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## Original Research Article

# Study of obstetric and fetal outcomes associated with maternal perception of decreased fetal movements in third trimester

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## ABSTRACT

**Background:** Prevalence of decreased fetal movement in third trimester has been reported as 4-15% in various studies. Association between maternal perception of decreased fetal movement and poor perinatal outcome like fetal growth restriction, oligohydramnios, fetal distress, preterm births, fetal congenital anomalies, and stillbirth are revealed in different studies. However, decreased fetal movements may sometimes cause unnecessary anxiety to pregnant women or clinicians leading to unnecessary interventions. Keeping this background, we planned to assess the significance of decreased fetal movement perception in third trimester of pregnancy and its correlation with the perinatal outcome.

**Methods:** A prospective observational study was carried out at a tertiary health care center B. J. Government Medical College, Pune for a period of 12 months (October 2021-October 2022). Study included 150 mothers with decreased fetal movement in the third trimester. These mothers were monitored till delivery by Repeat fetal movement count, cardiotocography (CTG), ultrasonography (USG), biophysical profile (BPP) and Doppler studies. Mothers were investigated for identification of ante-natal risk factors and their mode of delivery was noted. APGAR score of neonates at birth, birth weight and requirement of neonatal intensive care unit (NICU) admissions were also noted.

**Results:** Study observed that most of these females were primi-mothers belonging to lower socio-economic class. Oligohydramnios, obesity, gestational diabetes and anemia were observed as common risk factors. Emergency caesarean section was required in one out of five cases while one fourth of these mothers delivered pre-term. Most common neonatal complication observed was intra-uterine growth restriction. Mortality rate was 2%.

**Conclusions:** We thus conclude that mothers with reduced fetal movements are a risk group and should be referred immediately. Overall outcome was good in these babies, when given optimum institutional care.

**Keywords:** Decreased fetal movements, Perinatal mortality, BPP

## INTRODUCTION

Maternal perception of fetal movement is reassuring for a pregnant women as fetal movements are considered as a sign of fetal life and well-being.<sup>1</sup> Maternal perceptions of fetal movements are the result of pressure against abdominal wall due to gross fetal movement or limb movement.<sup>2</sup> Monitoring fetal movements is a useful tool to assess fetal well-being.<sup>1</sup>

Sensation of decreased fetal movement (DFM) is a common reason for concern in mothers and is a common

reason for unscheduled antenatal visits. Prevalence of DFM perception in third trimester has been reported as 4-15% in various studies.<sup>1,3,4</sup>

Association between maternal perception of DFM and poor perinatal outcome like fetal growth restriction, oligohydramnios, fetal distress, preterm births, fetal congenital anomalies, and stillbirth are revealed in different studies.<sup>5-7</sup> Besides fetal factor, perception of fetal movements can be affected by position of placenta (common in anterior), administration of corticosteroids in antenatal period, cigarette smoking, alcohol intake, use of

sedative drugs, increased maternal blood sugar, even maternal position, activity.<sup>8</sup> It is also found that inadequate measures taken by the obstetrician to the complaints of DFMs may be a contributor to stillbirth.<sup>9</sup> Fetal movement counting may allow the clinician to make appropriate intervention in the right time to improve perinatal outcome. After 28 weeks of gestation, it is treating obstetrician's responsibility to sensitize the pregnant woman regarding importance of counting fetal movement, as it allows early identification, timely evaluation and intervention for fetuses at risk of adverse outcomes. However, fetal movement count may sometimes cause unnecessary anxiety to pregnant women or elicit unnecessary intervention. A recent Cochrane Review in 2015, concludes that there is insufficient evidence to influence practice.<sup>10</sup>

Keeping this background, we planned to assess the significance of DFM perception in the third trimester of pregnancy and its correlation with the perinatal outcome. Mothers with DFM in the third trimester were included in the study and monitored till delivery by repeat fetal movement count, cardiotocography (CTG), ultrasonography (USG), biophysical profile (BPP) and Doppler studies. Mothers were investigated for identification of ante-natal risk factors and their mode of delivery was noted. APGAR score of neonates at birth, birth weight and requirement of NICU admissions were also noted.

