

Assessment of early perinatal outcome of cases for whom cesarean delivery is done for clinical diagnosis of non-reassuring fetal heart rate pattern in Jimma University Specialized Hospital, Southwest Ethiopia.

BY

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Abstract

Background: NRFHRP is one of the most common indications for cesarean delivery yet most of fetus have good outcome in most of study's.

Objective: *To determine early perinatal outcome and associated factors with the clinical diagnosis of NRFHRP*

Design: *A hospital based prospective, cohort study.*

Setting: *Jimma University specialized hospital.*

Subjects: *59 pregnant women with clinical diagnosis of NRFHRP for whom cesarean section is done compared with 59 pregnant women without the diagnosis of NRFHRP for whom cesarean section is done.*

Result: *Low APGAR score at 1st minute is noted 64.4% newborn with clinical diagnosis of NRFHRP compared with 22% without clinical diagnosis of NRFHRP. The risk of having low 1st minute APGAR score in newborn with clinical diagnosis of NRFHRP is 2.7*that of new born without NRFHRP. The adjusted RR after correcting for confounder is (ARR=2.72, 95% CI=1.64-4.44, P=0.0001). Similarly low 5th minute APGAR score is noted in 25.4% newborn with clinical diagnosis of NRFHRP as compare to only 3.4% of new born without clinical diagnosis of NRFHRP. So the risk of having low 5th minute APGAR score in new born with clinical diagnosis of NRFHRP is 6.9*higher than those without NRFHRP. (ARR=6.9, 95%CI=1.66-29.41, P=0.008). 42.4%of newborn with clinical diagnosis NRFHRP are admitted to NICU and treated while only 22.01% of those without NRFHRP. So newborn with clinical diagnosis of NRFHRP have 1.9* risk of admission to NICU than those without NRFHP. (RR=1.92, 95%CI=1.09-3.38, P=0.019). But after adjusting it for confounders the RR is 1.74 (RR=1.74, 95%CI=0.97-3.13, P=0.061).*

Conclusion: *The result found in this study showed that clinical diagnosis of NRFHRP have strong risk of having low 1st and 5th minute APGAR score. So clinical diagnosis of NRFHRP is valuable in identifying fetus in need of expedited delivery.*

Key word: *NRFHRP, APGAR score, NICU admission, neonatal resuscitation.*

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Acronyms

ACOG	American College of Obstetricians And Gynecologists
AFSL	Active First Stage of Labor
C/S	Cesarean Section
CPD	Cephalo-Pelvic Disproportion
DHS	Demographic and Health Survey
EONS	Early Onset Neonatal Sepsis
ENND	Early Neonatal Death
NICU	Neonatal Intensive Unit
JUSH	Jimma University Specialized Hospital
LFSL	Latent First Stage of Labor
MSAF	Meconium Stained Amniotic Fluid
NIH	National Institute of Health
NRFHRP	Non-Reassuring Fetal Heart Rate Pattern
SPSS	Statistical Package of Social Science
WHO	World Health Organization

CHAPTER ONE: INTRODUCTION

1.1 Background

Uncertainty about the diagnosis based on interpretation of fetal heart rate patterns has given rise to descriptions such as reassuring or non-reassuring. The term “reassuring” suggests a restoration of confidence by a particular pattern, whereas “non-reassuring” suggests inability to remove doubt. These patterns during labor are dynamic such that they can rapidly change from reassuring to non-reassuring and vice versa. In this situation, obstetricians experience surge of both confidence and doubt (1).

A normal FHR pattern is reassuring, when obtained by careful auscultation or electronic monitoring and is nearly associated with newborn that is vigorous at birth. Therefore the terminology of reassuring implies that in the absence of patterns defined as non-reassuring, the fetus can be assumed with a great deal of reliability to have normal oxygen and acid base status(2).

Conversely, non-reassuring patterns are quite non-specific and cannot reliably predict whether a fetus will be well oxygenated, depressed or acidotic. However factors other than hypoxia may lead to a non-reassuring fetal heart rate (FHR). In addition an abnormal FHR pattern associated with hypoxia may neither depict the severity of hypoxia nor predict how it will progress if labor is allowed to proceed (2).

Fetal distress may be defined as a physiological state in which there is metabolic acidosis secondary to hypoxia. It is brought about by factors that cause umbilical cord compression or impair gaseous exchange between the placenta and maternal circulation. Clinically, it is characterized by abnormal fetal heart rate and rhythm, passage of meconium into amniotic fluid, and decreased fetal movements. When fetal distress occurs in the presence of meconium in the amniotic fluid, the risk of newborn respiratory depression, morbidity and mortality are greater than if the meconium is not present (8,9).

Fetal heart rate monitoring can be performed by regular auscultation with a fetoscope, pinard or hand-held Doppler (intermittent auscultation (IA)) or by continuous electronic fetal monitoring (EFM) by cardiotocograph (CTG). The aim of fetal heart monitoring is to prevent

adverse perinatal outcome by identifying fetuses with metabolic acidosis/cerebral hypoxia at a point when the process is reversible by appropriate intervention(3).

Known obstetric conditions, such as hypertensive disease, fetal growth restriction, and preterm birth; predispose fetuses to poor outcome, but they account for a fraction of asphyxial injury. In a study of term pregnancies with fetal asphyxia, 63% had no known risk factor(3).

Monitoring the FHR is a modality intended to determine if a fetus is well oxygenated because the brain modulate the heart rate. It was used among 45% of parturient in 1980, 74% in 1992, and 85% in 2002. Despite the frequency of its use, issues with EFM include poor inter-observer and intra-observer reliability, uncertain efficacy and a high false- positive rate. Fetal heart rate monitoring may be performed externally or internally. Most external monitors use a Doppler device with computerized logic to interpret and count the Doppler signals. Internal FHR monitoring is accomplished with a fetal electrode, which a spiral wire placed directly on the fetal scalp or other is presenting part (3).

