**A Report on a Case Control Study of Arsenic Toxicity to Pregnant Women in Nawalparasi District, Nepal through Biological Monitoring**

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**Background**

Elevated arsenic level in drinking water has become a public health threat in many developing countries. The prevalence of arsenicosis due to long term arsenic exposure was reported to be 2.2% in the Terai. Chronic exposure to inorganic arsenic causes characteristics skin manifestations such as keratosis and melanosis. Arsenic readily crosses the placental barrier and thus affects the fetal development. Few human studies have been conducted and indicate adverse effects on reproductive outcomes and child health due to high arsenic exposure. This research compares the health of pregnant women in high arsenic contaminated community of Ramgram municipality with arsenic free pregnant women in Dhulikhel/Banepa municipality mainly through biological monitoring.

**Methods**

This is a case control study where pregnant women are chosen from a high arsenic drinking water location and an arsenic free drinking water location. Sixty pregnant women participated in the study, forty for case study and twenty for the control study group. Among the sixty pregnant women, thirty are selected for biological sample analysis. The biological sample analysis includes hair and urine sample which gives the chronic and acute arsenic exposure respectively. A family history survey of each pregnant woman was conducted. In addition, arsenic exposure assessment, pregnancy outcomes for each participant and a physical evaluation of arsenicosis symptoms is also conducted.

**Results**

About 95% of the women in case study groups have no knowledge about arsenic although they live in arsenic endemic areas. However, 30% of the women in control groups have some knowledge about arsenic. The difference in mean hair and urine arsenic concentration in both groups of women is highly significant (p,0.01) indicating the arsenic concentration is highest in exposed groups. Regression analysis between the hair and urine arsenic concentration with drinking water arsenic concentration is also statistically significant (p<0.05). One way ANOVA analysis done between the mean hair and urine arsenic concentration with literacy status does affect the hair and urine arsenic concentration among the women in case study (p>0.05). But a statistically significant (p<0.05) relationship is observed between the mean hair and urine arsenic concentration with the arsenic exposure level. The mean hair arsenic concentration was high among the pregnant women with previous residing place in arsenic free areas and India but the relationship was not statistically significant (p>0.05). The relationship between the exposure period arsenic intake with body mass index and hair arsenic concentration was found to be statistically significant (p<0.05). The study also shows that the prevalence of arsenicosis symptoms is 30% among the pregnant women in case study. Among pregnant women surveyed in case study, 12.5% of the pregnancy outcomes resulted in the death of the infant.

**Conclusions**

Mass screening of the pregnant women for arsenic toxicity should be done through urine sample analysis for arsenic concentration. Deeper tube wells for arsenic free water should be installed at least one or two in each village so that the people can use it for drinking and cooking.

**Keywords:** arsenic; arsenicosis; arsenic intake; body mass index; biological samples; case study; chronic and acute arsenic exposure; control study; exposed groups; exposure period.