### **Aims and objectives**

The primary objective of this study was to identify the mothers with DFM and to investigate them for the fetal well-being, to identify the antenatal risk factors related to DFM and to observe the perinatal outcome of these pregnancies.

## **METHODS**

### **Study design, location and duration**

A prospective observational study was carried out at a tertiary health care centre B. J. Government Medical College, Pune for a period of 12 months (October 2021 to October 2022).

### **Inclusion criteria**

The inclusion criteria were women giving consent to participate and ready for a follow-up, all pregnant women attending the antenatal OPD, wards, labor room of a tertiary healthcare center with a singleton pregnancy of 32<sup>nd</sup> – 40<sup>th</sup> weeks of gestation not in labor with perception of DFMs.

### **Exclusion criteria**

Women excluded from the study were those not ready to participate and not ready for a follow-up, diagnosed IUFD,

gross congenital anomaly, multifetal pregnancy, preconception irregular menstrual cycle, and gestational age beyond the said period and women with known history of psychiatric illness.

### **Methodology**

A total of 150 antenatal patients in antenatal OPD and wards and labor room in tertiary health care centre presenting with complaints of DFMs, fulfilling the inclusion and exclusion criteria were selected for the study. All cases were interviewed using a pre-structured interview schedule, thoroughly examined and investigated at regular intervals and were followed up till postnatal period to study the antenatal, intra-natal, post-delivery medical and obstetric complications, surgical problems encountered during this period and also the fetal outcome.

During data collection, medical conditions and medications taken at the time of booking were recorded. Demographic data (example age and marital status), pregnancy related characteristics (example parity and gestational age) and perinatal risk factors were noted. Antenatal presentation was examined along with recording blood pressure, BPP and NST results. Maternal perception of fetal movement was recorded during BPP. In the USG we looked for placental location/abruption. Finally, deliveries were done as indicated by either DFM or poor BPP at the time of presentation. Mode of delivery was noted down. Among those who continue pregnancy, further episodes of DFM were recorded. Ultimately all perinatal outcome was recorded including those who delivered at 1<sup>st</sup> presentation, as well as those who continued pregnancy and delivered at a later gestational age. Poor perinatal outcome was defined as one or all of the following i.e. poor APGAR, need for resuscitation, neonatal acidosis, perinatal asphyxia requiring intervention, and NICU admissions.

### **Statistical analysis**

All the data was noted down in a pre-designed study proforma. Qualitative data was represented in the form of frequency and percentage. Association between qualitative variables was assessed by Chi-square test with continuity correction for all 2×2 tables and Fisher's exact test for all 2×2 tables. Quantitative data was represented using mean±SD. Analysis of quantitative data between the two groups was done using unpaired t-test if data passed 'normality test' and by Mann-Whitney test if data failed 'normality test'. A p value <0.05 was taken as level of significance. Results were graphically represented where deemed necessary. Statistical package for the social sciences (SPSS) version 26.0 was used for most analysis and Microsoft excel 2021 for graphical representation.

## **RESULTS**

Mean age of the mothers in the study was 25.83 years with 70.7% in age group of 21 to 30 years and 17.3% above 30