Intermittent auscultation (IA) is an appropriate method of intra-partum fetal monitoring in women without recognized risk factor. Intermittent auscultation is a listening and counting method and the fetal heart rate should be documented as a single number (like documentation of maternal pulse rate) instead of a range. The terminology used around (IA) is different from that used for CTGs as there is not a printed trace to interpret (3).

The electronic fetal monitoring (EFM) will measure the fetal cardiovascular status. The tracing can provide important information on how the fetus is coping in the intra uterine environment. Certain well understood patterns exhibited on the tracing are known to indicate the potential for fetal distress and compromise. The purpose of monitoring with EFM is for the obstetrical team members to be alerted to indications of potential problems in the intra uterine environment so that intervention can take place before fetal compromise (4)

Nurses and physicians assess the fetal heart rate tracing for certain characteristics. They include the base line heart rate, base line variability and periodic changes. Periodic change can be broken down into acceleration and deceleration. Decelerations can be further broken down into early, late, variable and prolonged. Although the terminology used by obstetrician changes, for the purpose of this discussion the fetal heart rate tracing pattern will be described as either reassuring or non reassuring(4).

Since non-reassuring fetal heart rate patterns do not necessarily mean the fetus is distressed, timing of asphyxial injury may be difficult to pinpoint from heart rate patterns alone. Some more

dramatic or worrisome patterns can be highly suggestive of harm, but fetuses have a remarkable ability

to compensate in a stressful intrauterine environment. Consequently, for the purposes of timing asphyxia injury all relevant clinical and diagnostic information must be evaluated along with the fetal heart rate pattern (4).

The APGAR scoring system is a useful clinical tool to identify those neonates who require resuscitation as well as to assess the effectiveness of any resuscitative measures (Apgar, 1953). Each of the five easily identifiable characteristics—heart rate, respiratory effort, muscle tone, reflex irritability, and color—is assessed and assigned a value of 0 to 2. The total score, based on the sum of the five components, is determined 1 and 5 minutes after delivery (1).

The 1-minute Apgar score reflects the need for immediate resuscitation. The 5-minute score, and particularly the change in score between 1 and 5 minutes, is a useful index of the effectiveness of resuscitative efforts. The 5-minute Apgar score also has prognostic significance for neonatal survival, because survival is related closely to the condition of the neonate in the delivery room. In an analysis of more than 150,000 infants delivered at Parkland Hospital, Casey and associates (2001b) assessed the contemporaneous significance of the 5-minute score for predicting survival during the first 28 days of life. They found that in term neonates, the risk of neonatal death was approximately 1 in 5000 for those with Apgar scores of 7 to 10. This risk compares with a mortality rate of 1 in 4 for term infants with scores of 3 or less. Low 5-minute scores were comparably predictive of neonatal death in preterm infants. These investigators concluded that the Apgar scoring system is as relevant for the prediction of neonatal survival today as it was almost 50 years ago(1).

Fetal heart rate monitoring is one of way of knowing fetal well being whether it is reassuring or non- reassuring. It will lead us to intervention so as to save the life of the fetus to prevent some of the sever morbidity. The parameters used in our set up for diagnosis of NRFHRP is either fetal tachycardia when FHR is >170 or fetal bradycardia when the FHR is <110 with intermittent auscultation by pinnard's fetoscope .Since the diagnosis of NRFHRP is one the most common indication for cesarean delivery in jimma university specialized hospital

but most of the fetus after deliver have good 1st and 5th minute APGAR score. Few have low APGA score, need neonatal resuscitation and admission to NICU such values will create a doubt on our diagnosis. No study has been carried out in our set up which links NRFHRP and perinatal out come. So it is wise to try and see if there is any significant association between clinical diagnosis of NRFHRP and perinatal out come.

1.2 Statement of the problem

Even though the fetus is efficient at extracting oxygen from the maternal compartment, a complex interplay of antepartum complications, suboptimal uterine perfusion, placental dysfunction, and Intrapartum events may be associated with adverse outcome. Known obstetric conditions, such as hypertensive disease, fetal growth restriction, and preterm birth, predispose fetuses to poor outcomes, but they account for a fraction of asphyxial injury..Monitoring the FHR is a modality intended to determine if a fetus is well oxygenated because the brain modulates the heart rate(2).

Non-reassuring patterns occur in approximately 15% of labors and may prompt clinical actions ranging from simple maneuvers, such as a change of maternal position, improved maternal hydration, through to expedited birth of the baby (by caesarean section, forceps or vacuum), with the aim of preventing or minimizing hypoxia in the fetus(2).

Fetal heart rate monitoring is one of way of knowing fetal well being whether it is reassuring or non reassuring. It will lead us to intervention so as to save the life of the fetus to prevent some of the sever morbidity. This study will show us how fetal heart rate monitored in our set up, interpreted, neonatal resuscitation give, perinatal outcome and the care that is given in NICU. It also compare perinatal outcome of those with clinical diagnosis of NRFHRP and those without NRFHRP.

CHAPTER TWO

2.1 Literature review

A prospective study done Kenyatta National Hospital. the Department of Obstetrics and Gynecology .early perinatal outcome of a group of newborns delivered through Caesarian section due to clinical fetal distress (on the bases of abnormal fetal heart rate and rhythm by intermittent auscultation, together with meconium staining of amniotic fluid) in labor was compared with a group of newborns similarly delivered via Caesarian section without a diagnosis of clinical of fetal distress. Newborn academia was found in 71% of newborns with clinical fetal distress in contrast to 17% in newborns without fetal distress. Low Apgar score at one minute was noted in about 59% of newborns with fetal distress compared with 31% in newborns without fetal distress. Similarly, 24.1% of neonates with clinical fetal distress had low Apgar score at five minutes compared with 3.4% in those without fetal distress. Thirty one percent of newborns with clinical fetal distress were admitted to newborn unit for more than 24 hours due to respiratory distress or birth asphyxia compared to 17% of those without fetal distress. The incidence of morbidity and or mortality in newborns exposed to fetal distress was twice the one of newborns without fetal distress (5).

