


Environmental problems and their relationship to cardiovascular disease

Los problemas ambientales y su relación con las enfermedades cardiovasculares

Gonzalo González Hernández, PhD 

Center for Environmental Education Studies. Félix Varela Morales Pedagogical University. Santa Clara, Villa Clara, Cuba.

Received: June 09, 2013

Accepted: July 04, 2013

Key words: Environmental problems, Cardiovascular diseases

Palabras clave: Problemas ambientales, Enfermedades cardiovasculares

To the Editor:

The environmental issue has become part of everyday life: we live in the environment and are part of it, therefore “everything that happens on Earth, will affect the children of the Earth”¹; environmental problems are widely known, and its effects on human health are asserted and discussed.

Years ago, and in several publications, we stated² that human health is a reference point for environmental monitoring and the formulation of policies in this regard. Ultimately, with regard to global change, the biological integrity of humankind, its psychological well-being and survival, are at stake. Humans are an important part of the environment; therefore, their health and well-being are related to the fact of keeping habitable the whole planet².

There are numerous classifications of environmental problems. As a common denominator they all include: environmental pollution, global climate change, stratospheric ozone depletion, loss of biodiversity and soil degradation.

Cuban environmental problems, reported in the *Estrategia Ambiental Nacional de Educación Ambiental*³, are: soil degradation, damage to the forest cover, pollution (due to liquid and solid waste, air emissions, noise pollution, chemicals and hazardous waste), the loss of biological diversity, lack of water and difficulties with its availability and quality, and climate change impact.

The relationship between some environmental pro-

blems and cardiovascular disease has been studied in different geographical regions^{4,5}. In Cuba, there are studies which are primarily related to the change of weather patterns and its impact on the increase in cardiovascular disease.

Air pollution

The main sources of air pollution in Cuba are: automotive transport (which stands out for its poor technical condition and poor fuel quality), some industries near densely populated areas, noise, dust (especially in winter/dry season) and smoking³.

Pollution, specifically air pollution, and its relationship to cardiovascular disease, is determined by the quality of the air, and it is usually measured by the concentrations of pollutants such as nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM) and sulfur dioxide (SO₂). The measuring of particulates identifies two superimposed categories: those ≤ 10 microns in diameter (PM 10) and those ≤ 2.5 microns in diameter (PM 2.5). The smallest ones are considered the most harmful to health as they can penetrate deep into the lungs^{5,6}.

The American Heart Association (AHA) has concluded that an increase in fine particles of 10 mg/m³, for a 24-hour period, is associated in the short term with a 0.31 % increase in cardiopulmonary morbidity and mortality. A 10 mg/m³ increase in annual average exposure to PM 2.5 was associated with a 6 % increase in long term cardiopulmonary mortality⁷. Some groups

are more affected by air pollution, such as communities of low socio-economic status, the elderly and those suffering from other pre-existing diseases⁵⁻⁷.

Moreover, during the 2008 Beijing Olympic Games, researchers from the University of Southern California (USC) found biological evidence that even a short-term reduction of the exposure to air pollution improves cardiovascular health. The results of the study were published in the *Journal of the American Medical Association*⁴. In this regard, Dr. Junfeng Zhang, one of the authors of the study and a professor at the Keck School of Medicine of the USC stated: "We believe this is the first major study that clearly shows how changes in the exposure to air pollution affect cardiovascular disease mechanisms in healthy young adults."

It is said that there is a combination of direct toxic effects on the autonomic nervous system which causes systemic inflammation, which may cause not only cardiac arrhythmias or precipitate coronary thrombosis, but may also be mediated by some of the effects on behavior (highly contaminated environments may promote car use and discourage physical activity, although this is not proven)⁴⁻⁶.

One of the most common polluting gases in our environment is carbon monoxide (CO), produced by the incomplete combustion of gas, oil, coal, tobacco or timber, provided that the equipment that burn them are not working properly; it is also produced by stopped vehicles with the engine running. Its toxic effects are caused by tissue hypoxia resulting from increased formation of carboxyhemoglobin (COHb), because CO has an affinity with hemoglobin 200 times higher than oxygen, and the heart is one of the most sensitive organs. Induced acute cardiac disorders have been studied repeatedly and their characteristics have been described considering the exposure time, breathing frequency, age and previous diseases. While in healthy subjects the cardiovascular effects appear when the concentration of COHb is 35-40%, in patients with ischemic heart disease a COHb concentration of 2-5% may cause angina episodes, during physical exposure^{5,6}. In patients with pre-existing conditions, fatal myocardial infarctions have been observed with COHb concentrations of 20 %⁶.

The effects of exposure to low concentrations of CO in the long term are still controversial⁷. Increased mortality due to cardiovascular disease in people who work in tunnels may be best explained by acute exposure rather than by the chronic effects of carbon mon-

oxide^{5,7}.

The difficulties to clarify the mechanisms related to air pollution and cardiovascular disease are mainly due to the complex and variable composition of pollution, and the difficulty to develop methods that connect pollution components and that represent confounding factors for relevant people: smoking, socio-economic factors and factors related to the modification of individual exposure (the time spent at home, at work and traveling)⁸.

