MATERNAL AND NEONATAL OUTCOME OF TERM PREGNANCIES PRESENTED WITH REDUCED FETAL MOVEMENT

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ABSTRACT

Background

Maternal perception of fetal movements is the most common method to assess fetal wellbeing in most communities nowadys. It is regarded as unstructured screening on which most pregnant women depend. Significant reduction or sudden alteration in fetal movement is a potentially important sign of impending fetal death. Studies of fetal physiology using ultrasound have demonstrated an association between reduced fetal movement and poor perinatal outcome.

Objectives

To observe the outcome of pregnancies presented with reduced fetal movement (RFM) at term regarding intra-partum complications, time and mode of delivery and neonatal outcome.

Setting and duration

A prospective case –control study. The data collected at Sulaimania Maternity Teaching Hospital throughout the period from the 1st of September 2012 to the 1st of March 2013.

Methods

One-hundred low risk pregnant ladies at term were included in the study; fifty of them with reduced fetal movements and the other fifty with good fetal movement. After taking full history and examination including fetal heart rate and manual non stress test(MNST), they were sent to ultrasound (US) examination for amniotic fluid index and Umbilical artery Doppler velocimetery. Then they were followed up until delivery when intra-partum complications, mode of delivery and neonatal outcome were recorded and tabulated for comparison between the two groups.

Results

Regarding the mode of delivery, although the rate of C/S for fetal distress was more among the cases (45.8%) than control (29.4%) it didn't reach significant statistical difference. The number of stillbirth were just 2 babies in the case group. There were significant neonatal complications as birth asphyxia 24% with meconium aspiration syndrome 16%, seizures 10% and early neonatal death 6% in the studied (case) group.

Conclusion and recommendation

Reduced fetal movement is an important symptom that should be taken seriously and manage accordingly, to reduce perinatal morbidity and mortality. Each maternity hospital should have a protocol to deal with every pregnant presents with reduced fetal movement.

Keywords: *RFM, kick count, Doppler, NST, hypoxia, meconium aspiration syndrome.*

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INTRODUCTION

The predominant goal of antenatal fetal monitoring is to reduce perinatal morbidity and mortality [1]. Routine antenatal evaluation of pregnancy with the use of ultrasonography and external fetal monitoring would clearly tax limited resources but maternal assessment of fetal activity is a simple, inexpensive and probably effective mean of monitoring fetal condition [2] . Mothers usually report fetal movements from around 20 weeks with peak at 28-34 weeks of gestation. The number of spontaneous movements tends to increase until 32 weeks of pregnancy and from this stage of gestation, the frequency of fetal movements plateaus until the onset of labour[3] . A gradual decline during the third trimester is suggested to be due to improved fetal coordination and reduced amniotic fluid volume, coupled with increased fetal size, so by term the average number of generalized movements per hour is 31 (range 16-45) , with the longest period between movements ranging from 50 to 75 minutes [3] .Changes in the number and nature of fetal movements as the fetus mature are considered to be a reflection of normal neurological development of the fetus. From as early as 20 weeks of gestation, fetal movement show diurnal changes, where the afternoon and evening periods are periods of peak activity.

Fetal movement (FM) is usually reduced during "sleep cycle", which occur regularly throughout the day and night. It usually last for 20-40 minutes and rarely exceeds 90 minutes in normal, healthy fetus [4].

Various methods have been described to quantify the fetal movements to predict fetal well-being, which include the use of cardio-tocograph (CTG), ultrasound (U/S) and maternal subjective perception. Studies of fetal physiology using U/S have demonstrated an association between reduced fetal movements and poor perinatal out-come [5]. The fetus responds to chronic hypoxia by conserving energy and subsequent reduction of FM, which is an adaptive mechanism to reduce oxygen consumption. It's recognized that intrauterine death (IUD) is preceded by cessation of FM for at least 24 hours [6].

Perceived fetal movements are defined as the maternal sensation of any discrete kick, flutter, swish or roll. Such fetal activity provides an indication of integrity of the central nervous and musculoskeletal systems [7]. Reduction in these perceived movements is associated with both pathological and non–pathological conditions which may vary from serious clinical diagnosis such as intrauterine fetal death(IUD), intrauterine fetal growth restriction (IUGR), polyhydramnios, oligohydramnios and hydrops fetalis to other benign causes such as fetal sleep, anterior placental location, increase body mass index and maternal smoking or when the mother is in sitting or standing position as she perceive most movements when lying down [8].