A prospective observational study done *Department of Obstetrics and Gynecology, All India Institute of Medical Sciences, New Delhi, Indian* .Out of 3148 patients delivered at ≥ 36 weeks, 217 (6.8%) patients underwent cesarean section during labor primarily for non-reassuring fetal heart. The most common fetal heart abnormality was persistent bradycardia in 106(48.8%) cases followed by late deceleration in 38 (17.5%) cases and decreased beat to beat variability in 17 (7.8%) cases. In 33 (15.2%) babies the 5 minutes Apgar score was <7 out of which 13 (5.9%) babies had cord pH <7.10 . Thirty three (15.2%) babies required NICU admission for suspected birth asphyxia. Rest 184 (84.7%) neonates were born healthy and cared for by mother. Regarding decision to delivery interval of ≤ 30 minutes versus >30 minutes, there was no significant difference in the incidence of Apgar score <7 at 5 minutes, cord pH <7.10 and new born babies requiring immediate ventilation. But the need for admission to NICU in the group of D-D interval ≤ 30 minutes was significantly higher compared to the other group where D-D interval was >30 minutes.(6)

Retrospectively studied in the Department of Obstetrics and Gynecology of Punjab Institute of Medical Sciences (PIMS), Jalandhar (Punjab, India). One hundred women were delivered at PIMS during the study period out of which seventy two experienced Fetal Distress

and were finalized. 38.89% and 33.34% of mothers who had Fetal Distress fall in 21-25 yrs and 26-30 yrs of age group, respectively. This shows that the bulk belongs to 21-30 yrs of age group (72.23%). Majority of mothers belonged to middle socioeconomic scale (65.28%). Higher incidence of Fetal Distress was seen in unbooked mothers (61.12%) when compared to booked mothers (38.89%)(7)

The prevalence of Fetal Distress was same among both Primiparous and Multiparous mothers (50.00%). 63.89% of mothers who had Fetal Distress were delivered at 'TERM' while 23.62% and 12.50% of mothers were delivered at 'PRETERM' and 'POSTTERM' gestational age, respectively. Majority of mothers with Fetal Distress (52.78%) had Low birth weight babies (<2.5 kg) whereas, 47.23% of mothers had babies with appropriate weight (>2.5kg). Emergency Caesarean section was seen in 79.17% of mothers with Fetal Distress whereas, 20.84% of mothers had vaginal delivery(7).

Anemia was related with highest incidence of Fetal Distress (34.73%). Oligohydramnios, Pregnancy Induced Hypertension and Intrauterine Growth Retardation were responsible for Fetal Distress in 19.45%, 18.06% and 18.06% of mothers, respectively. The various other obstetric conditions in decreasing order were; Meconium Stained Amniotic Fluid (16.67%), Preterm Labor with Scar tenderness (16.67%), Preterm Premature Rupture Of Membrane (12.50%), Postdated (12.50%), Placenta previa (09.73%), Uteroplacental insufficiency (06.95%), True Nuchal Knot (06.95%), Failed Labour (05.56%) and Gestational Diabetes mellitus (02.78%)(7).

