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Frequency of pathological CTG in low risk women and its outcomes

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Abstract

Introduction: Cardiotocography is the simultaneous recording of the fetal heart rate and uterine contractions and is the one of the most common diagnostic techniques to evaluate fetalwell being during pregnancy and labour.: Cardiotocography is routinely applied in high risk pregnant females for screening purposes. CTG has been shown to predict fetal asphyxia during labour.

Objective: To determine the frequency of pathological cardiotocography during labour in low risk pregnancy and the outcome of new born in terms of APGAR score , in patients admitted in the Obstetrics and Gynecology Department of Civil Hospital Karachi.

Study design: Descriptive case Series.

Setting and Duration: Department of Obstetrics and Gynecology, Dow University of Health Sciences and Civil Hospital Karachi for six-month from 1st June to 30th November 2012.

Subjects and methods: 173 low risk pregnant females were included and CTG performed during labour. Frequency of pathological cardiotocography was noted. APGAR score was calculated for the babies who were born to mothers with pathological CTG at one and five minutes.

Results: Majority of patients (30.1%) were between 36-40 years of age group with mean (+SD) age was 30.51 (+6.11) years. 6.35% of the females had pathological CTG. 18.18% of the babies born to mothers with pathological CTG had low APGAR score at five minutes.

Conclusion: The number of patients having pathological CTG in low risk pregnancies is not negligible. The babies being born to these women have a high risk of having a low APGAR score at birth.

Key words: Cardiotocography, Low risk pregnancy, APGAR score

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Introduction:

Cardiotocography (CTG), is an electronic fetal monitoring, a method employed to record the changes in the fetal heart rate and their temporal relationship to the uterine contractions.[1] Meconium staining of liquor has for long been considered as a traditional indicator of fetal distress but now a day's cardiotocography is an up to date practical method for fetal surveillance during pregnancy and labour.[2]Its introduction in the clinical routine limited the occurrence of fetal problems leading to a reduction of the precocious child mortality.[3] It is also used to detect hypoxia in fetuses as the hypoxia renders a significant threat to the fetus especially during labour and accounts for 20 to 40% of poor newborn conditions.[4,5] When used as a screening tool to detect fetal well being during labour it can thus identify possibility of fetal asphyxia which may lead to permanent neurological damage and intrapartum death.[6]

Abnormal cardiotocography is common in a variety of cases, one of them being the meconium aspiration syndrome. This syndrome is more likely to occur if the mother is a cigarette smoker, hypertensive or anaemic.[7]The pregnancies

are coded as low risk pregnancies if the mother's age is less than forty years of age, with no history of diabetes or cardiac or renal diseases or antepartum haemorrhage. Other factors that are included to classify the pregnancy as low risk are cephalic presentation, gestational age being between thirty seven to forty two weeks, spontaneous onset of labour with no use of epidural anesthesia.[4]

CTG monitoring is a primary biophysical method for assessment of a fetal state based on quantitative analysis of the biophysical signal. Although the computerized monitoring system has become a standard in clinical centers, the effective method, which could enable conclusion in clinical generation is still being searched.[5] It has been postulated that CTG in some cases leads to a an unnecessary increase in the number of caesarian sections being performed.[8]

The aim of this study was therefore to estimate the magnitude of pathological cardiotocography and low APGAR score in the newborn delivered by women with low risk pregnancy.

Operational definition

A cardiotocograph was considered pathological if any one or more of the following features were observed:

- Baseline fetal heart rate above 170 beats per minute.
- Variability of the fetal heart rate less than five beats per minute.
- Early deceleration that is a drop in base line fetal heart rate of ≥15 beats per minute for >15 seconds, occurring with uterine contractions.
- Prolonged decelerations that is a drop in the baseline fetal heart rate of 30 beats per minute lasting for at least two seconds.
- Late decelerations that is a drop in the baseline fetal heart rate of ≥ 15 beats per minute for >15 seconds, occurring after uterine contractions.

