Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i4.5441

IMPACT OF MEDICAL PROFESSIONAL TRAINING ON PRENATAL ASPHYXIA: A PRE AND POST TRAINING SINGLE CENTER RESEARCH.

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ABSTRACT

Background: Birth asphyxia is a damage to the fetus or neonate that is brought on by insufficient or ineffective breathing, which lowers the amount of oxygen that reaches many organs. The World Health Organization estimates that birth asphyxia results in 4 million deaths annually, or 38% of all deaths in children under the age of five. Birth asphyxia accounted for 23% of all newborn deaths in low-income countries:

Objective: To determine impact of medical professional training on prenatal asphyxia

Study design: A retrospective comparative study.

Place and Duration: This study was conducted in Liaquat University of Medical and Health Sciences Jamshoro from November 2022 to November 2023

Methodology: A single center pre and post training study was conducted retrospectively to compare the pre and post training of CTG interpretation after the ethical approval. The inclusion criteria for the blood pH below 7.0 of the neonates at first hour after the birth and APGAR score less than 7 at 5 minutes of life however, neonates with prenatally diagnosed chromosomal anomalies, multiple pregnancies and preterm births were excluded from the study.

Results: There were 48(2.63%) and 74(3.38%) cases of birth asphyxia (BA) out of 1822 and 2187 total registered cases in Pre and Post training groups The highest proportion of cases of BA (56.25% and 58.11%) was observed in age group 20 to 34 years , there were 4(8.33%) and 9(12.16%) deaths in pre and post groups respectively.

Conclusion: Between the "pre and post training" groups, there was no discernible change. Perpartum asphyxia has been shown to be avoidable when obstetricians and midwives in delivery rooms underwent CTG analysis training.

Keywords: Neonatal Morbidity, Perinatal Asphyxia, Training, CTG

INTRODUCTION

Although the true definition is unclear, birth asphyxia is an injury to the fetus or neonate caused by a failure to breathe or inefficient breathing, resulting in reduced oxygen perfusion to numerous organs. According to the World Health Organization, birth asphyxia causes 4 million fatalities per year, accounting for 38% of all deaths among children under the age of five years. In low-income nations, birth asphyxia caused 23% of all newborn fatalities [1]. According to a report published by WHO in 2005, it is also one of the top causes of newborn mortality within the first week of life [2].

In addition to causing long-term neurological damage and impairment, it is strongly connected to 1.1 million intrapartum stillbirths [3]. Perinatal asphyxia can result from a number of factors. Severe birth asphyxia is defined by the WHO classification of disorders ICD10 as an Apgar score of 0-3, measured at one minute of life. If the Apgar score at one minute is between 4 and 7, it indicates mild to moderate birth asphyxia. [4].

The primary basis for acidosis risk screening is the analysis and interpretation of cardiotocography (CTG) data acquired during childbirth. However, with a high proportion of false positives, this tool—which is considered the first-line surveillance assessment—is a poor predictor of fetal hypoxia and metabolic acidosis. [5]. Aside from the method's limited specificity, which can lead to an increase in needless procedures like as caesarean section or instrumental births [5], numerous writers highlight the difficulties in analyzing the tracing due to substantial inter- and intra-observer variability [6].

To address this issue, various guidelines for CTG interpretation have been published, the most recent being that of the National Institute for Health and Care Excellence, which was released in 2014 and amended in 2017 [7]. In 2007, the French National College of Obstetricians and Gynecologists (CNGOF) issued clinical practice recommendations for fetal monitoring during labour, which resulted in the standardization of CTG visual analysis for all French perinatal practitioners [8]. The CNGOF recommends a systematic strategy that standardizes the CTG description, classifies anomalies with five degrees of acidosis risk, and proposes a therapeutic protocol based on risk level [8].

Training in CTG analysis and interpretation seems to increase health workers' expertise in this area; however, the influence of CTG interpretation training on newborn outcomes has yet to be determined [9-13].

The aim of the present study was to assess the impact of the training learning training on the rate of avoidable perinatal asphyxia in neonates.

Methodology

A single center pre and post training study was conducted retrospectively to compare the pre and post training of CTG interpretation after the ethical approval. All the working staff including the doctors and supporting staff were made pat of the study after attending the training for interpretation of CTG. The CTG training was according to the CTG training Design created in Sweden by the Neoventa Medical© group [14]

The “pre” group of neonates was structured with data obtained from the hospital record. The “post” group was structured after the training. For both pre and post training, that data was obtained from the hospital records of mothers delivering singleton neonates with term pregnancy at the Gyn and Obs wards. The inclusion criteria for the blood pH below 7.0 of the neonate at first hour after the birth and APGAR score less than 7 at 5 minutes of life however, neonates with prenatally diagnosed chromosomal anomalies among neonates, multiple pregnancies and preterm births were excluded from the study. Data was obtained from the hospital record, which included history of neonate, maternal pregnancy, follow-up of labour and analysis of CTG training by doctors and staff.

