

**Dyslipidemia In Pregnancy May
Contribute To Increased Risk Of Neural
Tube Defects**

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INTRODUCTION:

- Neural tube defects (NTD) are congenital structural abnormalities of the brain and vertebral column resulting from improper or non-timely closure of the neural tube.
- One of the most common and severe congenital malformations.
- Interplay of genetic, environmental and nutritional factors may result in neural tube defects.

INTRODUCTION Cont.

- Prevalence of neural tube defects is reported to be higher among women with diabetes and obesity.
- Prenatal screening of maternal serum alpha-fetoprotein, along with ultrasonography has allowed neural tube defects to be identified in utero.
- In India, screening for NTD is not yet included in routine screening

AIMS AND OBJECTIVES:

- Screening of the antenatal patients for NTD using maternal serum AFP
- To evaluate the association of dyslipidemia with the risk of development of fetal neural tube defects.

MATERIAL AND METHODS:

- The present study was involved 129 pregnant women in 16 to 18 weeks gestation period.
- Of these, 80 women had normal pregnancies and 49 were clinically high-risk cases for neural tube defects
- Patients with other conditions that may increase AFP levels (hepatitis, cirrhosis, hepatocellular carcinoma and germ cell cancers) were excluded from the study.

MATERIAL AND METHODS

Cont:

- The institutional ethical committee approved the study and the women were included after a written informed consent.
- 5 ml fasting venous blood sample was collected from each 129 subject and divided into three parts
- Plasma glucose was estimated by Glucose-oxidase method, lipid profile (serum cholesterol and triglycerides) by enzymatic method and Alpha-fetoprotein by Enzyme Immunoassay.

RESULTS:

- Alpha-foeto protein $>2\text{MoM}$: 27 women (Screen positive)
- Alpha-foeto protein $>2\text{MoM}$: 102 women (Screen negative)
- All 27 screen positive women were further evaluated by USG
- 21 out of these 27 screen positive women were confirmed to be carrying NTD positive fetus

RESULTS cont. :

- 19 out of 21 women were from the earlier classified high-risk pregnancy group and 2 were from the normal pregnancy group
- All the subsequent comparisons were made between these 21 NTD positive pregnant women (**cases**) and 108 pregnancies without NTD (**controls**)

Physical and biochemical parameters	Control group with normal fetus (n =108)	NTD positive pregnant Cases (n=21)	p-value
Age (years)	24.67 ± 0.98	25.08 ± 1.12	0.490
Parity	0.96± 0.24	1.02± 0.21	0.737
Body Weight (Kilograms)	56.91 ± 1.7	61.24 ± 3.05	0.112
Plasma Glucose (mg/dl)	84.8 ± 2.47	112.50 ± 6.75	0.002
S.Cholesterol (mg/dl)	176.76 ± 5.09	211.4 ± 12.8	0.038
S. Triglycerides (mg/dl)	156.4 ± 12.9	276.0 ± 14.3	0.001
Mean AFP (Designated as MoM values)	1.02 ± 0.11	2.98 ± 0.36	0.000

Results cont. :

- **Correlation of physical and biochemical parameters:**
 1. Serum AFP values were significantly associated with age, body weight, blood sugar levels and serum cholesterol and triglyceride levels in all women.
 2. Similarly blood sugar values also showed a positive correlation with age, body weight and serum cholesterol levels and highly significant correlation with serum triglyceride levels

Results cont. :

- Maternal body weight showed a significant correlation with blood sugar levels.
- A significant correlation of NTD with maternal age and body weight and very highly significant correlation with blood sugar, serum triglycerides and serum cholesterol levels was observed.

DISCUSSION:

Hyperglycemia and neural tube defects:

Elevated glucose concentrations

Oxidative stress and embryonic depletion
of inositol

Abnormal closure of neural tube

DISCUSSION:

- In pregnancy, changes in hepatic and adipose metabolism alter circulating concentrations of triacylglycerols, fatty acids, cholesterol, and phospholipids
- In this study, the mean serum triglyceride levels in normal pregnancies were towards the higher side of normal range (156.4 ± 12.9 mg/dl), but these values were significantly lower than the mean triglyceride values of the screen positive patients (276.0 ± 14.3 mg/dl; $p = 0.001$).

Dyslipidemia and NTD:

Excess free fatty acids

Formation of ceramides
(which are known to have apoptotic
properties)

may potentiate the embryotoxic
effects of glucose

DISCUSSION cont. :

- In the present study, 12- fold higher risk of NTD was observed in women having hypertriglyceridemia.
- Since the presence of increased body weight, dyslipidemia and elevated blood sugar increase the probability of metabolic syndrome in a patient; propose that Metabolic Syndrome may be associated with the increased risk of NTD

CONCLUSION:

- In addition to glucose, it is quite possible that other metabolic fuels like lipids may also cross the placenta and contribute to the adverse intrauterine environment leading to development of neural tube defects.
- However, further experimental studies are required before any conclusion is drawn from this preliminary observation.

THANK YOU

Correlation of physical and biochemical parameters

	Age of women	Body weight	Plasma glucose	Serum cholesterol	Serum triglycerides
AFP level	p= 0.041	p= 0.050	p= 0.002	p = 0.010	p = 0.000
Age of women		p= 0.000	p=0.027	p = 0.591	p = 0.067
Body wt.			p =0.042	p = 0.967	p = 0.011
Plasma glucose				p = 0.038	p = 0.000
Serum cholesterol					p = 0.000

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- Though the mean plasma glucose values of NTD positive women were not found to be in the diabetic range but they were still on the higher side of normal range (112.50 ± 6.75 mg/dl).

