

Maternal understanding of fetal movement in third trimester: A means for fetal monitoring and reducing stillbirth

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Abstract

Background: Fetal movement, a sign of life, is widely considered as an indicator of fetal health status. Therefore, perceived alteration in regular fetal movement after the age of viability may signify impending adverse perinatal outcome.

Aims: This study aimed to determine maternal knowledge, behavior, and concerns about abnormal fetal movement in the third trimester of pregnancy.

Materials and Methods: A total of 225 women were surveyed using a self-administered questionnaire at the out-patient prenatal clinics of two tertiary health facilities in Nigeria between December 1, 2012 through January 31, 2013. Questions addressed knowledge, perception behavior, and concerns about experience of abnormal fetal movement.

Results: Correct Knowledge of excessive and decreased fetal movement was found in 47% and 31.1% of respondents, respectively. Majority of women (87.6%) either had no knowledge of normal parameters of fetal activity or did not recall being told that movement frequency and strength should increase in the third trimester. The proportion of women who expressed concern over excessive and decreased fetal movement was 31.1% and 21.8%, respectively. Maternal education was significantly associated with correct knowledge of decreased fetal movement ($P = 0.026$). Almost 36% of respondents had knowledge of at least one potential consequence of abnormal fetal movement.

Conclusion: Maternal educational level is an important factor in the early identification of abnormality of fetal movement. The unsatisfactory knowledge and poor perception behavior among respondents reflect the need for a guideline, particularly during antenatal care, on information and management of abnormal fetal movement in our setting to prevent avoidable stillbirth.

Key words: Antenatal care, concerns, fetal movement, knowledge, maternal knowledge, pregnancy, surveillance, stillbirth

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Introduction

The primary concern for monitoring fetal movement is to prevent stillbirth.^[1] Fetal movement, a sign of life, is widely considered as an indicator of fetal health status.^[2-4] Maternally perceived fetal movement, a self-screening technique, is associated with improved perinatal outcome, particularly in chronic causes of fetal hypoxia such as

placental insufficiency, as it permits early identification, and timely evaluation and intervention for fetuses at risk of adverse outcome.^[5,6] Fetal activity in maternal conditions leading to chronic fetal compromise, such as diabetes, hypertensive disorders, and anemia often tilts in favor of decreased fetal movement.^[4] However, excessive fetal

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activity, characterized by strong, vigorous, or increased fetal movement, may be a warning sign of acute fetal distress complicating cord accidents or abruption placentae.^[4,7] These extremes of fetal movement may indicate warning signs of impending fetal death.^[8] Maternal tracking of fetal activity in the third trimester, either formal fetal counting or unstructured self-screening procedure may be the first to identifying events preceding late stillbirth.^[5,6,9,10] The adverse obstetric outcome that may set a precedent for future occurrence of late fetal death in a current pregnancy include intrauterine growth restriction, oligohydramnios, polyhydramnios, preterm delivery, and isoimmunization.^[11]

Saastad *et al.*, reported significance of building the capacity of pregnant women, through increasing awareness of self-monitoring of fetal activity; this seemed to improve self-assessment and seeking of timely evaluation of fetal movement.^[6] The ability of pregnant women to detect clinically significant variation in fetal activity may be improved by fetal movement counting.^[6]

The wide variation in the reported frequency of normal fetal movement, ranging from 4 to 1440 in 24 hours or 4 to 100 per hour, and in fetal movement perceived by the mother makes it difficult to establish a widely accepted quantitative threshold for the identification of decreased and excessive fetal movements.^[4,12] The lack of consensus on the cutoff for decreased fetal movement accounts for the varying definitions for its identification- “movements alarm signal” (MAS) – absent fetal movement for a duration of 12 hours with audible fetal heart beats,^[11] fewer than 10 movements in 2, 12 or 24 hours;^[10,13,14] and subjective maternal perception.^[14] One study which explored the impact of fetal hyperactivity on perinatal outcome defined excessive fetal movement, using the distribution curve of perceived fetal activity, as 40 or more fetal movements per hour.^[7]