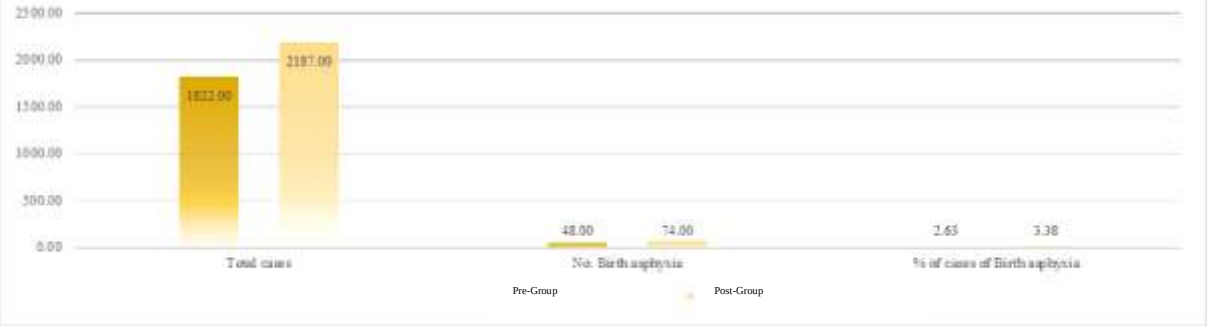
Data Analysis

During the pre and post training period, each case was carefully examined by a doctor and staff member in order to include the case in the study or not. We used t-test and chi-squared to evaluate the comparison between the variables. A P value less than 0.05 was considered statistically significant. The analysis was performed using SPSS version 26.

RESULTS

In the present study, there were 48(2.63%) and 74(3.38%) cases of birth asphyxia out of 1822 and 2187 total registered cases in Pre and Post training groups. (As shown in Fig I)

FIG I. FREQUENCY AND PERCENTAGE OF CASES OF BIRTH ASPHYXIA AMONG TOTAL REGISTERED CASES



The infants with birth asphyxia in pre and post training groups differed in maternal age, Time between Indication and C Section, Gestational age and parity. The highest proportion of cases of BA (56.25% and 58.11%) was observed in age group 20 to 34 years in pre and post training groups respectively. Most of the cases of BA belonged to those whose C section was performed within 20 – 30 minutes of planned for c section in pre training group 58.33%. More than 4/5th of the cases reported at the gestational between 37 weeks to ≦ 41 in either groups. Overall 77.08% and 40.54% of the cases were primiparous in pre and post training group respectively. (As shown in Table I)

Table I: Characteristics of mother and neonate in pre and post groups of training program in cardiotocography interpretation for midwives and obstetricians.

Variable	Pre-Group n=48		Post-Group n =74		P value
	n	%	n	%	
Maternal age (years)	n	%	n	%	
< 20	3	6.25	4	5.41	
20–34	27	56.25	43	58.11	
35–39	11	22.92	18	24.32	0.32
40–44	5	10.42	7	9.46	
> 45	2	4.17	2	2.70	
Time between Indication and C Section (min)					
< 20	17	35.42	62	83.78	0.89
20–30	28	58.33	8	10.81	
> 30	3	6.25	4	5.41	
Gestational age					

37< weeks of amenorrhea ≦ 41	41	85.42	61	82.43	0.35
41< weeks of amenorrhea ≦ 42	7	14.58	13	17.57	
Parity					
Primiparous	37	77.08	30	40.54	0.04
Multiparous	11	22.92	44	59.46	

The clinical characteristics revealed that there were 4(8.33%) and 9(12.16%) deaths in pre and post training groups respectively , The arterial pH was below 6.8 among 6.25% and 8.11% cases in pre and post training groups respectively. APGAR score in 5 minutes was below 3 in 10.42 and 12.16 cases in pre and post training groups respectively. In terms of hospitalization, the Most of the cases (47.92 % and 55.41%) were referred to Neonatal ICU in pre and post training groups respectively. (As shown in Table II)

Table II The Clinical Characteristics of Newborns with Perinatal Asphyxia.

