P690 Ambient air quality does not affect disease course in inflammatory bowel disease – a population based risk factor analysis using geographic information systems

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Background

Epidemiologic and mechanistic studies found smoking to be associated with the disease course of Crohn's disease (CD) and ulcerative colitis (UC). Ambient air pollution is also a source for airborne toxins, and an emerging problem worldwide. The role of air quality on the course of inflammatory bowel disease (IBD) has not been studied yet. We aimed to study associations between ambient air quality and disease course in CD and UC patients from the Dutch population based IBDSL cohort.

Methods

IBDSL patients diagnosed between 2001 and 2010 with a stable home address (≥3 years before and after diagnosis) were included. Geographic coordinates of addresses were linked to calendar year specific maps on (in)direct air quality data, including (1) air pollutants, and parameters related to (2) land use, (3) urbanity and (4) traffic. Demographic-, clinical- and smoking data were retrieved. A severe disease course was defined as having IBD surgery, hospitalization (≥2), progression, steroid use (≥2 courses), biological use (all CD and UC), or presence of a fistula or stricture (CD), within 2 years after diagnosis. Parameters with a $p<0.10$ in univariable logistic regression analyses were included in a multivariable analysis together with possible confounders. Sensitivity analyses were performed for (a) 5 years follow up, (b) separate components of the disease course definition, and (c) non-smokers at diagnosis.

Results

In CD, 174 of 338 patients had severe disease within 2 years. Lower NO2 levels, longer distance to first major road, to highway, and lower age at diagnosis were associated to severe disease in the univariable-, but not in the multivariable analyses. In UC, 112 of 576 patients had severe disease. Less industry (500 and 2500m buffer zones), more nature (2500m), male gender, and higher age at diagnosis were associated to severe disease in the univariable analyses. Less industry (500m), more nature (2500m), and higher age at diagnosis remained so in the multivariable analyses (all $p=0.01$). Although more patients smoked in the severe CD group, smoking was not associated to severe disease course in CD or UC. Odds ratios are shown in the figure. Sensitivity analyses did not reveal new associations.

