"EFFICACY OF CAFFEINE VS, THEOPHYLLINE IN THE PREVENTION OF ACUTE KIDNEY INJURY IN TERM, ASPHYXIATED NEWBORN – A RANDOMIZED COMPARATIVE OPEN LABELLED NON INFERIOR STUDY."

BY

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Dissertation submitted to

BLDE (Deemed to be) UNIVERSITY, VIJAYAPUR, KARNATAKA

In partial fulfillment of the requirements for the degree of

DOCTOR OF MEDICINE

IN PEDIATRICS

UNDER THE GUIDANCE OF

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2021

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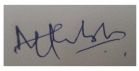

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LIST OF ABBREVIATIONS USED

AKI	-	Acute Kidney Injury
BA	-	Birth Asphyxia
PA	-	Perinatal Asphyxia
Cyst C	-	Cystatin C
WHO	-	World Health Organization
AED	-	Anti Epileptic Drug
NICU	-	Neonatal Intensive Care Unit
HIE	-	Hypoxic Ischemic Encephalopathy
NS	-	Neonatal Seizures
EEG	-	Electroencephalography
NNPD	-	National Neonatal-Perinatal Database
I V	-	Intra Venous
CFT	-	Capillary Filling Time
mg	-	milligram
ng	-	nanogram
micromole	-	micromole
rpm	-	revolutions per minute
MSAF	-	Meconium Stained Amniotic Fluid
AGA	-	Appropriate for Gestational Age
SGA	-	Small for Gestational Age
AAP	-	American Academy of Pediatrics
ACOG	-	American College of Obstetrics and Gynecology
IUGR	-	Intra Uterine Growth Restriction
UTI	-	Urinary Tract Infection

CBF	-	Cerebral Blood Flow
BP	-	Blood Pressure
ATP	-	Adenosine Triphosphate
ATN	-	Acute Tubular Necrosis
ICH	-	Intracerebral hemorrhage
CCF	-	Congestive Cardiac Failure
MAS	-	Meconium Aspiration Syndrome
NEC	-	Necrotizing Enterocolitis
GIT	-	Gastrointestinal Tract
CNS	-	Central Nervous System
RCT	-	Randomized Controlled Trial
NGAL	-	Neutrophil Gelatinase Associated Lipocalin
GFR	-	Glomerular Filtration Rate
ELISA	-	Enzyme-Linked Immunosorbent Assay
NICHD	-	National Institute of Child Health and Human Development
HRP	-	Horse Radish Peroxidase
TMB	-	Tetramethyl Benzidine
M	-	Molar
PIH	-	Pregnancy Induced Hypertension
DOL	-	Day of life
HOL	-	Hour of life
DOB	-	Date of birth
RDS	-	Respiratory Distress Syndrome
BMV	-	Bag and Mask Ventilation
NP	-	Nasal Prongs
SCR	-	Subcostal retractions

ABSTRACT

INTRODUCTION:

Asphyxia is the most common cause of convulsion in newborns, associated with high mortality and morbidity. It is a multisystem disorder involving many organs, but the effects on the heart, brain, and kidney are pronounced. It can involve kidneys and cause renal injury, which presents with oliguria and sometimes anuria in the newborn. Urine output and serum creatinine levels are usually difficult to monitor in newborn babies.

Term newborn usually do not pass urine till 48 hrs and their serum creatinine levels are usually a reflection of maternal serum creatinine levels, hence cannot be used as a reliable indicator for monitoring of AKI in the newborn as this can give rise to a false positive error.

Cystatin C is a more sensitive and specific marker for assessing kidney injury in the newborn. Hence, for this reason, cystatin C is used for monitoring of renal injury in newborn. For prophylactic prevention of AKI, a single dose of theophylline of 8mg/kg is given to the newborn, but it can be toxic and also can cause seizures and can even cause difficulty in the monitoring of asphyxia, so as alternative caffeine can be tried to prevent AKI in term and preterm babies as it is safer and does not cause seizures in the newborn.

Caffeine is commonly used in premature infants, and its use in term infants is not documented. Hence, we are using caffeine as a drug to prevent AKI in the newborn.

To the best of our knowledge, this study is the first of its kind using both caffeine and theophylline in the prevention of AKI in the asphyxiated term newborn. Caffeine has the same role as theophylline, but being a drug with minimal or no CNS side effects

like irritability or convulsions, as can occur with theophylline use, it is an appropriate choice for prevention of AKI in asphyxia in term and preterm neonate.

OBJECTIVES:

The purpose of this study is to compare the use of theophylline and caffeine in the asphyxiated babies and compare the renal parameters like creatinine with cystatin C in the term, late preterm & low birth weight neonates admitted in NICU.

MATERIAL AND METHODS:

Sample for the study are all term, late preterm & low birth weight neonates admitted in NICU with birth asphyxia at Shri B. M. Patil Medical College, Hospital & Research Centre, Vijayapur. Neonates were randomly allotted into two groups. In Group-A, caffeine was used, and in Group-B, theophylline was given.

RESULTS:

A total of 100 patients with clinically confirmed Birth asphyxia were randomly allotted into 2 groups with 50 patients in each group. Mortality was more in theophylline group with death of 2 patients(4%), and in caffeine group death was only in 1 patients(2%) with P value of 0.634.

Both groups were comparable and had equal severity of BA as all parameters like sex distribution (P-value:0.677), birth weight (P-value: 0.476), GA (p =0.887), inborn (p=0.309), gravidity (p=0.548), mode of delivery (p=0.663), MBG (p=0.157). Resuscitation measures (p=0.031), treatment given (p<0.001), therapeutic hypothermia (p= 0.307), HIE staging (p=0.017), NICU stay (p=0.036). (cystatin C on day 1 is significant (p=0.005).)

CONCLUSION:

In my study, caffeine and theophylline given in asphyxiated newborn, the results of caffeine group were comparable to that of caffeine, caffeine group babies had lower cystatin C levels at day 3 as compared to theophylline, also the babies of caffeine group had a better outcome.

KEY WORDS: Perinatal asphyxia, Caffeine, Theophylline, Creatinine, Cystatin C.

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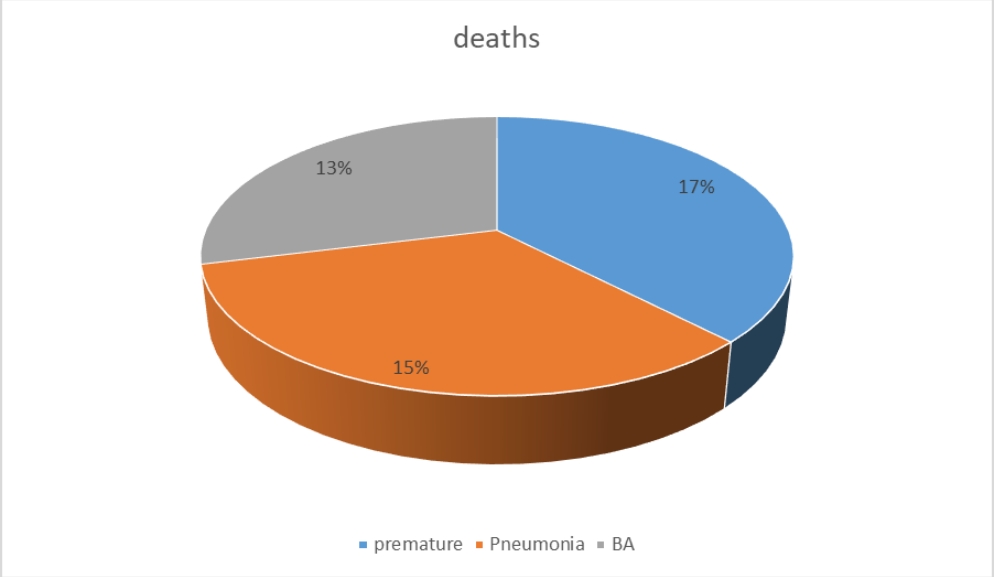
INTRODUCTION

Perinatal asphyxia is the most dreaded entity observed in a delivery room setting, quite frequently posing a challenge to both the obstetricians and the paediatricians alike. This entity wreaks havoc in an otherwise uneventful delivery, where there is a complex interplay of the maternal, foetal, and the iatrogenic factors, which ultimately manifest in the form of perinatal asphyxia.

According to WHO, around 4 million deaths every year occurred due to perinatal asphyxia, this figure accounting to 38% of all deaths in the under five year of age[1]. In low income countries, approx. 23% of all neonatal deaths are due to birth asphyxia[2,3,4]

In India, it is estimated that the incidence of perinatal asphyxia is in the higher range (12 – 16%) as opposed to the developed nations (1 – 1.5%)[5]

According to WHO, perinatal asphyxia is one of the 3 most common causes under 5 mortality rate, commonest being premature delivery (17%), followed by pneumonia (15%).



PIE CHART 1: BA AS ONE OF THE CAUSES OF UNDER 5 MORTALITY

According to a survey done by WHO in 2005, perinatal asphyxia is one of the leading causes of neonatal deaths occurring within the 1st week of life. It is also associated with around 1.1 million intrapartum stillbirths and is responsible for long term adverse neurological morbidity and mortality.

Mild and moderate birth asphyxia is categorized when the APGAR score done at 1 minute is 5-7/10 and 4-6/10 respectively. Severe birth asphyxia is when the Apgar score is less than 4, i.e. 0-3/10

Perinatal asphyxia or more commonly birth asphyxia or hypoxic ischemic encephalopathy is defined according to the following criteria:

1. According to WHO, it is defined as a failure to initiate and maintain breathing[6]
2. NNPD (National Neonatal – Perinatal Database) network – slow or gasping breathing OR APGAR score of 4-6 at the end of one minute – moderate perinatal asphyxia[7].
3. AAP and ACOG – define perinatal asphyxia as the presence of all the following criteria[8]:
    - Profound metabolic or mixed acidosis in the umbilical cord blood
    - Persistence of low APGAR score < 3 for a duration beyond 5 minutes
    - Signs of neonatal neurological dysfunction – seizures, encephalopathy, tone abnormalities and evidence of multiple organ involvement.

TABLE 1 : CAUSES OF PERINATAL ASPHYXIA[9]:

MATERNAL FACTORS	FETAL FACTORS
Primigravida	Intrauterine growth retardation
Prolonged labour	Foetal distress
Advanced maternal age	Prematurity
Pregnancy induced hypertension	Meconium aspiration syndrome
Oligohydramnios	Malpresentations
Polyhydramnios	Low birth weight
Multifetal pregnancy	High birth weight
Prolonged rupture of membranes	Cord around neck
Diabetes mellitus	Non reassuring fetal heart rate
UTI	
Anaemia	
Cord prolapse	

There can be involvement of more than one factor for the development of birth asphyxia.

