atherosclerosis (MESA) Lung Study

B. Doney[1], E. Hnizdo[2], M. Graziani[1], G. Kullman[1], C. Burchfiel[1], S. Baron[3], K. Fujishiro[3], P. Enright[4], J. L. Hankinson[5], K. Hinckley Stukovsky[6], R. G. Barr[7], MESA Occupational Working Group

[1]National Institute for Occupational Safety and Health, Morgantown, WV, [2]CDC/NIOSH, Morgantown, WV, [3]National Institute for Occupational Safety and Health, Cincinnati, OH, [4]University of Arizona, Tucson, AZ, [5]Hankinson Consulting, Athens, GA, [6]University of Washington, Seattle, WA, [7]Columbia University, New York, NY

Corresponding author's email: bdoney@cdc.gov

Rationale: The objective of this study is to identify and characterize occupational and non-occupational risk factors for obstructive lung disease in an older U.S. population. We hypothesize that airflow obstruction is associated with occupational exposures to vapor/gas, dust, and fume (VGDF).

Methods: The Multi-Ethnic Study of Atherosclerosis (MESA) recruited a population-based sample of adults 45–84 years old who were free of clinical cardiovascular disease in 2000-02. The MESA Lung Study measured spirometry and ascertained job history and occupational exposures for 3,667 participants. Airflow limitation was defined as the ratio of forced expiratory volume in one second to forced vital capacity (FEV_1/ FVC) below the lower limit of normal (LLN) and FEV_1<LLN. Self-reported occupational exposure to VGDF and severity (mild, moderate, or severe) of any VGDF exposure was ascertained by self-report on standardized questionnaire. A job-exposure matrix (JEM) was constructed and an industrial hygienist assigned a preliminary score (1, 2, or 3) representing the probability of exposure to VGDF based upon literature review and professional experience. After two Certified Industrial Hygienists reviewed these preliminary JEM scores, a final score representing the consensus of all three hygienists was entered into the JEM. Environmental tobacco smoke was considered in this overall VGDF score for occupations with likely exposure (e.g., bartenders, waiters and waitresses). The hygienists similarly entered separate scores representing severity of exposure for vapors and gases, fumes, dusts, and subcategories of dust (mineral; organic). Logistic regression models included adjustment for smoking status, pack-years, age, race/ethnicity, education, and body mass index.

Results: Airflow limitation was associated with self-reported gas/vapor exposure (OR=1.46, 95%CI 1.01-2.11) and severity of VGDF exposure (OR=2.10 severe vs. no exposure, 95%CI 1.21-3.65). Among never smokers, airflow limitation was associated with self-reported fume exposure (OR=2.49, 95%CI 1.18-5.28) and severity of VGDF exposure (OR=8.10 severe vs. no exposure, 95%CI 2.86-22.89). Using the JEM, airflow limitation was associated with dust exposure (OR=2.20, 95%CI 1.03-4.69) and, among females only, with organic dust exposure (OR=3.08, 95%CI 1.14-8.35).

Conclusions: Self-reported VGDF exposure and its severity, and dust exposure based on the JEM, were associated with airflow limitation in this large, multi-ethnic cohort.

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Adjusted Odds Ratios for the Association of Airflow Limitation† with Occupational Exposures from Questionnaire and Job-Exposure Matrix.

Characteristic	All	Males	Females	Never Smokers
	Airflow Limitation=205 n=3590	Airflow Limitation=121 n=1832	Airflow Limitation=84 n=1758	Airflow Limitation=40 n=1848
	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Dust	1.27 (0.92-1.76)	1.22 (0.79-1.89)	1.31 (0.79-2.17)	1.52 (0.76-3.04)
Gas/Vapor	**1.46** (1.01-2.11)	1.39 (0.88-2.18)	1.45 (0.76-2.79)	1.63 (0.73-3.67)
Fumes	1.30 (0.92-1.83)	1.27 (0.82-1.98)	1.31 (0.73-2.34)	**2.49** (1.18-5.28)
Severity of VGDF				
Mild vs. None	1.22 (0.83-1.80)	1.30 (0.79-2.14)	1.10 (0.59-2.05)	1.06 (0.43-2.62)
Moderate vs. None	1.50 (0.95-2.35)	1.22 (0.66-2.27)	1.88 (0.96-3.71)	1.51 (0.55-4.15)
Severe vs. None	**2.10** (1.21-3.65)	1.52 (0.71-3.27)	**3.13** (1.36-7.24)	**8.10** (2.86-22.89)
Dust JEM				
Med vs. Low	1.15 (0.66-2.02)	0.96 (0.48-1.91)	1.94 (0.74-5.12)	2.10 (0.63-6.98)
High vs. Low	**2.20** (1.03-4.69)	**2.22** (1.01-4.90)	--	4.19 (0.79-22.20)

Organic Dust JEM				
Med vs. Low	1.46 (0.75-2.84)	0.92 (0.37-2.29)	**3.08** (1.14-8.35)	2.94 (0.83-10.36)
High vs. Low	2.28 (0.92-5.65)	2.32 (0.90-5.98)	--	2.60 (0.29-23.14)

†Odds ratios for airflow limitation adjusted for age, race/ethnicity, BMI, smoking status, cigarette pack-years, asthma, and education

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