Table 1. Results of the univariable and multivariable analyses in CD and UC

		Mild CD mean (SD)	Severe CD mean (SD)	Uni OR/95CI/p	Multi p	Mild UC mean (SD)	Severe UC mean (SD)	Uni OR/95CI/p	Multi p
Pollutants (in $\mu g/m^3$)									
NO_2		26.6 (2.4)	26.2 (2.6)	0.93/0.85-1.01/0.08	0.34	25.8 (3.0)	25.7 (3.0)	0.98 (0.92-1.05)/0.64	-
O_3		37.3 (2.5)	37.6 (2.7)	1.05/0.97-1.14/0.21	-	37.5 (2.7)	37.7 (2.6)	1.04 (0.96-1.12)/0.35	-
PM_{10}		28.0 (2.4)	28.0 (2.5)	1.00/0.92-1.09/0.99	-	28.0 (2.5)	28.1 (2.3)	1.01 (0.93-1.10)/0.79	-
Landuse (in %)*									
Residential	-500m	65.6 (26.3)	66.5 (28.4)	1.14 (0.52-2.48)/0.75	-	64.8 (27.1)	67.0 (27.4)	1.35 (0.62-2.93)/0.45	-
	-2500m	33.1 (15.5)	32.2 (16.3)	0.70 (0.18-2.68)/0.60	-	31.9 (16.3)	30.4 (17.9)	0.58 (0.17-2.01)/0.39	-
Industrial	-500m	3.7 (9.1)	3.7 (10.5)	0.95 (0.11-8.39)/0.96	-	4.0 (10.2)	1.1 (4.1)	0.01 (0.00-0.15)/0.01	0.01
	-2500m	8.1 (7.3)	7.6 (7.0)	0.36 (0.02-7.18)/0.50	-	8.2 (7.1)	6.5 (6.4)	0.03 (0.00-0.68)/0.01	-
Agricultura	-500m	25.5 (26.5)	24.6 (28.8)	0.89 (0.41-1.92)/0.77	-	24.8 (26.9)	24.3 (27.6)	0.93 (0.43-2.01)/0.85	-
	-2500m	45.9 (20.8)	46.9 (22.0)	1.24 (0.46-3.36)/0.67	-	46.7 (22.5)	47.8 (23.9)	1.24 (0.50-3.05)/0.64	-
Natural	-500m	1.6 (5.1)	1.7 (6.2)	1.35 (0.03-59.7)/0.88	-	2.3 (8.0)	3.5 (11.6)	4.03 (0.52-31.0)/0.18	-
	-2500m	5.5 (5.9)	6.3 (6.2)	7.23 (0.20-257)/0.28	-	6.1 (6.7)	8.3 (8.3)	44.78 (3.12-643)/0.01	0.01
Urbanity (in density)**									
Population		2.9 (1.8)	2.8 (1.8)	0.96 (0.85 - 1.09)/0.54	-	2.8 (1.8)	2.8 (1.8)	1.02 (0.91-1.15)/0.71	-
Address		1.2 (0.7)	1.1 (0.4)	0.86 (0.62 - 1.19)/0.37	-	1.2 (0.6)	1.2 (0.7)	1.11 (0.81-1.51)/0.52	-
Traffic (in km)									
Cum. road length*	-200m	3.5 (1.3)	3.6 (1.1)	1.01 (0.84-1.21)/0.93	-	3.4 (1.1)	3.4 (1.3)	0.99 (0.83-1.18)/0.89	-
	-500m	18.6 (6.2)	18.4 (6.0)	0.99 (0.96-1.03)/0.76	-	18.2 (6.0)	18.1 (6.2)	1.00 (0.97-1.03)/0.90	-
Dist.to first major road		0.8 (0.5)	1.0 (0.9)	1.44 (1.06-1.96)/0.02	0.14	0.9 (0.7)	1.0 (0.8)	1.19 (0.92-1.54)/0.18	-
Dist. to first highway		2.5 (2.1)	3.0 (2.1)	1.13 (1.02-1.25)/0.02	0.11	2.9 (2.1)	3.3 (2.3)	1.07 (0.98-1.18)/0.12	-
Confounders (in %)									
Male		44.5	41.4	0.88 (0.57-1.35)/0.56	0.70	51.1	59.8	1.43 (0.94-2.17)/0.10	0.22
Diagnosed in first lustrum		39.6	40.2	1.03 (0.66-1.59)/0.91	0.58	39.0	45.5	1.31 (0.86-1.98)/0.21	0.22
Age at diagnosis (in yr)		45.6 (14.8)	42.8 (15.0)	0.99 (0.97-1.00)/0.08	0.08	51.7 (14.9)	54.6 (15.7)	1.01 (1.00-1.03)/0.07	0.01
Smoking at diagn.(binary)		44.9	47.8	1.13 (0.71-1.78)/0.61	0.51	-	-	-	-
Smoking at diagn.	-current	-	-	-	-	12.7	15.6	1.35 (0.71-2.56)/0.36	0.34
	-quit<3yr	-	-	-	-	13.0	16.7	1.41 (0.76-2.64)/0.28	0.33
	-other	-	-	-	-	74.4	67.7	REF	REF
Appendect. before diagn.		-	-	-	-	2.6	3.6	1.40 (0.44-4.41)/0.57	0.61

* within a buffer around residential address/ ** Population density, in 10^3 inhabitants per km^2, and Address density in 10^3 addresses per km^2

Conclusion

In this population based study, neither ambient air quality nor smoking was associated with severe disease course in CD or UC, except for less industry and more nature in UC. Regional exposure differences were small. We conclude that ambient air quality is not a strong contributing factor in IBD's disease course in The Netherlands.