ORIGINAL ARTICLE

To Study the Blood Lead Levels and Weights of Albino Mice in Different Doses of Lead: An Experimental Study

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ABSTRACT

Aim: To study the blood lead levels and weights of albino mice in different doses of lead.
Methodology: 36 albino mice were divided into three groups. Group A (control) was fed on synthetic diet, groups B and C were given lead acetate 2 mg and 8 mg/kg/day respectively for 60 days. Weights were recorded after 60 days and blood lead levels were done by taking blood in EDTA vials.
Results: The weights of different groups were measured at 60 days and the mean ± SD values of weights in group A to C were 33.8 ± 2.8, 33.5 ± 3.9 and 29.95 ± 5.5gms respectively and comparison between A Vs B showed non-significant difference ($p>0.05$) while comparison between groups A vs C and B vs C showed statistically significant difference ($p<0.05$). No significant difference was seen in blood lead levels of group A (control) at 60 days duration while Group B and C showed significant increase in the blood lead level at 60 days duration ($p<0.01$) as compared with control group.
Conclusion: Group B and C showed significant increase in the blood lead level at 60 days duration ($p<0.01$) as compared with control group.
Keywords: Blood lead level, Albino mice, weight.

INTRODUCTION

Lead is distributed in the body in blood (1% of the body lead burden), soft tissue e.g. kidneys and nervous system and skeleton (95% of the body lead in adults and 70% in children). Lead in blood has an estimated half life of 35 days, in soft tissue 40 days and in bones 20- 30 years[1]. Lead is mainly excreted in urine and in faeces[2]. Lead also appears in hairs, nails, sweats, saliva and breast milk[3]. Lead is a toxic agent and serves no known beneficial role in the human body[4].

The major toxic effects of lead are seen in nervous system, the blood and the gastrointestinal tract. The organic tetraethyl lead (used in petrol as antiknock agent) appears to have proclivity for nervous system[5]. The low level environmental exposures that occur from lead in water, air and soil can cause adverse effects on neurobehavioural developments, reproduction, neonatal growth, blood pressure and kidney function. At this exposure, lead blood level is more than 20 microgram /dl[6]. There is also an inverse relationship between body lead burden and child IQ[7].

An average human body contains about 120 mg of lead, which is mainly present in the skeleton and smaller amount in the hair, blood, aorta, kidney, liver and spleen. An adult ingest about 300 µg of lead via food and water per day. Atmospheric intake in urban area is about 14 µg per day[8].

METHODOLOGY

36 albino mice were selected for this study. At zero week, twelve mice were dissected to provide base line control group A was control group. Groups B and C were given lead acetate in de-ionized water for sixty days with doses of 2 and 8mg/kg/day respectively. The blood samples were taken by heart puncture and collected in a container having EDTA.

RESULTS

The detail of results is given in tables 1 and 2

Table 1: Blood Lead Levels in Control (A) and Experimental Groups (B &C)

Groups	Blood lead level(ug/dl)	Total mice
	Mean ± SD Value	
A (Control)	0.22 ± 0.01	12
B (lead dose 2 mg/kg/day)	0.25±0.02	12
C (lead dose 8 mg/kg/day)	0.67 ± 0.02	12

Statistical Analysis: A vs B = $p > 0.05$ (NS), A vs C = $P < 0.01$ (HS), B vs C = $P < 0.01$ (HS)

Table 2: Weight of albino mice taking different doses of lead

Groups	Lead dose (mg/kg/day)	Weight (gms)	Total mice
		Mean ± SD Value	
A (Control)	Zero	33.8± 2.8	12
B (lead dose 2 mg/kg/day)	02	33.5± 3.9	12
C (lead dose 8 mg/kg/day)	08	29.95± 5.5	12

Statistical Analysis: A vs B = $p > 0.05$ (NS), A vs C = $P < 0.05$ (S), B vs C = $P < 0.05$ (S)

DISCUSSION

In this study, body weight of control group was not statistically significant. The groups in present study B and C (having lead acetate in doses of 2 and 8 mg/kg/day respectively) had reduced body weight as compared to control group. The results correspond with the finding of Foster et al (1980)[8], who studied the lead toxicity in mice.

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In the present study, the blood lead level in the control group was not statistically significant. On the other hand, increase of blood lead levels between 2 and 8 mg/kg/day dose groups are not linearly correlated with the dose administered[9]. It is suggested that mechanisms responsible for lead absorption might get saturated if large single doses are administered. It is in agreement with the study done by Viskocil et al (1995)[10] about cerebral and cerebellar hemispheres in mice following lead exposure. Observations made in humans indicate that steady state blood lead concentrations are reached under relatively constant daily exposure conditions after 6–8 weeks[11]. The blood lead levels obtained in this study are comparable with current levels measured in general population[9].

The biological limit value for blood lead in developing countries suggesting sub-clinical absorption is reported to be 20–40µg/dl whereas the value of 40–60 µg/dl is an indicator of excessive lead absorption[12]. Safety limits set by Bio science laboratories and centre for disease control (CDC) are 40 µg/dl for adults and 30 µg/dl) for children[13]. The levels of toxicity for early toxic effects in children have been lowered from 25µg/dl to 10µg/dl by CDC and there may not be any threshold concentration for lead toxicity[14.]

CONCLUSION

the effects of lead toxicity are dose dependent; prolonged low level lead exposure can initiate the brain lesions, but high dose and prolonged period of exposure is necessary for significant Irreversible changes to occur and the blood lead levels should be more than 66 µg/dl to have marked changes.

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