ISSN: 2576-2842

Review Article

Journal of Gynecology & Reproductive Medicine

Serum Lead Levels During Pregnancy: A Descriptive Observational Study

G Nikila Reddy* and MB Bellad

Department of Obstetrics and Gynecology

***Corresponding author**
Dr. G Nikila Reddy, Department of Obstetrics and Gynecology, Hyderabad. India. E-mail: gnikilareddy@gmail.com

Submitted: 17 June 2019; **Accepted:** 24 June 2019; **Published:** 10 July 2019

Introduction

- Prenatal lead exposure- known adverse effects on maternal health and infant [1-3].
- Adverse effects of lead exposure at lower level than what was earlier [4-9].
- First guidelines 2010 by CDC during pregnancy [10].

Blood lead levels

- Threshold levels to trigger the adverse health effects of lead are not found.
- Normal non-pregnant adults - < 5 µg/dl
- Levels between 5 - 10 µg/dl need follow up.
- Levels >10 µg/dl - managed with environmental assessment and abatement of exposures.
- Levels >40 µg/dl needs chelation therapy
- Levels>70µg/dl-considered as medical emergency.
- Lead crosses the placenta even first trimester [11].

Effects of Increased levels

- In pregnancy associated with several adverse outcomes: Fetal-Miscarriage, Low birth weight and impaired neuro development.
- Maternal: Gestational-hypertension, Iron deficiency anemia
- Elevated blood lead levels-increase lead absorption.
- Levels vary during early mid and late gestation [11].

Objectives

- **Primary**
  To know the blood level of lead during pregnancy.
- **Secondary**
  To find out is there an association between blood lead level and adverse maternal outcomes-Anemia and hypertension.

Review of literature

- Prenatal lead exposure has known adverse effects on maternal health and infant outcomes across a wide range of maternal blood lead levels.
- The recommendations are risk assessment of exposure should take place at the earliest contact with pregnant women.
- Blood lead testing should be performed if a single risk factor is identified.
- Elevated lead levels- iron deficiency anemia, gestational hypertension, miscarriage, low birth weight and impaired neurodevelopment.
- Women with levels of 45 mg /dl or more need treatment [11].
- Women living in inner city neighborhood near heavy vehicular traffic had higher lead exposure [12].
- Lead levels from week 12 to week 20- decreases and from week 20 to parturition there is variable increase in lead levels [13-18].

Methods

- Study design –Descriptive Observational study
- Place – Department of Obst and Gyn. Teaching hospital attached to KLEU's J.N.Medical college, Belgaum
- Study period : Jan 2013 Oct 2014
- **Study population:** Pregnant women in early, mid and late pregnancy attending the above hospital.
- Sample size: 30
- Outcome data available for: 32
- Three times during pregnancy same women
- Early pregnancy: 10 - 14 weeks
- Mid pregnancy: 24 - 28 weeks
- Late pregnancy: 32 - 36 weeks

Selection criteria

Inclusion criteria	Exclusion Criteria
• Gestational age as required	• Known medical disorders or on medication.
• Willing to provide Informed consent	• HIV and HBsAg positive women.
	• Known drug abuse.
	• On ayurvedic medications.

Procedure

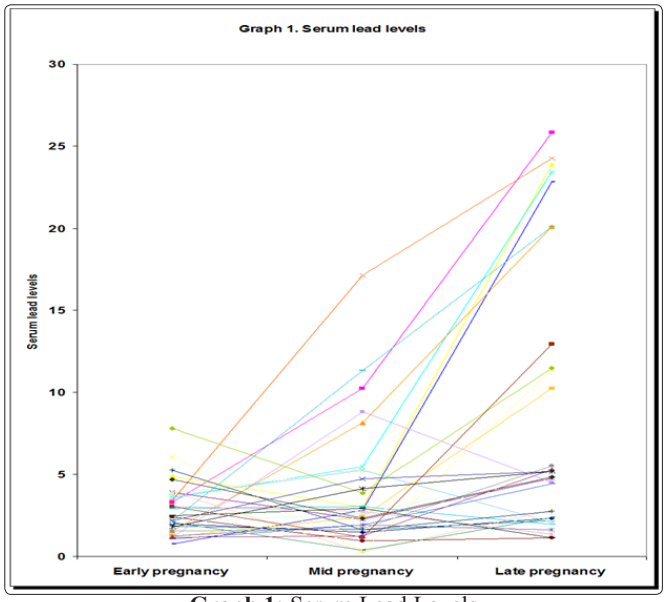
- 5 ml of venous blood will be taken in each trimester as specified for every patient and will be analyzed for serum lead levels using Perkin Elmer graphite furnace atomic absorption spectrometer.
- Investigations
  – Serum lead
  – Hb% in specified trimester

