

Original Article

Evaluation of serum lead levels in children with constipation: A case control study

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ABSTRACT:

Objective: Constipation is a major debilitating problem in children. This study aimed to assess the serum lead levels of 2-13 years old children complaining from constipation. **Material and Methods:** Overall, 100 children were recruited. There were 50 children between the age of 2-13 years suffering from constipation whereas 50 children without constipation were chosen as controls. The subjects who were not willing to participate in the study were excluded. Written informed consent was gathered from the parents. The demographic data of the two cohorts comprising their full name, age, sex, place of residence, and parents' occupation had been noted. All subjects had their 2cc of whole blood collected in order to measure the serum lead level. The blood was transported to the lab while preserving the cold chain in a plastic tube containing EDTA anticoagulant. **Results:** It was found that lead poisoning was significantly more frequent in the children who were less than 7 years old and had constipation compared with those who did not. Lead poisoning was significantly more frequent in the boys and girls of the case group compared with the control group. In the case group, children living in both old and new houses had significantly higher serum lead levels compared with the control group. In the case group, more children had significantly higher serum lead levels than the control group regardless of the low-risk or high-risk occupation of their parents. In the children living in urban areas lead poisoning was more frequent in children with constipation. **Conclusion:** The frequency of lead poisoning was higher in children suffering from constipation. No significant difference was found between the two groups with respect to their sex, age, father's job, and living in urban or rural areas.

Keywords: Constipation, Lead, Children, Lead Poisoning

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INTRODUCTION

Constipation is a major debilitating problem in children, which can be caused by various factors.¹ It is a common complaint comprising 3% of referrals to pediatricians and 25% of referrals to pediatric gastroenterologists. Its prevalence ranges from 10% to 30% in different parts of the world.^{2,3}

Constipation is commonly caused by functional disorders. In other words, it can be caused by any anatomical or organic reasons; it is caused by taking medications. Fecal incontinency is the most obvious complication of constipation, which is seen in 34% of affected patients.⁴ Chronic abdominal pain, as well as rectal and anal pain, is observed in nearly half of the children suffering from constipation. Other complications of constipation are urinary signs such as enuresis or urinary incontinency.⁵ Lead poisoning is an environmental cause of constipation. Evaluating the blood level of lead is the gold standard for determining the effect of lead on health status. The Center for Disease Control, the American Academy of Pediatrics, and many national and international organizations consider a blood lead level ≥ 10 microgram/dl as lead poisoning. It has been estimated that 99% of lead

poisoning cases can be identified through screening.^{6,7} Atomic absorption is the most accurate method for measuring serum lead levels.⁸

Hence, this study was conducted to evaluate serum lead levels in children with constipation.

MATERIAL AND METHODS

Overall, 100 children were recruited. There were 50 children between the age of 2-13 years suffering from constipation whereas 50 children without constipation were chosen as controls. The subjects who were not willing to participate in the study were excluded. Written informed consent was gathered from the parents. The demographic data of the two cohorts comprising their full name, age, sex, place of residence, and parents' occupation had been noted. All subjects had their 2cc of whole blood collected in order to measure the serum lead level. The blood was transported to the lab while preserving the cold chain in a plastic tube containing EDTA anticoagulant. The atomic absorption method by graphite furnace method with standard lead was used to measure the serum lead level. The kids were divided into two age groups: preschoolers (those under 7 years old) and older kids.

It had been determined whether the parents' line of work posed a high or low danger. Painting, making batteries, working in lead mines, and any other activity involving lead has previously been regarded as high-risk professions. Three factors were taken into consideration while evaluating the neighbourhood: high traffic or low traffic, old buildings (more than 15 years old), and new buildings (less than 15 years old). Based on the parents' reported residential address, the volume of traffic was calculated. Highways, public

Table 1: illustrating demographic data of children with constipation and the controls on the basis of low and high serum lead levels.

