

# To Lead and Stress during Pregnancy on Offspring Neurodevelopment during Single and Combined Exposure

Meenakshi Singh\*

Department of Environmental Health, University of Groningen, Netherlands

## Abstract

To examine links between lead and stress exposures throughout various periods of pregnancy and the neurodevelopment of the foetus. Methods: In the Shanghai Birth Cohort from 2013 to 2016, we assessed levels of maternal stress and prenatal lead. Midway through the pregnancy, the Center for Epidemiological Studies Depression Scale and Self-Rating Anxiety Scale were used to measure maternal stress. To evaluate neurodevelopment, the Ages-Stages-Questionnaires-3 and Bayley-III (at 24-months-of-age) were both employed. Prenatal lead and stress measurements were taken on a total of 2132 mother-child pairs. The geometric averages of cord blood lead and blood lead in early pregnancy were 1.46 g/dL and 1.33 g/dL, respectively. Anxiety and depression were detected in 1.89% and 0.14% of the study's female participants, respectively. After controlling for associated variables, combined exposures showed worse effects on children's social-emotional abilities than single exposures, especially combined exposure during early pregnancy.

**Keywords:** Lead exposure; Maternal stress; prenatal exposure; Different stage of pregnancy; Cognitive development; Birth cohort

## Introduction

Both isolated and combined prenatal lead/stress exposures hampered child neurodevelopment, and the combined effects could be more severe than isolated ones [1]. Particularly in terms of social-emotional development, combined exposure during early pregnancy may lead to poorer neurodevelopmental results than combined exposure around delivery [2]. Lead exposure is a serious public health issue that can have an impact on many organs and systems [3]. There is no amount of lead exposure that is safe for humans; even modest levels of lead exposure can be dangerous over time [4]. The foetus is exposed to endogenous lead built up in the mother's body prior to pregnancy as a result of the rapid mobilisation of lead from maternal bone reserves during pregnancy [5]. And environmental exogenous lead. The foetal central nervous system is susceptible to lead exposure because of the immature blood-brain barrier, which might limit foetal brain development and lead to probable neurobehavioral dysfunctions in the future [6]. Relevant epidemiological investigations discovered a link between lead exposure during early development and behavioural and cognitive problems in later life [7]. According to animal research, lead exposure throughout adolescence may result in pathological alterations to synaptic structures that are associated to alterations in the amounts of essential synaptic proteins, which affect brain communication and synaptic transmission [8]. On the other side, individuals are experiencing mental stress at a higher rate as a result of the accelerated pace of life [9]. Pregnant women must deal with the emotional ups and downs brought on by the physiological changes associated with pregnancy as well as the mental stress brought on by the responsibilities of mothers in society or households [10].

## Discussion

Prior prospective research has demonstrated that depression and anxiety during pregnancy are risk factors for unfavourable outcomes for both mothers and their offspring, including emotional, behavioural, and cognitive issues in the latter. Glover and other research on both humans and animals showed that the stimulation of the hypothalamic-pituitary-adrenal axis was a mediator of these negative consequences. Considering the prenatal during a crucial time while the CNS is forming

and developing, the embryo or foetus is vulnerable to environmental exposure factors. The effects of many prenatal exposures on foetal neurodevelopment must be carefully considered due to the complexity of the living environment. Although there is a lot of evidence for the cognitive effects brought on by prenatal single lead or stress exposure, realistic combination evaluation has received far less attention. In order to assess the associations between prenatal lead and stress exposures alone or in combination at various prenatal stages and offspring neurodevelopment, we used a large-scale prospective birth cohort study to examine prenatal lead and stress exposure levels in pregnant women participating in the Shanghai birth cohort study. In our hypothesis, lead exposure throughout pregnancy and Comparing stress to single exposures, the neurodevelopmental effects may be greater.