In some conditions, iatrogenic insult in the form of application of ventouse or forceps extraction can also cause asphyxia in a fetus, especially in the setting of prolonged labor.

Diagnosis is of utmost importance and it has to be done immediately as birth asphyxia can cause major neurodevelopmental derangements and neurological dysfunction sometimes even causing death.

AIMS AND OBJECTIVES

AIM OF THE STUDY:

To assess and compare the safety and efficacy of theophylline v/s caffeine administered to term and late preterm asphyxiated new borns admitted to the NICU of BLDE (Deemed to be) University's Shri B M Patil Medical College, Hospital and research centre, Vijayapura, Karnataka.

OBJECTIVES OF STUDY:

1. To study the safety of theophylline and compare with that of caffeine.
2. To compare the renal outcome of infants treated with theophylline v/s caffeine in the management of perinatal asphyxia, to compare efficacy of theophylline and caffeine in protecting acute kidney injury (AKI) in perinatal asphyxia.
3. Comparative evaluation of the laboratory parameters, for example cystatin C levels and its correlation of severity of renal damage following prophylactic use of theophylline vs caffeine.

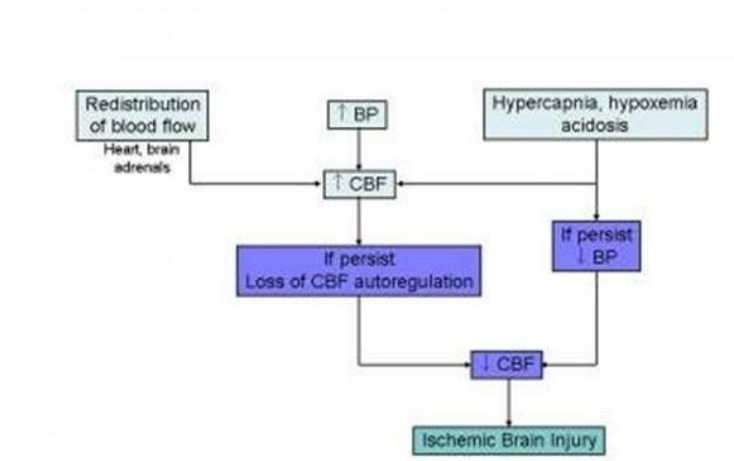
REVIEW OF LITERATURE

Hypoxia and ischemia of brain tissue due to systemic hypoxemia, reduced cerebral blood flow, or both are the primary processes leading to neuronal damage.

The initial compensatory adjustment to asphyxia is - an increase in CBF due to hypoxia and hypercapnia. This in turn is associated with a redistribution of cardiac output to essential organs – brain, heart, and adrenal glands. A rise in BP as a result of increased release of epinephrine also enhances the compensatory response.

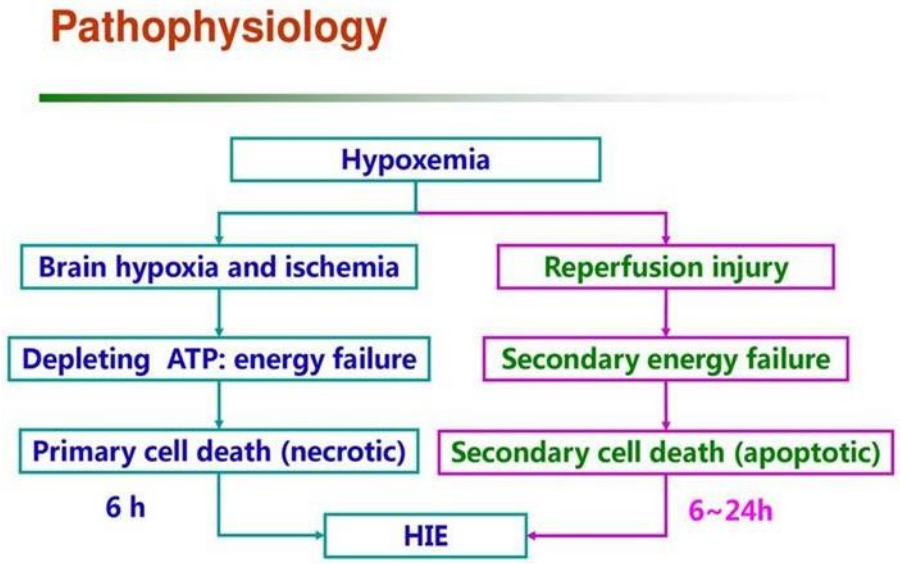
Hypoxemia triggers brain hypoxia and ischemia of the brain tissue, leading to increased ATP utilization and hence reduced ATP stores in the neural tissues. This entity is called as primary energy failure, lasting for around 6 hours, which results in excitotoxicity caused due to a huge influx of sodium ions, resulting in death of cells by necrosis, due to interaction of various inflammatory mediators like reactive oxygen species, interleukins and cytokines.

Figure 1



Following the initial phase of the primary energy failure, the cerebral metabolism recovers, but can deteriorate further as a result of reperfusion, by initiation of apoptosis of the cells, the so called phase of secondary energy failure. The time window for this phase may last between 6 hours to 24 hours. This can be summarized briefly in the figure.[10,11,12,13,14,15,16]

Figure 2



The duration of secondary energy failure is exactly not known in human foetuses, and newborn, but it appears to increase over the first 24 – 48 hours and then resolves later. Hence, to prevent development of permanent neurological disability one has to intervene before 6 hours of the neuronal damage.

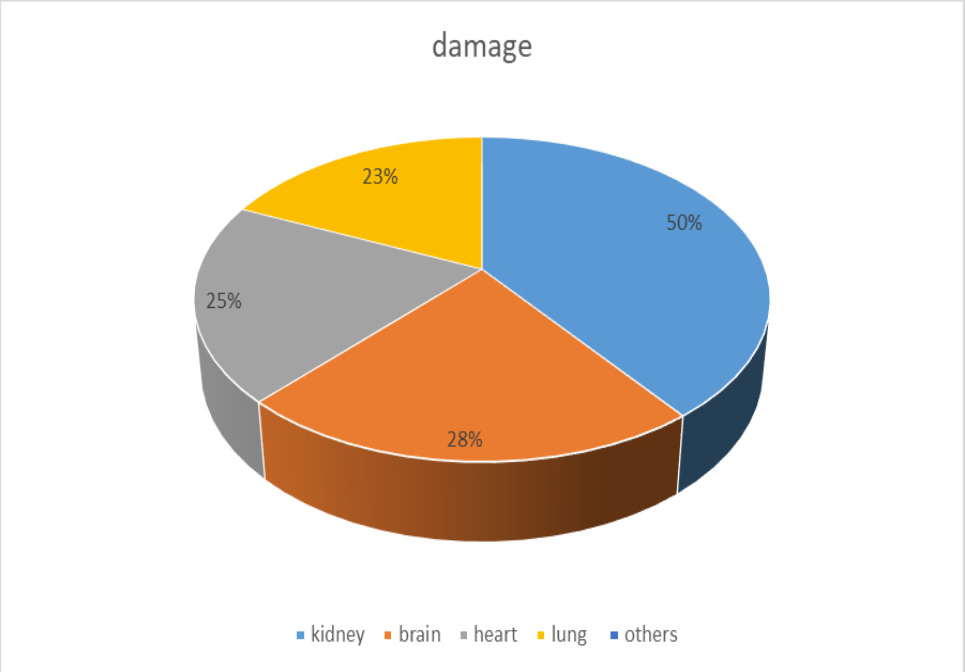
PATHOLOGY:

- PRIMARY APNEA: child has reduced breathing efforts, but tone, heart rate and blood pressure is maintained. It occurs transiently and it is a self-limiting mechanism, provided the resuscitation efforts are prompt, there will be no organ damage.

- SECONDARY APNEA: child enters into this phase, if the resuscitation efforts are unsuccessful or if child has severe asphyxia. Child could not be aroused quickly from this condition and might require positive pressure ventilation or even might require intubation and mechanical ventilation. Often the pathology can be intrauterine and the child can be delivered in secondary apnea also. Usually it can cause organ damage.

TABLE 2 : PATHOLOGY OF END ORGAN DAMAGE[17]:

.NO.	ORGAN INVOLVED	INCIDENCE
	Kidney	50% (haematuria, ATN, Renal. V. thrombosis)
	Brain	28% (HIE, ICH, seizures)
	Heart	25% (myocardial dysfunction, rhythm abnormalities, CCF)
	Lung	23% (respiratory failure, MAS, pulmonary hypertension)
	Liver, bowel, bone marrow	< 5% (hepatic dysfunction, NEC, thrombocytopenia, coagulation defects)



PIE CHART 2: PATHOLOGY OF END ORGAN DAMAGE

CLINICAL MANIFESTATIONS:

- Apnea, bradycardia
- Altered respiratory pattern - grunting, gasping
- Cyanosis
- Pallor, shock
- Hypotonia
- Unresponsiveness
- Seizures

TABLE 3 : SARNAT & SARNAT STAGING SYSTEM[18]

PARAMETER	MILD HIE	MODERATE HIE	SEVERE HIE
Level of consciousness	Alternating (hyperalert, lethargic, irritable)	Lethargic, obtunded	Stuporous
Muscle tone	Normal	Hypotonia	Flaccid
Posture	Normal	Decorticate	Intermittent decerebration
Stretch reflexes	Normal or hyperactive	Hyperactive or decreased	Absent
Segmental myoclonus	Present	Present	Absent
Suck reflex	Weak	Weak or absent	Absent
Moro reflex	Strong; low threshold	Weak; incomplete; high threshold	Absent
Oculovestibular	Normal	Overactive	Weak or absent
Tonic neck	Slight	Strong	Absent
Autonomic function	Generalized sympathetic	Generalized parasympathetic	Both systems depressed
Pupils	Mydriasis	Miosis	Variable, often unequal, poor light reflex
Heart rate	Tachycardia	Bradycardia	Variable

Bronchial & salivary secretions	Sparse	Profuse	Variable
GI motility	Normal or decreased	Increased; diarrhoea	Variable
Seizures	None	Common; focal or multifocal	Delayed
EEG findings	Normal (awake)	Early: low voltage continuous delta and theta Later: periodic pattern (awake) Seizures: focal 1-Hz spike and wave	Early: periodic pattern with isopotential phases Later: totally isopotential
Duration	1-3 days Typically < 24h	2 – 14 days	Hours to weeks

Diagnosis is made by APGAR score <4 at 5 min of life, CNS features like seizures, lethargy, coma, hypotonia or hypertonia & multisystem organ dysfunction[19].