Noise

Moreover, noise, also known as noise pollution, has been known to cause loss of hearing for a long time. Its best known relationship with cardiovascular disease is with hypertension⁹. The results of epidemiological studies do not explain clearly the adverse cardiovascular effects of chronic exposure to noise, environmental noise or at the place of work⁹⁻¹¹. Experimental knowledge on the hormonal effects of stress and the changes in peripheral vasoconstriction, on the one hand, and the observation that a high level of noise at the workplace (>85 dBA) induces the development hypertension, on the other hand, allows the inclusion of noise as a nonspecific stress stimulus in a model of multifactorial risk of cardiovascular disease, with a high degree of biological reliability¹¹.

Stress studies have shown that although the increases in blood pressure during work are related to noise exposure, blood pressure level itself depends on a complex association of environmental factors and factors related to personality⁹⁻¹¹. Therefore, it is an urgent task to study the effect of multiple loads at the workplace and to clarify the cross-effects (most of them are unknown until now) between the combination of exogenous factors and the various endogenous risk characteristics.

The studies are incipient, considering the complexity of the environmental issue and the many direct and indirect ways in which it relates to cardiovascular disease. It is the task of cardiologists to continue investigating this matter and incorporate the results into their practice, so that patients may know the risks and adopt the appropriate behavior.

REFERENCES

1. Cox, Roger y Kathy. SavethePlantet, SavethePlanet Shareware (programa ecológico informático sobre el calentamiento mundial). Pitkin, CO 81241, USA.

2. González Hernández G. La relación entre los problemas ambientales y algunas enfermedades. *Medicent Electrón* [Internet]. 2005 [citado 2013 Jun 3]; 9(3): [aprox. 3 p.]. Disponible en: <http://medicentro.vcl.sld.cu/paginas%20de%20acceso/Sumario/ano%202005/v9n3a05/problema42.htm>
3. CITMA. Informe de Cuba a la Conferencia de las Naciones Unidas sobre Desarrollo Sostenible Río + 20. [Internet]. La Habana; 2012 [citado 2013 May 28]. Disponible en: <http://www.cubadebate.cu/wp-content/uploads/2012/06/informe-cuba-a-rio20.pdf>
4. Rich DQ, Kipen HM, Huang W, Wang G, Wang Y, Zhu P, *et al.* Association between changes in air pollution levels during the Beijing Olympics and biomarkers of inflammation and thrombosis in healthy young adults. *JAMA*. 2012;307(19):2068-78.
5. Bell ML, Peng RD, Dominici F, Samet JM. Emergency hospital admissions for cardiovascular diseases and ambient levels of carbon monoxide: results for 126 United States urban counties, 1999-2005. *Circulation*. 2009;120(11):949-55.
6. Durante W, Johnson FK, Johnson RA. Role of carbon monoxide in cardiovascular function. *J Cell Mol Med*. 2006;10(3):672-86.
7. Chow CK, Lock K, Teo K, Subramanian SV, McKee M, Yusuf S. Environmental and societal influences acting on cardiovascular risk factors and disease at a population level: a review. *Int J Epidemiol*. 2009; 38(6):1580-94.
8. Li L, Hsu A, Moore PK. Actions and interactions of nitric oxide, carbon monoxide and hydrogen sulphide in the cardiovascular system and in inflammation – a tale of three gases! *Pharmacol Ther*. 2009;123(3):386-400.
9. Babisch W, Pershagen G, Selander J, Houthuijs D, Breugelmans O, Cadum E, *et al.* Noise annoyance – a modifier of the association between noise level and cardiovascular health? *Sci Total Environ*. 2013;452-453:50-7.
10. Argalášová-Sobotová L, Lekaviciute J, Jeram S, Sevciková L, Jurkovicová J. Environmental noise and cardiovascular disease in adults: research in Central, Eastern and South-Eastern Europe and Newly Independent States. *Noise Health*. 2013;15(62):22-31.
11. Davies H, Kamp IV. Noise and cardiovascular disease: a review of the literature 2008-2011. *Noise Health*. 2012;14(61):287-91

Erectile dysfunction: predictor of cardiovascular disease

Disfunción eréctil: factor predictor de enfermedad cardiovascular

Yudileidy Brito Ferrer, MD; Ana I. Árias Gallardo, MD, MSc[✉]; and Yossy González Caballero, BS

Dr. Serafín Ruiz de Zárate Ruiz University of Medical Sciences. Santa Clara, Villa Clara, Cuba.

Received : May 09, 2013

Accepted : July 04, 2013

Key words: Erectile dysfunction, Cardiovascular disease, Endothelial dysfunction
Palabras clave: Disfunción eréctil, Enfermedad cardiovascular, Disfunción endotelial

To the Editor:

Erectile dysfunction (ED) is an extremely common disease, which increases its incidence with age and affects moderately/severely about 35 % of men between 40 and 70 years of age. ED has multiple causes, and those of vascular origin are the most fre-

quent ones. This major cause of ED accounts for up to 70 % of this sexual disorder in men over 40, and is associated with other cardiovascular (CV) risk factors such as dyslipidemia, hypertension, diabetes mellitus, obesity, among others^{1,2}.

Also, ischemic heart disease, or more generally, CV