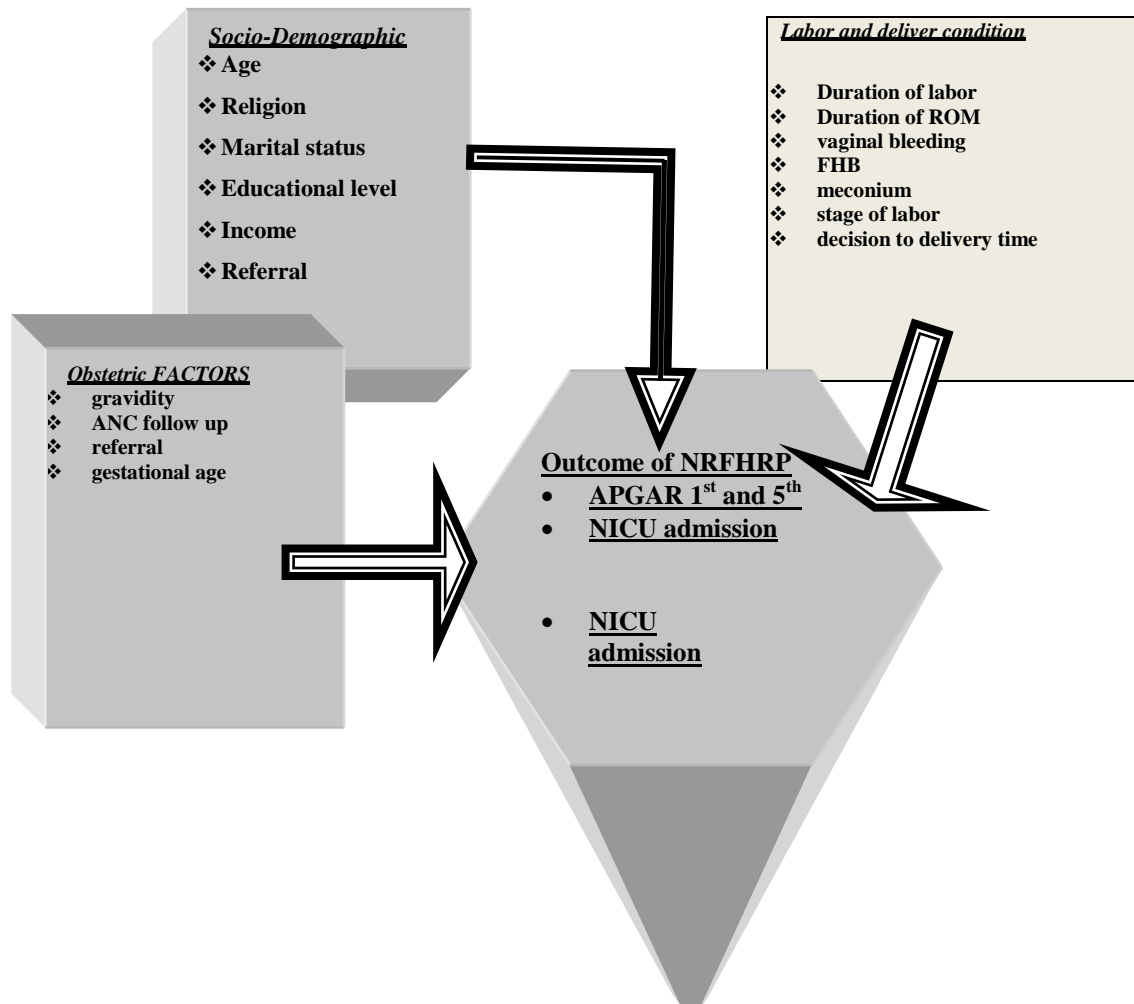
2.2 SIGNIFICANCE OF THE STUDY

Fetal heart rate monitoring is one of way of knowing fetal well being whether it is reassuring or non- reassuring. It will lead us to intervention so as to save the life of the fetus to prevent some of the sever morbidity. Since the diagnosis of NRFHRP is one the most common indication for cesarean delivery in jimma university specialized hospital but most of the fetus after deliver have good 1st and 5th minute APGAR score. Few have low APGA score, need neonatal resuscitation and admission to NICU such values will create a doubt on our diagnosis. Those neonates who has low APGAR score and sent to NICU the outcome were not good and complicated with high rate of neonatal mortality and morbidity.

However, till now there is no documented data on the perinatal outcome of NRFHRP in JUSH. Thus, the output of this study is helpful for clinicians that, clinical diagnosis of NRFHRP have strong risk of having low 1st and 5th minute APGAR score, need for neonatal resuscitation .So clinical diagnosis of NRFHRP is valuable in identifying fetus in need of expedited delivery. Furthermore it helps to create attention on our way of fetal heart rate monitoring, interpretation of Apgar score, the neonate were resuscitated, care that is given at NICU. So that it will give the higher officials of the hospital to plane on the improvement of the service that is given in our labor ward, NICU and to improve the perinatal outcome. Finally it gives additional information for further research in this regard.

2.3 conceptual frame work

The conceptual frame work are developed after review of different literatures, standard books, protocols and organized according to the major categories.



CHAPTER THREE OBJECTIVE

3.1 General objective:

- To determine early perinatal outcome and associated factors with clinical diagnosis of NRFHRP in JUSH.

3.2 Specific objectives:

- To assess socio demographic associated with clinical diagnosis of NRFHRP in JUSH
- To assess obstetric factors associated with clinical diagnosis of NRFHRP in JUSH.
- To determine the perinatal outcome of clinical diagnosis of NRFHRP in JUSH.
- To compare perinatal outcome of clinical diagnosis of NRFHRP with those without NRFHRP JUSH.
- To determine early perinatal outcome and associated factors with clinical diagnosis of NRFHRP in JUSH

CHAPTER FOUR: METHODS & MATERIALS

4.1 Study area and period.

Study area: The study was undertaken in Jimma university specialized hospital labor ward. It is used as the referral hospital for south-western region of the country. Most of the laboring mothers come from the surrounding hospitals and health centers with recently diploid ambulances. The maternity ward has 50 beds and seven 1st stage rooms with 4 delivery couch. It has its own operation and recovery rooms next to the delivery room.

Study period: from April1–June30, 2015gc

4.2 Study Design: This was a hospital based prospective cohort study in which early perinatal outcome of a group of newborns delivered through Cesarean section for NRFHRP (on the bases of abnormal fetal heart rate and rhythm by intermittent auscultation) in labor was compared with a group of newborns similarly delivered via Cesarean section without a diagnosis of NRFHRP. The outcomes of interest were Apgar score at one and five minutes, need for neonatal resuscitation, NICU admission.

4.3 Source population: all laboring mother who come to the labor ward of JUSH during the study period.

4.4 Study population: all term and post term laboring mothers who are with final diagnosed of NFRHRP and those with other indication for whom cesarean section is done in the study period.

4.5 Inclusion criteria

- Emergency Cesarean section ;
- Term and post term gestation (at 37 weeks or above);
- Cephalic presentation.
- Positive FHB.
- Singleton pregnancies.
- Neonate till they pass day 7 of their lives

Exclusion criteria

- intra-uterine fetal death (IUFD),
- multiple gestation,
- breech presentation,
- pre-term deliveries (less than 36 completed weeks),
- gross fetal abnormalities and

4.6 Sample size determination: By using two populations proportion formula with winpepi software for epidemiology is used.

Assumption were p - value=5% power=80%

Sample size B/sample size of A =1

Proportion in (A)=25%

Proportion in (B)= 5%

Ratio of A/B= 5

S(A) NRFHRP= 59

S(B) without NRFHRP= 59

N(TOTAL)= 118

For each of the 59 mothers in labor waiting Caesarian section with a clinical diagnosis of NRFHRP during the study period, one mother waiting for Caesarian section without NRFHRP in labor was selected.

4.8 Study variables:

4.8.1 Dependent variable

- Early perinatal outcome

4.8.2 Independent variables

- Socio demographic characteristics of the cases
- Obstetric factors
- Diagnosis of NRFHRP

4.9 Operational definition

- ANC booked: Mother who have ANC follow up in any government or private facility at least one visit.
- ANC unbooked: mother who has no ANC follow up.
- APGAR score: A score of the newborn based on appearance, heart rate, grimace, body movement, and respiration.