The likely complications of HIE include – cerebral palsy, feeding intolerance, septicaemia, acute renal failure, seizures [20,21].

El – Gamasy [22] studied about the biomarkers used for acute kidney injury in babies hospitalized at the NICU and found out that cystatin C levels were elevated in newborn babies exposed to the hypoxic insult. The study was done to analyze the

levels of serum creatinine, Cystatin – C and beta 2 microglobulin, using a ELISA kit. This test was done for comparison between Cystatin – C, serum creatinine and beta 2 microglobulin as early markers for AKI in neonates.

Result: On the day 1 of incubation of samples there was a significant increase in the mean values of Cystatin – C & Beta 2 microglobulin in patient group (2.2 ± 0.5) and (7.2 ± 2.4) as compared to the control group. (0.5 ± 0.2) and (1.9 ± 0.4) respectively while there was no such difference documented with that of serum creatinine in both the groups under study. At a cut off value of ≥ 1.5 mg/L, it has been shown that beta 2 microglobulin has got the highest sensitivity for early prediction of acute kidney injury in neonates (98%), with a documented specificity of 80%.

On the other hand, Cystatin – C at a cut off value of ≥ 0.6 mg/L had documented a good sensitivity of around 85%, with a specificity documented at 80%.

Serum creatinine at the cut off value of ≥ 0.5 mg/L and had the lowest sensitivity documented at around 41.5% and a lower specificity documented at around 52.7%.

This above study concludes that the serum levels of beta 2 microglobulin and Cystatin – C were found to be more sensitive and more specific as compared to serum creatinine for the early prediction and diagnosis of acute kidney injury in newborn.

		Controls	Patients	Statistical test p value
Gest. Age(wk)	mean	38.4+1.2	38.5+1.2	0.77
Gender (M)	NO. (%)	33 (55%)	42 (70%)	0.69
Gender (F)		27(45%)	18 (30%)	
Mode (NVD)	NO. (%)	21 (35%)	24 (40%)	0.9
Mode (CS)		39 (65%)	36 (60%)	
Birth wt (kg)	Mean	3.1 +46..7	3.13 +57.5	0.3
Apgar	1 min (mean)	6.2 + 0.8	8.4 + 0.8	< 0.001
	5 min (mean)	7.3 + 0.7	9.5 ±0.7	< 0.001

		Patients	Controls	Student t test	P value
Creatinine	Day 1 range	0.6-0.9	0.45-0.8	1.34	0.3
	mean	0.8 ± 0.1	0.54 ± 0.2		
Creatinine	Day 3 range	1.4-1.6	0.4-0.7	2.53	0.048
	mean	1.5 ± 0.6	0.5 ± 0.2		
Cyst C	Day 1 range	0.7-3.9	0.4-0.7	3.26	0.01
	mean	2.2 ± 0.5	0.5 ± 0.2		
	Day 3 range	1-6.7	0.4-0.7	7.64	0.001
	mean	4.2 ± 1	0.5 ± 0.1		

According to another study conducted by El Gamasy et al [23], who analysed the correlation between the serum creatinine levels and the degree of hypoxia-ischemia, according to Sarnat & Sarnat scoring. 16 patients had HIE-I with serum creatinine in the range of 0.51±0.19. 12 patients had HIE-II with serum creatinine in the range of 0.74±0.25. 8 patients had HIE-III with serum creatinine in the range of 1.3±0.5.

This study reveals that serum creatinine is increased with the severity of hypoxic insult, which correlated with the CT scans done on all the babies.

H Al – Wassia et al[24], studied the effect of prophylactic theophylline for the prevention of severe renal dysfunction in post asphyxiated term and post term neonates. The evidence derived that prophylactic theophylline was associated with a significant reduction in the incidence of severe renal dysfunction.

Result: Four RCTs involving 197 infants were included in the meta analysis. When compared with the control group, group that received prophylactic theophylline was associated with a significant decrease in the incidence of severe renal dysfunction using fixed effects model was 0.38 (95% confidence interval, $P < 0.001$).

Abdel-Hady H [25], et al, studied the effect of caffeine therapy in premature newborn. They concluded that the newborn who were given caffeine had a higher survival rate (59.8% vs 53.8% in the placebo group) at follow up and also did not have neurodevelopmental disability.

Caffeine also exerts a diuretic effect by increasing GFR and in turn increasing the creatinine clearance. However, caffeine does not alter the serum electrolytes.

Jenik et al[26], studied 24 asphyxiated term babies who received a single dose of IV theophylline in the dose of 8 mg/kg and 27 babies who received placebo during the

1st 1 hour of life. They documented the 24 hr fluid intake & urine output during the 1st 5days of life. This study is a randomized double blind placebo controlled trial.

Results: In the 1st day of life, the 24-hour fluid balance was more in babies who had been given placebo, as compared to infants who received theophylline.
In the next few days, this trend had favoured the theophylline group.

Severe renal dysfunction was present in 17% of the infants in the theophylline group & 55% infants in the control group (RR-0.30, CI- 95%)

The mean creatinine clearance of the theophylline group was increased (21.84±7.96) compared to the control group (6.42±4.16)

Sathe et al[27], have observed that when methylxanthines were used in hypoxic neonates, they prevent the oliguric renal failure. They are also associated with increased diuresis & natriuresis in the 1st few hours of life in at risk patients and hence they carry a better outcome.

Sweetman et al[28], reviewed the mechanism of acute kidney injury in asphyxiated newborn. They suggested the use of biomarkers for AKI like NGAL (neutrophil gelatinase associated lipocalin) in serum & urine, as opposed to serum creatinine, which takes some days to stabilize. Urinary cystatin C levels were also increased in term asphyxiated infants as opposed to controls on Day 1 and hence can reliably predict AKI.

Askenazi[29] in his study deduced that in 4 randomized controlled trials of severely asphyxiated neonates, out of which 3 of them included term & 1 study included preterm neonates. All these trials assessed the reno protective effect provided by the administration of a single prophylactic dose of theophylline given within 1

hour of the birth and compared the values with the serum creatinine levels. The babies randomized to theophylline to IV theophylline had lower creatinine levels in serum and higher urine output on 2nd post-natal day and later.

Raina et al[30], studied the effect of theophylline to prevent renal dysfunction in term asphyxiated neonates. They randomized 159 severely asphyxiated newborn to 2 groups, study group (78 babies) to receive theophylline (5mg/kg), and control group (81 babies) to receive placebo, normal saline or dextrose IV. The theophylline group had lower creatinine levels (0.83±0.35 vs 1.47±0.61). AKI was present in 15% of babies in theophylline group and 48% babies in placebo group. GFR was increased in theophylline group (32.16±16.34 vs 17.73±7.92) as compared to the control group.

Parameter	**Theophylline iv 5mg/kg (n=78)**	**Placebo (n=81)**	**P value**
Creatinine	0.83 ± 0.35	1.47 ± 0.61	0.00
Incidence of AKI (%)	36 (15%)	117 (48%)	< 0.01

Elsami et al[31], studied the 24-hour fluid intake & urine volume of 36 severely asphyxiated infants, 17 of whom received theophylline as a single dose, 5mg/kg and 19 infants who received placebo, on D1, D3 and D5 of life. Change in the fluid balance favoured theophylline group, both initially and later days. Higher serum creatinine values were seen in the placebo group on D3. (1.06±0.47 in placebo vs 0.63±0.22 in theophylline group). Severe kidney dysfunction was seen in 2 infants of theophylline group (11.7%) and in 8 (42.1%) of the placebo group. GFR was

increased in the theophylline group (42.4±19.1 vs 27.5±10.7 in placebo group). There was no difference in the severity of asphyxia between the two groups.

Bhat et al[32], studied the effect of prophylactic theophylline & incidence of severity of renal failure in term infants with perinatal asphyxia. They randomized 40 infants to theophylline group and 30 infants to the control group, and observed that creatinine clearance was higher & excretion of β2microglobulin was lower in theophylline group.

Kandasamy et al[33], studied the relationship between serum creatinine & cystatin C in a cohort of 31 term & 49 preterm infants. The median creatinine level was 17µmol/L and the mean cystatin C level was 1.64 mg/L. They also assessed the relationship between birth weight, serum creatinine, cystatin C in the term & preterm infants. Serum creatinine had a significant correlation with the birth weight. Cystatin C levels had no correlation with the weight of the infant.

Maruniak-Chudek[34] et al, studied 32 late preterm & term neonates with sepsis admitted to NICU during the 1st 14 days of life, categorized as sepsis, severe sepsis & septic shock. They assessed the cystatin C levels with ELISA during 3 successive days. Mean cystatin C levels were 1.35 mg/L. The lowest concentrations were observed in septic shock (1.23 mg/L).

Higher concentrations were observed in sepsis (1.47 mg/L) and severe sepsis (1.50mg/L). There was no correlation between serum cystatin C, creatinine or gestational age. They concluded that cystatin C was not a useful marker of kidney function in septic neonates.

Roy Amardiyanto[35] et al, studied the prevalence of AKI in asphyxiated neonates, it was a cross sectional analytical study which included 94 neonates, 70 of which had moderate asphyxia and 24 had severe asphyxia. The prevalence of AKI was 38.

They concluded that the neonates who had more severe degree of asphyxia had more severe AKI stage and lower median GFR.

Ioannis Bellos et al[36], conducted a meta-analysis of 7 studies with total 458 asphyxiated neonates, who were randomized to receive theophylline and a placebo. Incidence of AKI was lower in neonates receiving theophylline while mortality rates were similar in between the 2 groups.

Theophylline was associated with decreased serum creatinine levels and elevated GFR in the 3rd day of life. They concluded that theophylline can improve renal function in asphyxiated neonates.

Bakr et al[37], studied the efficacy of theophylline to prevent renal dysfunction in term neonates with perinatal asphyxia.

