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CORRELATION BETWEEN MATERNAL PERCEPTION OF REDUCED FOETAL MOVEMENTS WITH CARDIOTOCOGRAPHIC INTERPRETATION AND PERINATAL OUTCOME – A CROSS-SECTIONAL STUDY.

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ABSTRACT

Introduction: In a patient presenting with reduced fetal movements (RFM), there is an increased risk of stillbirth and intrauterine growth restriction. The reduction of adverse perinatal outcomes may be achieved by cardiotocographic (CTG) monitoring and immediate intervention.

Aim: The aim is to detect the factors of poor perinatal outcome after maternal perception of RFM and to analyse the effectiveness of antenatal CTG monitoring to achieve better outcomes for mothers and babies in the perinatal period.

Materials and methods: A cross-sectional study was conducted for eighteen calendar months in the Department of Obstetrics and Gynaecology, Medical College and hospital, Kolkata, among 280 antenatal patients who came with a perception of RFM. Study participants were divided into two groups, control group N (n=140) without reduced fetal movements and study group R (n=140) with reduced fetal movements by using a purposive sampling technique. CTG monitoring was done in patients with RFM. The outcome was measured and compared with the control group.

Results: Adverse perinatal outcomes were successfully reduced, with a mean pathological CTG value of 0.09 in the study group, compared to 0.02 in the control group (p = 0.009). There was a significantly higher induction of labour (IOL) in women of reduced fetal movement (p=0.0053). Patients with pathological CTG underwent immediate caesarean section, with a significantly higher rate of 16% in the study group in comparison to 6% in the control group.

Conclusion: CTG monitoring in patients with RFM effectively reduced and controlled adverse perinatal outcomes with immediate intervention by caesarean section and by vaginal and assisted vaginal delivery.

Keywords: RFM, CTG, Antepartum fetal monitoring.

INTRODUCTION

Maternal perception of reduced fetal movements (RFM) in pregnancy is one of the common reasons for patients to self-referral to the hospital/ healthcare system and assessment by healthcare providers in pregnancy [1]. Maternal perception of RFM is associated with an increased risk of stillbirth/ intrauterine fetal death (IUFD) and intrauterine growth restriction (IUGR) [2]. RFM mostly occurs due to placental insufficiency, and in such cases, it is thought to represent the fetal compensation of conserving energy because of insufficient oxygen and nutrient transfer. Fetal movement counting is essential for the long-standing assessment of fetal wellbeing [3]. There is no such evidence that any formal definition of RFM is of greater value than the subjective maternal perception in the detection of fetal compromise. It has been suggested that a gradual decline in fetal movements during the third trimester is due to improved fetal coordination and increased fetal size, along with reduced amniotic fluid volume. About 11- 29% of women presenting with RFM carry a small for gestational age (SGA) fetus below the 10th centile [4]. The variation in maternal perception may be related to

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gestational age, fetal sleep, amount of amniotic fluid volume, sedatives, anterior placenta, congenital malformations, etc. [5].

The goal of the antepartum fetal surveillance is to predict, diagnose and provide timely intervention of pregnancies that are complicated by fetal asphyxia, which leads to fetal and newborn morbidity and death [6]. Electronic foetal monitoring by CTG, obstetrical intervention at the right time and optimum care of newborn can reduce associated adversities and improve foetal outcome [7]. Though CTG can be continued as a good screening test of fetal surveillance but it is not the sole criterion to influence the management of high-risk pregnancies. CTG should be supplemented with other test-like a biophysical profile and fetal scalp pH, before intervention [8].

We aim to identify the predictors of poor perinatal outcome after maternal perception of RFM and to assess the effectiveness of antenatal CTG in improving outcomes for mothers and babies in the perinatal period.

METHODOLOGY:

A hospital-based cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Medical College and Hospital, Kolkata, for 18 calendar months after obtaining permission from the Institutional Ethical Committee, among antenatal patients attending in antenatal outpatient department (OPD) and emergency room (ER); and getting admitted to the labour room. The sample size consisted of 280 participants, divided into two groups: a control group (N = 140) without reduced fetal movements and a study group (R = 140) with reduced fetal movements. Sample size was calculated according to the sample size calculator (for quantitative data), and participants were selected by using a purposive sampling technique.

Inclusion criteria: Singleton pregnancy with age 19-35 years, first   presentation with maternal perception of reduced fetal movements, gestational age: more than 34 weeks of gestation, able to give written informed consent, provided urgent delivery not required, patients with available clinical details like maternal demographics, past obstetric and medical history and duration of reduced fetal movements.

Exclusion criteria: Antenatal patients with RFM with multiple pregnancy, fetuses with structural anomaly, heart disease, severe pre-eclampsia, eclampsia, severe oligohydramnios, patients in labour, unable to give written informed consent, and first contact with the maternity service were excluded from the study.