Maternal perception of FM ranges from 4-94% of actual movements seen on concurrent ultrasound scanning. Definition of reduced fetal movement (RFM) ranges from less than 10 movements in 2 hours to less than12 movements in 24 hours [9]. There is no evidence that any formal definition of reduced FM is of greater value than subjective maternal perception in the detection of fetal compromise. Therefore maternal perception of reduction or sudden alteration of FM should be considered clinically important [8-10] . Up to 5% of women will present with reduced FM. If the perception of reduce FM persists, consideration should be given to other causes such as fetal structural anomalies (4-3%), anemia or feto-maternal hemorrhage. A practical approach is to perform Uultrasound assessment to rule out small for gestational age (SGA), structural anomalies and oligo –or polyhydramnios and invite the women for daily CTG until mother and clinicians are reassured. A blood test should ultimately be considered looking for maternal metabolic disorders or feto-maternal hemorrhage. Smoking should be discouraged. If concerns persist in later gestation, induction of labour or delivery can be considered.[11] All ante-partum fetal tests should be interpreted in the light of gestational age, the presence or absence of congenital anomalies and underlying clinical risk factors [10].

PATIENTS AND METHODS

This is a prospective case – control study conducted in Sulaimania maternity teaching hospital for a period of 6 momths from the 1st of September 2012 till the 1st of March 2013. The study involved 2 groups of pregnant ladies with low risk singleton between 37-42 weeks gestation. The 1st group consist of 50 cases who were complaining of reduced fetal movements and the 2nd group were 50 patients who had infrequent uterine contractions with early

labour and no history of reduced fetal movements whom were taken as control group. Exclusion criteria include medical illness with pregnancy (diabetes mellitus, hypertension, and etc.), multiple gestation, preterm gestation <37 weeks, previous 2 C/S or more and IUGR. Both groups were oriented about the objectives of the study and verbal consent was obtained from each patient. The the scientific committee of the department agreed on the study and a preformed questionnaire was organized for collection of data.

For each patient detailed history and examination including fetal heart (FH), symphysis fundal height (SFH), manual non-stress test (MNST) were done. Then the patient was sent for an U/S examination for fetal biometry, estimated fetal weight (EFW), amniotic fluid index (AFI) and umbilical artery Doppler (UAD) velocimetry and she was put on kick count of fetal movements /12hrs. All the patients were followed up till delivery. Any intra-partum complication such as meconium stained liquor, fetal distress together with the mode of delivery and the indication of C/S were recorded for each patient. After delivery neonatal outcome; gender, weight, apgar score and early neonatal period complications were also recorded and tabulated for statistical analysis.

Data were collected, coded, tabulated and then analyzed by computer using SPSS (Statistical Program for Social Science) version 18. Any P value of less than 0.05 was considered as statistically significant.

RESULTS

During the study period a total of 83 cases complaining of reduced fetal movements were taken. However 3 cases had intrauterine fetal death (IUFD) which were diagnosed on admission to hospital and 13 cases of IUGR were considered as high risk pregnancy and excluded from the study while managed accordingly. Another 17 cases were missed in the follow up, so 50 cases only completed the follow up period and encountered in this study. Among them 38 patient delivered after admission and 12 patients discharged and followed up till delivery (5 days-3 weeks). Among the 50 term pregnant women (control), 42 patients were delivered after admission and the remaining 8 delivered at second time admission after follow up.

Table 1 shows the demographic characteristics of women in both groups. No statistical significant differences between the studied groups regarding the age, gravidity, residency, gestational age etc.