They randomized 40 severely asphyxiated term infants to 2 groups containing 20 infants each– study group which received a single dose of IV theophylline and a control group which received placebo in the 1st hour of life. They analysed urine output, serum creatinine, GFR, urinary β2 microglobulin in the 1st 5 days of life. The control group had severe renal dysfunction. Serum creatinine values and β2 microglobulin excretion was less and GFR was more in the theophylline group. They concluded that prophylactic theophylline when given early had a significant benefit in reducing the renal involvement in asphyxiated infants.

Daetwyler et al[38], analysed 18 asphyxiated term newborns who were treated with hypothermia in 3 tertiary neonatal & paediatric intensive care centres. Results were compared with published data from the NICHD neonatal research network's hypothermia trial.

Results: 4 infants did not require active cooling at all in the whole period required for cooling. 14 infants had passive cooling during 85% of the total time, and active cooling in 15% of the total cooling time.

M Treiber et al[39], analysed cystatin C in the umbilical blood as a predictor of AKI after perinatal asphyxia and compared it with creatinine. 100 full term neonates were enrolled in the study, they randomised these infants to two groups- study group & control group of 50 each. Cystatin C and creatinine were measured in the cord blood at birth and from a peripheral vein 3 days later. At birth, the mean level of cystatin C in healthy term babies, i.e. the control group was found to be 1.39±0.19 mg/L and 1.34±0.21 mg/L after 3 days of life.

The mean cystatin C levels in the study group was 2.12±0.53 mg/L in the cord blood and 1.56±0.32 mg/L in day 3 samples.

Creatinine levels were analysed simultaneously at birth between control & study group. (62.74±12.84 µmol/L vs 72.60±15.55µmol/L).

They reported that serum cystatin C is a more sensitive marker of GFR than creatinine in the newborn.

Parameter	Asphyxia (n = 50)	Control (n = 50)	Group caffeine	Group theophylline
Cystatin C day 1 (umb)	2.12 ± 0.53	1.39 ± 0.19	3.3 ± 1.7	4.6 ± 2.6
Cystatin C day 3 (peripheral vein)	1.56 ± 0.32 (p < 0.001)	1.34 ± 0.21 (p = 0.137)	2.6 ± 1.5	2.7 ± 1.5
Creatinine day 1 (umb)	72.60 ± 15 15.55 (p < 0.001)	62.74 ± 12.84 (p < 0.001)	0.9 ± 0.4	0.9 ± 0.4
Creatinine day 3 (peripheral vein)	0.918 ± 0.22 (p < 0.001)	0.692 ± 0.03 (p < 0.001)	-	-

Harer and Askenazi[40] studied the effects of caffeine administration and incidence of AKI in preterm newborn. They concluded that the incidence of acute kidney injury is reduced in newborn who received caffeine compared to those who did not receive caffeine. They concluded that for every 4.3 neonates who were exposed to caffeine, 1 case of AKI was prevented.

Bokenkamp et al[41], studied the values of cystatin C in 258 children aged between 1 day to 18 years age, who did not have any kidney disease. They also measured serum creatinine values simultaneously in the samples. They observed that the levels of cystatin C was highest in the initial days of life (1.64 – 2.59 mg/l), and a decreasing trend is noted in the following years. Concurrently, the creatinine levels in the serum increased steadily with age till the child reached adulthood. They postulated that the higher cystatin C levels in the newborn period were probably due to the low GFR of newborn & infants.

Finney et al[42] compared the plasma levels of cystatin C with creatinine levels in 291 children with age ranges of 1 day to 17 years. They found that the concentrations of cystatin C and creatinine in premature babies were significantly raised compared to term neonates. The cystatin C levels are in the range of 1.10 – 2.06 mg/l, creatinine levels are in the range of 32- 135 micromol/l. They concluded that cystatin C is a better marker of GFR than creatinine in preterm infants.

Harmoinen et al[43], measured the cystatin C levels in the plasma in 58 preterm infants, 50 full term infants and compared with plasma creatinine levels. They found that preterm infants had higher cystatin C levels (mean 1.88 mg/l) than the full term newborn (mean 1.70 mg/l). they concluded that plasma cystatin C levels are a better marker for GFR than the plasma creatinine.

Bahar et al[44], determined the reference values of cystatin C at birth, and 3 days after birth, and assessed the correlation between the gender, gestational age and bilirubin level. They analysed the levels of cystatin C in umbilical cord and in peripheral vein, and also analysed the serum creatinine, total & direct bilirubin levels. They observed that the mean concentration of cystatin C did not differ significantly between the cord blood and peripheral blood (1.36± 0.35 mg/l and 1.35± 0.33 mg/l).

Simons et al[45] studied the pharmacokinetics of theophylline in preterm neonates. It is postulated that the metabolism of theophylline follows a unique pattern in that there is methylation of theophylline to caffeine. Thus, the dose requirements are lower in neonates.

Sun Young Cho et al[46], studied the clinical significance of serum cystatin C in critically ill newborn.

Results: The range of serum creatinine was from 0.1-0.8 mg/dl and the cystatin C levels were in the range of 1 – 2.3 mg/l. They concluded that there is an increased level of cystatin C without a significant increase in the serum creatinine levels. This showed that cystatin C levels showed a more delicate change in the newborn than the serum creatinine levels. Thus, cystatin C could be a very appropriate indicator, especially for the critically ill newborn.

Schnermann et al[47], studied the effect of methylxanthines on the kidney. The potency of various methylxanthines to cause diuresis is as follows: theophylline causes the greatest diuretic action, followed by caffeine (Fulgraff[48], G. Xanthinderivate als Diuretika. In: Herken, H., editor. Handbuch der Experimentellen Pharmakologie. Vol. vol XXIV. Berlin: Springer Verlag; 1969. P. 596-640.)

Selewski et al[49], studied the incidence of acute kidney injury in asphyxiated newborn who were put on therapeutic hypothermia. They evaluated the serum creatinine levels, duration of NICU stay and mechanical ventilation in these babies. They concluded that AKI occurred in 36 out of 96 cooled infants. Babies who had AKI had longer duration of NICU stay, and prolonged duration of mechanical ventilation.

Kandasamy et al[50], measured the serum cystatin C levels serially in a cohort of preterm neonates and followed up till age of 2 years. They found that cystatin C levels were not influenced by gestational age or gender, but there was a significant association with the body weight gain (p value < .001). They also concluded that the mean levels of cystatin C (CysC) was higher in the neonate and later plateaued by 24 months.

Pacifici et al[51], studied the metabolism and pharmacokinetics of theophylline in preterm newborn. Theophylline is metabolized to caffeine by N-methylation in premature infants.

MATERIALS AND METHODS

Source of data:

This study was carried out on 100 term newborn babies admitted to the NICU of BLDE (Deemed to be) University's Shri B M Patil Medical College, Vijayapura, Karnataka, either born with the history of birth asphyxia or referred from other centres.

PERIOD OF STUDY:

January 2019 to June 2020

Sample for the study are all term, late preterm neonates diagnosed with birth asphyxia and admitted in NICU at Shri B. M. Patil Medical College, Hospital & Research Center, Bijapur.

Randomized study involving late preterm and term neonates with birth asphyxia admitted in NICU. A total of 100 cases of birth asphyxia were studied in a span of 1 1/2 year.

Method of collection of Data (including sampling procedures if any)

After taking written informed consent from the parents and fulfilling inclusion and exclusion criteria, the neonates were included in the study.

Method of study:

A randomized study involving late preterm and term neonates admitted in NICU with a history of delayed cry or no cry at birth.

Period of study – 1 1/2 year

METHODOLOGY:

Blood samples were taken at admission and on day 3 of life (or NICU stay) and collected in a plain bulb (with red cap) or in a lithium heparin bulb (with green cap). After the 1st blood sample was collected for the investigation, the babies were either given caffeine or theophylline slow iv drip over 1 hour. Blood samples were again collected on day 3. All the samples were processed by centrifugation at a speed of 3500 rpm over a duration of 10 minutes to separate the serum from the plasma. The serum floats over the plasma as a supernatant, which is pipetted into Eppendorf tubes and stored at -20°C till further analysis.

EQUIPMENT:

1. Centrifuge
2. ELISA reader (Erba Mannheim – LisaScan® EM)
3. ELISA plate & wells
4. Reagents (standard solutions, conjugate diluent, quality controls, substrate solution, wash solution, dilution buffer, stop solution.
5. Pipettes
6. Test tubes for dilution & standardization
7. Distilled water
8. Graduated cylinders for conjugate & wash solutions

INTRODUCTION OF THE PROCEDURE:

Cystatin C (formerly known as cystatin 3, post gamma globulin) is a protein of low molecular weight belonging to the superfamily of cysteine protease inhibitors. It is produced by all nucleated cells, at a fairly constant rate, it's production is not much affected by the diet, inflammatory states, lean body weight, or by circadian rhythms.

Cystatin C is freely filtered by the glomeruli, similar to creatinine. It is reabsorbed by the proximal renal tubular epithelial cells and is completely catabolized in the proximal tubules and it is not returned to the bloodstream. It is mainly used as a biomarker of renal function.

Cystatin C levels are inversely related to the glomerular filtration rate. Hence cystatin C can be a potential biomarker to determine early insult to the kidney.

PROCEDURE:

The standards (recombinant human cystatin C), quality controls and the samples are incubated in the micro titre plate wells pre coated with polyclonal anti human cystatin C antibody for 30 minutes. After 30 minutes of incubation is completed, the wells are washed thoroughly for around 3-4 times with the wash solution (deionized or distilled water). The horse radish peroxidase enzyme (conjugate solution) is added to all the wells and incubated for another 30 minutes. The plate is washed again after 30 minutes, then the substrate solution (TMB- tetramethylbenzidine) is added to the wells and allowed to incubate for 10 minutes. The wells acquire a blue colour after adding the substrate solution. The plate is again washed after 10 minutes, and the colour development is stopped by adding the stop solution (0.2M sulphuric acid), which after added to the wells changes the blue colour to yellow. The plate is analysed by a microplate reader for the absorbance range set between 450nm-630nm. Simultaneously serum creatinine levels were also assessed and compared with the cystatin C ELISA values.

