

Reduced fetal movement as a predictor of perinatal outcome

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Abstract

Background: Maternal perception of fetal movement is one of the first signs of fetal life and is regarded as a manifestation of fetal wellbeing.

Aims: To evaluate reduced fetal movement as an effective predictor for the assessment of fetal condition and to improve fetal outcome by early detection of fetal hypoxia.

Study Design and setting: A Co relational study carried out for a period of two years from Dec. 2010 - Dec. 2012 at Obstetrics and Gynecology Department of Al Yarmouk teaching hospital \ Baghdad \ Iraq.

Patients and Methods: 200 patients with history of sluggish fetal movements from 32-41weeks gestation were admitted to the Obstetric ward during the study time for clinical evaluation and their biophysical profile score was recorded and were followed till delivery, the mode of delivery and neonatal outcome were recorded including APGAR score of newborn which was noted at one and five minutes and those having poor APGAR score were resuscitated and admitted to neonatal care unit.

Results: During this study 200 patients were evaluated, 58 patients were primigravidas and 142 were multigravidas. Among 200 patients non reactive fetal heart was found in 64 cases. 120 patients had a biophysical profile score of 10/10, 44 patients had a score of 8/10 and 32 patients had a score of 6/10. In 4 patients with 4/10 score emergency caesarean section led to the delivery of neonates with low APGAR score. Majority of patients with normal biophysical profile score of 8-10/10 had good APGAR score. The rate of caesarean section was 34%. Concerning fetal outcome 70% of cases with good outcome, low APGAR score at five minutes (<6/10) in 14% of cases, meconium staining in 9% of cases, birth asphyxia in 6% and endotracheal intubation in 1% of cases.

Conclusions: reduced fetal movement appears to be a serious complaint that should be further evaluated and is associated with a significant fetal compromise.

Keywords: Reduced fetal movement, Biophysical profile, APGAR score

INTRODUCTION

The goal of antepartum fetal surveillance is to identify the healthy fetus and the fetus at risk of death.^[1] Fetal

surveillance should effectively identify the fetus exposed to intrauterine hypoxia and may therefore improve fetal outcome.^[2] Maternal perception of good fetal movement

is considered as a manifestation of fetal wellbeing.^[3] Inability to count 10 fetal movements in a 12-hour period was associated with increased risk of fetal death.^[4] Most mothers are aware of how their babies move and intuitively interpret decreased fetal movement (DFM) as an alarming sign. Maternal concern for DFM is a frequent cause for unscheduled antenatal consultations, occurring in approximately 10% of third-trimester pregnancies.^[5, 6] Existing guidelines recommend that pregnant women should be informed about the need to contact healthcare professionals when they notice DFM.^[7-9] Currently, the best definition of DFM comes from the study by Moore and Piacquadio, who defined DFM as maternal perception of less than ten movements within 2 hours (it is referred to as the '2-hours alarm'), which is approximately five standard deviations from the mean counting time in normal pregnancies,^[10, 11] this is currently recommended by the American Academy of Pediatrics, the American Congress of Obstetricians and Gynecologists, the Society of Obstetricians and Gynaecologists in Canada and the Australian and New Zealand Stillbirth Alliance.^[12, 13] The biophysical profile (BPP) which is an ultrasound score had potential benefits in the reduction of perinatal mortality.^[14,15] In our setup, other methods of fetal surveillance like cardiotocography, Doppler ultrasound were used, but we wanted to assess those patients with DFM as an effective predictor of perinatal outcome.