APGAR score was carried out in those babies who had pathological cardiotocography. This was calculated at one and five minutes according to the Figure 1:

Pregnancies were classified as low risk in whom the gestational age was between 37 to 42 weeks based on the dating ultrasound, parity ≤ 5, spontaneous onset of labour, cephalic presentation, age <40, no diabetes, cardiac or renal disease,and no antepartum haemorrhage.

Material and methods:

This study was conducted at Department of Obstetrics and Gynecology, Dow University of Health Sciences and Civil Hospital Karachi from 1st June to 30th November 2012. The sample size (n) was calculated to be 173 patients by non-probability purposive

Low risk females, who delivered in the obstetric ward of Civil Hospital Karachi, were selected during study period on the basis pre-determined criteria as defined in the operational definitions.

Inclusion criteria:

- All low risk pregnancies in labour.

Exclusion criteria:

- Known fetal congenital malformations.
- Patient with medical disorders like hypertension and diabetes.
- Mal-presentation.
- Multiple gestation.
- Ruptured membrane more than 24 hours.
- Intrauterine growth retardation.

A total of 173 pregnant females, who were admitted in labour; were included in the study. Informed consent was obtained from patients. The participant's detailed history was elicited regarding frequency and time of onset of contractions, the status of the amniotic membranes,if

Figure 1:

Sign	0	1	2
Heart rate	Absent	Below 100	Over 100
Respiratory effort	Absent	Slow, irregular	Good, crying
Muscle tone	Limp	Some flexion of extremities	Active motion
Response to catheter in nostril	No response	Grimace	Cough or Sneeze
Color	Blue,Pale	Body pink, extremities blue	Completely pink

An APGAR score of ≤ 7 was considered as low APGAR score.

ruptured then colour, the fetal movements, and the presence or absence of vaginal bleeding.. The gestational age was reconfirmed by ultrasound pelvis.

The progress of labour was assessed by maintenance of a partograph.. Cardiotocography was performed in every patient for 30 minutes in the left lateral position. The fetal heart transducer and the uterine pressure transducers were applied and the readings were recorded. On the criteria defined in the operational definitions, the cardiotocography was classified as pathological or non-pathological. Based on the findings of physical examination and CTG, the appropriate method of delivery was decided by the consultant , and the patient was managed accordingly. The APGAR scores were calculated at 1 and 5 minutes for the newborns who had demonstrated pathological CTGs. Final outcome was determined at 5-minutes (i.e. low APGAR score ≤7).

All the findings were entered in a predesigned proforma which included patient's demographics (name and age), gestational age (in weeks), parity status, pathological cardiotocography (yes/no), mode of delivery (vaginal/caesarean section), APGAR score, and low APGAR score (yes/no).

Confounding variables were controlled by exclusion of women having known fetal congenital malformations, women with co-morbidities like hypertension and diabetes, and women who had multiple gestations, malpresentation, ruptured membrane >24 hours and intrauterine growth retardation. Moreover, stratification was performed to control the confounders.

SPSS version 16 was used for data analysis. Mean ± standard deviation was calculated for age, parity and gestational age. Frequency and percentages were calculated for pathological cardiotocography, mode of delivery, APGAR scores at one and five-minutes, and final outcome (i.e. low APGAR score at five-minutes). Stratification was done with respect to age, parity and gestational age to control the effect modifiers.

Results:

173 females with low risk pregnancies who fulfilled the inclusion criteria were included in the study. Majority of women fifty-two females (30.1%) were between 36 to 40 years of age. Fifty-one women (29.4%) belonged to the age group of 20 to 25 years. Thirty-seven of the study participants belonged to the age group of 31 to 35 years accounting for 21.4% of the cases. Thirty-three females were of the ages between 26 to 30 years making up 19.1% of the study participants. Mean (±SD) age was 30.51(±6.11) years.

