**Original Article**

**PREVALENCE OF FETOMATERNAL HEMORRHAGE AND ITS QUANTIFICATION IN THE THIRD TRIMESTER OF PREGNANCY**

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**Objective:** The purpose of this study was to find out the prevalence of fetomaternal hemorrhage (FMH) and its quantification in the third trimester of pregnancy.

**Material & Methods:** This cross-sectional study was conducted from April 1999 to April 2000. 500 females in the third trimester of pregnancy were selected from the outdoor of Obstetrics/Gynecology of Sir Ganga Ram Hospital Lahore. Kleihauer's acid elution test was done to see the prevalence of FMH and the hematological parameters performed were hemoglobin estimation and blood groups of patients.

**Results:** Out of 500, 384 subjects were multigravida (76.8%) and 116 subjects were primigravida (23.2%). They were further evaluated under the following headings. (1) i) Multigravida (MG) without risk factors. ii) Multigravida with risk factors. 2) i) Primigravida (PG) without risk factors. ii) Primigravida with risk factors.

**Conclusions:** The prevalence of FMH is 5.6%, with MG 5.3% and PG 6.5% and the volume of FMH was in the range of 0.2-2 ml.

**Keywords:** Fetomaternal hemorrhage (FMH), Transplacental Hemorrhage (TPH).

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**Introduction**

Fetomaternal hemorrhage (FMH) or transplacental hemorrhage (TPH) is the passage of fetal blood into the maternal circulation through the placenta. The possibility of occurrence of FMH was first described by Deinest in 1905 and Chown (1954) demonstrated the fetal red cells in maternal circulation. Fetal red cells have been identified in the first trimester of pregnancy with increasing frequency and volume as pregnancy advances. This is due to increase in the placental surface and increase in the fetal blood volume.

For the detection of fetal red cells in the maternal circulation the acid elution technique was introduced by Kleihauer in 1957. This test is quite accurate and the procedure is simple to perform. Hence it remains the gold standard for the detection of FMH. The factors which can precipitate FMH are trauma, placental tumors, antenatal manipulations, fetal blood sampling, antepartum fetal death and preeclampsia. However, in a number of cases FMH occurs spontaneously.

Volume of FMH in different cases is variable. It may be very low to be insignificant, i.e. <0.1 ml or very high, i.e. up to 150 ml. The prevalence of FMH has now been reduced to a great extent due to improved antenatal care and obstetric procedures carried out antenatally. The importance of FMH is as a risk factor for fetal anemia and fetal distress in the Rh positive pregnant mother. In the Rh negative pregnant female it carries the risk of sensitization in the first pregnancy and hemolytic disease of newborn (HDN) in the subsequent pregnancy with an Rh positive fetus.

**Pathophysiology of FMH:**

FMH can be found in normal pregnancy and during delivery which may be physiological when the transfusion is small (Chown 1997). Increase in uterine activity during the third trimester could result in the transplacental passage of fetal cells into the maternal circulation (cited by Heise et al 1993).

**Objective:**

The study was conducted with the objective to find out the prevalence and to quantify the volume of FMH.

**Material and Methods**

500 subjects were selected from the outpatient Department of Obstetrics and Gynaecology of Sir Ganga Ram Hospital Lahore. The inclusive criterion was a healthy gravid female in the third trimester of pregnancy. 50 control samples
from fetal umbilical cord were drawn. A short history was taken and relevant clinical and physical examination was also done including body weight, blood pressure, pulse and body temperature. The laboratory investigations were hemoglobin percentage, blood groups, Kleihauer count and volume of FMH. For these investigations 5 ml of EDTA anticoagulated blood samples were used. Hemoglobin percentage was checked to correlate anemia with occurrence of FMH and blood grouping done to correlate Rhesus blood group positivity or negativity with FMH.

For the detection and quantification of FMH Kleihauer’s acid elution test was carried out. The basis of this test is that fetal hemoglobin resists acid elution to a greater extent than adult hemoglobin.

Kleihauer’s acid elution test is simple to perform and an economical test for calculating the volume of FMH. When the volume of FMH is known, appropriate dose of anti-D immunoglobulin can be calculated to be given to the Rh negative mother to prevent sensitization with Rh positive fetal red cells.

**Results**

500 subjects were included in the study (Table-I). Out of 500, 384 (76.8%) were multigravida (MG) and 116 (23.2%) were primigravida (PG).

**Table-1: Parity of the subjects.**

<table>
<thead>
<tr>
<th>Parity</th>
<th>No. of Subjects</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multigravida</td>
<td>384</td>
<td>76.8%</td>
</tr>
<tr>
<td>Primigravida</td>
<td>116</td>
<td>23.2%</td>
</tr>
<tr>
<td>Total</td>
<td>500</td>
<td>100%</td>
</tr>
</tbody>
</table>

For correlation of prevalence of FMH with parity and presence of risk factor, these were described as follows:

I) Multigravida:
   i) Multigravida without risk factors
   ii) Multigravida with risk factors

II) Primigravida:
   i) Primigravida without risk factors
   ii) Primigravida with risk factors

The risk factors were:
   i) Amniocentesis
   ii) Antepartum hemorrhage
   iii) Maternal trauma
   iv) Antenatal manipulations

Out of 384 MG, 83 (21.6%) were positive with risk factors and 301 (78.4%) were negative with risk factors. Out of the 83 subjects positive with RF, 7 (8.4%) were positive for FMH and 76 (91.6%) were negative for FMH (Table-III).