PATIENTS AND METHODS

A co relational study was conducted at Obstetrics and Gynecology Department of Al Yarmouk teaching hospital, Baghdad, Iraq for a period of two years from Dec. 2010 to Dec. 2012. A total of two hundred singleton pregnant patients presented between 32 – 41 weeks to the hospital for DFM (less than 10 movements in 2 hours) before the onset of labour were included. Women with known medical disorders, with congenital fetal anomalies and those admitted for elective caesarean section were excluded. Patients were evaluated with detailed history (select a 2-hour period during the day when they knew their babies were usually active to count the fetal movements) and clinical examination (including symphysio-fundal height measurement). Non stress test had been done for all the patients (considered as reactive when two accelerations of fetal heart with fetal movements, non reactive when no accelerations or less than two movements in a 20 minutes period) and the BPP score was recorded (in the ultrasound department of Al Yarmouk hospital which includes: fetal breathing

movement, gross body movement, fetal tone, reactive fetal heart rate and amniotic fluid volume) and the patients were followed till delivery. The mode of delivery and neonatal outcome were recorded including APGAR score of newborn which was noted at one and five minutes (APGAR refers to: Appearance, Pulse, Grimace, Activity and Respiratory effort), those having poor APGAR score (<6\10) at five minutes were resuscitated and admitted to neonatal care unit.

Statistical analysis: by Chi-square (X^2) test to determine the relative importance of various variables. P-value equal to or less than 0.05 was considered as statistically significant. For detecting the association of DFM and poor fetal outcome the correlation coefficient was applied at P value of less than 0.01 significance.

RESULTS

Among 200 patients included, the maternal demographic characteristics were expressed in table (1).

Table 1. The maternal demographic characteristics

Demographic character		Number (N=200)	Percentage	
Gravidity	Primi-gravida	58	29%	$X^2=13.1$ P value <0.05
	multi-gravida	142	71%	
Maternal age (years)	19- 24	42	21%	$X^2=9.7$ P value <0.05
	25- 30	56	28%	
	31- 36	68	34%	
	37- 42	34	17%	
Weeks of gestation (weeks)	32- 34	8	4%	$X^2=16.4$ P value <0.05
	>34- 36	12	6%	
	>36- 38	19	9.5%	
	>38- 40	120	60 %	
	>40- 42	41	20.5%	

Most of the cases(more than 80%) presented with DFM were at term gestation (37 weeks gestation and more).

The distribution of cases according to reduced fetal movements as shown in table (2) revealed that most cases (55%) presented with 2-3 movements in a 2-hour period.

Table 2. Distribution of cases according to reduced fetal movements

Fetal movements (no. in 2-hour)	Number of patients	percentage
0-1	18	9%
2-3	110	55%
4-5	40	20%
6-7	24	12%
8-9	8	4%
X²=14.3 P value <0.05		

Among the cases admitted, reactive fetal heart was shown in 136 cases (68%) and non reactive fetal heart was shown in 64 cases (32%), this is considered as part of BPP result which is shown in table (3).

Table 3. The results of BPP

Biophysical profile score	Number of patients	percentage
10	120	60%
8	44	22%
6	32	16%
4	4	2%
X²=17 P value <0.05		

From the above table the study showed that 82% of the patients had normal BPP (8 or 10 score) and 18% of the patients had abnormal BPP (6 or less score). In 4 patients with 4/10 score emergency caesarean section led to the delivery of neonates with low APGAR score. Majority of patients with normal biophysical profile score of 8-10/10 had good APGAR score.

The mode of delivery was shown in figure (1), with vaginal delivery rate 64%, caesarean section rate 34% and ventouse delivery in 2% of cases. The indications for caesarean section were: fetal heart abnormalities in 23%, failure of progress of labour in 9%, placental abruption in 1.5% and cord prolapse in 0.5% of cases.

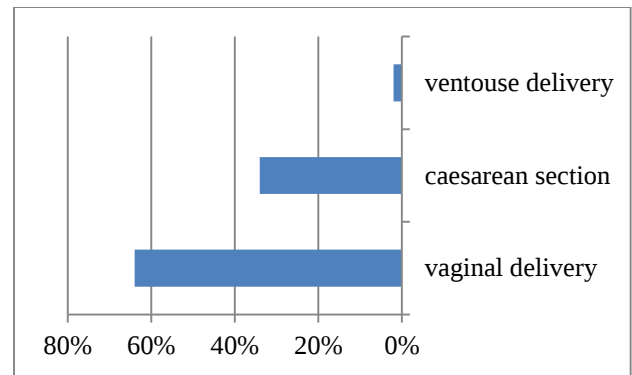


Figure 1. The mode of delivery.

