

# Perinatal outcome of women presenting with reduced fetal movements

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## Abstract

**Background and objectives:** Reduced fetal movement is a reason for concern in both mothers and clinicians. The objective of this study was to assess the pregnancy characteristics and perinatal outcomes in women with decreased fetal movements.

**Methods:** A case-control study was conducted on 489 pregnant women in Maternity Teaching Hospital, Erbil city from October 2021 to December 2022. They were assigned into two groups, cases consisting of 244 women with a perception of reduced fetal movements and a control group including 245 women with good fetal movements. perinatal outcome was compared between the two groups.

**Results:** The majority (59.5%) of the study participants were term pregnancies ( $\geq 37$  weeks). Among women with RFM, 32.4% were nulliparous and 59% were multiparous comparing to control group (26.9% and 63.7%, respectively). A higher proportion of women with reduced fetal movements had gestational diabetes (34%), and preeclampsia (40.2%), compared to women of Group II with the rate of 15.5% and 21.2% respectively. The rate of cesarean section was significantly higher among cases than controls (45% vs. 24.9%, respectively). The rate of abnormal Doppler among Group I women was higher than in Group II women (26.2% versus 2.9%). Significantly higher rate of neonates in Group I had low APGAR score.

**Conclusions:** Perception of reduced fetal movements is a reason for woman to contact their healthcare providers. The poor perinatal outcome is more evident in women with reduced fetal movements.

**Key words:** Fetal movement counting; Perinatal outcome; Reduced fetal movements, Umbilical artery Doppler.

## Introduction

Fetal movement as felt by the mother is described as any rolling, swishing, tumbling sensation or a kick. fetal movements usually start from 18 weeks of gestation but some multiparous woman recognize these movements earlier (16 weeks) and a few primiparas may record them in later gestation.<sup>1</sup> Number of these movements increases up to the 32nd week of gestation, thereafter it begins to plateau until the end of pregnancy. This is likely to ensure maturation of the nervous system, leading to the appearance of clear periods of sleep alternating with wakefulness.<sup>2</sup> Despite improved obstetric services,

stillbirth is still a notable pregnancy complication, and reduction in maternally perceived fetal movements is one clinical sign intimately associated with still-birth and most of the unplanned obstetrical visits are attributed to this.<sup>3</sup> Counting fetal movements (FM) is one-way women can estimate fetal wellbeing without requiring a clinician. In the detection of fetal compromise with reference to international guidelines, disparities are seen in the definition and care of women with reduced fetal movements (RFM) and there is no proof that any of these definitions is of greater value than the individual maternal

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perception.<sup>4</sup> The National Institute for Clinical Excellence guidelines on antenatal care declare that fetal movement counting should not be advised routinely,<sup>5</sup> while World Health Organization (WHO) does encourage health care workers to inform all pregnant women to monitor their fetal movements during the third trimester and report any reduction. It is important that clinicians also enquire about FM during each antenatal visit and offer investigations as indicated.<sup>6</sup> In some studies, in addition to unsatisfactory physician response to the mother's complaint, it has been shown that RFM is

### Patients and methods

This is a case-control study conducted at Erbil maternity teaching hospital, Kurdistan Region, Iraq from October 2021 to December 2022. In total, the study included 489 participants, of whom 244 participants presented with perception of RFM have been taken as cases and 245 participants with perception of good fetal movements were taken as control group. Cases were defined as women with less than 10 fetal movements in 12-hour period and controls were defined as Perception of 10 or more fetal movements in 12-hour period.<sup>10</sup> The inclusion criteria were singleton pregnancies with gestational age  $\geq 28$  weeks and those who accepted to participate. Exclusion criteria included women with a confirmed intrauterine fetal death at presentation, multiple pregnancies and those who refused to participate. Direct interview of the participants done by using a close-ended questionnaire. Pregnancy induced hypertension is blood pressure  $\geq 140/90$  mmHg on two or more occasions beyond twenty weeks of gestation in those women who were normotensive previously, with or without presence of proteinuria (1+ or more), protein: creatinine ratio of 30 mg/mmol.<sup>11</sup> gestational diabetes was defined as fasting plasma glucose of  $\geq 5.6$  mole/L or after 2-hour plasma glucose level  $\geq 7.8$  mole/L.<sup>12</sup> The amniotic fluid

a predisposing factor to unfavorable perinatal outcomes including stillbirth, fetal distress, IUGR, and preterm birth<sup>7-8</sup>. The right path to managing pregnancies with RFM remains debatable because the significance of such a history is unclear and lots of factors (physical and social) play a role in the individual perception of mothers.<sup>9</sup> Therefore, the decision on these pregnancies should be considered by a consultant on an individualized basis.<sup>1</sup> The objective of this study was to determine the maternal characteristics and perinatal outcome of women with RFM.