years of age. Most of the females belonged to lower socioeconomic class (85.4%). Out of the total 150 females with DFMs, 73.3% were primi-para while 26.7% were multiparous. A total of 19.3% mothers presented with DFMs before 34 weeks while 71.3% and 9.3% presented between 34 to 36 and >36 weeks of gestation. Most common observed risk factors for DFMs in present study were oligohydramnios (22.7%), obesity (18.7%), GDM and anaemia (16.7% each). History of still birth was given by 13.3% cases while hypothyroidism and polyhydramnios were seen in 12.7% and 9.3% cases respectively. Only 24% mothers knew about the Cardiff ten count/DFMC. In majority of the mothers (88.7%), only a single episode of DFM was observed while in 11.3% cases, two episodes were observed. On admission, NST was non-reactive in 26.7% cases. On biophysical profile, a score of 8 or 10 was seen in 92% cases while the score was lower in 8% cases. In over half of the cases (54.7%), placenta was anteriorly located while in 22% cases each it was located posteriorly and fundally, low lying being 2%. Normal doppler findings at the time of labour was seen in 74.7% cases while high resistance in uterine artery flow was seen in 10.7% cases. Umbilical artery showed abnormal doppler in 6%, absent end diastolic flow in 3.3% and reversal of end diastolic flow in 4% cases. Reversal of a-wave in ductus venosus was seen in 1.3% cases. On CTG assessment during labour, abnormal results were seen in 19.3% cases. Induction of labour was required in 38.7% cases. Vaginal delivery was seen in 72% cases while elective and emergency caesarean was done in 10% and 18% cases respectively.

A total of 24.7% babies delivered pre-term while 75.3% babies delivered at term. APGAR score of  $\leq 4$  and 5 to 7 was seen in 3.3% and 9.3% babies respectively, while it was more than 7 in remaining 87.3% cases. Incidence of low birth weight was observed in 40.7% cases while IUGR and SGA were seen in 13.3% and 7.3% cases. A total of 16% babies required NICU admission while mortality rate among babies with DFM was seen as 2%.

Mean age of the mothers in the study was 25.83 years with 70.7% in age group of 21 to 30 years and 17.3% above 30 years of age (Table 1).

**Table 1: Distribution of cases as per age of mothers.**

| Age group (years) | N                | %            |
|-------------------|------------------|--------------|
| $\leq 20$         | 18               | 12.0         |
| 21-25             | 60               | 40.0         |
| 36-30             | 46               | 30.7         |
| >30               | 26               | 17.3         |
| <b>Total</b>      | <b>150</b>       | <b>100.0</b> |
| <b>Mean age</b>   | 25.83 $\pm$ 5.21 |              |

In majority of the mothers (88.7%), only a single episode of DFM was observed while in 11.3% cases, two episodes were observed (Table 3).

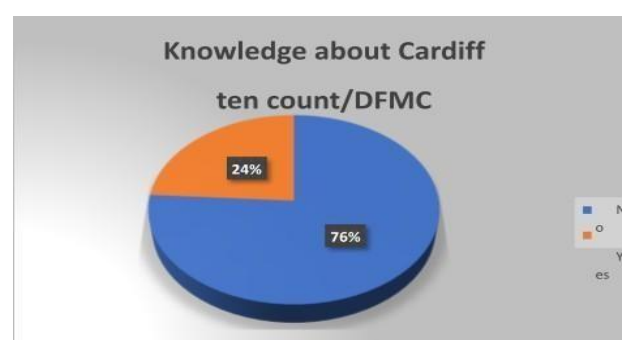
**Table 2: Distribution of cases as per risk factors.**

| Risk factors                      | N  | %    |
|-----------------------------------|----|------|
| <b>Oligohydramnios</b>            | 34 | 22.7 |
| <b>Obesity</b>                    | 28 | 18.7 |
| <b>GDM</b>                        | 25 | 16.7 |
| <b>Anemia</b>                     | 25 | 16.7 |
| <b>History of still birth</b>     | 20 | 13.3 |
| <b>Hypothyroidism</b>             | 19 | 12.7 |
| <b>Polyhydramnios</b>             | 14 | 9.3  |
| <b>Prev. LSCS</b>                 | 14 | 9.3  |
| <b>Pre-eclampsia</b>              | 9  | 6.0  |
| <b>PPROM</b>                      | 5  | 3.3  |
| <b>Malpresentation</b>            | 4  | 2.7  |
| <b>Hyperthyroidism</b>            | 3  | 2.0  |
| <b>Placental abruption/previa</b> | 3  | 2.0  |
| <b>CPD</b>                        | 1  | 0.7  |
| <b>Pulmonary TB</b>               | 1  | 0.7  |
| <b>SLE</b>                        | 1  | 0.7  |

**Table 3: Distribution of cases as per episodes of decreased fetal movements.**

| Episodes of DFM | N          | %            |
|-----------------|------------|--------------|
| <b>One</b>      | 133        | 88.7         |
| <b>Two</b>      | 17         | 11.3         |
| <b>Total</b>    | <b>150</b> | <b>100.0</b> |

Only 24% mothers knew about the Cardiff ten count/DFMC (Figure 1).