One hundred and twenty four females were multiparous accounting for 71.7% of the cases. The rest of the women 49 (28.3%) were primiparous. Mean (±SD) parity was 2.74(±1.43).

The mean (±SD) gestational age of the participants was 39.70 (±1.70) weeks. Majority of the participants had forty weeks of gestation making up 20.8% of the study population. Twenty-nine (16.7%) women were 37 weeks pregnant, eighteen (10.4%) were 38 weeks pregnant, thirty-five (14.5%) 39 weeks, thirty-four (19.7%) 41 weeks and thirty-one (17.9%) females were 42 weeks pregnant.

A total of one hundred and seven (61.8%) women had normal vaginal deliveries. Sixty six (38.2%) had to undergo a caesarian section . (Table 1)

Out of 173, eleven patients (6.35%) had pathological cardiotocography. The rest of the participants that is one hundred and sixty two women (93.65%) had normal cardiotocographs. (Figure 2)

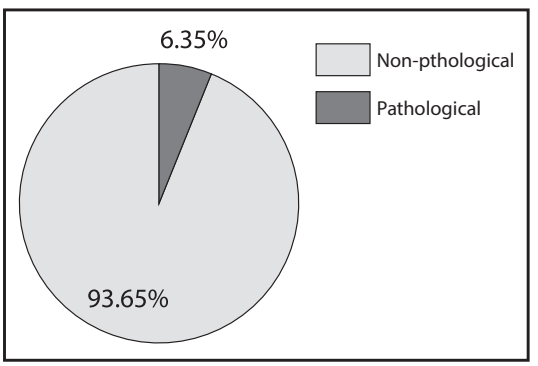

Figure 2: *Cardiotocography (n=173)*

Table 1: *Demographic data (n=173)*

	Frequency	Percentage (%)
Age (Years)		
20-25	51	29.4
26-30	33	19.1
31-35	37	21.4
36-40	52	30.1
Parity		
Primipara	49	28.30%
Multipara	124	71.40%
Gestational Age		
37-39	72	41.6%
40	36	26.6%
41-42	65	36.5%
Mode of delivery		
Vaginal	107	61.8%
Caesarean	66	38.2%

Table 2: *Frequency of Apgar score with pathological cardiotocography (n=11)*

	Frequency	Percentage (%)
APGAR score at one minute		
<7	07	3.6
>7	04	36.4
APGAR score at five minute		
<7	02	18.18
>7	09	81.82

Table 3: *Demographic relationship to low agpgar score at 5-minutes (n=11)*

	Low Apgar at 5 minutes	
	Yes	No
Age (Years)		
20-25	0 (0)	0 (0)
26-30	0 (0)	02 (100)
31-35	01 (20)	04 (80)
36-40	01 (25)	03 (75)
Parity		
1,3	0	4
2,4	1	0
5	1	
Gestational age (weeks)		
37	0(0)	03(100)
38	0(0)	0(0)
39	0(0)	01(100)
40	1(20)	04(80)
41	1(50)	01(50)
42	0(0)	0(0)

Data is shown in numbers followed by percentages in parentheses

Out of eleven (6.35%) babies born with pathological cardiotocography, seven (63.6%) had APGAR ≤7 at one minute. The rest of the babies (36.4%) had APGAR score of 8 at one minute. Two babies (18.18%) had APGAR ≤7 and nine (81.82%) had APGAR score of >7 at five minutes. (Table 2)

Table 3 demonstrate the relationship of age, parity, and gestational age with regards to low APGAR score at five-minutes.

Discussion:

It is a common concept that the frequency of abnormal CTG is higher in patients who are already classified as to be high risk pregnancy, however reported frequency of abnormal CTG even in low risk pregnancies is around 7.8%.[8] Though this frequency is considerably lower than that observed in the high risk pregnancy group which is 22.8%, the fact is that fetuses with abnormal CTG have a 2.3 times higher chance to develop cerebral palsy than those fetuses which had a normal CTG.[4] The risk of perinatal death is even higher as the abnormal CTG population has a 6.7 times higher chance of death than the fetuses born with the normal CTG.

