

Effect of Lead Exposure on the Behaviour and Intelligence of School-Age Children

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ABSTRACT

Objectives : to assess the problem of lead exposure in our locality, Mansoura city, through screening of the Blood Lead Level (BLL) in a group of primary school students and to detect the relationship between different BLLs and the changes in the behaviour and IQ of these students.

Subjects & Methods : BLL was estimated among 100 students who were subjected also to psychometric testing of their intelligence quotient with Wechsler Intelligence Scale for Children, and their disruptive behaviour with Child Behaviour Checklist. **Results:** The mean BLL among students was 30.1 ± 10.2 $\mu\text{g/dl}$ and 83% of them had BLL above 20 $\mu\text{g/dl}$. Mean IQ of students with $\text{BLL} < 20$ was 111.5 as compared to 74.2 of students whose BLL is > 50 . CBCL score was 3.9 for students with $\text{BLL} < 20$ while it was 14.4 for those of $\text{BLL} > 50$. Also, there was significant correlation of BLL inversely with IQ and directly with CBCL score. **Conclusion :** Lead exposure has drastic effects on school-age children as revealed by lowering of IQ and increase of disruptive behaviour among them.

Nowadays, it is practically impossible, at least in the industrialized parts of the world, to find a human who doesn't have a significant amount of lead in the body and hence in the blood and any amount of body lead reflects an environmental pollution (Hernretig, 1998). It has become customary to refer to the blood lead values found in apparently healthy individuals as "normal BLLS"; this definition is an obvious misnomer as it implies some kind of minimum physiological requirement for lead while this metal should not be present what so ever in the human body (CDC, 1990). Central nervous system appears to be the primary target organ for lead poisoning. Children show more sensitivity to the neurotoxic effects of lead than adult because they absorb and retain more lead in proportion to their body weight and also due to incomplete development of blood brain barrier leading to permanent neurobehavioural changes and lowering Intelligence Quotient (IQ) (Hernretig, 1998). Many studies have reported inverse associations between low level lead exposure and neuropsychological development, particularly cognitive function (Koike, 1997; Schnaas et al., 2000 and Nevin, 2000). Hurlbut (2000) found that blood lead level (BLL) as little as 10 $\mu\text{g/dl}$ may induce neurobehavioural changes and decreasing IQ in children who become at high risk for impediment in progress of their school

life. FitzGerald (2003) notified that beside the already known detrimental effect of lead exposure on children's IQ, attention, language development and behavior, it may also heighten the risk of later delinquent behavior and she pointed to a study done by Needleman in University of Pittsburgh where he found that juvenile offenders as compared to control- were much more likely to have elevated levels of lead in their bodies. In Egypt, exposure to lead is especially prevalent in urban areas due to air pollution, use of lead water pipes and food contamination. In addition, there is also occupational exposure as in "mechanics, painters and battery factory workers" (Mortada, 2000). Accordingly, the aim of this study is to assess the magnitude of this problem in our locality, through screening of the BLL in a group of primary school students in Mansoura City and to detect the relationship between different BLLs and the changes in the behaviour and IQ of these students.

Subjects & Methods

I- Subjects : The present study was conducted on 100 students (57 boys and 43 girls) age from 6-12 years recruited randomly from a primary school situated in the center of Mansoura City during the period from Mars 1, to May 30, 2001. The area in which this school is present is characterized by overcrowding of both people