**Figure 1: Distribution of cases as per knowledge of Cardiff ten count/ (daily fetal movement count) DFMC.**

On admission, NST was non-reactive in 26.7% cases (Table 4).

**Table 4: Distribution of cases as per NST findings at admission.**

| NST on admission    | N          | %            |
|---------------------|------------|--------------|
| <b>Reactive</b>     | 110        | 73.3         |
| <b>Non-reactive</b> | 40         | 26.7         |
| <b>Total</b>        | <b>150</b> | <b>100.0</b> |

On doing biophysical profile, it was found out that a score of 8 or 10 was seen in 92% cases while the score was lower in 8% cases (Table 5).

**Table 5: Distribution of cases as per biophysical profile.**

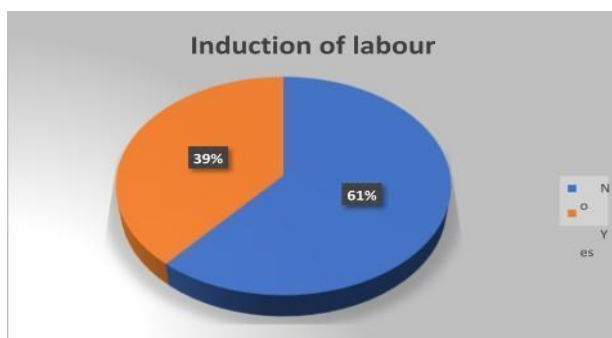
| BPP          | N          | %            |
|--------------|------------|--------------|
| 4            | 2          | 1.3          |
| 6            | 10         | 6.7          |
| 8            | 34         | 22.7         |
| 10           | 104        | 69.3         |
| <b>Total</b> | <b>150</b> | <b>100.0</b> |

Normal doppler findings at the time of labour was seen in 74.7% cases while high resistance in uterine artery flow was seen in 10.7% cases. Umbilical artery showed abnormal doppler in 6%, absent end diastolic flow in 3.3% and reversal of end diastolic flow in 4% cases. Reversal of a-wave in ductus venosus was seen in 1.3% cases (Table 6).

**Table 6: Distribution of cases as per doppler study findings.**

| Doppler study                                   | N          | %            |
|-------------------------------------------------|------------|--------------|
| High resistance in uterine artery               | 16         | 10.7         |
| Umbilical artery abnormal doppler               | 9          | 6.0          |
| Umbilical artery absent end diastolic flow      | 5          | 3.3          |
| Umbilical artery reversal of end diastolic flow | 6          | 4.0          |
| Reversal of A wave in ductus venosus            | 2          | 1.3          |
| Normal                                          | 112        | 74.7         |
| <b>Total</b>                                    | <b>150</b> | <b>100.0</b> |

Induction of labour was required in 38.7% cases (Figure 2).



**Figure 2: Distribution of cases as per of requirement of induction of labour.**

Vaginal delivery was seen in 72% cases while elective and emergency caesarean was done in 10% and 18% cases respectively (Table 7).