Regarding fetal heart rate (FHR) (detected by sonic aid taken for 1 minute continuously), although abnormal fetal heart rate (<110 or >160) were detected more in the case group but this didn't not reach statistical significance. By abdominal examination the symphysis–fundal height (SFH) was smaller than date in 22 of cases (44%) versus (14%) in control group, with a p-value 0.003 (statistical significant). The study showed that SFH smaller for date had a relation with increase C/S rate and meconium aspiration (RR=1.4, sensitivity= 44%, specificity=74%, NPV=80%). Similarly manual non-stress test(MNST) was abnormal in 21 case (42%) versus 8 control (16%) with a P value <0.05 and had relation with increased rate of C/S (RR=1.3) and neonatal complications (RR= 1.5, sensitivity=48%, specificity=77%). Kick counting showed also statistical significant difference between the studied groups as it was less than 10/12 hrs in 28 cases (56%) versus 18 control (36%) and showed relationship with increased rate of meconium aspiration and birth asphyxia (RR=1.7, sensitivity=32%, specificity=57%) as shown in figure (1), and in Table (2).

Fetal presentation and EFW didn't show any statistical significant difference between the studied groups. However, AFI<=5 cm were found in 22 (44%) of cases and 16(32%) of control group and it was related to increased C/S rate for indication of fetal distress (RR=1.5) and also increased rate of birth asphyxia (RR=1.2) (sensitivity=28%, specificity=69% and NPV=74%), while AFI > 20 cm was reported in only 4 of the cases (8%). The difference between groups were statistically significant with the p-value of <0.05, as shown in the figure (2). Regarding umbilical artery (UA) Doppler velocimetry there were 4 (8%) of cases and 3 (6%) of control with abnormal UA flow rate. This was statistically not significant with p-value 0.695, (sensitivity=8%, specificity=97%, and NPV=71%). Similarly the placental site found by US showed no significant difference between the studied groups. As shown in Table (3).

Meconium stained liquor were found more in the study group than in the control group but it didn't reach statistical significance. However the study showed that meconium stained liquor was related to increase neonatal complications in those groups (sensitivity = 68%, PPV=14%, specificity=94%, and NPV= 79%), as shown in figure (3).

Table 1. Characteristics of the Studied Groups.

Characteristics of the studied groups		classes	Study Group				P. value	
			Cases		Control			
			N	%	N	%		
1	**Age**							
	1	<20	5	10	8	16		
	2	20-30	21	42	20	40	0.669	Non Sig
	3	>30	24	48	22	44		
		Total	**50**	**100**	**50**	**100**		
2	**Residence**							
	1	Urban	34	68	31	62		
	2	Rural	16	32	19	38	0.529	Non Sig
		Total	**50**	**100**	**50**	**100**		
3	**Occupation**							
	1	Housewife	39	78	43	86		
	2	Employee	11	22	7	14	0.298	Non Sig
		Total	**50**	**100**	**50**	**100**		
4	**Gravidity**							
	1	Primi	25	50	22	44		
	2	Multi	25	50	28	56	0.548	Non Sig
		Total	**50**	**100**	**50**	**100**		
5	**Gestational age (GA)**							
	1	<40	38	76	32	64		
	2	≥40	12	24	18	36	0.190	Non Sig
		Total	**50**	**100**	**50**	**100**		
6	**Blood Group**							
	1	RH+	41	82	45	90		
	2	RH-	9	18	5	10	0.249	Non Sig
		Total	**50**	**100**	**50**	**100**		