The fetal outcome revealed that 70% of cases with good outcome and 30% with poor outcome distributed as following: low APGAR score in 14% of cases, meconium staining in 9% of cases, birth asphyxia in 6% and endotracheal intubation in 1% of cases (those two cases delivered by emergency caesarean section for severe fetal bradycardia for whom endotracheal intubation done, one of them died after 8 hours and the other died after 2 days). Concerning prematurity only 4 cases of those with poor outcome were preterm deliveries who were admitted to the neonatal care unit with low APGAR score and discharged well.

Table 4. The fetal outcome

Fetal outcome		Number	Percentage
Good		140	70%
Poor	Low APGAR	28	14%
	Meconium staining	18	9%
	Birth asphyxia	12	6%
	Endotracheal intubation	2	1%
X²=6.82 P value <0.05			

The correlation of reduced fetal movement and poor fetal outcome was expressed in table (5) showing a significant negative correlation (correlation coefficient $r = -0.98$) so as fetal movements reduced more cases of poor fetal outcome were recorded.

Further analysis of those with poor fetal outcome, a regression line between fetal movements and APGAR score was shown in figure (2) revealed a significant

positive correlation($r = 0.86$, $p < 0.001$) so as fetal movements increased the APGAR score improved.

Table 5. The correlation of reduced fetal movement and poor fetal outcome

Fetal movements (No. in 2-hour)	Poor fetal outcome No. (%)	$r = -0.98^{**}$ $p \text{ value} < 0.01$
0-1 (No. 18)	8 (44.4%)	
2-3 (No. 110)	38 (34.5%)	
4-5 (No. 40)	9 (22.5%)	
6-7 (No. 24)	4 (16.7%)	
8-9 (No. 8)	1 (12.5%)	

** The correlation is significant at the 0.01 level.

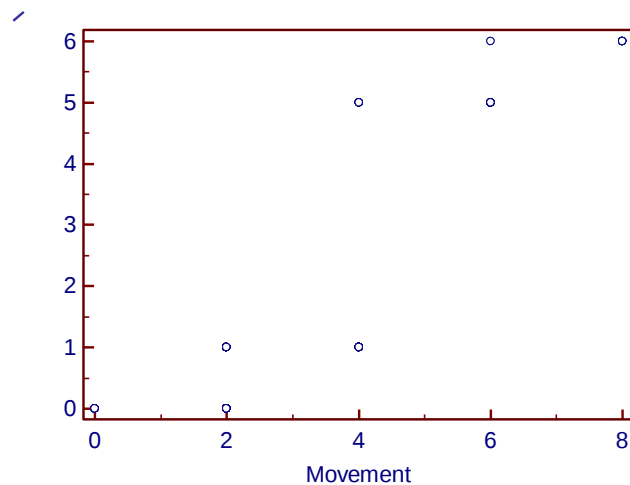


Figure 2. Regression line between fetal movements and APGAR score at 5 minutes.

Dependent Y	APGAR_5
Independent X	Movement

Sample size	200
Coefficient of determination R^2	0.7540
Coefficient of Correlation R	0.86

Regression Equation

$y = -1.2498 + 0.9194 x$					
Parameter	Co-efficient	Std. E	95% CI	t	P
Intercept	-1.2498	0.1325	1.5110 to -0.9886	-9.4346	<0.001
Slope	0.9194	0.03732	0.8458 to 0.9930	24.6358	<0.001