Variable		Group	Lead serum level		Total	P value
			<10 µg/dL	≥10µg/dL		
Age	<7 years	Case	16	18	34	0.002
		Control	15	21	36	
	>7 years	Case	8	10	18	0.6
		Control	6	6	12	
Sex	Male	Case	20	24	44	0.0001
		Control	16	17	33	
	Female	Case	7	8	15	0.006
		Control	2	6	8	
Age of residential building	New	Case	19	13	32	0.2
		Control	11	19	30	
	Old	Case	10	16	26	0.001
		Control	5	7	12	
Traffic of residential area	High traffic	Case	24	27	51	0.7
		Control	11	19	30	
	Low traffic	Case	6	6	12	0.002
		Control	4	3	7	
Parents job	Low risk	Case	11	17	28	0.004
		Control	9	15	24	
	High risk	Case	13	16	28	0.002
		Control	12	7	20	

It was found that lead poisoning was significantly more frequent in the children who were less than 7 years old and had constipation compared with those who did not. Lead poisoning was significantly more frequent in the boys and girls of the case group compared with the control group. In the case group, children living in both old and new houses had significantly higher serum lead levels compared with the control group. In the case group, more children had significantly higher serum lead levels than the control group regardless of the low-risk or high-risk occupation of their parents. In the children living in urban areas lead poisoning was more frequent in children with constipation. No significant difference was found between the two groups with respect to their sex, age, father's job, and living in urban or rural areas.

DISCUSSION

Constipation is broadly defined as unsatisfactory defecation characterized by infrequent stools, difficult stool passage or both.⁹ Constipation is prevalent in North America, with most studies estimating a prevalence of 12% to 19%, and some Canadian

squares, and congested streets were all regarded as high traffic places. Data was analysed using SPSS software, version 18.

RESULTS

The mean (\pm SD) age of the participants in the case and control group was 5.127 \pm 3.176 and 5.921 \pm 4.431 years, respectively. The mean serum lead level of the children in the case and control group was 12.792 µg/dL and 5.657 µg/dL, respectively.

national data suggesting rates up to 27%.^{10,11} The pathophysiology of constipation is multifactorial and classification schemes can be confusing. The common approach groups constipation into primary and secondary causes. Primary causes are intrinsic problems of colonic or anorectal function, whereas secondary causes are related to organic disease, systemic disease or medications. The classification becomes confusing because secondary causes are typically ruled out first through history, physical examination and diagnostic testing.

Evidence exists on the negative effects of high concentrations of serum lead on children's health and its negative behavioral, social, and intellectual consequences. This issue has aroused serious health related concerns throughout the globe. The need for control, supervision, and management to decrease the risks of lead exposure is deeply felt.¹²

In our study, it was found that lead poisoning was significantly more frequent in the children who were less than 7 years old and had constipation compared with those who did not. Lead poisoning was significantly more frequent in the boys and girls of the case group compared with the control group. In the

case group, children living in both old and new houses had significantly higher serum lead levels compared with the control group. In the case group, more children had significantly higher serum lead levels than the control group regardless of the low-risk or high-risk occupation of their parents. In the children living in urban areas lead poisoning was more frequent in children with constipation.

In Khan and colleagues study in Pakistan, the frequency of lead poisoning in children whose parents had high-risk jobs (31%) was significantly higher.¹³ In a descriptive study, Nuwayhid and coworkers measured the serum lead level of 281 healthy 1-3 year-old children referring to a medical center in Beirut. Logistic regression analysis showed that an increased serum lead level was related to the fathers' job.¹⁴ Furthermore, Olewe and colleagues studied the potential factors related to increased serum lead levels on 387 under 5 year-old children in Kibera slums in Nairobi. They found that high levels of serum lead was related to having unhealthy and unsuitable housing, eating and playing in contaminated soil.¹⁵ Queirolo and coworkers conducted a study in Montevideo, Uruguay on 222 pre-school children to identify the predicting factors for high serum lead levels. They concluded that the lead-related job of the fathers was related to higher serum lead levels in the children.¹⁶

CONCLUSION

The frequency of lead poisoning was higher in children suffering from constipation. No significant difference was found between the two groups with respect to their sex, age, father's job, and living in urban or rural areas.

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