The emphasis on fetal movement and associated perinatal outcome has been concentrated on decreased fetal movement rather than addressing the extremes of fetal activity, including excessive fetal movement. Variation in fetal activity, as reflected in perceived extremes of fetal movement, may present a great source of concerns to women and obstetric care providers. Studies suggest greater risk of late stillbirth in women with complaints of persistent decrease in the frequency of perceived fetal movement.^[2,9,15] Little evidence is available regarding the aspects of opposite extreme of perceived decreased in fetal activity – excessive fetal movement. A diminution in fetal movement causes worries, both for pregnant women and obstetricians, and is a common indication for seeking care out of the schedule for prenatal visits.^[8,14] However, little is known about the significance of excessive fetal movement. While there is no scientific literature on excessive fetal activity from the maternal perspective, information shared by pregnant women on the social media demonstrates high levels of concern about excessive fetal activity.^[16] These concerns

justify further scientific enquiry into the clinical significance of excessive fetal movement especially in low-income countries which lack technology for electronic fetal surveillance and prompt intervention.

We hypothesized that high maternal knowledge and perceptions about fetal movement (increased or reduced) in the third trimester of pregnancy would influence pregnant women’s timely decision to seek intervention. This study aimed to explore maternal knowledge and perceptions about fetal movement and the sources of such information. Secondly, we sought to understand maternal behavior regarding reporting when faced with perception in alteration in the movement of the fetus. Our findings should contribute to maternal understanding of fetal well-being in utero, and possible ways to work with mothers to prevent intrauterine fetal deaths and stillbirths.

Materials and Methods

This cross-sectional survey was conducted using a piloted, self-administered questionnaire in prenatal clinics at two tertiary teaching hospitals – Ekiti State University Teaching Hospital and the University of Benin Teaching Hospital in Nigeria. These tertiary care centers, located in different geo-political regions, in Nigeria, provide major tertiary maternity care to their catchment populations. Approval for this study was obtained from the Ethics Committee of the two hospitals.

Data for this study were collected from December 1, 2012 through January 31, 2013. We included women with singleton pregnancy and early ultrasound or menstrual dating suggestive of ≥ 28 weeks by convenience sampling. All respondents gave verbal informed consent, initiated prenatal care in the first half of pregnancy, and had prenatal visits based on the traditional antenatal care schedule. Consultations were primarily by obstetricians and resident doctors in obstetrics. The rationale for the aforementioned inclusion criteria was in respect of the possible influence of the frequency of prenatal visit on the information available to pregnant women and decision making regarding experience of variation in the self-assessment of fetal activity. Women who could not read and write in English were not eligible to participate in the study. The questionnaire comprising open-ended and fixed choice questions with focus on the index pregnancy was self-administered. The questionnaire was pretested by questioning 30 pregnant women and the final version of questionnaire was based on the analysis of their responses.

The survey questionnaire was designed based on information obtained from recent studies carried out in New Zealand and Canada,^[1,17] and from the experience of authors in clinical practice. The questionnaire was sub-divided into the following sections: The first section elicited information about the demographic characteristics of the participants; the

second enquired if antenatal care providers routinely enquire about fetal movement at each prenatal visit, kind of advice women received from antenatal care providers regarding their expectations of the frequency of fetal movement in the third trimester, antenatal care providers' advice regarding the report of reduced or excessive fetal movement in the third trimester of pregnancy, and participants' source (s) of information about fetal movement in pregnancy. Multiple responses were allowed regarding where information on fetal movement was acquired. The third section enquired about maternal knowledge of abnormal fetal movement, consequences of extreme variations in perceived fetal movement, and decision-making regarding seeking intervention from health providers when faced with perception of reduced or excessive fetal movement. To determine if a woman has understanding of decreased or excessive fetal movement, women were asked the questions "what do you understand by: (i) Decreased fetal movement (ii) Excessive fetal movement. Based on the literature search concerning variation in normal fetal movement (decreased or excessive), decreased fetal movement mean baby could be sick,^[1] weak, inactive, reduction in average regularly perceived baby movement, or less than 10 baby movements in a day; and excessive fetal movement refer to "overactive baby" or "baby's movement exceeding maternally perceived average movement". The designation of "Correct Knowledge" is used to describe women who demonstrate any of the aforementioned components of decreased or excessive fetal movement.

