

AIR POLLUTION FROM TRAFFIC AND RESPIRATORY HEALTH

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Air pollution has very important influence on human health. Earlier investigations were not employed with estimation of influence of air pollution, which spring from traffic, on people health who live near busy cross – road.

The aim of this paper was to determine how living near busy cross – road influences on appearance of respiratory symptoms and illness.

400 adult people between 18-76 age who live five year least on this location at took a part in investigation. One group (200) live in Nis near the busiest cross-road, another group live in Niska Banja near cross-road with the smallest concentration of pollutants in last five years.

We determined that examines, who live near busy cross – road had statistical significant greater prevalence of all respiratory symptoms and pneumonia.

Our investigation showed that living near busy cross road present risk factor for appearance of respiratory symptoms and pneumonia. *Acta Medica Medianae 2004; 43(4): 9–12.*

Key words: *Air pollution, traffic, respiratory symptoms, respiratory diseases*

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Introduction

Transport is the fundamental to the efficient functioning of the city and its economic, social and cultural development. It also has a very big effect on the health (1–3). Transport affects health in a variety of ways, both directly and indirectly. Direct effects such as crash deaths and injuries and the impacts of vehicle related pollution on respiratory disease are clear and significant. Indirect effect such as a little physical activity, the restriction of access to services, fear of traffic relating to insulation, stress linking to noise and vibration levels are also significant but more difficult to measure.

Motor vehicle is a major source of outdoor pollution throughout the world and there is a widespread public concern over their effect (4–8). The number of studies conducted on the health effects of air pollution has increased exponentially (9–11). Despite the important contribution of traffic sources to urban air quality, relatively few studies have evaluated the effects of traffic-related air pollution on health.

Emission from an individual car is generally low, but in city the personal automobile is the single greatest pollution, as emissions from thousands of vehicles on the streets add up.

Aim

The contribution of motorized traffic to air pollution is widely recognized, but relatively few studies have looked at the respiratory health status of subjects living near busy roads.

In Nis, a lot of citizens lived very closely to busy streets and therefore they are at health risk. The aim of this study is to investigate if the population living along streets with high traffic density has a higher prevalence of chronic respiratory symptoms and diseases.

Methods

The survey was conducted on 400 adults during the period 2002/2003 in two areas in Niš with different traffic air pollution levels. A sample of 200 adults living along busy traffic streets in the city of Nis (Trg Knežinje Ljubice) was compared with a control sample of 200 adults living along quiet streets in Niska Spa.

Exposed and control streets were selected on the basis of measured air pollutant concentrations in last five years (CO, HCOH, NOx and black smoke).

Standard questionnaire prepared by WHO was used in the study. The questionnaire included questions on: personal data, place of living and its characteristics, years of living on this locations, personal smoking habits, type of heating, respiratory symptoms and diseases in last five years and medical history. Medical students collect information directly from subjects in home.

Statistical methods: Reported respiratory symptoms and disease in the questionnaire were analyzed with logistic regression. Univariate association was investigated by chi-squares test for categorical data and t – test for continuous data. The Mantel – Haenszeel test was used to investigate the effect of specific exposure on the prevalence of respiratory symptoms. Odds ratio (ORs) and 95% confidence intervals (95% CIs), adjusted for several potential confounders, were estimated from logistic regression models.

Results

Study was done on a sample of 400 adults (aged 18 – 76) living in two areas in Nis with different level of traffic air pollution in last five years (Table 1).

Table 1. Characteristic of study group according to age

Age	Exposed		Not exposed		Total	
	n	%	n	%	n	%
Under 20	35	8.75	33	8.25	68	17.00
21-40	43	10.75	39	9.75	82	20.50
41-60	78	19.50	42	10.50	120	30.00
More than 60	44	11.00	86	21.5	130	32.50
Total	200	50.00	200	50.00	400	100

All subjects lived more than five years on the same location and distance between their home and street was less than 150 m. They were separated in two groups: exposed and not exposed. People living in Nis were in grouping of exposed and they live near the measurement station „Kneginje Ljubice“ the most polluted street in the city. Subjects from Niska Spa were in grouping of not exposed and they lived near the less polluted street.

Table 2 shows the pollutant concentrations by area in last five years. All value was lower in Niška Spa then in Nis. This difference was statistically significant (Table 3).

Table 2. Pollutant concentration in two areas during the period 1998. – 2002. ($\mu\text{g}/\text{m}^3$ *, mg/m^3 **)

Measure station	Pollutant	\bar{X}	Min	C ₁₀	C ₅₀	C ₉₀	Max
Trg Kneginje Ljubice	CO**	2.55	0.5	1.1	2.10	11.0	18.80
	NOx *	23.92	16.90	17.50	22.20	30.30	36.85
	HCHO *	10.85	0.0	0.0	0.0	12.30	21.70
	Black smoke *	38.0	5.0	7.0	30	109	126.0
Niska Banja	CO**	0.38	0.0	0.0	0.23	2.1	2.5
	NOx *	9.96	1.55	2.0	8.00	10.50	17.18
	HCHO *	4.15	0.0	0.0	0.0	10.6	23.40
	Black smoke *	14.0	0.9	0.0	5.0	37.0	46.0

Table 3. Statistical signification of differences in pollution levels

Pollutant	Statistic	
	T-test	ρ – value
CO	1.99	< 0.005
NOx	2.05	< 0.005
HCHO	2.15	< 0.005
Black smoke	2.77	< 0.001

Table 4 indicates a consistent positive association between higher traffic air pollution and a wide range of respiratory complains in last five years. All respiratory symptoms have statistic significant higher prevalence in subjects living in Nis and doctors – diagnosed pneumonia. We did not find connection between high pollutant concentrations and occurrence of asthma, bronchitis and sinus trouble.