- C/S: delivery of the fetus, placenta and membrane by an incision made on the abdominal wall and on an intact gravid uterus after 28 wks of gestational age.
- Unfavorable perinatal outcome: when the 1st and 5th minute APGAR score is <7, NICU admission
- Income: low income 200-900, middle income 1000-1700, high income 2000-6000
- Gravidity: number of pregnancy experience irrespective of the outcome.
- NRFHRP: with fetal tachycardia of more than 170 beats per minute or bradycardia of less than 110 beats per minute recorded .
- Parity: number of delivery after 28 completed wk of gestion.
- Perinatal mortality rate: number of still birth neonatal death until they were discharged.

4.10 Data collection tools and procedure

4.10.1 data collection tools

Data were collected using a structured questionnaire which contains socio-Demographic variables, type of NRFHRP, obstetrics related factors, labor and delivery condition Clinical features and perinatal outcome.

4.10.2 Data collection procedure

Six obstetrics and gynecology second year residents were selected and oriented as data collector's .Then the questionnaires were pretested. Using this questionnaires the data were collected from patient and neonatal information on their charts and asking the Patient & their physician who are following them in their stay in the ward.The principal investigator is considered as supervisor and follows daily the filled questionnaires, check for any missing data cross check the data . Laboring mother were followed from time of recruitment to the study until the time of delivery .In addition each day the responsible ward resident approaches the mother and fetus to find out any complication till discharge. If there is any sign of sepsis, meconium aspiration, low APGAR score the newborn is sent to NICU after the 5th minute APGAR score given and recorded. The newborns in NICU were also followed till the 7 day and there outcome is recorded.

4.11 Data processing and analysis

Each day, the principal investigator checks the completeness and consistency of data Collected by each data collector and the data were compiled. Then, the collected Data were organized, coded, entered, cleaned, and analyzed using SPSS version 20.0. Percentages, frequency, comparison between the two groups was performed using chi-square test for categorical variables and t- test for continuous variables with normal distribution. A probability value of <0.05 was considered significant. The relative risk as well adjusted relative risk is calculated after correcting it for confounders using poisson long linear model and 95% CI.

4.12 Data quality assurance

Pretests were made by collecting five questionnaires from the targeted group and crosscheck was made before actual data were collected. Questionnaires were prepared and revised by advisers. Data collectors were selected from OBGYN resident's year two. Vague points and other problems encountered about the questionnaires were given explanation and clarification. Close supervision were undertaken by principal investigator during data collection.

4.13 Ethical consideration: Before starting to collect the data, Ethical clearance was obtained from Jimma university medical sciences faculty ethical review committee & permission were also granted to conduct the study from JUSH. Verbal consent was obtained from the respondents, & the right of the respondents to withdraw or not to participate will be respected. Additionally, confidentiality for the patient information will be kept.

4.14 dissemination plan

The result will be presented for Jimma university collage of public health and medical science, department of obstetrics and gynecology. Further efforts will be made to publish on journals.

CHAPTER FIVE: RESULT

5.1 Sociodemography

During the study period there were total of 1173 deliveries in JUSH of which there were 357 cesarean section which accounts for 30.4% of deliveries. The cesarean section done for clinical diagnosis of NRFHRP is 59 that is 16.5% of all cesarean section and 5.02% of total delivery. The maternal age with clinical diagnosis of NRFHRP is with the range of 17-42 years of age, nearly half of them were with the age group of (25-34) in both NRFHRP (48%) and without NRFHRP (54%). The mean maternal age is 26.18(\pm 5.5) whereas the mean age of those without NRFHRP is 26.28(\pm 5.5) (table 1). Nearly half (49%) of the clients were from jimma with clinical diagnosis of NRFHRP while 46% of them were from jimma from those without NRFHRP (table 1).Majority of them have Muslim religion in both group accounting for 71% and 63% respectively (table 1). Only one of the cases in both NRFHRP and without NRFHRP was not married (table 1). Majority of them were Oromo in ethnicity in both of them accounting for 77.9% and 79.6% in NRFHRP and with out-NRFHRP respectively with (table 1).Most of the illiterate group accounts for the highest number in both group with 47.% and 46% in NRFHRP and with out-NRFHRP respectively with (table 1). Majority of them (71%) were house wife form NRFHRP while it is 63% of them without NRFHRP (table 1). Nearly one third (37%) of them have low-income in NRFHRP whereas half of them (45%) have high income in those without NRFHRP. The mean income was 1354 birr and 1784 birr in those with NRFHRP and without NRFHRP respectively with (p- value of 0.033, 95%CI of 35.16-825.8) (table 1).

Table 1 Socio-demographic characteristics of mothers with clinical diagnosis of NRFHRP and without NRFHRP who deliver in JUSH labor ward from April 1 to June30, 2015gc

Factors		NRFHRP(%)	Without NRFHRP(%)	p-value
Age	15-24	25(42)	21(36)	0.843
	25-34	28(48)	32(54)	
	35-44	6(10)	6(10)	
	mean	26.18	26.38	
Address	Jimma	29(49)	27(46)	0.715
	Outside of Jimma	30(51)	32(54)	
Religion	orthodox	13(22)	18(30)	0.399
	Muslim	42(71)	37(63)	
	protestant	4(7)	4(7)	
Marital status	Married	58(98)	58(98)	0.656
	single	-	1(2)	
	Divorced	1(2)	-	
Ethnicity	Oromo	46(79)	47(81)	0.657
	Amhara	3(5)	3(5)	
	Dawro	3(5)	2(3)	
	Kaffa	3(5)	5(8)	
	Gurage	2(3)	2(3)	
	yeme	2(3)	-	
Educational status	Illiterate	28(47)	27(46)	0.414
	Read and write	6(10)	10(17)	
	Grade 1-8	5(9)	10(17)	
	Grade 9-10	7(12)	4(7)	
	Grade 10-12	4(7)	2(3)	
	Grade 12+	9(15)	6(10)	
Occupation	House wife	42(71)	37(62)	0.792
	Civil servant	6(10)	10(17)	
	Farmer	4(7)	7(12)	
	Merchant	7(12)	5(9)	
Income	Low income	22(37)	11(17)	0.033