DISCUSSION

A significant reduction or sudden alteration in fetal movement is a potentially important clinical sign. It has been suggested that reduced or absent fetal movement may be a warning sign of impending fetal death. Studies of fetal physiology have demonstrated an association between DFM and poor perinatal outcome.^[16] The majority of women (55%) experiencing a stillbirth perceived a reduction in fetal movement prior to diagnosis.^[17] The current study revealed that women presented with DFM had high rates of abnormal BPP and perinatal morbidity; in agreement with these results a randomized study suggested that inadequate clinical evaluation and false reassurance of patients with DFM were associated with high fetal death.^[3] Also the current study agreed with Dutton PJ et.al (2012) who studied 303 women with DFM, 22% of these cases developed poor perinatal outcome.^[18] In our study 32% of cases had non reactive fetal heart tracing which indicated further evaluation with BPP, the introduction of continuous fetal monitoring (used in non stress testing) was associated with a reduction in the number of intrapartum fetal deaths.^[19] In a different observational study of women presenting with DFM who had an initial non stress test and an ultrasound scan for BPP, 21% had an abnormality detected that required action and 4.4% were admitted for immediate delivery.^[20] Bobby in 2003 proposed the combined assessment techniques (using the five parameters of BPP) to evaluate antepartum fetal risks as more accurate of assessing fetal health than any single variable including non stress test.^[21] Johnson et al, in her study on BPP in the management of post term pregnancy found an increase in perinatal morbidity in fetuses exhibiting an abnormal BPP, when compared to a group of fetuses with normal BPP.^[22] This study is very much comparable to our study where abnormal BPP associated with increased perinatal morbidity. Perinatal morbidity was low in patients having good BPP score in the current study which was comparable to the results of English JD conducted in North West Armed Forces Hospital.^[23] In contrast to other study which concluded that DFM is normal as the pregnancy approaches term,^[24] In this study, more than 80% were term gestation as term defined as 37 completed weeks and there was considerable perinatal morbidity with DFM. In contrast to our study which criticized the importance of fetal movement counting as a routine testing, a retrospective cohort found that 23% of women reported anxiety and a further 16% felt that monitoring fetal movements was useless,^[25] Perception of DFM itself is associated with

increased maternal anxiety and any study of the utility of fetal movements as a screening test must take account of the potentially deleterious effects of maternal stress and anxiety.^[26, 27] The rate of caesarean section in our set up was 34% which was high, this possibly because of lack of fetal blood sampling in our labour room so that in cases of possible fetal compromise emergency caesarean section had been done.

Conclusions: in our clinical set up we found a significant correlation between DFM and poor fetal outcome so proper clinical evaluation and BPP assessment is indicated in any patient presented with DFM so that fetal hypoxia can be detected early before fetal death and it is recommended that patients and health care providers should be educated about fetal movement counting as a routine antenatal evaluation and the importance of early awareness of DFM. Also it is recommended that further studies with larger sample size and possibly other fetal movement counting methods (as count to 10 method) being evaluated.