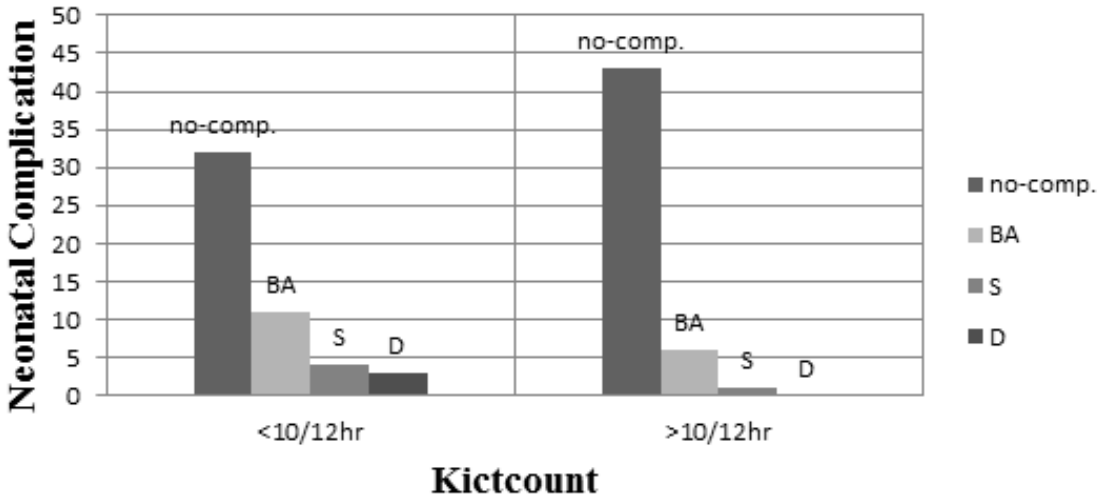

Figure 1. Increase neonatal complications with decrease fetal movements. No-comp. (No complication), BA (Birth asphyxia), S (Seizures), D (Death).

Table 2. Clinical Findings of the studied groups.

Clinical findings of the studied groups		Classes		Study Group				P. value	
				Cases		Control			
				N	%	N	%		
1	**Fetal heart rate (FHR)**	1	Normal FHR (110-160)	38	76	46	92		
		2	Abnormal FHR (<110or >160)	12	24	4	8	0.069	Non sig
			Total	**50**	**100**	**50**	**100**		
2	**Symphysis –fundal height (SFH)**	1	Smaller for date	22	44	7	14		
		2	Coincide with date	28	56	43	86	0.003	Sig
			Total	**50**	**100**	**50**	**100**		
3	**Manual non stress test**	1	Reactive	29	58	42	84		
		2	Non-reactive	21	42	8	16	0.002	Sig
			Total	**50**	**100**	**50**	**100**		
4	**Kick Count**	1	<10/12 hr	28	56	18	36		
		2	>10/12hr	22	44	32	64	0.045	Sig
			Total	50	100	50	100		

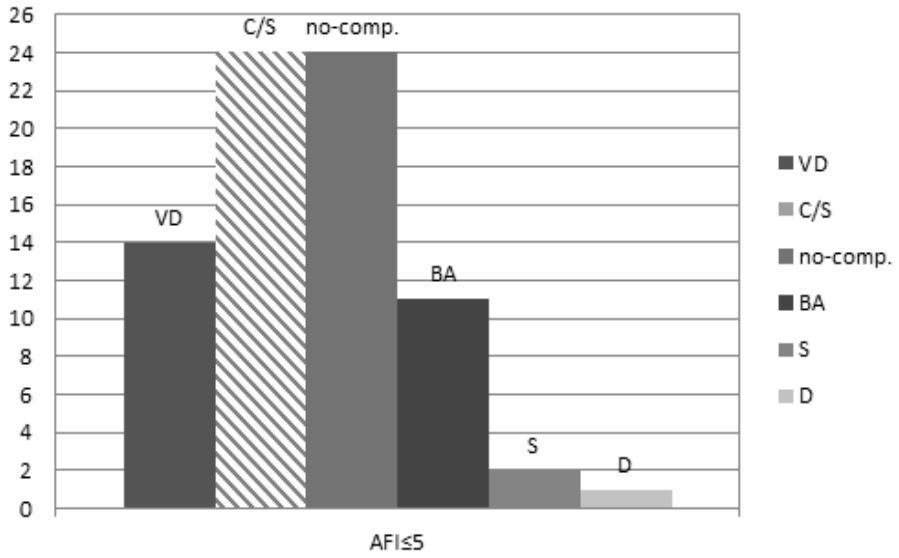

Figure 2. Effect of low AFI on pregnancy outcome. VD(Vaginal Delivery), C/S(caesarean section),.No-comp(No complication), BA (Birth asphyxia), S (Seizures), D (Death).