Method of Data Collection:

A detailed history elicited whether that was the first occasion she perceived RFM, any previous episodes, duration of RFM, clinical assessment done, including height, weight, BMI, blood pressure, pulse rate, urinalysis for proteinuria, abdominal palpation was done and measurement of Symphysio-fundal height recorded. Auscultation of FHS and rate was recorded. Patients were placed in the left lateral position, oxygen inhalation was given, proper hydration done. The CTG tracing was done for all the patients over a period of 40 minutes. Two groups were compared with demographic parameters, including duration of reduced fetal movements, number of fetal movements perceived in the last 12 hours, induction of labor (done or not), mode of delivery, gestational age at delivery in weeks, birth weight of the babies in grams, features of asphyxia at birth, nicu admission of babies. CTG tracing was classified as normal, suspicious and pathological according to NICE guidelines. Features monitored include baseline fetal heart rate (bpm), variability (bpm), decelerations and accelerations interpreted as reassuring, non-reassuring and abnormal.

Statistical analysis: Collected data were analysed for sensitivity, specificity, positive predictive value, negative predictive value and p value with statistical software InStat. Chi-square tests were used for categorical data, and Student's t-test was used for continuous data. Statistical significance in all evaluations was defined as $P<0.05$.

RESULTS

Initially, 200 patients with RFM were assessed for eligibility. 50 patients refused and did not meet the inclusion criteria. 10 opted out of the study. Finally, 140 patients with RFM were taken up for study. About 140 patients without RFM who met the inclusion criteria were included. There were no refusals after the start of the study. So, data from 280 patients were divided into two were available for analysis: with RFM group R (n=140) and without RFM group N (n=140). All 280 patients underwent CTG tracing. Observations were tabulated in an Excel sheet and analysed. Continuous data was expressed as mean ± SEM. Statistical tests were considered significant when the p-value <0.05.

Table 1: Distribution of study participants according to demographic parameters and gestational age at delivery of both groups.

Parameters (Mean ± SEM)	Group N (n=140)	Group R (n=140)	p-value
Age in years	25.18±0.15	25.17±0.27	0.981 (NS)
BMI (Kg/m^2)	22.05±0.11	22.18±0.17	0.515 (NS)
Gravidity	1.29±0.03	1.34±0.04	0.407 (NS)

Parity	0.29±0.03	0.34±0.04	0.407 (NS)
Gestational age in weeks	36.45±0.07	36.25±0.08	0.099 (NS)
Gestational age at delivery in weeks	38.30±0.05	38.20±0.08	0.303 (NS)

Table 1 shows the mean age, BMI, gravidity, parity, and gestational age for group N without RFM and that of group R with RFM are statistically not significant. The mean gestational age at delivery for group N was 38.30 with SEM of 0.05, and that of group R was 38.20 with SEM of 0.08 and p value 0.303, which is also statistically not significant.

Table 2: Distribution of Cardiotocographic interpretations, presence of birth asphyxia and NICU admission after birth of both groups N (without RFM) and group R with RFM.

Parameters (Mean ± SEM)	Group N (n=140)	Group R (n=140)	p-value
Number of fetal movements perceived in last 12 hours	9.35±0.08	7.06±0.17	0.0001 (S)
Normal CTG	0.94±0.01	0.76±0.03	0.0001 (S)
Suspicious CTG	0.03±0.01	0.14±0.02	0.001 (S)
Pathological CTG	0.02±0.01	0.09±0.02	0.009 (S)
Birth weight in grams	2659.75±8.37	2611.52±21.56	0.038 (S)
Features of birth asphyxia	0.02±0.01	0.12±0.02	0.0006 (S)
NICU admission	0.02±0.01	0.12±0.02	0.0006 (S)

Table 2 shows the mean normal CTG for group N was 0.94 with SEM of 0.01 and that of group R was 0.76 with SEM of 0.03 and p value 0.0001 which is statistically significant. The mean suspicious CTG for group N was 0.03 with SEM of 0.01 and that of group R was 0.14 with SEM of 0.02 and p value 0.001 which is statistically significant. The mean pathological CTG for group N was 0.02 with SEM of 0.01 and that of group R was 0.09 with SEM of 0.02 and p value 0.009 which is statistically significant. The mean features of birth asphyxia and NICU admission for group N was 0.02 and 0.02 with SEM of 0.01 and 0.01 and that of group R was 0.12 and 0.12 with SEM of 0.02 and 0.02 and p value of 0.0006 and 0.0006 which are again statistically significant. The mean number of fetal movements perceived in last 12 hours by group N was 9.35 with SEM of 0.08 and that for group R was 7.06 with SEM of 0.17 and p value of 0.0001 which is statistically significant. The mean birth weight of group N was 2659.75 with SEM of 8.37 and that for group R was 2611.52 with SEM of 21.56 and p value 0.038 which is statistically significant.

Table 3: Distribution of Induction of labour done and Mode of delivery among group N without RFM and group R with RFM.

Parameters	Group N (n=140)	Group R (n=140)
Induction of labor done	4 (2.8%)	17 (12.1%)
Induction of labor not done	136 (97.2%)	123 (87.85%)
Vaginal delivery	129 (92%)	110 (79%)
Assisted vaginal delivery	3 (2%)	7 (5%)
Caesarean section	8 (6%)	23 (16%)

Table 3 shows the percentage of induction of labor done in group N was 2.8% and in group R was 12.1% and the two sided p value 0.0053 which is statistically significant. The relative risk (RR) was 0.3627. 95% confidence interval (CI) was 0.1490 to 0.8829. The VD, AVD, CS delivery in group N was 92%, 2%, 6% and that of group R was 79%, 5%, 16% and the two sided p value 0.0069 which is statistically very significant. The RR was 2.054. 95% CI was 1.118 to 3.775.