Results

Statistical Analysis

- Screened were: 43
- Consented were: 35
- Outcome data available for: 32

- Loss of follow up : 3
- The categorical data -chi-square test
- Continuous data t test
- 'P'< 0.05 was considered as statistically significant



Graph 1: Serum Lead Levels

Table 1: Serum Leads Levels and Haemoglobin in Early Pregnancy

Serum Lead levels	No. of women	Haemoglobin levels (gm %)							
		≥ 11		10 to 10.9		7 to 9.9		< 7	
		No	%	No	%	No	%	No	%
≤ 5.00	29	12	37.50	16	50.00	1	3.13	0	0.00
5.01 to 9.99	3	1	3.13	2	6.25	0	0.00	0	0.00
Total	**32**	**13**	**40.63**	**18**	**56.25**	**1**	**3.13**	**0**	**0.00**

Table 2: Serum Leads Levels and Haemoglobin in Mid Pregnancy

Serum Lead levels	No of women	Haemoglobin levels (gm %)								Gestational HTN		Pre-eclampsia	
		≥ 11		10 to 10.9		7 to 9.9		< 7					
		No	%	No	%	No	%	No	%	No	%	No	%
≤ 5.00	24	8	25	11	34.38	5	15.63	0	0.00	4	12.50	3	9.38
5.01 to 9.99	3	0	0.00	0	0.00	3	9.38	0	0.00	1	3.13	2	6.25
≥ 10	5	0	0.00	1	3.13	4	12.50	0	0.00	1	3.13	1	3.13
Total	**32**	**8**	**25**	**12**	**37.5**	**12**	**37.51**	**0**	**0.00**	**6**	**18.76**	**6**	**18.76**

Table 3: Serum Leads Levels and Haemoglobin in Late Pregnancy

Serum Lead levels	No of women	Haemoglobin levels (gm %)								Gestational HTN		Pre-eclampsia	
		≥ 11		10 to 10.9		7 to 9.9		< 7					
		No	%	No	%	No	%	No	%	No	%	No	%
		No	%	No	%	No	%	No	%	No	%	No	%
≤ 5.00	17	2	6.25	6	18.75	9	28.13	0	0.00	1	3.13	3	9.37
5.01 to 9.99	4	0	0.00	0	0.00	4	12.50	0	0.00	1	3.13	3	9.37
≥ 10	11	0	0.00	0	0.00	9	15.63	2	3.13	3	9.38	1	3.13
Total	**32**	**2**	**6.25**	**6**	**18.75**	**22**	**56.26**	**2**	**3.13**	**5**	**15.64**	**7**	**21.87**

Table 4: Haemoglobin Levels

Haemoglobin (gm %)	Early Pregnancy (n=32)		Mid Pregnancy (n=32)		Late Pregnancy (n=32)	
	No	%	No	%	No	%
Normal (≥ 11)	13	40.63	8	25.00	2	6.25
Mild (10 to 10.9)	18	56.25	12	37.50	6	18.75
Moderate (7 to 9.9)	1	3.13	12	37.50	22	68.75
Severe (< 7)	0	0.00	0	0.00	2	6.25
Total	**32**	**100.01**	**32**	**100.00**	**32**	**100.00**

Table 5: Serum Lead Levels

Haemoglobin (gm %)	Early Pregnancy (n=32)		Mid Pregnancy (n=32)		Late Pregnancy (n=32)	
	No	%	No	%	No	%
≤ 5.00	No	%	No	%	No	%
5.01 to 9.99	29	90.63	24	75.00	17	53.13
10.00 to 14.99	3	9.37	5	15.63	4	12.50
15.00 to 19.99	0	0.00	3	9.37	4	12.50
20.00 to 24.99	0	0.00	0	0.00	0	0.00
25.00 to 30.00	0	0.00	0	0.00	6	18.75
Total	0	0.00	0	0.00	1	3.12
Lead Levels	32	100.00	32	100.00	32	100.00
Lead Levels	Early pregnancy (n=32)		Mid pregnancy (n=32)		Late pregnancy (n=32)	

Conclusion

Based on the findings of this study it is evident that, the serum lead levels in pregnant women increase with duration of gestation. Further there is moderate negative correlation between serum lead levels and haemoglobin during mid pregnancy and strong negative correlation during late pregnancy suggesting increase in lead levels associated with anaemia. It is also observed that, there is positive co-relation between increase in serum lead levels and hypertension (gestational hypertension/ pre eclampsia). The findings of the same study need to be confirmed by larger multicentre trial.

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