FIGURE 3: CONTENTS OF THE ELISA KIT

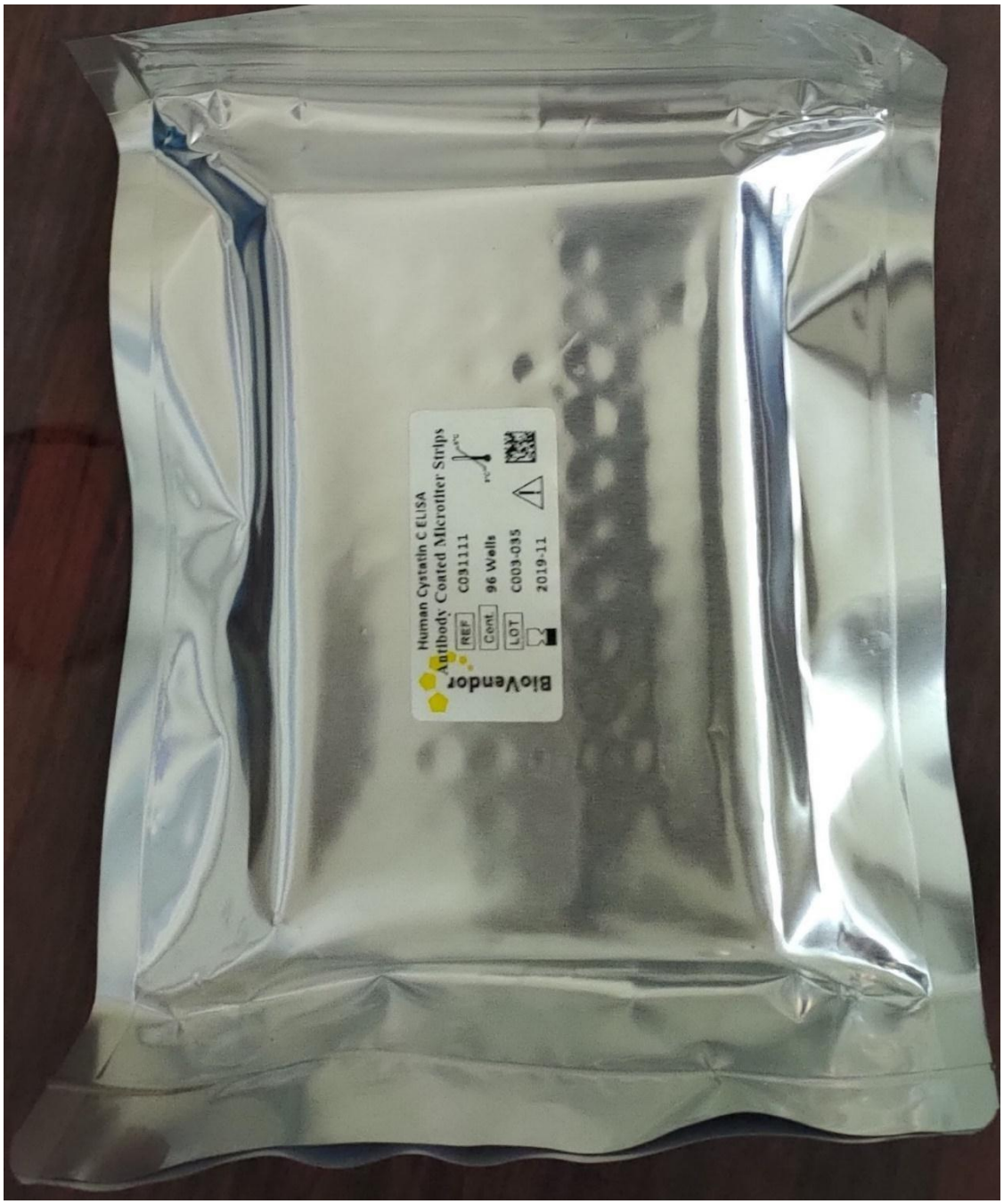


FIGURE 4: ELISA PLATE

FIGURE 5: DILUENT BUFFER SOLUTIONS

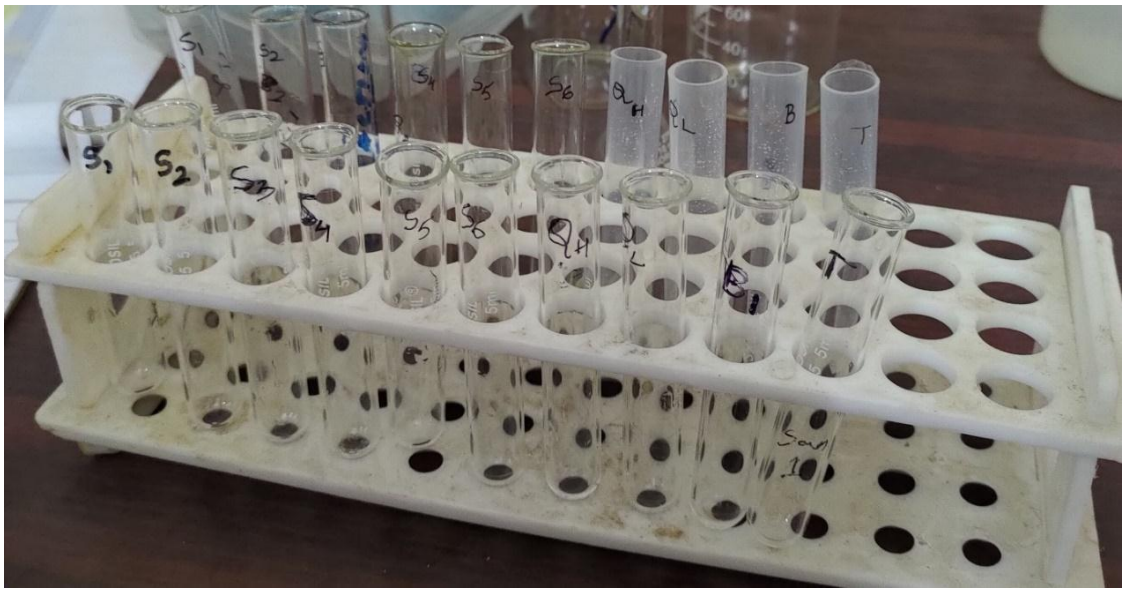


FIGURE 6: STANDARDIZATION TUBES

FIGURE 7: ELISA PLATE WITH MICROTITRE WELLS

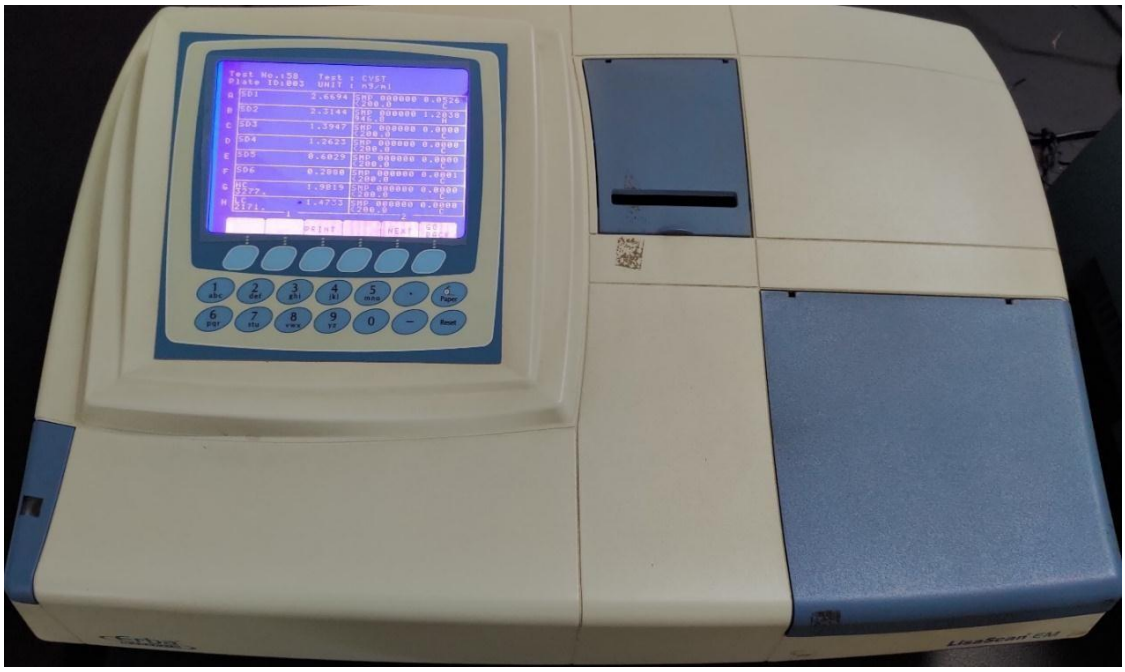


FIGURE 8: ELISA READER

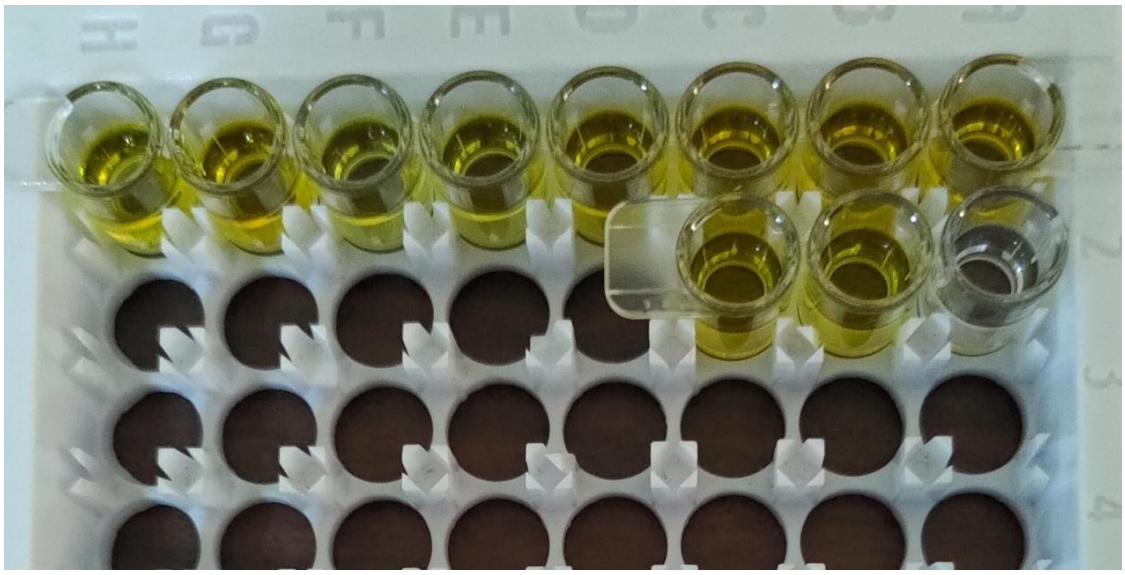


FIGURE 9: STANDARD WELLS

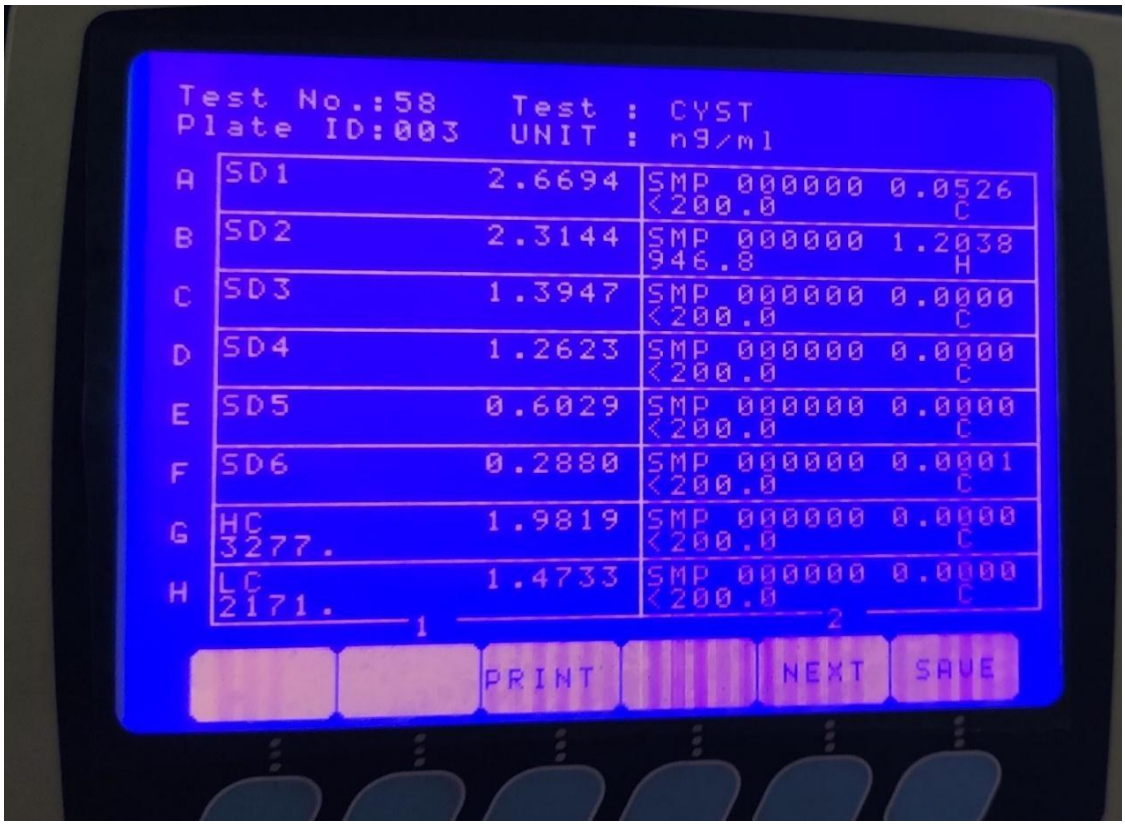


FIGURE 10: ELISA STANDARDIZATION READING VALUES

FIGURE 11: MULTICHANNEL PIPETTE

