

Environmental and occupational exposures as a cause of male infertility

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Abstract

Objectives To determine the association between environmental and occupational exposures, semen parameters and lead (Pb) and cadmium (Cd) levels in seminal plasma of men investigated for infertility.

Methods Data were collected from 300 men investigated for infertility using an interviewer administered questionnaire. Seminal fluid analysis and classification was done according to WHO guidelines. Positive exposure was defined as environmental or occupational exposure to agro or industrial chemicals, heavy metals and living in areas within 50m of potential sources of pollution for three months or more. Seminal plasma lead and cadmium levels were estimated by graphite furnace atomic absorption spectrophotometry after digestion with nitric acid. The means of sperm parameters, Pb and Cd concentrations between exposed and non exposed groups were compared using t-test.

Results Mean age was 34.8 (95% CI 34.2-35.4) years BMI was 24.3 (95% CI 23.8-24.7) kg/m² and duration of the infertility was 45.7 (41.7-49.6) months. In this study, 54.6% were exposed to toxins through environmental or occupational sources. All sperm parameters were lower in the exposed group when compared to the non exposed. Lead and cadmium were detected in 38.3% and 23% of men respectively. The distance from the source of possible environmental or occupational exposure was negatively correlated to seminal plasma Pb ($r=0.06$, $p>0.05$) and Cd ($r=0.26$, $p<0.05$) concentrations. In the exposed, mean

lead concentration was 17.7 (95% CI 15.0-20.4) µg/dl and 13.5 (95% CI 11.2-15.7) µg/dl in non exposed and cadmium concentration in exposed was 1.2 (95% CI 1.1-1.4) µg/dl and 1.1 (0.9-1.3) µg/dl in non-exposed.

Conclusions Environmental and occupational exposures were associated with reduced sperm count motility, viability, normal forms and detectable levels of lead and cadmium in seminal plasma.

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Introduction

Globally, human fecundity appears to be on the decline with decrease in semen quality and male infertility being on the rise [1,2]. Environmental pollutants, occupational exposures and life style factors have been explored as possible contributors [3]. Toxicants affecting the reproductive system are broadly categorised as petroleum products, agrochemicals, industrial chemicals and heavy metals. The effects of exposure to toxicants and male infertility have been reported by many investigators [4]. However the results vary according to the study population, the methods used in the assessment of exposure and the biological end point.

Of the heavy metals known to impair semen quality, lead (Pb) and cadmium (Cd) are the two most prevalent

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