Data were coded into Microsoft Excel database and exported into SPSS statistical software (SPSS Inc. version 16.0, Chicago, IL, USA) for descriptive analysis. Chi square test was used to estimate statistical differences between proportions of categorical variables as regard to 'Correct Knowledge' of decreased or excessive fetal movement. A *P* value less than 0.05 was considered statistically significant.

Results

Maternal demographic characteristics

A total of 225 women completed the survey. Most of the participants were married (96.4%) and had completed education beyond high school (86.4%). One hundred and fifty six (69.3%) of them were employed. About half of them were nulliparous (45.8%). The mean maternal age and mean gestational age at participation in the study were 29.7 years and 34 weeks, respectively.

Maternal knowledge about fetal movement in third trimester

Forty-seven percent of the women demonstrated right knowledge of decreased fetal movement, whereas 31.3% had right knowledge of excessive fetal movement. Eighty-four women (37.3%) reported the knowledge of alarm limit (fetal movements fewer than 10 in daytime period) to timely

present to a healthcare provider. Of these 84 women, about 62% (52) reported that they would seek care from health provider when the frequency of fetal movement is less than 10.

Maternal concerns about fetal movement in third trimester.

Seventy women (31.1%) expressed concerns about excessive movement of fetus and one-fifth (21.8%) were concerned about reduction in the movement of the fetus in the last trimester of pregnancy. A hundred and six expressed no concern about the movement of the fetus in the last 3 months of their pregnancy.

Information received about fetal movements in third trimester

Four-fifths (181, 80.4%) of the women recalled that their antenatal care providers routinely enquire about their perception of fetal movement at prenatal visits. The lead sources of information to women about fetal movement in the third trimester of pregnancy were doctors (120, 53.3%) and nurses (104, 46.2%). When asked about other sources of information about fetal movement, 20.8% of participants stated dieticians or community health officers/extension workers. Further, 18.2% of women reported that they only got their information about fetal movement from family or friend, internet, reading, and entertainment media.

Regarding the information on the expected pattern of frequency of fetal movement in the last trimester of pregnancy, 58% (131) reported ever receiving information from the aforementioned sources, whereas 41.7% did not. Almost half of the women (46.9%) reported their awareness that baby's movements may increase in the last three months of pregnancy. Twenty-three (10.2%) of the women reported awareness that fetal movement in the last trimester of pregnancy may remain unchanged from the preceding trimesters. Only three of the respondents understood that diminution in fetal movement might arise in the last three months of gestation.

Maternal decision-making and knowledge of adverse pregnancy outcomes following abnormality in fetal movement

Eighty-nine (39.6%) women reported that they received information from their antenatal care providers to seek immediate care when faced with variation in their perceived average fetal movement. A hundred and thirty (57.7%) women documented that they would raise alarm about their concerns of their perceived variation in the regular pattern of fetal movement in the last three months of pregnancy. About 41% (53/130) of them reported that they would only raise alarm when they perceived absent fetal movement over a period of 24 hours.

Of the total number of women who participated in the survey, only 80 (35.6%) had knowledge of at least one adverse pregnancy outcome that may arise from decreased or excessive fetal movement. Stillbirth and fetal distress were the common complications of variation from average fetal movement mentioned by 16.4% and 18.2% of women, respectively. Complications comprising cesarean delivery and preterm birth were reported by two women (0.9%) each.

The relationships of maternal demographics to Correct Knowledge of abnormality in fetal movement [Table 1].