	Middle income	20(34)	22(38)	
	High income	17(29)	26(45)	

5.2 Obstetric condition

From the study participants primigravida (56%) and multigravida (44%) in NRFHRP while it is the reverse in those without NRFHRP primigravida (44%) and multigravida(56%). Nearly 90% of them in both groups have ANC follow up majority of it being at the health center 65% in NRFHRP and 70% without NRFHRP. Most of the case were referral 76% in NRFHRP and 86% without NRFHRP health center being the major referral area accounting 80%, 73% in both group respectively(table2).

Table 2:- Distribution and association of obstetric condition in relation to NRFHRP and without NRFHRP in JUSH labor ward from April 1 to June30,2015G.C

Factors		NRFHRP	Without NRFHRP	P-value
Gravidity	primi	33(56)	26(44)	0.201
	mulit	26(44)	33(56)	
ANC	booked	52(88)	53(90)	0.771
	Unbooked	7(12)	6(10)	
Place of ANC	Hospital	11(21)	8(15)	0.222
	Health center	34(65)	37(70)	
	FGA	3(6)	2(4)	
	Private clinic	4(8)	6(11)	
Referred case		45(76)	51(86)	0.159
Place of referral	hospital	4(9)	6(12)	0.790
	Health centers	36(80)	37(73)	
	FGA	1(2)	1(2)	
	Private clinic	4(9)	7(13)	

5.3: Labor and Delivery Condition

In both groups the mean laboring hour on admission were comparable 9.53h in NRFHRP and 10.12h in those without NRFHRP. Two third (64%) of them were having rupture of membrane in those with NRFHRP and in 54% in those without NRFHRP. 53% of them were having meconium in those with NRFHRP 30% in those without NRFHRP (p –value 0.015). In both groups the mean duration of stay after decision for cesarean section is 24m in those with NRFHRP and 25m without NRFHRP (table 3).

Table 3 Distribution and association of labor and delivery condition in relation to NRFHRP and without NRFHRP in JUSH labor ward from April 1 to June30, 2015gc

Factors	NRFHRP (%)	Without NRFHRP	p-value	
Labor (mean)in hour	9.53h	10.12h	0.609	
Rupture membrane on admission	38(64)	32(54)	0.265	
Duration ROM(mean) in hour	7.08h	7.12h	0.986	
Vaginal bleeding	8(14)	4(7)	0.227	
Meconium	31(53)	18(30)	0.015	
Foul smelling discharge	4(7)	1(2)	0.093	
Cervical dialation(mean)	4.57cm	5.5cm	0.093	
Stage of labor	LFSL	28(47)	21(36)	0.488
	AFSL	22(38)	28(47)	
	2 nd stage	9(15)	10(17)	
Duration of stay after decision(mean)minute	24m	25m	0.363	

5.4: Perinatal outcome

At the 1st minute after delivery, close to 15.3% of neonate with the clinical diagnosis of NRFHRP have very poor APGAR score [0-3] while there was none without NRFHRP (table 4). Over all only 35.6% of babies in exposed group have good APGAR score in 1st minute [7-10] compared to 78% of non exposed babies. Newborns with NRFHRP has low APGAR score [<7] in 64% of the case so the risk of having low 1st minute APGAR score is 2.7*that of without NRFHRP (table 5). This risk is statistically significant (RR=2.92, 95%CI=1.74-4.9, P=0001). But after adjusting it for confounder which turns out to be income and birth weight the (ARR=2.7, 95%CI=1.64-4.44, P=0001)(table 9)

The study showed that 1.2% of newborns with clinical diagnosis of NRFHRP have very poor APGAR score at 5th minute while none of the babies without NRFHRP (table 4). Whereas three fourth (74%) neonates with diagnosis of NRFHRP at 5th minute have good APGAR score [7-10] compared to 96.7% without NRFHRP (table4). The incidence of low 5th minute APGAR score of 25.4% which is much less than 1st minute (table4). Neonate delivered with the diagnosis of NRFHRP were 7.5*more likely to have low APGAR score compared to those without NRFHRP at 5th minute. This risk is found to be significant (RR= 7.5, 95%CI=1.79-31.36, P. value= 0.001) (table 6). After adjusting it for the confounders (ARR=6.9, 95%CI=1.66-29.41, P=008)(table 9)

From the 25 neonates which are admitted to NICU with clinical diagnosis of NRFHRP, 22(88%) of them discharged improved, 3(12%) dead within 7 days. While all of them, 13(100%) of the neonate admitted to NICU are discharged improved within 7days from those without NRFHRP (table4). The mortality rate of NRFHRP is 5% while there was no death in those without NRFHRP (table 4).

