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Role of blood lead level in battery workers

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Abstract

Background: Chronic lead exposure from the lead-acid–battery manufacturing process has been linked to a variety of health effects, including dental health, cardiovascular disease risk, Matrix–gamma– carboxy glutamic acid protein (MGP) polymorphism, oxidative stress, immunological, genotoxicity, reproductive, neuropsychological, and pteridine metabolism with neurotransmitters synthesized.

Aim of the Work: effects of lead exposure in battery workers.

Subjects and Methods: The present study will be conducted in Department of Biochemistry, Index Medical College and research center, Indore. A total of 100 lead exposed battery workers and 100 aged (20-60 yr) matched non lead exposed controls. Blood sample was withdrawn from the anticubital vein and centrifuged to obtain serum after that serum was quantitatively analyzed for lead level.

Result and conclusion: The blood lead level was found significantly higher in lead exposed battery workers, in comparison to that in the non-lead exposed controls group, with a p value of < 0.001.

Keywords: Battery workers, Lead

Introduction

Lead poisoning has been the most widespread environmental health concern confronting humanity in recent years. Despite being a naturally occurring component of the earth's crust, lead does not become dangerous until it is extracted and turned into human-made items. When it comes into contact with humans, it is swiftly absorbed in blood and soft tissues and slowly absorbed in bones[1].

Lead is also prevalent in locations where lead pipes are utilized for potable water supply, in addition to petroleum-related emissions. Furthermore, absorption of old leaded paint and glazes used in ceramics is linked to lead exposure in the home. Lead contamination has not been managed and is intermittent in nations in the global south, particularly in India. Many previous studies have found that more than half of India's children have high blood lead levels (te g/dL)[2].

Lead and its compounds have been linked to a variety of human health issues, including acute, sub-acute, and chronic occupational lead poisoning. Lead poisoning occurs as a result of lead manufacturing and usage activities, which are mostly linked to emissions from

lead smelting plants, automobile emissions, and lead contamination of food or drinking water. Various studies have shown that the current lead acid battery manufacturing process, which involves various subsections such as lead oxide fabrication, grid casting, pasting, plate cutting, forming, charging, and assembly, is the primary source of lead danger today. Furthermore, hazardous substances such as lead oxide (PbO2), spongy lead (Pb), and sulphuric acid are employed in this procedure (H2SO4). Workers are exposed to lead by inhalation, ingestion, and skin contact during these procedures. Lead accumulates in red blood cells, soft tissue (brain, kidney, and bone marrow), and mineralised tissue after it enters the body (bone & teeth). Airborne lead toxicity is common in lead acid battery manufacturing sites, and it's linked to an increase in blood lead levels (BLL)[3]. Chronic lead exposure from the lead-acid–battery manufacturing process has been linked to a variety of health effects, including dental health, cardiovascular disease risk, Matrix–gamma– carboxy glutamic acid protein (MGP) polymorphism, oxidative stress, immunological, genotoxicity, reproductive, neuropsychological, and pteridine metabolism with neurotransmitters synthesized[4,5]. Lead poisoning can be acute, subacute, or chronic. The public is concerned about all of these toxins. The toxicokinetics of lead and the mechanism of poisoning have yet to be fully understood. Bivalent cations include lead, calcium, and zinc. At blood lead levels as low as 5 g/dL, lead absorption raises blood pressure, especially systolic blood pressure. However, nothing is known about genetic diversity in the risk of high blood pressure caused by lead[6]. The present research was show the effects of lead exposure in battery workers"

Material And Methods

The present study will be conducted in Department of Biochemistry, Index Medical College and research center, Indore. A total of 100 lead exposed battery workers and 100 aged (20-60 yr) matched non lead exposed controls. A Performa containing questionnaire as base line record (Performa enclosed) was filled prior to the blood specimen collection. All ethical measures were taken during the course of study. Blood sample was withdrawn from the anticubital vein and centrifuged to obtain serum after that serum was quantitatively analyzed for lead level.The mean (± SD) blood lead level of test group (lead exposed battery workers) was compared with that of control group (non lead exposed controls) by ANOVA test. A p value of less than 0.05 was considered as significant.

Results

This was observed that the average (Mean ± SD) Blood lead concentration that was found in the LEBW group was 38.9 ± 30.8 and in the NLEC group, it was 11.2 ± 12.5. The blood lead level was found significantly higher in LEBW group, in comparison to that in the (NELC group) control group, with a p value of < 0.001. However, one way anova of variance indicated that these differences in mean blood lead level among two groups were highly significant (p<0.001).

Table 1: Comparison of Blood leads level of LEBW and NLEC

Variable	LEBW	NLEC	p – Value
	Mean ± SD	Mean ± SD	
Blood lead level (µg/dl)	38.9 ± 30.8	11.2 ± 12.5	0.001

LEBW = lead exposed battery workers

NLEC = Non lead exposed controls

Values in Mean ± SD

* p<0.001 (highly significant)

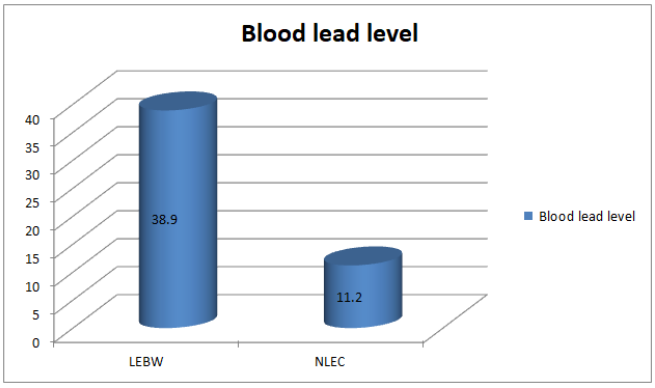

Figure 1: Comparison of blood lead level of control group and subject group, in the form of bar diagram.

Discussion

The blood lead level was found significantly higher in lead exposed battery workers, in comparison to that in the non-lead exposed controls group, with a p value of < 0.001. These findings were concordant with the results of the studies, which were previously done by Batra et al., (2020), Himani et al., (2020) and Ahmad et al., (2018) found that the BLL were substantially greater in LEBW than NLEC (p 0.0001)[7,8,9].

Conclusion

The blood lead level in lead-exposed battery workers was found to be considerably higher than in non-exposed controls. Furthermore, it was discovered that blood lead levels varies significantly with increasing age and duration of exposure in lead-exposed battery workers when they were divided by age and duration of exposure.

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