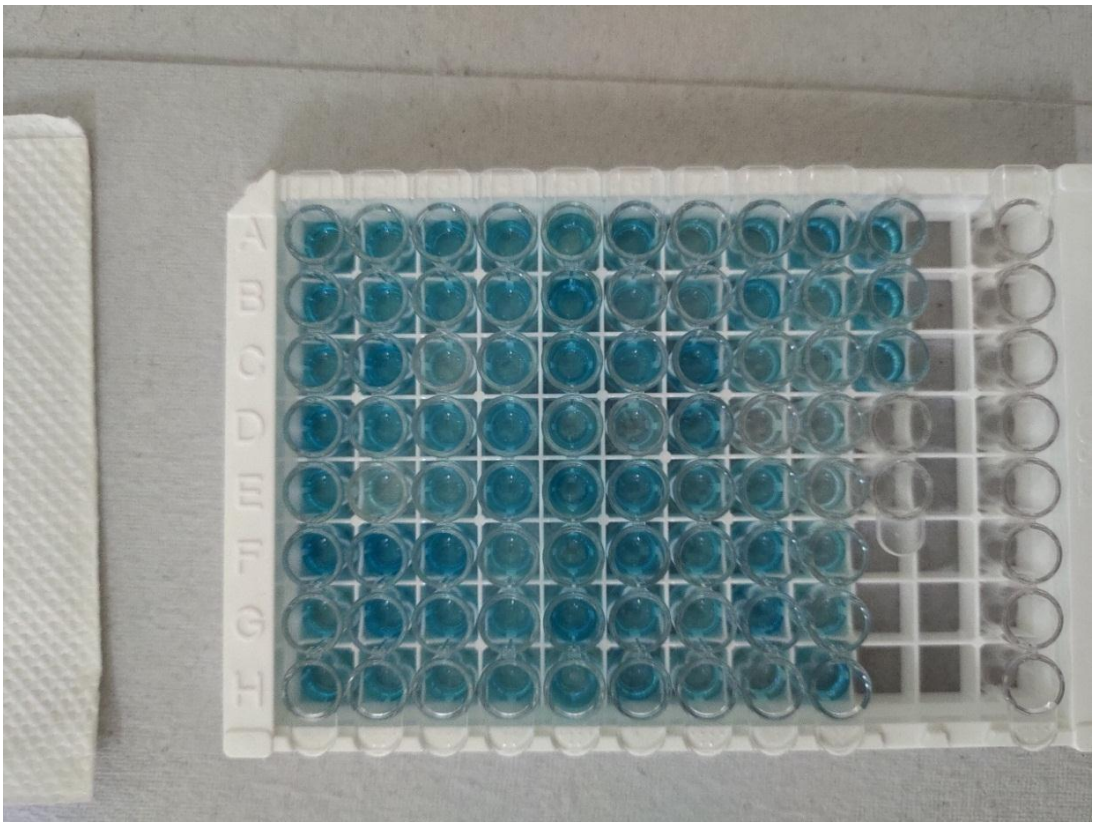


FIGURE 12: INITIAL COLOR DEVELOPMENT

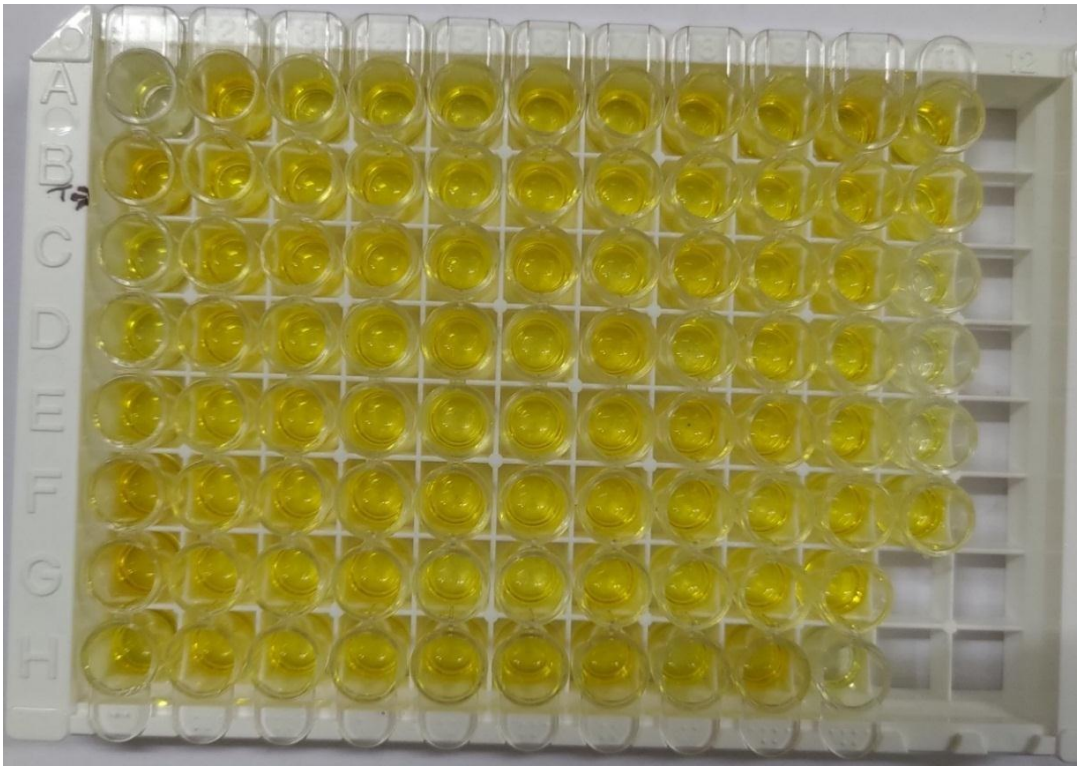
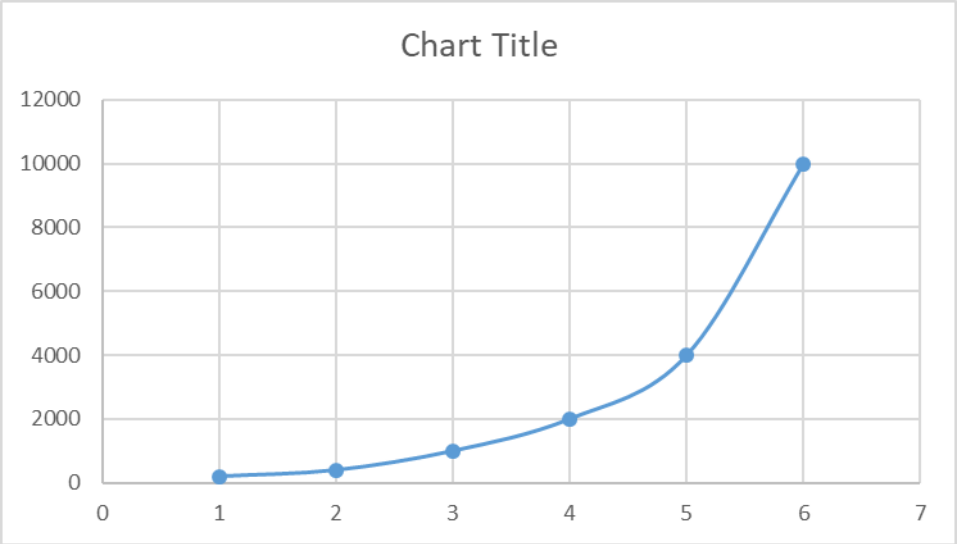


FIGURE 13: FINAL COLOR DEVELOPMENT

TABLE 4: STANDARDIZATION TABLE

absorbance	concentration
std 1	200
std 2	400
std 3	1000
std 4	2000
std 4	4000
std 6	10000



X axis – absorbance, Y axis – concentration

FIGURE 14: STANDARDIZATION CURVE

DATA ANALYSIS:

EXPOSURE:

We categorize the babies randomly into two different groups once the diagnosis of birth asphyxia is made.