**Table 7: Distribution of cases as per of mode of delivery.**

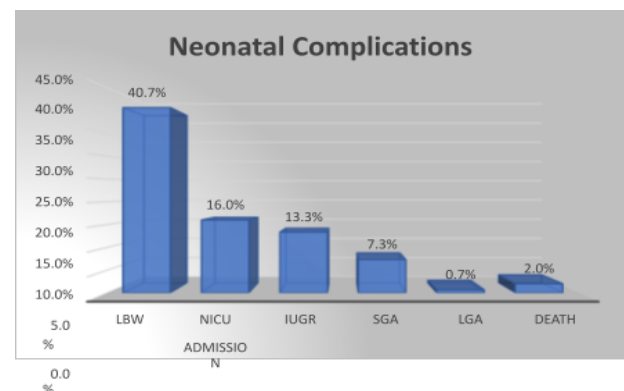
| Mode of delivery | N          | %            |
|------------------|------------|--------------|
| Vaginal          | 108        | 72.0         |
| Emergency LSCS   | 27         | 18.0         |
| Elective LSCS    | 15         | 10.0         |
| <b>Total</b>     | <b>150</b> | <b>100.0</b> |

APGAR score of  $\leq 4$  and 5 to 7 was seen in 3.3% and 9.3% babies respectively, while it was more than 7 in remaining 87.3% cases (Table 8).

**Table 8: Distribution of cases as per APGAR score.**

| APGAR at 5 min | N          | %            |
|----------------|------------|--------------|
| $\leq 4$       | 5          | 3.3          |
| 5 to 7         | 14         | 9.3          |
| 8 to 10        | 131        | 87.3         |
| <b>Total</b>   | <b>150</b> | <b>100.0</b> |

Incidence of low birth weight was observed in 40.7% cases while IUGR and SGA were seen in 13.3% and 7.3% cases. A total of 16% babies required NICU admission while mortality rate among babies with decreased fetal movement was seen as 2% (Figure 3).



**Figure 3: Distribution of cases as per neonatal complications.**

## DISCUSSION

### Baseline data

Mean age of the mothers in the study was 25.83 years with 70.7% in age group of 21 to 30 years and 17.3% above 30 years of age. Most of the females belonged to lower socio-economic class (85.4%). Out of the total 150 females with DFMs, 73.3% were primi-para while 26.7% were multiparous. A total of 19.3% mothers presented with DFMs before 34 weeks while 71.3% and 9.3% presented between 34 to 36 and  $>36$  weeks of gestation.

Sheikh et al observed mean maternal age as  $28.5 \pm 5.1$  years and gestational age as  $31.5 \pm 5.3$  weeks.<sup>11</sup> A total of 60%

cases were primi-para and most of them belonged to lower socio- economic class. Nandi et al observed 73% cases between 21 to 30 years with mean age as 24.3 years and 80% primiparous mothers.<sup>12</sup>

### **Risk factors**

Most common observed risk factors for decreased fetal movements in present study were oligohydramnios (22.7%), obesity (18.7%), GDM and anemia (16.7% each). History of still birth was given by 13.3% cases while hypothyroidism and polyhydramnios were seen in 12.7% and 9.3% cases respectively.

Sheikh et al observed the risk factors as diabetes (4.9%) and poly- and oligohydramnios (3.9%), Nandi et al observed 48.75% women from study group had at least one antenatal risk factor, in comparison to 33.75% women from control group.<sup>11,12</sup> Fifteen women from the study group (18.75%) had multiple antenatal risk factors, whereas in control group only 3 (3.75%) mothers had multiple risk factors which is statistically significant ( $p$  value=0.0026). They reported oligohydramnios and anaemia as the most common risk factors among the study group. Turner et al observed diabetes (14% versus 3%) and history of still birth (2.1% versus 1.2%) as the significant factors associated with DFM.<sup>13</sup>

### **Clinical evaluation**

On admission, NST was non-reactive in 26.7% cases. On biophysical profile, a score of 8 or 10 was seen in 92% cases while the score was lower in 8% cases. Normal doppler findings at the time of labour was seen in 74.7% cases while high resistance in uterine artery flow was seen in 10.7% cases. Umbilical artery showed abnormal doppler in 6%, absent end diastolic flow in 3.3% and reversal of end diastolic flow in 4% cases. Reversal of a-wave in ductus venosus was seen in 1.3% cases. On CT assessment during labour, abnormal results were seen in 19.3% cases. We observed that in over half of the cases (54.7%), placenta was anteriorly located while in 23.3% and 22% cases, it was either posteriorly and fundal.

