Rates and indicators of Continuous Electronic fetal monitoring - A study from Saudi Arabia

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Background: This observational study aimed to describe the rates and indicators for continuous electronic fetal monitoring (EFM) during normal labour and to compare them between women who have had one pregnancy (PG) and women who have already delivered two or more children (G2 and above).

Methods: The study was conducted at Mother and Child Hospital, Buraidah from July-Sept, 2013 as a descriptive cross sectional study.

Results: Seventy four percent of labouring women had EFM and 25.7% had intermittent auscultation. Amongst the EFM group 62% were Primigravidas and 37.9% were multigravidas. When compared between PG and multigravidas, maconium staining (14.18vs 1.22, p value=0.001), maternal concerns for fetal heart rate (14.93 vs 6.10 p value=0.049), and syntocinon usage (14.18 vs 2.44 p value=0.005) were significantly prominent indications for Primigravidas. However trial of scar (0.00vs 15.85 p value <0.001) and associated medical problems (6.72 vs 19.51 p value 0.004) were the most frequent indications for G2 and above. For a large population of women including 13 PG and 18 Multigravidas (Overall 14.3%) there was no particular indication assigned for EFM and this was more frequent amongst Gravida2 and above (P < 0.013).

Conclusion: Electronic fetal monitoring is a very common obstetric intervention. It remains a challenge to review its rates and indications in order to identify areas that needs improvement.

Key Words: Electronic fetal monitoring, Primigravida, labour, Saudi Arabia

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Introduction

Electronic fetal monitoring or Cardiotocography (CTG) is a method of recording the fetal heart rate via an ultrasound transducer through maternal abdomen. [1] It was introduced to reduce the incidence of intrapartum fetal hypoxia however there are limitations to its reproducibility as well as interpretations. [2] Although this intervention has helped to reduce the rate of neonatal seizures but at the cost of increased operative vaginal delivery and cesarean section. [3] In more than 50% cases of pathological or suspicious CTG there is no clinical evidence of fetal hypoxia therefore necessitating the concomitant use of some biochemical method along with it. [4] This leads to another intervention indeed. Canadian Society of Obstetricians and Gynecologists reviewed the randomized controlled trials from 1995-2002 and reached at the conclusion that intermittent fetal heart rate auscultation should be the first option for fetal well- being assessment in healthy pregnancies and continuous fetal monitoring should be limited for high risk pregnancies in which risk of perinatal death is high. [5] Based on randomized controlled trials continuous EFM can be recommended in women who have antenatal and intrapartum risk factors (like post maturity, induction of labour, oxytocin augmentation of labour) however as its interpretation is subjective and increases the risk of operative delivery women should be allowed to make informed decision on the type of fetal monitoring in low risk labours. [6] Thus, the present study was conducted to identify rates and indications for EFM in order to identify areas of good practice and areas that need improvement.

Methods

The study was conducted from July 2013-Sept 2013 as a descriptive cross sectional study at Mother Child Hospital, Buraidah. A self-structured proforma was used to collect the data. Mother Child Hospital, Buraidah is a major tertiary care facility in the region with annual delivery rate of 10,000. Normal delivery rate is 70% however 30% undergone cesarean section. All women undergoing normal vaginal delivery between 37-40 weeks of gestation were included in the study and electronic fetal monitoring (EFM or CTG/Cardiotocography) was considered as an obstetrical intervention. Sample size of 291 women had a 95% confidence level and a confidence interval of 5. The study aimed to find out the rates of electronic fetal monitoring in the study population, along with their indications. The intervention rates were compared between Primigravidas and Gravida two or above. Data was kept anonymous for privacy. The Statistical Package for the Social Sciences (SPSS) 22 was used to conduct proportion z-tests to determine if any significant differences existed between women who have had one pregnancy (PG) and women who have already delivered two or more children (G2 and above) as regards indications of EFM. That is, for each intervention, several indicators were examined to determine if the frequency of occurrence was different between gravidity groups. P values less than 0.05 was considered as significant.

