

Increased Risk of Adverse Birth Outcomes of Newborns in Arsenic Exposed- Women with Gestational Diabetes

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Abstract : Background: Exposure to arsenic has known toxic effects but the effect on pregnancy outcomes is not as widely documented especially in women with diabetes. Growing evidence has suggested a potential role of arsenic exposure in the development of gestational diabetes mellitus (GDM). Therefore, we aimed to investigate the association of urinary arsenic (UAs) with birth outcomes in GDM subjects. Methods: Under an observational cross-sectional design a total of 263 GDM subjects (age in years, $M \pm SD$, 21 ± 3.7) residing in an arsenic affected area of Bangladesh, were subjected to a 2 sample OGTT at the third trimester of gestation. Among them, 73 GDM and 190 non-GDM subjects enrolled in this study. Clinical and anthropometric measurements were done by standard techniques. Degree of chronic arsenic exposure was assessed by the level of UAs level. According to World Health Organization (WHO) criteria, GDM was diagnosed and neonatal outcomes using APGAR (Activity Pulse Grimace Appearance Respirations) Score, birth weight and size were assessed by a specialist obstetrician. Serum glucose was measured by the Glucose Oxidase method and UAs level was determined by ultraviolet/visible spectrophotometry. Result: Out of the 263 pregnant women, 28% developed GDM. Urinary Arsenic was significantly higher in the GDM as compared to the non-GDM group [UAs, $\mu\text{g/l}$, $M \pm SD$ (range), 204.2 ± 67.0 (67.0-377.0) vs 77.3 ± 38.1 (22.0-99.0), $p < 0.001$]. Activity Pulse Grimace Appearance Respirations Score of the neonates from GDM mothers was significantly lower compared to the neonates from non-GDM mothers [APGAR Score, $M \pm SD$, 4.7 ± 0.8 vs. 6.4 ± 0.7 , $p < 0.001$]. Pearson's correlation analysis in GDM subjects revealed that UA levels were found to have a significant positive correlation with both fasting and postprandial serum glucose levels ($p < 0.001$) and ($p < 0.001$) respectively. Again, a significant inverse correlation of UAs with birth weight and size was observed ($p < 0.001$). The APGAR Score of the neonates were found to have a significant negative correlation ($p < 0.001$) with UAs level. Conclusion: The effect of chronic arsenic exposure is associated with glucose intolerance during pregnancy and it also adversely affects birth outcomes. The study suggests further research on the impact of total arsenic exposure on pregnancy outcomes.

Keywords : APGAR score, arsenic exposure, birth outcome, gestational diabetes mellitus,

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