Group A will receive Caffeine. (A single dose of 20 mg/kg/dose {equivalent to caffeine base 10mg/kg} over 20 minutes)

Group B will receive Theophylline. (A single dose of 8 mg/kg)

These drugs will be administered with in twelve hours of life. Prophylactic antibiotic, and other treatment will be given to all the groups, as per the protocol.

DETERMINATION OF SAMPLE SIZE:

100 (50 per group) patients are required to have a 90% chance of detecting, as significant at the 5% level, a decrease in the primary outcome (Cystatin C) measure from 4.2 in the Group A to 1.5 in the group B.

Total sample size = 100

Calculation based on the formula:

$n = f(\alpha/2, \beta) \times 2 \times \sigma^2 / (\mu_1 - \mu_2)^2$

where μ_1 and μ_2 are the mean outcome in the control and experimental group respectively, σ is the standard deviation

Statistical analysis:

All characteristics will be summarized descriptively.

For continuous variables, the summary Statistics of N, mean, standard deviation (SD) will be used.

For categorical data, the number and Percentage will be used in the data summaries Data will be analysed by Chi square test for Association, comparison of means using t test, ANOVA and diagrammatic presentation.

Type of study

Randomized comparative open labelled non inferior study.

Asphyxiated newborn (term and late preterm) were randomized into 2 groups:

GROUP A: Caffeine citrate (20 mg/kg/dose)

GROUP B: Theophylline (8 mg/kg/dose)

After initial stabilization of the baby, either caffeine or theophylline is given at admission and the blood samples drawn on the admission day and on day 3 of admission for analysis of serum creatinine, and serum cystatin C. Babies are managed according to the degree of HIE accordingly and the corresponding antibiotic policy applied in the NICU. Seizures are managed by antiepileptic drugs. The babies are monitored for development of any complications like seizures, and duration of NICU stay and the need for phototherapy or therapeutic hypothermia.

Statistical Analysis:

All characteristics were summarized descriptively. For continuous variables, the summary statistics of mean ± standard deviation (SD) were used. For categorical data, the number and percentage wereused in the data summaries and diagrammatic presentation. Chi-square (χ^2) test was used for association between two categorical variables.

The formula for the chi-square statistic used in the chi square test is:

$$\chi_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

The subscript "c" are the degrees of freedom. "O" is observed value and E is expected value. C= (number of rows-1)*(number of columns-1)

The difference of the means of analysis variables between two independent groups was tested by unpaired t test.

The t statistic to test whether the means are different can be calculated as follows:

$$t = \frac{(\overline{x_1} - \overline{x_2}) - (\mu_1 - \mu_2)}{\sqrt{\frac{{s_1}^2}{n_1} + \frac{{s_2}^2}{n_2}}}$$

where $\bar{x}_1$ = mean of sample 1

$\bar{x}_2$ = mean of sample 2

n_1 = number of subjects in sample 1

n_2 = number of subjects in sample 2

$$s_1^2 = \text{variance of sample 1} = \frac{\Sigma(x_1 - \bar{x}_1)^2}{n_1}$$

$$s_2^2 = \text{variance of sample 2} = \frac{\Sigma(x_2 - \bar{x}_2)^2}{n_2}$$

If the p-value was < 0.05, then the results were considered to be statistically significant otherwise it was considered as not statistically significant. Data were analyzed using SPSS software v.23(IBM Statistics, Chicago, USA)and Microsoft office 2007.

Selection criteria

Inclusion criteria:

The study includes

1. Asphyxiated term & late preterm babies
2. History of decreased activity since birth (Apgar < 7)

Exclusion criteria:

The study will exclude

1. Severe IUGR
2. Multiple anomalies in babies
3. Systemic disorders in mothers
4. If mother found out to have severe PIH, gestational diabetes, oligohydramnios.
5. Mother smoking or drinking alcohol
6. Syndromic baby

Duration of study: 1 ½ year(January 2019 to June 2020)

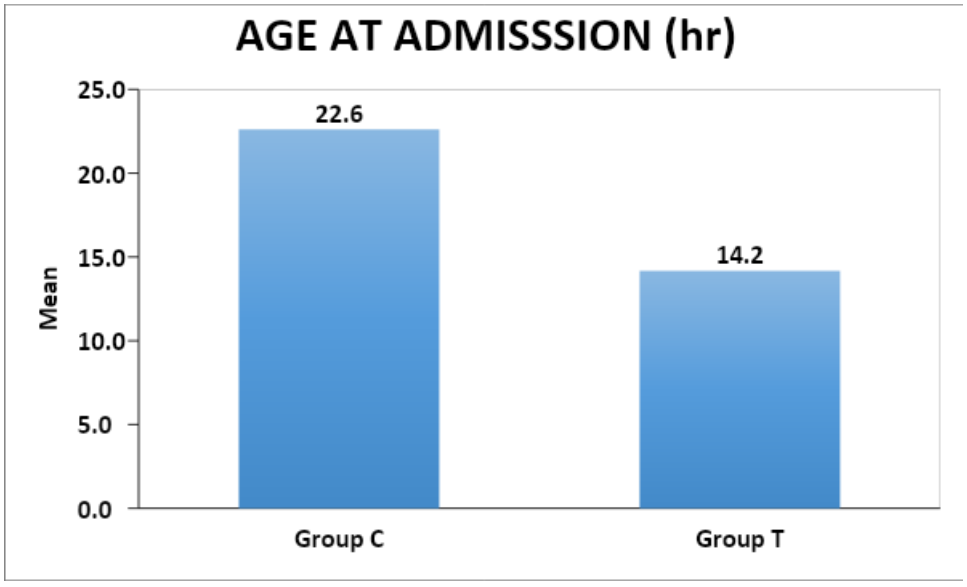
RESULTS

One hundred asphyxiated newborns are enrolled into two groups – Group C – Caffeine and Group T – Theophylline. The characteristics are summarized as follows in the following charts and figures:

TABLE 5 : DISTRIBUTION OF AGE AT ADMISSSION BETWEEN STUDY GROUPS

Parameters	Group Caffeine		Group Theophylline		p value
	Mean	SD	Mean	SD	
AGE AT ADMISSSION (hr)	22.6	70.1	14.2	34.8	0.446

GRAPH 3: DISTRIBUTION OF AGE AT ADMISSSION BETWEEN STUDY GROUPS



The mean age of babies treated with caffeine at admission is 22.6hrs as compared to babies treated with theophylline at admission, i.e, 14.2hrs, the comparison between these groups is not much significant (p value 0.446)

TABLE 6: DISTRIBUTION OF SEX BETWEEN STUDY GROUPS

SEX	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
Male	33	66	31	62	
Female	17	34	19	38	0.677
Total	50	100	50	100	

GRAPH 4 : DISTRIBUTION OF SEX BETWEEN STUDY GROUPS

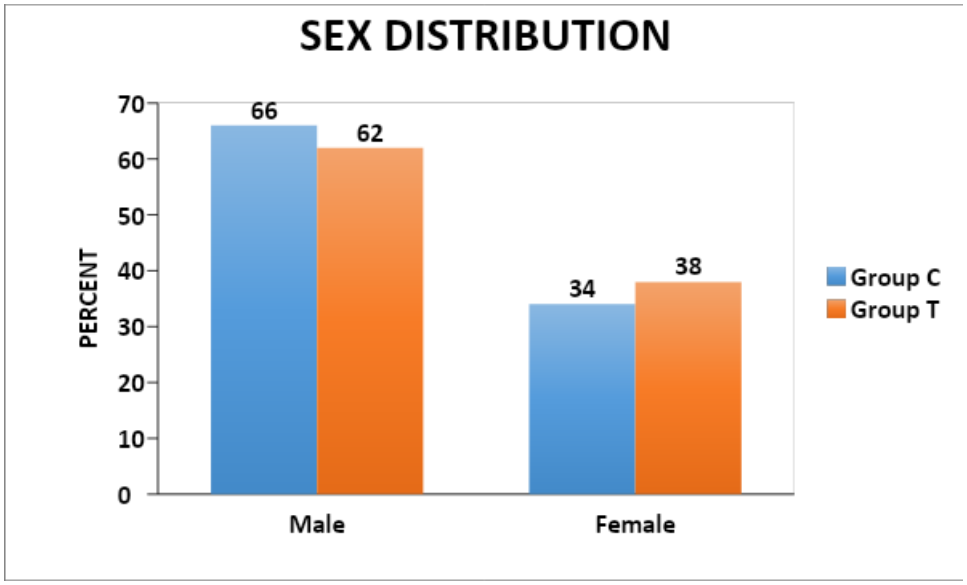


TABLE 7 : INBORN/OUTBORN BETWEEN STUDY GROUPS

INBORN/OUTBORN	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
INBORN	23	46	18	36	0.309
OUTBORN	27	54	32	64	
Total PERCENT	50	100	50	100	