Table 3. U/S Findings of the studied groups

U/S Findings of the studied groups		Classes		Study Group				P. value	
				Cases		Control			
				N	%	N	%		
1	**Presentation**	1	Cephalic	47	94	46	92		
		2	Non Cephalic	3	6	4	8	0.695	Non sig
			Total	**50**	**100**	**50**	**100**		
2	**Estimated fetal weight (EFW)**	1	<2.5 Kg	2	4	0	0		
		2	(2.5-3.7)Kg	45	90	44	88	0.222	Non sig
		3	>3.7	3	6	6	12		
			Total	**50**	**100**	**50**	**100**		
3	**Amniotic fluid index (AFI)**	1	≤5	22	44	16	32		
		2	6-20	24	48	34	68	0.036	sign
		3	>20	4	8	0	0		
			Total	**50**	**100**	**50**	**100**		
4	**UA Doppler Velocimetry**	1	Normal	46	92	47	94		
		2	Abnormal	4	8	3	6	0.695	Non sig
			Total	**50**	**100**	**50**	**100**		
5	**Placental site**	1	Anterior	24	48	28	56		
		2	Posterior	24	48	22	44		
		3	Low-lying	2	4	0	0	0.302	Non. sig
			Total	**50**	**100**	**50**	**100**		

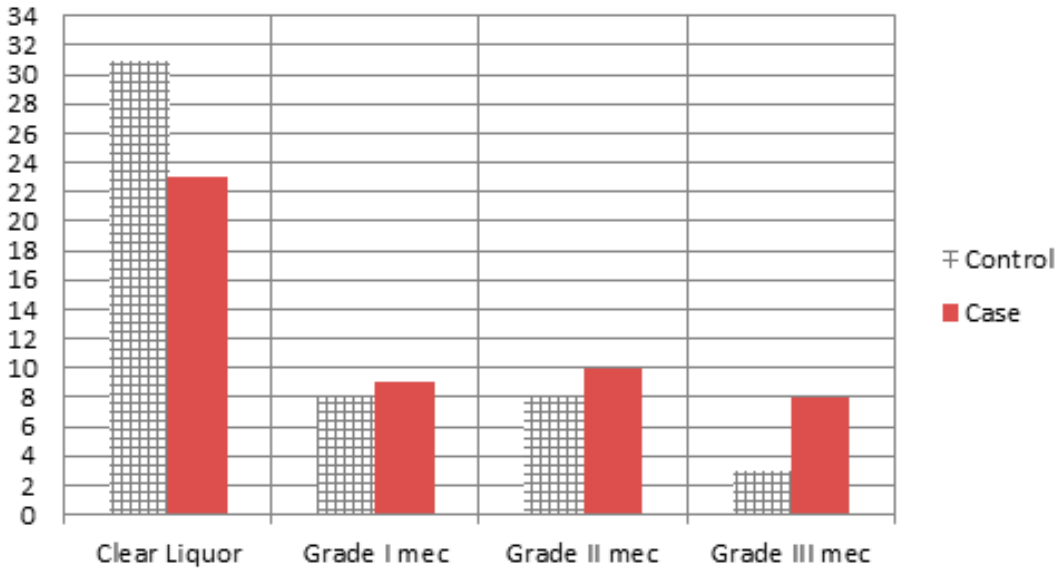

Figure 3. Liquor colour among studied groups. Mec.(meconium)

Majority of the patients were delivered by vaginal delivery, but the collected data showed significant relation between GA>40 and neonatal outcome as it increases the rate of meconium aspiration (RR =1.2) and birth asphyxia (RR=1.3) but the rate of C/S wasn't affected (RR=0.5). The reported cases of stillbirth among all the 100 patients were 2 fetuses in which both were congenitally abnormal as shown in Table (4).

There were no statistically significant difference between the two groups regarding the gender of the fetuses, birth weight and the need for admission to NCU. While the Apgar score at 1st mintute in 31 (62%) of cases and 16 (32%) of control were within (0-6), p-value 0.003 (highly significant) and there were a relation with the increase in neonatal complication for these groups (RR= 1.2) (sensitivity =76%, specificity= 73% , PPV=51%, and NPV=90%), as shown in figure (4). However at 5 minutes the apgar score difference didn't reach statistical significance.