Studies with conflicting results have assessed the associations of the placental site and the perception of DFM. a British study of 182 patients reported an association of DFM with an anterior placenta.<sup>14</sup> In another study of 284 women, an anterior placenta was associated with a reduced perception of fetal movements only in some gestational ages and not throughout the entire pregnancy. Sheikh et al observed 55.9% cases with anterior placenta and 33.2% with posterior placenta.<sup>11</sup> Nandi et al observed that 62% women with decreased fetal movements had anteriorly placed placenta.<sup>12</sup>

### **Mode of delivery**

Vaginal delivery was seen in 72% cases while elective and emergency caesarean was done in 10% and 18% cases

respectively. Induction of labour was required in 38.7% cases.

Turner et al study observed that DFM was associated with lower odds of spontaneous vaginal birth (aOR, 0.83; 95% CI, 0.77-0.89;  $p<0.001$ ) and higher odds of emergency caesarean delivery (aOR, 1.18; 95% CI, 1.09-1.28;  $p<0.001$ ).<sup>13</sup> They observed 49% vaginal deliveries and 19.6% emergency caesarean sections. Awad et al observed that women with DFM have a higher risk of caesarean delivery due to fetal heart rate abnormalities.<sup>15</sup>

Nandi et al observed 20% cases of emergency C-section in their study. Induction of labor was required in 42.8% cases.<sup>12</sup> Bellussi et al in a systemic review observed a weak but significant increase in induction of labor (36.6% versus 31.6%; RR 1.15, 95% CI 1.09–1.22), and caesarean delivery (28.2% versus 25.3%; RR 1.11, 95% CI 1.10–1.12) in DFM group as compared to controls.<sup>16</sup>

### **Neonatal outcome**

A total of 24.7% babies delivered pre-term while 75.3% babies delivered at term. APGAR score of  $\leq 4$  and 5 to 7 was seen in 3.3% and 9.3% babies respectively, while it was more than 7 in remaining 87.3% cases. Incidence of low birth weight was observed in 40.7% cases while IUGR and SGA were seen in 13.3% and 7.3% cases. A total of 16% babies required NICU admission while mortality rate among babies with DFM was seen as 2%. No association was observed between the anterior location of placenta with any of the neonatal complications ( $p>0.05$ ).

Nandi et al observed low APGAR ( $<7$ ) in 8.75% cases while incidence of low birth weight was 21.2% and 18% required NICU admission.<sup>12</sup> No mortality was observed in any case in this study among the 80 cases observed. In a case control study from England, DFM was associated with an increased risk of stillbirth (adjusted odds ratio [aOR] 4.51, 95% CI 2.38-8.55), whereas increasing strength of fetal movements was associated with a decreased risk of stillbirth (aOR 0.14, 95% CI 0.08-0.24).<sup>17</sup> Bellussi et al in a systemic review observed incidence of perinatal death as 0.54% in DFM group.<sup>16</sup> There were weak but significant increases in preterm delivery in DFM versus controls (7.6% versus 7.1%; RR 1.07, 95% CI 1.05–1.10). Turner et al study observed the incidence of pre-term birth as 23%.<sup>13</sup> Incidence of SGA and neonatal mortality was 9.7% and 0.2%. Requirement of NICU admission was 8.8%. Study observed no association between reduced fetal movements in third term and poor perinatal outcome

### **CONCLUSION**

Present study aimed to evaluate the maternal characteristics, risk factors and neonatal outcome of women with reduced fetal movements in third trimester. Study observed that most of these females were primiparous mothers belonging to lower socio-economic class.



Oligohydramnios, obesity, gestational diabetes and anemia were observed as common risk factors. Emergency caesarean section was required in one out of five cases while one fourth of these mothers delivered pre-term. Most common neonatal complication observed was intra-uterine growth restriction. Mortality rate was 2%. We thus conclude that mothers with reduced fetal movements are a risk group and should be referred immediately. Overall outcome was good in these babies, when given optimum institutional care.

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