index calculated by adding together the measurements from all four quadrants of the uterus, divided into 3 groups, AFI 5-25 were labeled "adequate", AFI less than 5cm labeled "oligohydramnios", and eventually those with AFI over 25cm were labeled "Poly-hydramnios"<sup>13</sup>. Cardiotocograph was categorized as normal when the baseline fetal heart rate was 110–160 beats per minute, variability between 5 -25 beats per minute, presence of accelerations, and absence of decelerations.<sup>14</sup> The umbilical artery waveform is determined by establishing the velocity of blood flow at peak systole and peak diastole. The measurements were then calculated to obtain the resistance index (RI). A resistance index of 0.6 was considered normal.<sup>15</sup> The management and mode of delivery were decided according to the findings of the cardiotocograph, ultrasound, pelvis, and general examination. The Apgar score was considered normal if scored 7–10, moderate if 4-6, and low if 0–3.<sup>8</sup> World Health Organization defined early neonatal death as death of an infant during the first week of life.<sup>9</sup> The proposal of this study was approved by the Research Ethics Committee, number 4573, November 2nd 2020. Informed consent was obtained from all the participants, the aim of the study was clarified and confidentiality was

assured. The statistical package for social science (SPSS, version 25) was used to analyze the data, and the chi-square test of association was used to compare proportions. when the expected frequency (value) was less than 5 of more than 20%

## Results

The mean age ( $\pm$ SD) of Group I participants was  $29.1 \pm 6.9$  years, and that of Group II was  $29.4 \pm 6.7$  years, which shows no notable difference in the age group distribution between the two groups ( $p = 418$ ). The majority (59.5%) of the study participants were term pregnancies ( $\geq 37$ weeks), while only 5.9% were 28 to 31+6 weeks gestation, however, no remarkable difference was found between cases and controls in regard to gestational age distribution ( $p = 0.979$ ). In this study, among women with RFM, 32.4% were nulliparous and 59% were multiparous, in control group, 26.9% were nulliparous and 63.7% were multiparous women; thus, no

of the cells in the table, fisher's exact test was used. to compare the mean of the two samples, a student's t-test of two independent samples (unpaired t-test) was used. A p-value of  $\leq 0.05$  was considered statistically significant.

significant differences were found between the case and control groups with regard to parity ( $p = 0.420$ ). In the view of medical history, a significantly higher proportion of women with the perception of RFM had gestational diabetes (34%), and preeclampsia (40.2%), compared to women of Group II with rates of (15.5% and 21.2%) respectively ( $p < 0.001$ ). Concerning corticosteroid injection for fetal lung maturity and its effect on fetal movement, around one-third (30.7%) of Group I women, and 15.1% of Group II women had received steroids within two days of presentation ( $p < 0.001$ ).

**Table (1):** Basic characteristics and risk factors for reduced fetal movements.

	RFM		Normal movement		Total		p value
	No.	%	No.	%	No.	%	
Age							
< 35	187	(76.6)	180	(73.5)	367	(75.1)	
$\geq 35$	57	(23.4)	65	(26.5)	122	(24.9)	0.418*
Mean( $\pm$ SD)	29.1	( $\pm 6.9$ )	29.4	( $\pm 6.7$ )			0.653†
Parity							
Nulliparous	79	(32.4)	66	(26.9)	145	(29.7)	
Multiparous	144	(59.0)	156	(63.7)	300	(61.3)	
Grand-multiparous	21	(8.6)	23	(9.4)	44	(9.0)	0.420
Gestational age (weeks)							
28-31	14	(5.7)	15	(6.1)	29	(5.9)	
32-36	84	(34.4)	85	(34.7)	169	(34.6)	
$\geq 37$	146	(59.8)	145	(59.2)	291	(59.5)	0.979
Corticosteroid administration in two days of presentation							
No	169	(69.3)	208	(84.9)	377	(77.1)	
Yes	75	(30.7)	37	(15.1)	112	(22.9)	< 0.001
Diabetes mellitus							
No	161	(66.0)	207	(84.5)	368	(75.3)	
Yes	83	(34.0)	38	(15.5)	121	(24.7)	< 0.001
Preeclampsia							
No	146	(59.8)	193	(78.8)	339	(69.3)	
Yes	98	(40.2)	52	(21.2)	150	(30.7)	< 0.001