Table 4. Traffic air pollution and respiratory symptoms and diseases in last five years

Respiratory symptoms and diseases	Summary statistics			
	OR	CI	χ^2	ρ
Morning cough in autumn/winter	3.01	1.53 – 5.97	12.30	0.00045*
Night cough in autumn/winter	2.43	1.17 – 5.08	6.80	0.00909*
Caught longer than three months	4.49	1.89 – 10.96	14.96	0.00010*
Cough with cold	2.10	1.04 – 4.25	5.13	0.02345*
Phlegm	2.62	1.01 – 6.94	4.90	0.02687*
Phlegm longer than three months	2.58	1.12 – 6.03	6.04	0.01397*
Running nose longer than three months	4.18	1.23 – 15.62	6.95	0.00840*
Wheezing	2.87	1.22 – 6.89	7.16	0.00746*
Wheezing with speech limit	3.48	1.38 – 9.02	8.89	0.00286*
Sinus trouble	1.26	0.67 – 2.37	0.59	0.44154
Bronchitis	1.16	0.63 – 2.13	0.26	0.60720
Pneumonia	3.39	1.40 – 8.90	9.26	0.00234*
Asthma	2.15	0.65 – 5.20	1.95	0.16311

ρ – value < 0.01

Discussion

The role of traffic air pollution on the respiratory health has been extensively investigated (12 – 15).

Acute adverse effect and high concentration of air pollution have been clearly associated. Long term exposure to traffic air pollution on chronic respiratory disorders has been less clearly based up by evidence (16). People living in urban area are permanently exposed to some levels of several pollutants, but living near busy street has additional exposure.

Our study shows a positive association between indicators of traffic air pollution and wide range of respiratory disorders in subject living near busy streets. Exposed subjects more often reported respiratory symptoms and pneumonia.

Many studies suggested a specific role of diesel exhaust. Recent results (3,4) indicate that chronic respiratory symptoms and reduced lung function were more strongly associated with lorry traffic (and to black smoke as a proxy of diesel exhaust) than to automobile traffic (and to nitrogen dioxide). Diesel exhaust are relevant contributors of black smoke and particulate less than 10µm which is toxic to the respiratory mucous. It cause inflammatory reactions and predisposing to the infections of the lower respiratory tract.

A number of potentially important confounding factors including smoking habits, occupational exposure and indoor heating did not include in investigation because we did not found out that there are a significant difference in two group for this factors. It is unclear to what extent confounding may have contributed to the positive associations reported in our study.

After adjustment for potential cofounders, adults living along busy streets were found to have a higher prevalence of most respiratory symptoms than adults living along quiet streets do.

We failed to find an association between road traffic and asthma. Few studies found that only the subgroup of children with bronchial hyper responsiveness and high serum concentrations of IgE appeared susceptible to air pollution, which suggests an interaction between pollution and allergic response (17–21). Further work is needed to disentangle this interaction and the underlying mechanisms, but the balance of evidence remains that outdoor air pollution has at most a modest effect on asthmatic symptoms.

Conclusion

The study provides support for the hypothesis that air pollution from traffic is potentially hazardous to the health and increase the risk for a wide range of adverse respiratory effects.

Solve this problem, it seems imperative to promote the reasonable use of automobiles and to work toward more efficient transportation of goods based on analyses of city structure, the life-styles of city dwellers, and the socioeconomic composition of cities. In addition, the discharge of pollutants from automobiles could be controlled. A stricter regulation of traffic in residential areas may be an effective preventing measure for the respiratory health of citizens.

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UTICAJ AEROZAGAĐENJA KOJE POTIČE OD SAOBRAĆAJA NA RESPIRATORNI SISTEM

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Aerozagađenje značajno utiče na zdravlje ljudi. Dosadašnja istraživanja nisu se posebno bavila procenom uticaja aerozagađenja koje potiče od saobraćaja na zdravlje ljudi koji stanuju uz prometne raskrsnice. Cilj našega rada je da se utvrdi kako stanovanje uz prometne raskrsnice utiče na pojavu respiratornih simptoma i oboljenja.

U istraživanju je učestvovalo 400 odraslih osoba starosti od 18–76 godina, koje najmanje pet godina žive na toj lokaciji. Jedna grupa (njih 200) živi u Nišu pored najprometnije raskrsnice, dok druga grupa živi u Niškoj Banji uz raskrsnicu sa najmanjim koncentracijama polutanata u poslednjih pet godina.

Utvrđeno je da su ispitanici koji žive uz prometnu raskrsnicu statistički značajno imali veću prevalencu svih respiratornih simptoma i pneumonije.

Naše istraživanje je pokazalo da stanovanje uz prometne raskrsnice predstavlja rizik faktor za nastanak respiratornih simptoma i oboljenja. *Acta Medica Medianae* 2004; 43(4): 9–12.

Ključne reči: aerozagađenje, saobraćaj, respiratorni simptomi, respiratorna oboljenja