## Conclusion

We also anticipated that combined exposure to lead and stress at various prenatal stages had distinct effects on offspring neurodevelopment since the reactions of embryos and fetuses (at various prenatal stages) to environmental exposures may vary. Identified standard operating procedures were utilised for the collection and handling of biological materials. Basic data on the subjects was gathered, such as prior medical histories, family histories, social environments, living conditions, diet, behaviour, physical activity, and psychological stress. Finally, 5749 couples in total who matched the inclusion criteria were sought for. A total of 3692 moms gave birth to their children, with the exception of 1622 women who had high-risk pregnancies and women who withdrew during pregnancy and had miscarriages or stillbirths. The Xinhua Hospital Institutional Review

\*Corresponding author: Meenakshi Singh, Department of Environmental Health, University of Groningen, Netherlands, E-mail: MeenakshiSingh43@gmail.com

**Received:** 02-Feb-2023, Manuscript No. jpch-23-86818; **Editor assigned:** 06-Feb-2023, PreQC No. jpch-23-86818 (PQ); **Reviewed:** 20-Feb-2023, QC No. jpch-23-86818; **Revised:** 24-Feb-2023, Manuscript No. jpch-23-86818(R); **Published:** 28-Feb-2023, DOI: 10.4172/2376-127X.1000574

**Citation:** Singh M (2023) To Lead and Stress during Pregnancy on Offspring Neurodevelopment during Single and Combined Exposure. J Preg Child Health 10: 574.

**Copyright:** © 2023 Singh M. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Boards, which is associated with Shanghai Jiao Tong University School of Medicine, gave its approval for this study. At the start of the trial, pregnant women were given information about the goals and methods of the study and asked to sign an appropriate informed consent form.

### **Acknowledgement**

None

### **Conflict of Interest**

None

### **References**

1. AMW, AEM, AGIM, B HR, C ME, et al. (1992) Prenatal stress selectively alters the reactivity of the hypothalamic-pituitary adrenal system in the female rat. *Brain Res* 595: 195-200.
2. Adams J, Barone S, Jr La Mantia A, Philen R, Rice DC, et al. (2000) Workshop to identify critical windows of exposure for children's health: neurobehavioral work group summary. *Environ Health Perspect* 10: 535-544.
3. Alderdice F, Lynn F, Lobel M (2012) A review and psychometric evaluation of pregnancy-specific stress measures. *J Psychosom Obstet Gynaecol* 33: 62-77.
4. Allen KA (2015) Is Prenatal lead exposure a concern in infancy? what is the evidence? *Adv Neonatal Care* 15: 416-420.
5. Al Saleh I, Nester M, Mashhour A, Moncari L, Shinwari N, et al. (2009) Prenatal and postnatal lead exposure and early cognitive development: longitudinal study in Saudi Arabia. *J Environ Pathol Toxicol Oncol* 28: 283-302.
6. Barbazanges A, Piazza PV, Moal ML, Maccari S (1996) Maternal glucocorticoid secretion mediates long-term effects of prenatal stress. *J Neurosci* 16: 12.
7. Baron E, Bass J, Murray SM, Schneider M, Lund C, et al. (2017) A systematic review of growth curve mixture modelling literature investigating trajectories of perinatal depressive symptoms and associated risk factors. *J Affect Disord* 223: 194-208.
8. Bergh B, Mulder E, Mennes M, Glover V (2005) Antenatal maternal anxiety and stress and the neurobehavioural development of the fetus and child: links and possible mechanisms. A review *Neurosci Biobehav Rev* 29: 237-258.
9. Biqwaggi A, Conroy S, Pawlby S, Pariante CM (2016) Identifying the women at risk of antenatal anxiety and depression: a systematic review. *J Affect Disord* 191: 62-77.
10. Binns HJ, Campbell C, Brown MJ (2007) Interpreting and managing blood lead levels of less than 10 microg/dL in children and reducing childhood exposure to lead: recommendations of the centers for disease control and prevention advisory committee on childhood lead poisoning prevention. *Pediatrics* 120: e1285-e1298.