Results

Most of the participants 125 (42.95%) were between 20-35 years of age, 120 (41.23%) had education level either primary or below, 169 (58.07%) were Primigravidas (Table 1). Seventy four percent had EFM and 25.7% had intermittent auscultation. Amongst the EFM group Sixty two percents were Primigravidas and 37.9% were multigravidas. (Table 1)

Table 1

Count and Percent Statistics for Demographic Variables

Variable	Level	Frequency	Percent
Age	Below 25	65	22.33
	25-30	125	42.95
	Above 30	101	34.70

		291	
Education	Primary or below	120	41.23
	High School	102	35.05
	College and above	69	23.71
		291	
Method of monitoring of Fetal heart rate	Intermittent auscultation	75	25.77
	EFM	216	74.22
		291	
Occupation	House wife	201	69.07
	Professional	90	30.92
		291	
Parity	Primiparous	169	58.07
	G2 and above	122	41.92
		291	
EFM	PG	134	62.03
	G2 and above	82	37.96
		216	

***EFM=Electronic fetal monitoring (CTG or Cardiotocography)**

Indications of EFM

Proportion z-tests were conducted to determine if any significant differences in indications of electronic fetal monitoring (EFM) existed between gravidity groups (PG and G2 and above). The indications of EFM included induction of labour, concern about fetal heart rate, prematurity, epidural, maconium stained liquor, syntocinon, trial of scar, malpresentation, associated medical problems, reduced fetal movements, Antepartum hemorrhage (APH), post maturity, and unable to ascertain reason. Since this analysis examines indications of EFM, participants that reported having intermittent auscultation were removed from the analysis. Thus, there were a total of 134 PG participants and 82 G2 and above participants used in the analysis.

As displayed in Table 2, the most frequent indication of EFM was concern for fetal heart rate for PG participants (n = 20) and the most frequent indication for G2 and above participants was associated medical problems (n = 16). The lowest frequencies of indication for PG were trial of scar (n = 0) and epidural (n = 1). Whereas the lowest frequency of indications of EFM for the G2 and above group were prematurity, epidural, maconium stained liquor, and reduced fetal movements (n = 1 for all). Lastly, there were 13 PG and 18 G2 and above participants where no reason was ascertained. See Table 2 for details of the cross tabulation of gravidity groups and indications of EFM.

Table 2

Cross Tabulation of Gravidity Groups and Indications of EFM

Indications of EFM	PG	G2 and above	Total
Induction of labour	12	5	17
Concern about fetal heart rate	20	5	25
Prematurity	5	1	6
Epidural	1	1	2
Maconium stained liquor	19	1	20
Syntocinon	19	2	21
Trial of scar	0	13	13

Malpresentation	9	12	21
Associated medical problems	9	16	25
Reduced fetal movements	12	1	13
APH	10	5	15
Post maturity	5	2	7
Unable to ascertain reason	13	18	31
Total	**134**	**82**	**216**

Results from the proportions tests revealed that there were several significant differences between gravidity groups on indications of EFM. That is, significant differences occurred on seven indications of EFM: concern about fetal heart rate (p = .049), maconium stained liquor (p = .001), syntocinon (p = .005), trial of scar (p < .001), associated medical problems (p = .004), reduced fetal movements (p = .020), and unable to ascertain reason (p = .013). Specifically, PG participants experienced concern about fetal heart rate (20 of 134 = 14.93%) significantly more often than G2 and above participants (5 of 82 = 6.10%); PG participants experienced maconium stained liquor (19 of 134 = 14.18%) significantly more often than G2 and above participants (1 of 82 = 1.22%); PG participants experienced syntocinon (19 of 134 = 14.18%) significantly more often than G2 and above participants (2 of 82 = 2.44%); and PG participants experienced reduced fetal movements (12 of 134 = 8.96%) significantly more often than G2 and above participants (1 of 82 = 1.22%). Reversely, G2 and above participants experienced trial of scar (13 of 82 = 15.85%) significantly more often than PG participants (0 of 134 = 0.00%); G2 and above participants experienced associated medical problems (16 of 82 = 19.51%) significantly more often than PG participants (9 of 134 = 6.72%); and G2 and above participants had an EFM conducted for no ascertainable reason (18 of 82 = 21.95%) significantly more often than PG participants (13 of 134 = 9.70). A summary of the proportions z-tests is displayed in Table 3.