About early neonatal period complications; 12 (24%) of case's babies and 5 (10%) of control's babies had birth asphyxia in which majorities were meconium aspiration syndrome and seizure were recorded in 5 cases. After follow up; one of them died after 14 days of birth, and 3 of them died during the first 7 days of birth one because of birth asphyxia and the other 2 babies had congenital anomalies died on the first day of life. The p-value was 0.003 (highly significant difference) as shown in Table (5).

Table 4. Intrapartum outcome.

Intrapartum outcome		Classes		Study Group				P. value	
				Cases		Control			
				N	%	N	%		
1	Meconium	0	Clear liquor	23	46	31	62		
		1	Grade I mec.	9	18	8	16		
		2	Grade II mec	10	20	8	16	0.291	Non. sig
		3	Grade III mec	8	16	3	6		
			Total	**50**	**100**	**50**	**100**		
2	Mode of Delivery	1	VD	26	52	33	66		
		2	C/S	24	49	17	34	0.155	Non. sig
			Total	**50**	**100**	**50**	**100**		
3	Indication of C/S	1	Fetal distress	11	45.8	5	29.4		
		2	Malpresentation*	3	12.5	4	23.5		
		3	APH	2	8.3	0	0	0.355	Non. sig
		4	FOP	7	29.2	8	47.1		
		5	On request	1	4.2	0	0		
			Total	**24**	**100**	**17**	**100**		
4	Still Birth	1	Negative	48	96	50	100		
		2	Positive	2*	4	0	0	0.153	Non sig
			Total	**50**	**100**	**50**	**100**		

***All of them breech presentation, except one of control was shoulder presentation.**

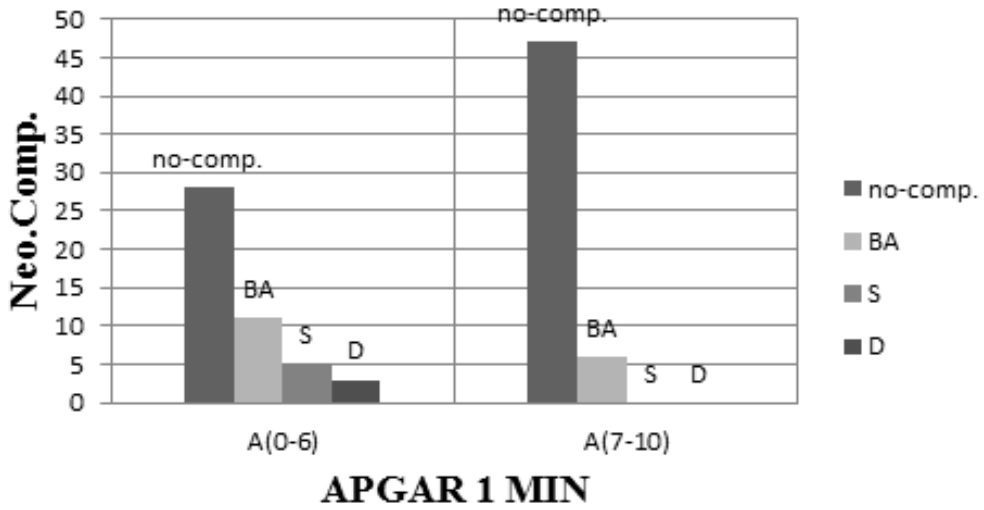

Figure 4. 1st Mint APGAR score related to neonatal outcome.
No-comp (No complication), BA (Birth asphyxia), S (Seizures), D (Death).

Table 5. Neonatal Outcome of the study groups.

Neonatal outcome of the study groups	Classes		Study Group				P. value	
			Cases		Control			
			N	%	N	%		
1 Gender	1	Male ♂	27	54	23	46		
	2	Female ♀	23	46	27	54	0.424	Non. sig
		Total	**50**	**100**	**50**	**100**		
2 Weight	1	<2.5 Kg	2	4	0	0		
	2	(2.5-3.7)Kg	43	86	41	82	0.203	Non. sig
	3	>3.7	5	10	9	18		
		Total	**50**	**100**	**50**	**100**		
3 APGAR 1min	1	0-6	31	62	16	32		
	2	7-10	19	38	34	68	0.003	Sig
		Total	**50**	**100**	**50**	**100**		
4 APGAR 5min	1	0-6	26	52	21	42		
	2	7-10	24	48	29	58	0.316	Non sig
		Total	**50**	**100**	**50**	**100**		
5 Admission to neonatal care unit (NCU)	1	Yes	27	54	21	42		
	2	No	23	46	29	58	0.230	Non. sig
		Total	**50**	**100**	**50**	**100**		
6 Neonatal complications	1	No	30	60	45	90		
	2	Birth asphyxia	12	24	5	10		
	3	Seizure	5	10	0	0	0.003	Sig
	4	Death	3	6	0	0		
		Total	**50**	**100**	**50**	**100**		
7 Congenital Anomaly	1	Negative	48	96	50	100		
	2	Positive	2	4	0	0	0.153	Non sig
		Total	**50**	**100**	**50**	**100**		