Having tertiary education was statistically significant for Correct Knowledge of decreased fetal movement ($P = 0.026$). With regard to Correct Knowledge of excessive fetal movement, tertiary education appears to be almost statistically significant ($P = 0.052$). Other maternal demographic characteristics such as age, parity, gestational age, marital status, and employment status were not correlated with Correct Knowledge of either of the above mentioned abnormality in fetal movements.

Discussion

In this study which explored the perspective of women in the third trimester of pregnancy on in-utero fetal movement, the proportion of women who expressed concern over excessive and decreased fetal movement was 31.1% and 21.8%, respectively, suggesting that excessive movement of the fetus may give serious cause for concern to women over the safety of the fetus than diminution in fetal movement. Our results also show that women are concerned with any perceived variation in frequency of fetal movement from what they consider 'normal'.

In contrast to commonly documented evidence that diminution of gross fetal activity is suggestive of adverse pregnancy outcomes.^[9,15,18-23] Rayburn *et al.*, using data obtained from fetal movement monitoring recorded by 931 women found no link between persistent excessive fetal activity and adverse newborn or infant outcomes.^[7] In 2011, Stacey *et al.*, identified a reduced risk of late fetal death following maternal report of perceived persistent fetal hyperactivity.^[2] However, Stacey's study found a contrasting association with single episode of vigorous fetal activity.^[2] This recent study by Stacey *et al.*, demonstrated an almost 7-fold risk of late-stillbirth following maternal self-report of a single episode of extreme fetal activity. The concerns of women over fetal activity may be allayed by recommending formal fetal counting from the beginning of third trimester of gestation onwards. A multicenter, controlled trial by Saastad *et al.*, evaluating the effect of formal fetal movement monitoring on maternal concern in pregnancies beyond 28 weeks demonstrate less concern about fetal movement in women who were assigned to perform fetal movement counting.^[24]

Although, this present study demonstrates that majority of the respondents recalled that their antenatal care providers regularly asked about fetal movement at prenatal visits, there is a relative lack of knowledge about the extremes (decrease and excessive) of fetal movement in the third trimester of pregnancy. Less than half of women who participated in this study had knowledge to recognize what constitutes decreased or excessive fetal movement. The relative lack of evidence on fetal movement alarm limit, above which the risk of having adverse fetal outcome is increased, may place a restriction on the information received by pregnant women. Existing guidelines, based on the best information available, have mostly restricted advice on the identification and management of any alteration in fetal movement to reduced fetal movement.^[11,25-27]

As shown in Table 1, the association of tertiary education and Correct Knowledge of recognizing decreased fetal activity is statistically significant. A closer association between tertiary education and Correct Knowledge of identifying excessive fetal movement was also found in this present study. Although, this present study cannot demonstrate a causal relationship between maternal educational status and Correct Knowledge of variation in normal fetal movements, it is likely that the general information on fetal movement acquired by women with high education could explain why

Table 1: Relationships of maternal demographics to Correct Knowledge of abnormality in fetal movement

	Total (N=225) %	Correct Knowledge of DFM %	P value	Correct Knowledge of EFM %	P value
Gestational age (weeks)	34.2*				
<32	24.9	19.6	0.082	17.1	0.071
≥32	75.1	80.4		82.9	
Maternal age (years)	29.7*				
<35	83.6	81.3	0.387		0.173
≥35	16.4	18.7		88.6	
Parity					
Nulliparity	28.8	43.0	0.424	11.4	
Multiparity	71.2	57.0			0.572
Marital status					
Married	96.4	99.1	0.119	97.1	0.631
Single/ Separated	3.6	0.9		2.9	
Educational level: Tertiary					
Yes	86.2	91.6	0.026	92.9	0.052
No	13.8	8.4		7.1	
Employment status					
Yes	69.3	71.0	0.600	72.9	0.441
No	30.7	29.0		27.1	