Variables	Pre-Group n=48		Post-Group n =74		P value
	n	%	n	%	
Total cases	1822.00		2187.00		
Newborns with perinatal asphyxia	48	2.63	74	3.38	0.23
Arterial umbilical cord pH					
below 6.8	3	6.25	6	8.11	0.08
pH 6.8 to 6.9	6	12.50	13	17.57	
pH 6.9 to 6.95	17	35.42	23	31.08	
pH 6.95–7	22	45.83	32	43.24	
5-min Apgar score, n (%)					
Below 3	5	10.42	9	12.16	0.47
Between 3 to 7	18	37.50	21	28.38	
7	25	52.08	44	59.46	
Neonatal deaths	4	8.33	9	12.16	0.06
Hospitalization and transfer					
Hospitalized	20	41.67	26	35.14	0.71
Referred to Neonatal ward	5	10.42	7	9.46	
Referred to Neonatal ICU	23	47.92	41	55.41	

The table III depicts the evaluation of the suitability of provided care aspects in in obstetrics, anesthetics and pediatrics settings. The obstetrical evaluation was optimal in 39.58% and 59.46% cases in pre and post training groups respectively, similarly the optimal care was higher in post groups in terms pediatric settings, antenatal surveillance and analysis and interpretation of CTG. However, the p value didn't reveal any significant association.

Table III Comparison of Suboptimal care Identified in Avoidable Perinatal Asphyxia Cases.

Provided Care	Pre-Group n=48		Post-Group n =74		P value
	n	%	n	%	
Obstetrical					
Optimal	19	39.58	44	59.46	0.07
Non-optimal	28	58.33	28	37.84	
Conclusion not established	1	2.08	2	2.70	
Not applicable	0	0.00	0	0.00	
For antenatal surveillance		0.00		0.00	
Optimal	29	60.42	52	70.27	0.12
Non-optimal	9	18.75	12	16.22	
Conclusion not established	2	4.17	1	1.35	
Not applicable	8	16.67	9	12.16	
Pediatrics					
Optimal	37	77.08	61	82.43	
Non-optimal	8	16.67	11	14.86	0.23
Conclusion not established	2	4.17	1	1.35	
Not applicable	1	2.08	1	1.35	
For the analysis and interpretation of CTG					
Optimal	15	31.25	44	59.46	
Non-optimal	30	62.50	28	37.84	0.10
Conclusion not established	2	4.17	2	2.70	
Not applicable	1	2.08	0	0.00	

DISCUSSION

In the present study we found no difference in the prevalence of per-partum asphyxia deemed preventable following a training Programme that included CTG training. The proportion of inadequate treatments that may have led to prenatal asphyxia was similar before and after training. According to the specialists who evaluated the avoidability, mistakes in CTG processing and interpretation were among the primary suboptimal treatments found as leading to neonatal hypoxia, which was judged preventable in both periods despite training.

In the present study, there were 48(2.63%) and 74(3.38%) cases of birth asphyxia out of 1822 and 2187 total registered cases in Pre and Post training groups. These results are somewhat higher than those reported in earlier research [1, 15, 16].

In our study, the highest proportion of cases of BA (56.25% and 58.11%) was observed in age group 20 to 34 years in pre and post training groups respectively. Most of the cases of BA belonged to those whose C section was performed within 20 – 30 minutes of planned for c section in pre group 58.33%, which reveals no any significant difference in pre and post training groups.

Moreover in our results, The clinical characteristics revealed that there were 4(8.33%) and 9(12.16%) deaths in pre and post training groups respectively , The arterial pH was below 6.8 among 6.25% and 8.11% cases in pre and post training groups respectively. APGAR score in 5 minutes was below 3 in 10.42% and 12.16% cases in pre and post training groups respectively. This once again did not demonstrate the significant difference in both study groups. Contrary to our results where there is minimum impact of training on outcomes, one idea is that staff will adopt the training based on the number of individuals trained and how it will be implemented. According to a research conducted by Carbonne et al. [12], time spent on the e-learning platform appears to be a crucial parameter for determining the success of training. The authors demonstrated that an e-learning Programme would be suitable for increasing midwives' and obstetrician-gynecologists' understanding of CTG analysis.

In our study, optimal care was higher in post groups in terms pediatric settings, antenatal surveillance and analysis and interpretation of CTG. However, the p value did not reveal any significant association. In contrast, one study found that training improved clinical results. Draycott et al. [17] investigated a traditional training Programme for managing obstetrical crises that included lectures, workshops, and practical training and discovered that it was related with a substantial reduction in low 5 minute Apgar scores and hypoxic ischemic encephalopathy.

Where as in our study, most of the variables did not show any significant association of the training on outcomes however giving only a single exposure of the training to doctors and staff might be a limitation in this regard since A comprehensive evaluation by Pehrson et al. [18] suggests that CTG training programs should be repeated every 6 months to prevent knowledge loss. Repeating the examinations might increase information retention in the long term [19].

CONCLUSION

We found no significant difference between the "pre and post training" groups. The occurrence of infant peripartum asphyxia is deemed preventable following a CTG analysis training Programme for obstetricians and midwives working in delivery rooms. Furthermore, we found no reduction in mistakes in CTG analysis and interpretation across the two periods.

FUNDING SOURCE

No funding source

CONFLICT OF INTEREST

None

APPROVAL

It was taken from the review committee

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