DISCUSSION

Fetal movement is a sign of fetal well-being. Mother's awareness of a loss of or significant decrease of the propulsive fetal movements has been traditionally regarded as a warning sign. We all accept that fetal activity expresses fetal condition in utero, daily monitoring of fetal movement provides good way of assessing fetal well-being [12].

In this study among 50 cases who presented with reduced fetal movement 12 cases showed abnormal FHR and 21 cases had abnormal MNST with significant differences between the two studied groups. This result agrees with Mamata Baral (2002) [12] and N Daly et al. (2011) [13] where a significant change in FHR and NST may indicate placental insufficiency or fetal hypoxia. About the fact that kick count chart of patients with reduced fetal movement show statistically significant difference compared with the control which agrees with Unterscheider et al. (2010) [11] and Grant et al. (1989)[7] whom were able to demonstrate reduction in the incidence of antepartum fetal death using formal movement counting, but does not agree with Heazall et al. (2008) [14], Witty et al. (1991) [15] and Sinha D et al. (2007) [16] whom were against using kick count chart routinely as it is associated with 2.6 fold increase in obstetric interventions and C/S rate.

The study didn't show any relation between fetal presentation and fetal activity and this agrees with the results of Dr Mamata (2002) [12]. Using AFI for the assessment of fetal well being showed significant association between reduced liquor amount and reduced fetal movement and this agrees with Julia Unterscheder and Keeln Donoghue (2012) [11] and Mamata B (2002) [12] who found that oligohydraminos associated with placental insufficiency in pregnancies presented with RFM. Regarding umbilical artery (UA) Doppler in this study there were non-significant difference among groups and this agrees with Dubiel et al. (1997) [17], Seregnt et al. (2005) [18] who reported only one highly pathological UA Doppler in the retrospective review of 160 pregnant lady with RFM. So UA Doppler velocimetry is of limited use in the assessment of RFM (Unterschrder et al. 2009) [11], but it is useful in the assessment of IUGR fetuses.

About mode of delivery the study didn't show any significant difference between the groups and this dose not agreed with Dr. Mamata (2002) [12] , N. Daly et al. (2011) [13] and Unterscheider et al. (2011) [14] who found significant association between RFM and increase rate of C/S.

Regarding neonatal outcome and especially the Apgar score, the study results showed significant low Apgar score at first minute in babies whose mother presented with RFM, but not at 5th minute. This agrees with the results of Dr. Mamata (2002) [12], N. Daly et al. (2011) [13] of Apgar at 1st minute but does not agree with this study regarding 5thminute Apgar score. Similarly admission to NCU shows no significant difference among studied groups which agree with results of Dr. Mamata (2002) [12] but does not agree with N Daly et al. (2011) [13]. This study shows that there is significant association between RFM and early neonatal period complications, as there were 12 babies of cases with birth asphyxia and 5 babies with seizure, where one of them died after 14 days while there were neither seizure nor death in the control group which agrees with the results of Dr. Mamata (2002) [12] and N. Daly et al. (2011) [13]. In this study there are no significant difference between the two groups regarding birth weight which agrees with the results of Dr. Mamata (2002) [12], but not with N. Daly et al.(2011) [13].

In conclusion, reduced fetal movement is an important symptom that should be taken seriously and manage accordingly, to reduce perinatal morbidity and mortality. It is recommended that each maternity hospital should have a protocol to deal with every pregnant presents with reduced fetal movement.

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