\*By Chi square test. †By t test

As shown in Table (2), less than half (45.1%) of cases had an adequate amount of amniotic fluid, compared with 66.9% of Group II women ( $p < 0.001$ ). Oligohydramnios was evident in 38.9% of women with RFM and polyhydramnios in 16% of cases. We found that the rate of abnormal doppler readings among Group I women (26.2%) was significantly higher than the rate among Group II women

(2.9%). ( $p < 0.001$ ) and it is evident that more than half (55.3%) of Group I women had abnormal CTG compared with 15.1% of women in Group II ( $p < 0.001$ ). Regarding mode of delivery, it is evident that the rate of cesarean section (whether emergency or elective) was significantly higher in women with the perception of RFM than Group II women, 45% vs. 24.9% respectively ( $p < 0.001$ ).

**Table (2):** Maternal outcome of the study groups.

	Decreased fetal movement		Normal movement		Total		p value
	No.	(%)	No.	(%)	No.	(%)	
<b>Amniotic fluid index</b>							
Adequate	110	(45.1)	164	(66.9)	274	(56.0)	
Oligohydramnios	95	(38.9)	67	(27.3)	162	(33.1)	
Polyhydramnios	39	(16.0)	14	(5.7)	53	(10.8)	< 0.001
<b>UA Doppler</b>							
Normal	180	(73.8)	238	(97.1)	418	(85.5)	
Abnormal	64	(26.2)	7	(2.9)	71	(14.5)	< 0.001
<b>CTG</b>							
Reassuring	109	(44.7)	208	(84.9)	317	(64.8)	
Non-reassuring	121	(49.6)	37	(15.1)	158	(32.3)	
Abnormal	14	(5.7)	0	(0.0)	14	(2.9)	< 0.001
<b>Meconium stained liquor</b>							
No	186	(76.2)	191	(78.0)	377	(77.1)	
Yes	58	(23.8)	54	(22.0)	112	(22.9)	0.649
<b>Mode of delivery</b>							
Spontaneous	63	(25.8)	128	(52.2)	191	(39.1)	
Induced VD	71	(29.1)	56	(22.9)	127	(26.0)	
Emergency CS	95	(38.9)	50	(20.4)	125	(29.7)	
Elective CS	15	(6.1)	11	(4.5)	26	(5.3)	< 0.001
Total	244	(100.0)	245	(100.0)	489	(100.0)	

\*By Chi square test.

With APGAR score results between the two groups, Table (3) shows that more than half of the neonates of Group I women had either a low APGAR score in the first minute (10.7%) or a moderate score (48.4%) compared with 1.6% and 19.6% respectively in the control group ( $p < 0.001$ ). In Group I neonates APGAR score improved in the fifth minute but was still less than the scores of the neonates of

Group II ( $p = 0.002$ ). Around one-third (32.8%) of Group I neonates had been admitted to NICU compared with 21.2% of Group II neonates. ( $p = 0.004$ ). Low birth weight (< 2.5 Kg) was 25% among cases and 20% among women with normal fetal movement ( $p = 0.008$ ). In regard to early neonatal death, no significant difference was found between the two groups ( $p = 0.221$ ).

**Table (3):**Fetal outcome of the study groups.

	RFM		Normal movement		Total		p value
	No.	(%)	No.	(%)	No.	(%)	
<b>APGAR1</b>							
Low	26	(10.7)	4	(1.6)	30	(6.1)	
Moderate	118	(48.4)	48	(19.6)	166	(33.9)	
Normal	100	(41.0)	193	(78.8)	293	(59.9)	<0.001*
<b>APGAR 5</b>							
Low	4	(1.6)	5	(2.0)	9	(1.8)	
Moderate	46	(18.9)	20	(8.2)	66	(13.5)	
Normal	194	(79.5)	220	(89.8)	414	(84.7)	0.002**
<b>Admission to NCU</b>							
No	164	(67.2)	193	(78.8)	357	(73.0)	
Yes	80	(32.8)	52	(21.2)	132	(27.0)	0.004*
<b>Neonatal weight</b>							
< 2.5	61	(25.0)	49	(20.0)	110	(22.5)	
2.5-3.9	174	(71.3)	170	(69.4)	344	(70.3)	
≥ 4	9	(3.7)	26	(10.6)	35	(7.2)	0.008*
<b>Early neonatal death</b>							
No	237	(97.1)	242	(98.8)	479	(98.0)	
Yes	7	(2.9)	3	(1.2)	10	(2.0)	0.221**
<b>Total</b>	<b>244</b>	<b>(100.0)</b>	<b>245</b>	<b>(100.0)</b>	<b>489</b>	<b>(100.0)</b>	