The NICU admission in those with the diagnosis of NRFHRP is 42.4% while those without NRFHRP are 22.0%. The risk NICU admission in those with NRFHRP is 1.92*than those without NRFHRP (table 7). This result is statistically significant (RR=1.92, 95%CI=1.09-3.38 P.value0.019). But after adjusting it for confounders the risk is not significant (ARR=1.74, 95%CI=0.97-3.13, P=0.061)(table 9)

Table 4 Distribution of perinatal outcome in relation of NRFHRP and without NRFHRP in JUSH labor ward from April 1 to June30, 2015gc

		NRFHRP(%)	Without NRFHRP(%)	P -value
1 st minute apgar score	0-3	9(15.3)	0	0.0001
	4-6	29(49.1)	13(22)	
	7-10	21(35.6)	46(78)	
5 th minute apgar score	0-3	1(1.7)	0	0.001
	4-6	14(23.7)	2(3.4)	
	7-10	44(74.6)	57(96.6)	
NICU admission Dead in the 7 days	Discharged improved	22(88)	13(100)	0.019
	Dead	3(12)	0	
Day 7 outcome	alive	56(95)	59(100)	0.81
	dead	3(5)	0	
sex	male	38(64)	21(36)	0.455
	female	34(58)	25(42)	
Birth weight gram	(mean)	3013	3206	0.026
	≥4000 gm	1(2)	4(7)	
	2500-4000	53(90)	52(88)	
	≤2500	5(8)	3(5)	

Table 5 Association b/n 1st minute APGAR score with NRFHRP and without NRFHRP in JUSH labor ward from April 1 to June30, 2015gc

NRFHRP	1 st minute APGAR score			RR (95% CI)	P.value
	1 st m. Low APGAR		Incidence of low 1 st minute APGAR		
	Yes	No			
YES	38	21	64.4%	2.92 (1.74-4.9)	0.0001
NO	13	46	22.0%		

Table 6 Association b/n 5th minute APGAR score with NRFHRP and without in JUSH labor ward from April 1 to June30, 2015gc

NRFHRP	APGAR score			RR (95% CI)	P.value
	1 st m. Low APGAR		Incidence of low 5 th minute APGAR		
	Yes	No			
YES	15	44	25.4%	7.5 (1.79-31.36)	0.001
NO	2	57	3.4%		

Table 7 Association of NICU admission with NRFHRP and without NRFHRP in JUSH labor ward from April 1 to June30, 2015gc

NRFHRP	Morbidity/mortality		Incidence early neonatal morbidity and mortality	OR (95%CI)	P.value
	Yes	No			
YES	25	34	42.4%	1.92 (1.09-3.88)	0.019
NO	13	46	22.0%		

Table 8 The summary of relative risk of perinatal outcome with NRFHRP and without NRFHRP in JUSH labor ward from April 1 to June30, 2015gc

Factors	NRFHRP	Without NRFHRP	RR 95%CI	P-value
Low 1 st minute APGAR	64.4%	22.0%	2.92(1.74-4.9)	0.000
Low 5 th minute APGAR	25.4%	3.4%	7.5(1.79-31.36)	0.001
NICU admission	42.4%	22.0%	1.92(1.09-3.38)	0.019

Table 9 The summary of adjusted relative risk of perinatal outcome with NRFHRP and without NRFHRP in JUSH labor ward from April 1 to June30, 2015gc

Factors	ARR 95%CI	P-value
Low 1 st minute APGAR	2.7(1.64-4.44)	0.0001
Low 5 th minute APGAR	6.9(1.66-29.41)	0.008
NICU admission	1.74(0.97-3.13)	0.061

CHAPTER SIX: DISCUSSION

In Jimma university specialized hospital the diagnosis of NRFHRP pattern is made when fetal heart rate abnormality is detected by intermittent auscultation with pinards fetoscope, which is either fetal bradycardia or tachycardia. This is prospective study and NRFHRP is diagnosed the same way. Generally

Fetal heart rate monitoring can be performed by regular auscultation with a fetoscope, Pinard or hand-held Doppler (Intermittent Auscultation (IA)) or by continuous electronic fetal monitoring (EFM) by cardiotocograph (CTG). EFM should not be used for women experiencing uncomplicated labour as it increases maternal intervention rates without improvement in perinatal outcome. The RANZCOG Intrapartum fetal surveillance guidelines (2014) indicate that there is insufficient evidence for routine admission CTGs .Continuous EFM should be considered and discussed when risk factors for intrapartum hypoxia are present(1).

Clinical diagnosis of NRFHRP as an indication for cesarean section account for 25% of the case (1).The total cesarean rate in JUSH is 30.4%.The study found that NRFHRP is an indication for cesarean section in 16.5% the case. Which account for 5.02% the total delivery.

Studies have shown that newborns delivered with clinical fetal distress showed evidence of low Apgar score at 1st minute to be 59% and 24.1% at 5th minutes. The risk of low Apgar score in newborns with a diagnosis of clinical fetal distress at 1st and 5th minutes was 2.5 and 7.1 times higher than that of babies without a diagnosis of fetal distress(5). This study has found that the proportions of newborns with clinical diagnosis of NRFHRP have low Apgar score in 64% and 25.4% of case in the 1st and 5th minute Apgar score. Thus the risk of having low Apgar score is 2.7 and 6.9 times higher than those without clinical diagnosis NRFHRP after adjusting it for confounder.

This study found that the NICU admission in clinical diagnosis of NRFHRP is 42.4%. Early neonatal mortality accounting for 5% of the case while there was no early neonatal death in those without the clinical diagnosis of NRFHRP .Similar study which is done in Kenyatta national hospital showed that an early perinatal mortality rate of 5% among neonates exposed to clinical fetal distress in contrast to no mortality among the newborns not exposed to fetal distress. There was increased risk of perinatal morbidity and mortality among newborns with clinical fetal distress compared to those without fetal distress(5).

Study limitation: we couldn't do umbilical cord blood analysis for PH and gas since we don't have it in our set up which could give us better picture of fetal condition at birth.

CTG were not functional to see the different fetal heart rate abnormality and it's perinatal outcome.

The APGAR score is given by different person so there may be inter-observer bias.