DFM=Decreased fetal movement; EFM=Excessive fetal movement;
*Mean value

they may recognize excessive fetal movements compared to women with low educational status. These findings demonstrate that low maternal educational status poses potential risk of stillbirth to the unborn baby. In support of this proposition, a previous study found a strong association between low maternal education and stillbirth.^[22] The positive relationship of high maternal education status and immediate reaction to drawing attention of healthcare providers when decreased fetal movement is perceived has been documented by Berndt *et al.*^[1] The results from this recent study further demonstrate convincingly that maternal right knowledge of fetal movement, a component of “safe baby chain”, is one of the main factors that influence prompt presentation to a healthcare provider when they face a challenge of decreased fetal movement.^[1]

When asked the limit to daily fetal movement that would necessitate seeking medical advice, 37.3% of respondents reported they would seek medical evaluation for decreased fetal movement when fetal movement is less than a count of 10 in 24 hours, suggesting that education about fetal movement alarm signal needs to be incorporated into the routine information provided to pregnant women. Our findings on sources of information about fetal movement are consistent with that of Berndt *et al.*, which showed doctors and nurses at prenatal clinics to be the leading sources of information to women about fetal activity.^[1]

From the results of information acquired on the frequency of fetal movement in the third trimester of pregnancy, it is important to consider further the information available to women about what to expect regarding the frequency of fetal movement at gestation beyond the age of viability. The recall of receiving information on expectation that fetal activity should increase in the last three months of pregnancy is of deep concern in a population where women express concern about excessive fetal movement. A considerable proportion of the surveyed women had no clue of the expected normal strength and frequency of fetal movement in the last trimester of pregnancy despite the fact that any alteration in regular fetal activity may be a signal for impending stillbirth. The deeply divided evidence on the frequency of fetal movements in the last trimester of pregnancy may account for the varying responses.^[6,26,28,29]

In our study, it is surprising that more than one third (41%) of women who stated they would raise alarm when they experienced perceived alteration in fetal activity would only seek prompt evaluation after a 24 hour period of perception of absent fetal activity. The documented occurrence of 50% of cases of stillbirth in women who experienced reduction in fetal activity for over 24 hours reflects that delayed reaction to seek care until fetal movement becomes absent may be associated with higher fetal mortality rate.^[30] A plausible explanation for this poor health seeking behavior towards fetal health status may be

the low rate of information (39.6%) given to women on when to seek medical advice for perception of extremes of fetal movement. The finding of awareness of clinical significance of variation in normal fetal movement in only 35.6% of our study participants possibly provides an explanation for the delayed reaction of women to extremes of fetal activity. In our study population, only 16.4% of women were aware of the most dangerous consequence of variations in fetal movement (intrauterine fetal death). This low knowledge of impending complications emphasizes the need to increase the awareness of expectant mothers on specific poor neonatal outcome that may follow abnormal fetal movement should be an important component of education for pregnant women about reducing stillbirth.

In interpreting the results of our findings, it is important to note certain limitations in the study design. A possible weakness of this self-administered questionnaire might be the inability of women to recall exactly the information received on fetal movement. Given that over four-fifths of our respondents had tertiary education and that the questionnaires were self-administered, response bias seems to be minimal. Additionally, the lack of general consensus about what is regarded as abnormal movement limits our optimal assessment of the Correct Knowledge on identification of any alteration in regular fetal movement among study participants.^[14] Nevertheless, the conduct of the study in multi-public health facilities located in different geographical regions with varying ethnic populations, and receiving referrals from both primary and secondary health facilities may enable the generalization of these findings to a wider target population in Nigeria. Furthermore, because our study population was conducted at out-patient prenatal clinic, the possibility of selection bias from in-patient prenatal women was avoided.

This study suggests that women are concerned with any perceived alteration in fetal activity, either fetal inactivity or hyperactivity. The considerable proportion of patients who lacked knowledge of abnormal fetal activity, and expressed delay in seeking intervention when faced with perceived alteration in fetal movement reflects the need for a guideline on information and management of abnormal fetal movement in our setting to prevent avoidable stillbirth.

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