Out of the 301 MG without risk factors, 14 (4.6%) were positive for FMH and 287 (95.4%) were negative for FMH. So a total of 21 MG were positive with FMH and 363 were negative with FMH. On statistical analysis, the results were non-significant at $\chi^2 = 0.114, P>0.05$ NS.

Out of 116 PG, 8 (6.9%) were positive with risk factors and 108 (93.1%) were negative with risk factors. Out of the 8 subjects positive with RF, 03 (37.5%) were positive for FMH and 05 (62.5%) were negative for FMH.

Out of 108 PG with RF, 04 (3.7%) were positive for FMH and 104 (96.3%) were negative for FMH. On statistical analysis, the results were non-significant at $\chi^2 = 0.1037, P>0.05$ NS.

The findings in both MG and PG show that incidence of FMH is not related to the presence of risk factors. The overall incidence of FMH was 5.6% with MG 5.3% and PG 6.5%. The volume of FMH ranged from 0.2-2 ml (Table-IV).

**Discussion**

This was a prospective study which was designed to see the incidence and to quantify the volume of FMH. Certain risk factors were studied as well so as to see whether they aggravate FMH or not. The prevalence of FMH was 5.6% in the third trimester...
Table-3: Prevalence of FMH with parity.

<table>
<thead>
<tr>
<th>Multigravida</th>
<th>+ve for FMH</th>
<th>-ve for FMH</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. MG without risk factors</td>
<td>14</td>
<td>287</td>
<td>301</td>
</tr>
<tr>
<td>II: MG with risk factors</td>
<td>07</td>
<td>76</td>
<td>83</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>363</td>
<td>384</td>
</tr>
</tbody>
</table>

Primerigravida

| I. PG without risk factors | 04          | 104         | 108   |
| II: PG with risk factors   | 03          | 05          | 08    |
| Total                     | 07          | 109         | 116   |

χ² 0.1037 P > 0.05 NS

Keys: χ²- Chi square, P- Probability of chance, NS- Non-significant.

Table-4: Volume of FMH.

<table>
<thead>
<tr>
<th>Volume of FMH</th>
<th>No. of Cases</th>
<th>MG</th>
<th>PG</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2-0.4 ml</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>35.74</td>
</tr>
<tr>
<td>0.4-0.6 ml</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>17.85</td>
</tr>
<tr>
<td>0.6-0.8 ml</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>10.71</td>
</tr>
<tr>
<td>0.8-1.0 ml</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>14.28</td>
</tr>
<tr>
<td>1.0-1.2 ml</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>7.14</td>
</tr>
<tr>
<td>1.2-1.4 ml</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1.4-1.6 ml</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>7.14</td>
</tr>
<tr>
<td>1.6-1.8 ml</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>3.57</td>
</tr>
<tr>
<td>1.8-2.0 ml</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>3.57</td>
</tr>
</tbody>
</table>

of pregnancy. The results are consistent with the study of PG positive with the study by Bois et al which gives a prevalence of 2.2%. The study shows a slightly larger preponderance of PG positive with FMH. Barstch (1972) and Zipursky et al (1963) also conclude that incidence of FMH was greater in primigravida than in multigravida. The present study does not show a positive correlation of FMH with the presence of risk factors. This is consistent with other studies done by Sebring et al (1990), Lloyd et al (1980), Ness et al (1987), Reaner et al (1976), Shahar et al (1981) and Stedman et al (1987) (cited by Sebring et al 1990) who made a conclusion that a significant proportion of FMH cannot be predicted by obstetric risk factors. The risk factors were amniocentesis, antepartum hemorrhage, preeclampsia, maternal trauma and antenatal manipulations. In the study 7 subjects with polyhydramnios had undergone amniocentesis, out of them 2 cases (28.5%) were positive with FMH. 5 subjects had a history of preeclampsia and 1 (20%) was positive with FMH. 45 subjects had antenatal manipulations and 4 (8.8%) were positive with FMH. A total of 6 subjects in the study had maternal trauma and 2 subjects (33.3%) were positive with FMH.

Conclusion

The conclusions made from the study were: the overall prevalence of FMH is 5.6%, with MG 5.3% and PG 6.5% and the volume of FMH was in the range of 0.2-2 ml.
References


Answer Picture Quiz

Correct answer is b - Sins rhythm (sinus tachycardia), complete heart block with ventricular escape. Often it can be difficult to discern if the escape pattern is junctional versus ventricular. One way of answering this is via an electrophysiological studies (EP) study. However in this patient the ventricular rate is too slow to be coming anywhere above the HIS bundle and qrs duration is also slightly prolonged. EP study in this person showed appropriately functioning sinus node with normal SNRT with CHB. Escape was from below the HIS bundle thus confirming Infra-Hisian origin of the ventricular escape.