DISCUSSION
In this study, we examined women who presented with reduced fetal movements (Group R) and followed up with these patients to note their subsequent perinatal outcomes. We have observed an equal number of patients without the complaint of reduced fetal movements in group N (control) and compared their perinatal outcomes.
The demographic parameters (age, BMI, gravidity, parity and gestational age) of our study were comparable between the two study groups. In the current study, 95% of the study population fell within the 20-29 years age group, and 5% had an

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age above 30 years in both study groups. The mean age was 25.17 ± 0.27 years. Similarly, Kumari et al. [7] and Khatun et al. [8] had 65% women in the age group 20-29 years and 20% women above 30 years in their study.

In the present study, half of the cases were presented at term pregnancy. Three-fifths of the study population were primigravida, and two-fifths were 2nd and 3rd-gravida. Nahar et al. [9] had a study population of all multigravida having various types of previous obstetric history. On the other hand, Kumari et al. [7], observed that 42% were nullipara, followed by 37% with parity 2-5 and 20% grand multiparous (parity >5). The demographic parameters (age, BMI, gravidity, parity and gestational age) of our study participants were comparable between the two study groups.

This study confirms that the maternal perception of RFM has been associated with increased incidence of pregnancy complications such as small for gestational age (SGA) babies, fetal growth restriction (FGR) and fetal hypoxia, which are consistent with other studies [10]. O Sullivan et al. [11] in 2009 have reported that there are no agreed-upon guidelines available concerning the number and frequency of perceived movements needed for either fetal health assurance or management options when a pregnant woman complains of reduced fetal movements.

We found that the control group N (without RFM) had significantly high rate of vaginal deliveries (92%) compared to that of study group (79%) and we have demonstrated that patients with RFM had a higher rates induction of labour (IOL), cesarean section (CS) rates, and the subsequent delivery rate of our hospital with complaint of RFM were up to 70% after the admission and neonatal admission rates also high when compared to non RFM counterparts. This finding is consistent with McCarthy, Claire M et al. [12] who have found higher rates of operative delivery and increased incidence of induction of labour in patients with reduced fetal movements. Kumari et al. [7] have found 60% vaginal deliveries and 40% caesarean deliveries in their study. There is a significant difference in IOL (induction of labor) rates, caesarean section rates and NICU admission rates between the RFM and the non-RFM group, which is in contrast to other studies [13,14]. This study highlights the need for both the local and national guidelines on the topic of reduced fetal movements, to reduce the disparity of the evaluation and management practices in accordance with studies conducted by Smith V et al. [15].

We found that CTG in antenatal mothers significantly improved the perinatal outcomes and reduced the perinatal morbidity and mortality. We observed that group R (study) had a significantly greater number of non-reassuring CTGs compared to group N (control). Chakraborty et al. [16] have found two-thirds of their study population with reactive CTG and one-third with non-reactive type. Kumari et al.[7] have found that 33% of patients had non-reactive CTG, and the remaining had reactive CTG. The result of this study indicated that CTG is beneficial in the screening of both low-risk and at-risk pregnancies. It is evident from this study that CTG is a valid tool in the setting of RFM, and early delivery is needed, as an abnormal CTG might be associated with poor outcomes [17].

We found that the incidence of birth asphyxia was in 12% of cases, which was significantly higher in non-reassuring CTG, and immediate resuscitation was needed in 20% of cases. 12% of babies needed admission to the NICU. 20% of babies were found to be LBW (low birth weight). 2% of babies were born preterm. The control group had lower percentages of all the above-mentioned parameters when compared to the group with reduced fetal movements. Chakraborty et al.[16] have shown low birth weight in 17% of cases. Kumari et al. [7] have observed low birth weight in 40% of cases and birth asphyxia in 1.3% of cases.

Limitation:
Because this is a simple cross-sectional study, there are some limitations also present in this study; it was not possible for us to access the full information from our control group, limiting the comparison of data. Finally, as there are no proper guidelines available regarding the assessment and the management of reduced fetal movements, investigations and management decisions are based upon individual experience rather than the protocols. A more comprehensive strategy is needed to predict which pregnancies are most at risk of stillbirth after maternal perception of reduced fetal movements, as a single CTG interpretation can give false reassurance, which may increase perinatal mortality in low-risk populations.

CONCLUSION
Maternal perception of RFM and its complications is associated with and related to a lot of factors. Poor perinatal outcome after perception of RFM can be decreased by CTG monitoring along with timely obstetrical intervention, which in turn leads to improved fetal outcome. Abnormal CTG findings showed a significant relationship with birth asphyxia and admission to the neonatal unit. So, it is concluded that CTG can be the first investigation for both antepartum and intrapartum fetal assessment.

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