\*Chi square test. \*\*By Fisher's exact test

## Discussion

Fetal movement counting by the mother is a method used to assess fetal well-being. In this study, among women with RFM, 32.4% were nulliparous and 59% were multiparous. In control group, 26.9% were nulliparous and 63.7% were multiparous, there was no significant difference between the two groups, this result is supported by other studies including one study done by university of Manchester with no significant difference found between cases and control groups in regard to parity.<sup>16</sup> In this study around one third (30.7%) of Group I women, and 15.1% of Group II women had received corticosteroids within two days of presentation ( $p < 0.001$ ), this shows that there may be a transitory depression in fetal movements after receiving steroid for fetal lung maturity. A study conducted at Ain Shams university shows that there was significant reduction in fetal movement at 24 hour of receiving dexamethasone after first and second doses, this reduction in fetal movement improved after 48 hours of injection but still less than baseline.<sup>17</sup>

Among the study groups, 34% of women in group I and 15.5% in group II had gestational diabetes ( $p < 0.001$ ). Hypertension was evident in 41.2% of cases and 21.2% of control group ( $p < 0.001$ ). The correlation between diabetes, hypertension, and RFM is statistically significant, this could be explained by changes in the fetal autonomic nervous system affected by maternal blood glucose level, also, the maternal nervous system alters fetal cardiac function in pregnancies complicated by hypertension.<sup>18-19</sup> In our study, the rate of abnormal Doppler reading among Group I women (26.2%) was significantly higher than the rate among Group II women (2.9%). A cohort study in eastern Norway and Bergen carried out by Froen et al.<sup>20</sup> showed that no helpful information can be obtained from umbilical artery Doppler in women with RFM. However, it is recommended by the RCOG guideline that after confirmation of fetal viability and a confirmed history of RFM in pregnancy over 28 weeks of gestation, a CTG is to be performed to

identify and rule out any fetal distress and compromise.<sup>1</sup> We found that less than half (45.1 %) of women with RFM had adequate amniotic fluid, while 38.9% of them had oligohydramnios and 16.0% had polyhydramnios compared to control group (66.9%, 27.3% and 5.7% respectively). a study showed similar findings revealed that, fetal movements are affected by abnormal level of amniotic fluid volume, in women with oligohydramnios, there was 4.13 times increase in the odds of RFM compared to women with normal amount of liquor<sup>21</sup>. In this study women with RFM have higher rates of emergency and elective cesarean section (38.9% and 6.1% respectively) compared to control group (20.4% and 4.5% respectively), and a higher rate of induced vaginal delivery found among cases (29.1%) compared to control group (22.9%). Whether or not expediting delivery is necessary for pregnancies with

### Conclusion

Maternal perception of RFM is a reason for pregnant women to contact their healthcare providers. Women presenting with RFM are at more risk of obstetrical intervention and poor perinatal outcomes including higher rate of caesarian section

### Conflicts of interest

The author reports no conflicts of interest.

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RFM. A randomized trial was done in 2018 among 409175 pregnancies concluded that expediting delivery did not affect the rate of stillbirth in a woman with RFM. The authors found that 108 more induction of Labour and 162 more cesarean deliveries would be done using the intervention in 10.000 women, and 68 more neonatal admissions in the neonatal unit.<sup>22</sup> Other studies evaluated the relationship between RFM and delivery mode, all found that there is an increased rate of caesarian section and induction of labour<sup>23-24</sup>. In this case-control study, we found that among cases, reduced fetal movements was not related to an increase in early neonatal death. Our results are similar to a cohort study done with more than 100 000 women, which found no increased risk of neonatal death in women with RFM but a significant increase in adverse perinatal outcomes.<sup>24</sup>

and induction of Labour, lower APGAR scores, and more NICU admissions. Further research is needed to delineate best management plan to optimize maternal and fetal outcome.

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