REFERENCES

- Dayal AK, Manning FA, Berck DJ, Mussalli GM, Avila C, Harman CR et al. Fetal death after normal biophysical profile score: An eighteen-year experience. *Am J Obstet Gynecol* 1999; 181:1231-6.
- Mohsin H. Neonatal outcome as prescribed by biophysical profile. *J Coll Physician Surg Pak* 2001; 11:149-51.
- Rayburn WF. Fetal body movement monitoring. *Obstet Gynecol Clin North Am* 1990; 17:95-110.
- Grant A, Elbourne D, Valentin L, Alexander S. Routine formal fetal movements counting and risk of antepartum late death in normally formed singletons. *Lancet* 1989; 2:345-9.
- Frøen JF, Saastad E, Tveit JV, Bør Dahl PE, Stray-Pedersen B. Clinical practice variation in reduced fetal movements. *Tidsskr Nor Lægeforen* 2005; 125:2631-4.
- Tveit JV, Saastad E, Stray-Pedersen B, Bør Dahl PE, Flenady V, Fretts R, et al. Reduction of late stillbirth with the introduction of fetal movement information and guidelines - a clinical quality improvement. *BMC Pregnancy Childbirth* 2009; 9:32.
- Australian and New Zealand Stillbirth Alliance (ANZSA). Clinical Practice Guideline for the Management of Women who report Decreased Fetal Movement. 1.1 ed. 2010.
- Norwegian Society for Gynecology and Obstetrics. Veileder i fødselshjelp 2008 (Clinical Guidelines for Antenatal Care, Norwegian Only). Oslo: Norwegian Society for Gynecology and Obstetrics, 2008.
- Royal College of Obstetricians and Gynaecologists. Antenatal Routine- Care for The Healthy Pregnant Woman. London: RCOG Press, 2003.
- Heazell AE, Frøen JF. Methods of fetal movement counting and the detection of fetal compromise. *J Obstet Gynaecol* 2008; 28:147-54.
- Moore TR, Piacquadio K. A prospective evaluation of fetal movement screening to reduce the incidence of antepartum fetal death. *Am J Obstet Gynecol* 1989; 160:1075-80.
- American Academy of Pediatrics, The American College of Obstetricians and Gynecologists. Guidelines for Perinatal Care, 5th edn. Washington, DC: AAP and ACOG, 2002.
- Liston R, Sawchuck D, Young D. Fetal health surveillance: antepartum and intrapartum consensus guideline. *J Obstet Gynaecol Can* 2007; 29:S3-56.
- Mognann EF, Doherty DA, Field K, Chauhan SP, Muffley PE, Morrison JC. Biophysical profile with amniotic fluid volume assessments. *Obstet Gynecol* 2004; 104:5-10.
- Tahir S. Incidence and outcome of preterm premature rupture of membranes. *Pak Med Sci J* 2002; 18:26-32.
- Harrington K, Thompson O, Jordan L, Page J, Carpenter RG, Campbell S. Obstetric outcome in women who present with a reduction in fetal movements in the third trimester of pregnancy. *J Perinat Med* 1998; 26:77-82.
- Efkarpidis S, Alexopoulos E, Kean L, Liu D, Fay T. Case-control study of factors associated with intrauterine fetal deaths. *MedGenMed* 2004; 6:53.
- Dutton PJ, Warrander LK, Roberts SA, Bernatavicius G, Byrd LM, Gaze D, et al. Predictors of poor perinatal outcome following maternal perception of reduced fetal movements. *PLoS One* 2012; 7:e39784.
- Gardosi J. Monitoring technology and the clinical perspective. *Baillieres Clin Obstet Gynaecol* 1996; 10:325-39.
- Whitty JE, Garfinkel DA, Divon MY. Maternal perception of decreased fetal movement as an indication for antepartum testing in a low-risk population. *Am J Obstet Gynecol* 1991; 165:1084-8.
- Bobby P. Multiple assessment techniques to evaluate antepartum fetal risks. *Pediatr Ann* 2003; 32: 609-16.

22. Johnson JM, Harman CR, Lange IR, Manning FA. Biophysical profile scoring in the management of the post term pregnancy: An analysis of 307 patients. *Am J Obstet Gynecol* 1986;154:269-73
23. English JD. Perinatal mortality at North West Armed Forces Hospital, Tabuk, Saudi Arabia and the potential benefits of the biophysical profile score. *Ann Saudi Med* 1995; 15:133-6.
24. Kuwata T, Matsubara S, Ohkusa T, Ohkuchi A, Izumi A, Watanabe T, et al. Establishing a reference value for the frequency of fetal movements using modified 'count to 10' method. *J Obstet Gynaecol Res* 2008; 34:318-23.
25. Draper J, Field S, Thomas H, Hare MJ. Womens' views on keeping fetal movement charts. *Br J Obstet Gynaecol* 1986; 93:334-8.
26. Frøen JF, Tveit JV, Saastad E, Bør Dahl PE, Stray-Pedersen B, Heazell AE, et al. Management of decreased fetal movements. *Semin Perinatol* 2008; 32:307-11.
27. Saastad E, Ahlborg T, Frøen JF. Low maternal awareness of fetal movement is associated with small for gestational age infants. *J Midwifery Womens Health* 2008; 53:345-52.