The current study reveals that the frequency of pathological cardiotocography in low risk pregnant females was 6.35%and 18.18% of babies born to these mothers had low APGAR score of ≤7 A probable reason is the ability of the cardiotocograph to indicate the intrapartum fetal hypoxia which is usually implicated as the cause for low birth APGAR score.

Sheikh et al[8] in their study, co related the APGAR score of the babies born with abnormal CTG's. They reported the APGAR score of less than 7 at one minute in 64.15% of the cases. This score after five minutes, stayed at less than 7 in 18.86% of the cases, while in the rest it either improved or remained at 7. CTG as a routine measure is still applied only patients with high risk pregnancies. As the risk of the babies who are born with abnormal CTG develop cerebral palsy and even death is considerably higher; and the fact that even patients with low risk preg-

nancies have a risk of 7.8% to have an abnormal CTG, there is a need to routinely apply CTG even in patients of low risk pregnancy.

Accurate monitoring of fetal well being is one of the most important components of prenatal care. The ramifications of fetal compromise have both short and long term sequelae for early neonatal life and beyond. However, application of cardiotocography is not usually employed in low risk pregnancy females. The prevalence of pathological CTG in low risk pregnancies have been found to be 7.8%[4]Sheikh et al[8] in their study demonstrated that the babies born to mothers with pathological CTG, had a APGAR score of seven or less in 18.86% of the cases.

The average age of the patients enrolled in this study was 30.51 years.The study reveals that 51.4% of the patients belonged to the age group of 31 to 40 years. This observation is comparable to the observations of Khattak et al[9], who in their study of over five thousand patients reported that 51.94% of patients belonged to this age group.

Wang and associates[10], in their study of 301 patients, noticed that 61.1% of the patients enrolled in their study, underwent normal vaginal delivery, whereas 38.9% of the females had cesarean section. Sheikh[11] in her study reported that 78.9% of the patients had given birth through normal vaginal delivery. Also Khursheed and colleagues[12] noted that 62.57% of the patients delivered vaginally.

In this study out of one hundred and seventy three patients with low risk pregnancies, a total of eleven females (6.35%) had pathological cardiotocography. Khursheedet al[12] in their study reported this prevalence to be 11%. In contrast, Breuker and associates[13] reported a prevalence of pathological CTG amongst low risk pregnancy females to be 3.1%.

Out of the eleven babies born to these females with pathological cardiotocographs, seven (63.6%) had low APGAR score at one minute. This is highly comparable to the frequency observed in the study conducted by Berglund Sand colleagues[14], who reported this frequency to be 60.4%.

The number of babies who had persistent low APGAR score at five minutes were two (18.18%) in our study. Berglund Sand colleagues[14] found this prevalence to be 25.6% which is comparable to this study. Sheikh et al[8], too found the frequency to be 18.86% which is highly comparable with this study.

The main limiting factor of this study was the comparative lesser sample size especially in respect to the number of babies born with pathological cardiotocography. In this study the number of such babies was only eleven. Comparable studies conducted by Berglund et al[14] had more than 300 patients included. Despite this limitation, the overall frequencies observed were comparable to other studies. Evaluating the results seen in this study, it can be interpreted that CTG is an effective screening tool to predict the possibility of low APGAR scores in the new born. Kapidzicet al[15] were also of the same opinion after evaluation of the results observed in their study.

Conclusion:

In summary, the number of women having pathological CTG in low risk pregnancies is not negligible. The babies being born to these women also have a risk of having a low APGAR score at birth. Therefore CTG should be routinely used for screening low risk pregnant females for timely evaluation of fetal compromise during labour so that appropriate measures can be undertaken in time to avoid morbidity.

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