CHAPTR SEVEN: CONCLUSION AND RECOMMENDATION

The result found in this study showed that clinical diagnosis of NRFHRP have strong risk of having low 1st and 5th minute APGAR score, need for neonatal resuscitation .So clinical diagnosis of NRFHRP is valuable in identifying fetus in need of expedited delivery.

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ANNEX I QUESTIONNAIRE

Jimma university collage of public health and medical sciences department of obstetrics and gynecology, QUESTIONNAIRE format on out came of NRFHRP in labor ward of JUSH, Jimma town, Jjimmia zone, oromia region, Ethiopia, April 01,2015

INSTRACTION

You are kindly requested to answer all questions genuinely. Card no ----- bed no---

Part I- socio demography information

1.1	Age of the mother	
1.2	Address	1. Jimma 2. Out of Jimma
1.3	Religion	1. Orthodox 2. Muslim 3. Protestant 4. Others (specify) -----
1.4	Marital status	1. Married 2. Single 3. Divorced 4. Widowed
1.5	Ethnicity	1. Oromo 2. Amhara 3. Dawro 4. Kaffa 5. Gurage 6. Yem 7. Tigre 8. Others (specify) ---
1.6	Educational status	1. Illiterate 2. Read and write 3. Grade 1-8 4. Grade 9-10 5. Grade 10-12 6. Grade 12+
1.7	Occupation	1.house wife 2. Civil servant (employee) 3. Farmer 4. Merchant 5. other (specify)
1.8	In came of the family per month	-----birr

PART II OBSTETRIC CONDITION

2.1	Gravidity -----	
2.2	Parity -----	
2.3	ANC follow up	1. booked 2. Unbooked
2.4	If the answer to question no2.3 is yes where was it?	1. Hospital 2.health center 3. FGA 4. private clinic
2.5	Was LNMP known?	1. Yes 2. No
2.6	GA by	1.LNMP if known -- 2.amenorrhoea-- 3.early u/s--- 4.urine HCG---- 5.U/S from admission 6. Ballard score----
2.7	Source of referral	1. Yes 2. No
2.8	If the answer to 2.7 is yes	1.hospital 2.health center 3. FGA 4. private clinic 5. directly from home
2.9	what was pre delivery hematocrit(hct)-----	

PART III LABOR AND DELIVERY CONDITION

3.1	compliant of the mother when she came to labor ward	1. pushing down pain 2. Passage of liquor 3. Cord prolapse 4. Others(specify)
3.2	Duration of labor in hours	
3.3	was membrane ruptured on admission	1. Yes 2. No
3.4	if the answer for no 3.3 is yes, the duration in hours-----	
3.5	Vital signs	1. Blood pressure-----mmHg 2. pulse rate-----bpm 3. Temperature-----Oc 4. Respiratory rate-----bpm
3.6	Abdomen	1. Fundal height----- 2. Uterine contraction----- 3. Fetal heart beat- A
3.7	Pelvic examination	1. vaginal bleeding 2. meconium grade 3. foul smelling discharge
3.8	cervical dialation at admission (cm)-----	
3.9	meconium	1. grade I 2.gade II 3. Grade III
3.10	Was there any problem during intrapartum follow up?	1. Yes 2. No
3.11	If the answer to no3.10 yes what was the problem?	1.NRFHRP 2.cord prolapse 3. Abrupton 4. Uterine ruptre 5. Other (specify)

3.12	stage of labor	1. LFSL 2. AFSL 3. 2 nd stage of labor
3.13	Mode of delivery of index pregnancy	1. Normal vaginal delivery 2. Vacuum delivery 3. Forceps delivery 4. Elective c/s 5. Emergency c/s 6. Laparotomy
3.14	what was the duration of stay from admission to delivery?(in hrs or days)	
3.15	estimated blood loss at delivery in milliliter -----	
PART IV POSTPARTUM ASSESSMENT		
4.1	post operation or post procedure HCT ?-----	
4.2	is there any problem encountered during delivery?	1. Yes 2. No
4.3	if the answer to no4.2 is yes, what was it?	1. uterine atony 2. Genital tract laceration 3. Perineal tear 4. Maternal death 5.uterine rupture 6. Other(specify)-----
4.4	is there any problem encountered after delivery?	1. Yes 2. No
4.5	if the answer to no 4.4 is yes what was it?	1. puerperal sepsis 2. Surgical site infection 3.post partum deproton 4. PPH 5. Other(specify)-----.
4.6	Duration of hospital stay in hrs or days -----	
4.7	condition at discharge	1. Improved 2.died
4.8	if there was maternal death, what was the cause? Specify -----	
PART V NEONATAL ASSESSEMENT		
5.1	Out came	1.alive 2. Dead
5.2	sex	1. Male 2. Female
5.3	weight in grams	
5.4	1 st and 5 th minute APGAR score -----, -----	
5.5	was there any need for resuscitation?	1. Yes 2. No
5.6	if the question to no 5.5 is yes ?	1.Drying, tactile stimulation only 2. Required resuscitation(suctioning & inflation breath given 3. Chest compration medication required 4. incubation and chest compration. 5.NICU admission 6. medication started
5.7	Was there a need for referral to NICU?	1. Yes 2. No
5.8	Indication for referral to NICU?	1. PNA 2. Birth trauma 3.for neonatal Evaluation 4.Other(specify)-----
5.9	Diagnosis made at NICU for referred case (specify)-----	
5.10	Neonatal out came	1. discharged improved 2. dead within 7 days
5.11	If there was neonatal death, what was the cause? (Specify)-----	
5.12	Causes for NRFHRP	1.Cord accidents 2. Abruption placenta 3. Meconium 4. Chorioamnionits 5. PROM 6. post term 7. Anemia 8. preterm labor 9. PIH 10. other specify----- 11. Not found
5.13	Interventions done	1. Caesarean section 2. instrumental delivery

Name of data collector ----- signature -----

Date of data collection -----

Thanks you for your time.

