Material and Methods
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This is a comparative study of evaluation of neonatal complications in infants of mothers having abnormal glucose tolerance and mothers having normal glucose tolerance during third trimester of pregnancy.

Study was carried out over 100 antenatal mothers in their third trimester of pregnancy attending the department of Obstetrics and Gynaecology at M.L.B. Medical College, Jhansi and infants born to these mothers. Study was done over a period of one year from June 1993 to May, 1994.

Antenatal mothers were screened on the basis of certain factors present in history and clinical examination i.e. obesity, age, family history of diabetes, previous history of unexplained perinatal death, previous history of infant born with congenital malformations, polyhydramnios, hypertension, proteinuria and moniliasis.

These mothers underwent detailed medical history and thorough clinical examination, including obstetrical examination.

Mothers with established diabetes were excluded from the study.
Methodology:

Mothers were subjected to 100 gm glucose 3 hour glucose tolerance test, at 30 ± 2 weeks gestation, than at weekly interval, up to one week after delivery.

Criteria for abnormal glucose tolerance test:

On the basis of 3 hour GTT, mothes having abnormal glucose tolerance were grouped into three categories.

Gestational diabetes:

On the basis of O' Sullivan's criteria gestational diabetes is diagnosed, if two or more values are abnormal.

C'Sullivan's Criteria -

- Fasting glucose - 105 mg/dl
- At one hour - 190 mg/dl
- At two hour - 165 mg/dl
- At three hour - 145 mg/dl

Impaired gestational glucose tolerance:

If two hour plasma glucose levels lies between 120 to 164 mg/dl, this category is defined as impaired gestational glucose tolerance (GIGT).

Isolated abnormalities of blood glucose:

If any of the plasma glucose values exceeded the O' Sullivan's criteria at the appropriate time (IABG).
Those mothers who showed abnormal test were given suitable dietary advise and if necessary were kept on insulin. Plasma glucose values were estimated every week, so as to keep post prandial plasma glucose value below 120 mg/dl.

Newborn:

Newborns of these mothers were subjected to thorough clinical examination and investigations -

Clinical examination was done to see -

- Weight of the baby at the time of birth
- Gestation of baby
- Any congenital anomaly, if present
- Any clinical evidence of respiratory distress syndrome.
- Any clinical evidence of hypocalcemia
- Hyperbilirubinemia - all the common causes of pathological jaunice were excluded.

Weight of baby:

Weight of newborn was taken by electronic weighing machine by Lectomedrik. It has got accuracy upto 10 gms. weight of the baby was plotted against intrauterine growth charts (See fig-2) and babies having birth weight more than 90th percentile for gestational age were termed as macrogomie babies.
Fig 3 Intrauterine Weight chart for both sexes
Gestational age

in weeks.

Fig-2 Both the external physical
criteria score and that for the
neurologic criteria are added together.
**Gestational age:**

Gestational of baby was estimated using Dubowitz's

**Criteria (See fig-1)**

Dubowitz have derived a score based on -

(a) External characteristics

(b) Neurological characteristics. This score system is convertable into a graph (See fig - 3).

**Investigations of newborn:**

For the purpose of investigation blood samples of newborn was collected by heel prick method.

Investigations include -

i) Plasma glucose estimation 2 hour after birth by Hemoglukotest strips using Refloux - S glucometer.

ii) Hb estimation

iii) Serum bilirubin estimation (if clinical evidence of hyperbilirubinemia present)

(iv) Serum calcium estimation (if clinical evidence of hypocalemia present).

**Plasma glucose estimation:**

Plasma glucose levels in mothers and newborns were estimated by Hemoglukotest 20-800 R. Strips using glucometer named Refloux - S supplied by Boehringer Mannheim.
Principle:

Test is based on glucose oxidase/pevoxidase reaction. Hemoglukotest strips react specifically to glucose.

Test area consists of two test zones with different sensitivity to glucose. The lower test zone gives (clearly distinguishable) colour in the range 20-120 mg/dl, and upper test zone in the range 120-800 mg/dl.

Exact values are determined with the help of Refolux - S glucometer.

Test strips were protected from humidity and direct sunlight.

Refolux - S:

It is the instrument used for plasma glucose measurement.

Principle:

The colour intensity of the reacted strip area is measured by reflectance photometry in Refolux - S. The instrument is equipped with double beam optical system, capable of evaluating both zones of the test area simultaneously.
Technical specifications:

Type: Reflolux - S

Range of measurement: 10-500 mg/dl

Wavelength: 950 n.m. (infrared)

Power supply: 6 volt battery

Storage capacity: Max 20 blood glucose value.

Test procedure:

- Finger was pricked with disposable needle after cleaning the test area.

- Test area of Hemoglukotest Strip 20-800 R was covered with one large drop of blood. Timer pressed immediately.

- At the long buzzer at 60 Sec. blood is wiped off with clean dry cotton.

- After 120 Sec. the display automatically shows exact plasma glucose values.

Serum bilirubin measurement:

Mitra's bilirubin reagent is used for determination of total and direct serum bilirubin.

Procedure:

Three test tubes labelled as B-blank, D-direct and T-total taken.
<table>
<thead>
<tr>
<th>Reagent</th>
<th>For 3 ml Cuvette (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Diazo blank D reagent</td>
<td>B 2.0 D - T -</td>
</tr>
<tr>
<td>2. Diazo working reagent</td>
<td>- 2.0 2.0</td>
</tr>
<tr>
<td>3. Serum</td>
<td>- 0.1 0.1 0.1</td>
</tr>
<tr>
<td>4. Reagent C</td>
<td>- 1.0 - 1.0</td>
</tr>
<tr>
<td>5. Distilled water</td>
<td>- - 1.0 -</td>
</tr>
</tbody>
</table>

Contents of each tube were mixed thoroughly, after each edition.

Optical densities of contents of all the three tubes were measured at 540 ± 15 nm.

**Calculation:**

- Total Bilirubin = \( \frac{O.D. \text{ of } T - O.D. \text{ of } B}{O.D. \text{ of standard}} \times 5.0 \text{ mg/dl} \)
- Direct bilirubin = \( \frac{O.D. \text{ of } D - O.D. \text{ of } B}{O.D. \text{ of standard}} \times 5.0 \text{ mg/dl} \)

**Hemoglobin estimation:**

Mitra's hemoglobin reagent was used for the purpose. Test is based on cyanmethglobin principle.

**Calculation = gm/dl of Hb in blood = \( \frac{O.D. \text{ of test}}{O.D. \text{ of Stand.}} \times 15 \)**