Table 3

Summary of Proportion z-Tests on Indications of EFM by Gravidity Groups

Proportions (%)

Indications of EFM	PG (I)	G2 and above (J)	Difference (I-J)	*Z*	Probability (2-tailed)
Induction of labour	8.96	6.10	2.86	0.757	0.449
Concern about fetal heart rate	14.93	6.10	8.83	1.968	0.049
Prematurity	3.73	1.22	2.51	1.090	0.276
Epidural	0.75	1.22	-0.47	-0.352	0.726
Maconium stained liquor	14.18	1.22	12.96	3.189	0.001
Syntocinon	14.18	2.44	11.74	2.826	0.005
Trial of scar	0.00	15.85	-15.85	-4.754	<0 .001
Malpresentation	6.72	14.63	-7.92	-1.906	0.057
Associated medical problems	6.72	19.51	-12.80	-2.853	0.004
Reduced fetal movements	8.96	1.22	7.74	2.320	0.020
Ante Partum Hemorrhage	7.46	6.10	1.37	0.383	0.702
Postmaturity	3.73	2.44	1.29	0.521	0.603
Unable to ascertain reason	9.70	21.95	-12.25	-2.492	0.013

Discussion

Electronic fetal monitoring is a very common obstetric intervention in labour. However its routine use has been the subject of debate as evidence of benefit for the neonate is small but operative delivery risk is high. [7, 8] It was observed in this study that 74% of women had EFM and only 25.75 had intermittent auscultation. Out of the EFM Sixty two percents were Primigravidas and 37.9% were multigravidas. When compared between PG and multigravidas women's concern about fetal heart rate (14.93 vs 6.10 P value 0.049), reduced fetal movements (8.96 vs 1.22 p value 0.020), maconium stained liquor (14.18 vs 1.22 P 0.001) and Syntocinon usage (14.18 vs 2.44 P value 0.005) were significantly prominent indications for Primigravidas. Trial of scar (0.00 vs 15.85 p value <0.001) and associated medical problems (6.72 vs 19.51 p value 0.004 were the leading indications for G2 and above women. Indication "trial of scar" should be excluded from comparison as PG cannot be a candidate for this indication.

For a large population of women including 13 PG and 18 Multigravidas (Overall 14.3%) there was no particular indication assigned for EFM and significant portion was falling in Gravida2 and above (P < 0.013).

Literature review reveals that women during labour who had admission CTG as compared to intermittent auscultation had high risk of cesarean section (risk ratio (RR) 1.20, 95% confidence interval (CI) 1.00 to 1.44, four trials, 11,338 women, $T^2 = 0.00$, $I^2 = 0\%$)[9]. EFM if compared with intermittent auscultation does not improve the perinatal mortality rate, (risk ratio (RR) 0.86, 95% confidence interval (CI) 0.59 to 1.23, n = 33,513, 11 trials), results in no effect on cerebral palsy (RR 1.75, 95% CI 0.84 to 3.63, n = 13,252, two trials), and results in 50% reduction in neonatal seizures (RR 0.50, 95% CI 0.31 to 0.80, n = 32,386, nine trials). At the same time the rate of cesarean section is increased (RR 1.63, 95% CI 1.29 to 2.07, n = 18,861, 11 trials) as well as instrumental delivery rates is increased (RR 1.15, 95% CI 1.01 to 1.33, n = 18,615, 10 trials). [10, 11]

Continuous electronic fetal monitoring places economic burden on an already busy labour ward and sometimes is not available in developing countries for all women. Therefore Rehman et al offered admission cardiotocography as a screening tool for high risk women and offer continuous EFM only to those who had non reassuring admission CTG. [12]

Therefore it's an established fact that benefit of continuous EFM is little and at the cost of increased risk of operative delivery. It is a big challenge to review the indications for this obstetric intervention so that it should be used where it is really useful. At the same time without compromising its effectiveness we can try our best not to increase the risk of operative delivery. Hence, normal labour can be kept normal with minimum intervention.

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