GRAPH 5 : INBORN/OUTBORN BETWEEN STUDY GROUPS

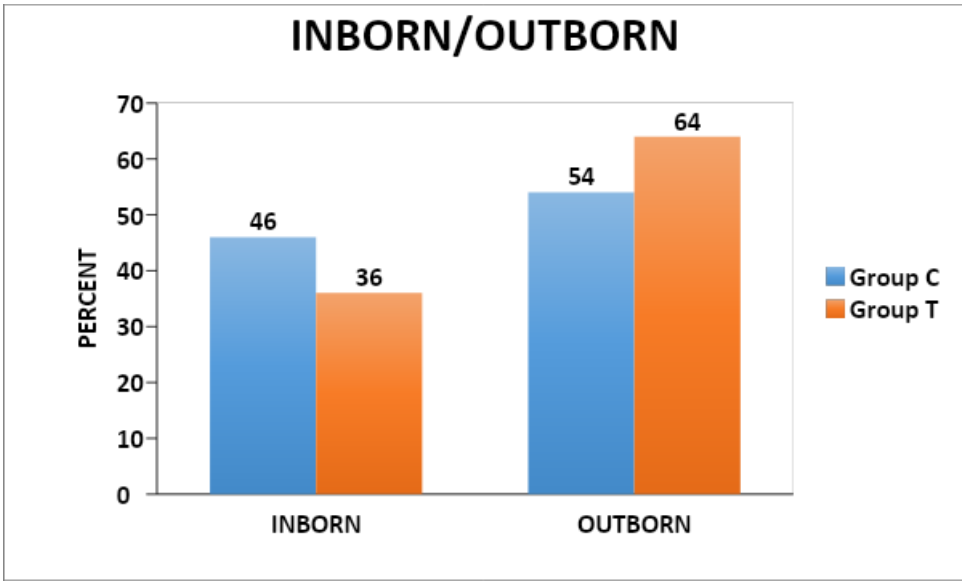


TABLE 8 : DISTRIBUTION OF GA BETWEEN STUDY GROUPS

GA	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
LATE PRETERM	6	12	7	14	0.887
POST TERM	4	8	5	10	
TERM	40	80	38	76	
Total	50	100	50	100	

GRAPH 6 : DISTRIBUTION OF GA BETWEEN STUDY GROUPS

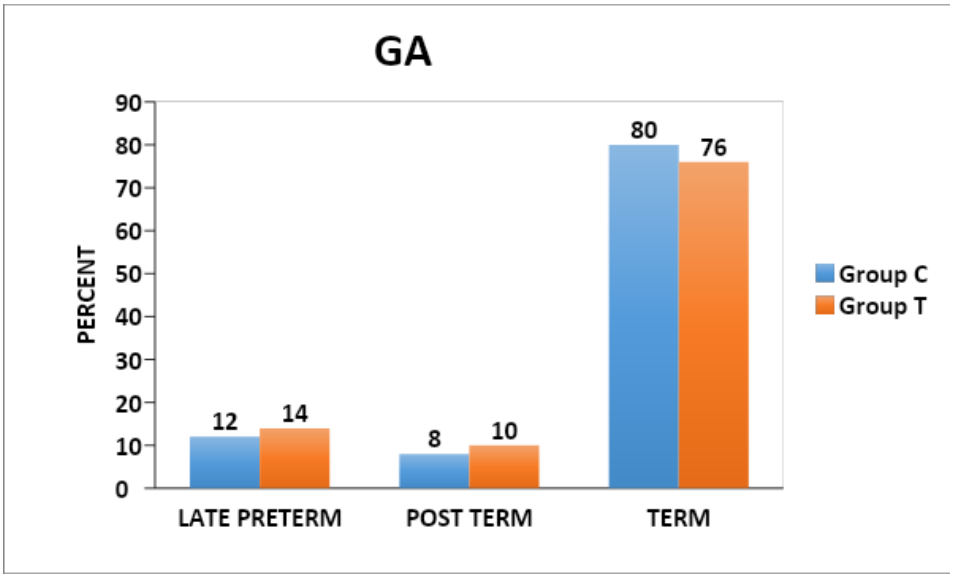


TABLE 9 : DISTRIBUTION OF GRAVIDA BETWEEN STUDY GROUPS

GRAVIDA	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
MULTI	25	50	22	44	0.548
PRIMI	25	50	28	56	
Total	50	100	50	100	

GRAPH 7 : DISTRIBUTION OF GRAVIDA BETWEEN STUDY GROUPS

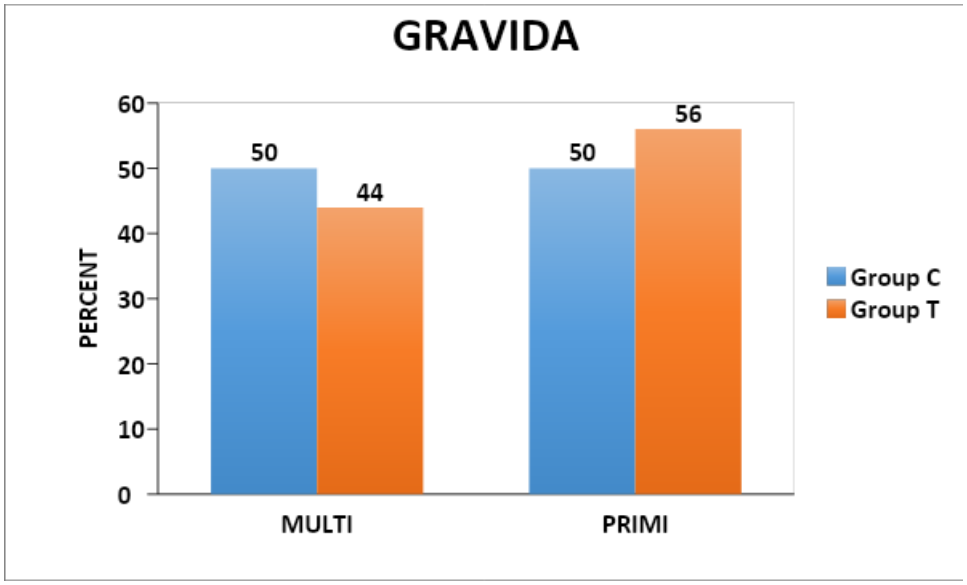


TABLE 10 : DISTRIBUTION OF RISK FACTORS BETWEEN STUDY GROUPS

RISK FACTORS	Group Caffeine		Group Theophylline	
	N	%	N	%
ABORTION	7	14	3	6
OBSTRUCTED LABOR	1	2	1	2
THROMBOCYTOPENIA	1	2	0	0
APE	3	6	0	0
BREECH PRESENTATION	1	2	0	0
DEATH	1	2	4	8
FACE PRESENTATION	1	2	0	0
HBSAG POSITIVE STATUS	0	0	2	4
IMPENDING ECLAMPSIA	1	2	0	0
MSAF	10	20	19	38
MAS	5	10	14	28
PROM	1	2	1	2
RH NEGATIVE	2	4	1	2
GHTN	2	4	0	0
SEVERE PE	4	8	3	6
ANEMIA	2	4	1	2

GRAPH 8 : DISTRIBUTION OF RISK FACTORS BETWEEN STUDY GROUPS

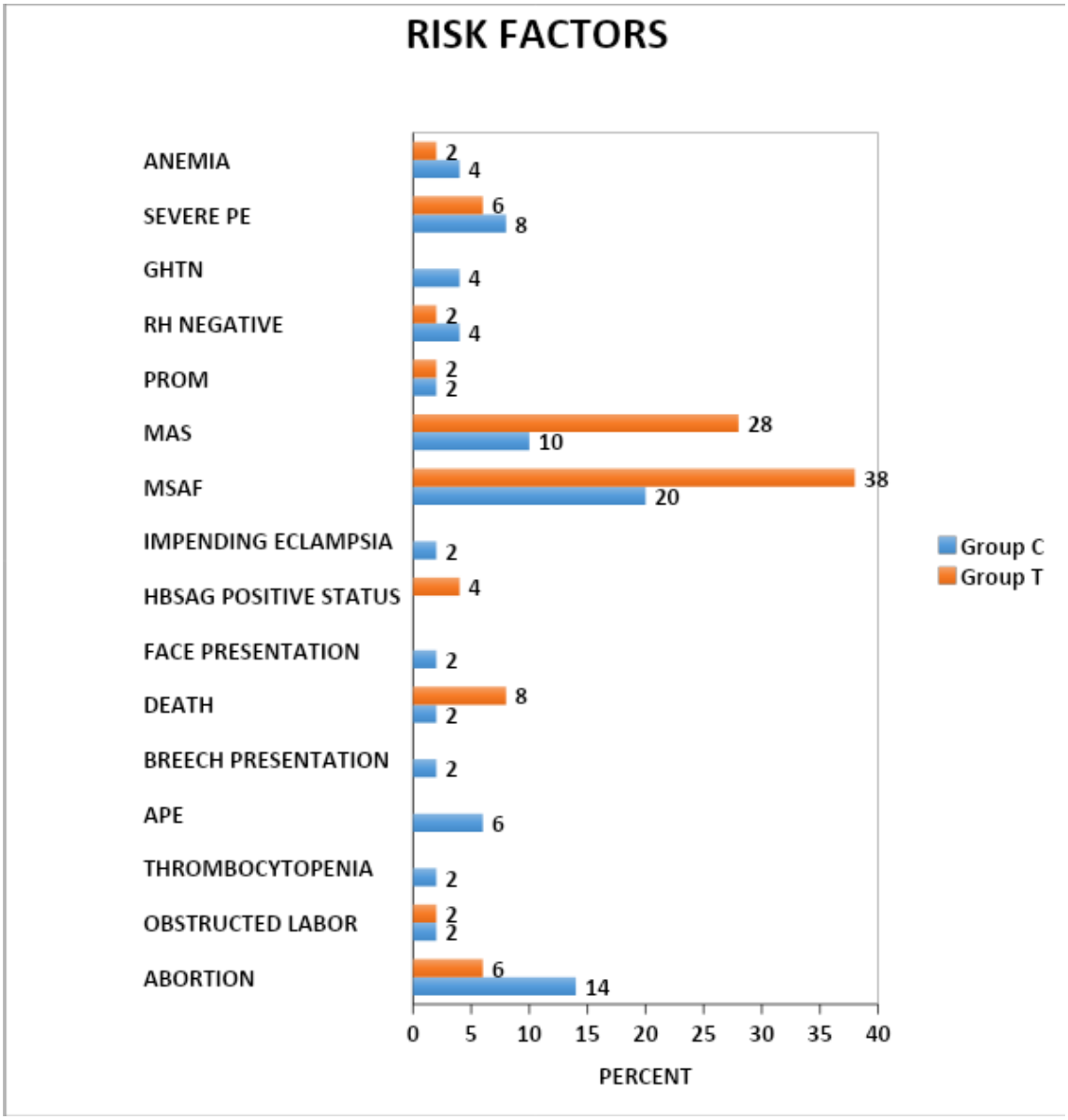


TABLE 11 : DISTRIBUTION OF MOD BETWEEN STUDY GROUPS

MOD	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
LSCS	16	32	14	28	
NVD	34	68	36	72	0.663
Total	50	100	50	100	

GRAPH 9 : DISTRIBUTION OF MOD BETWEEN STUDY GROUPS

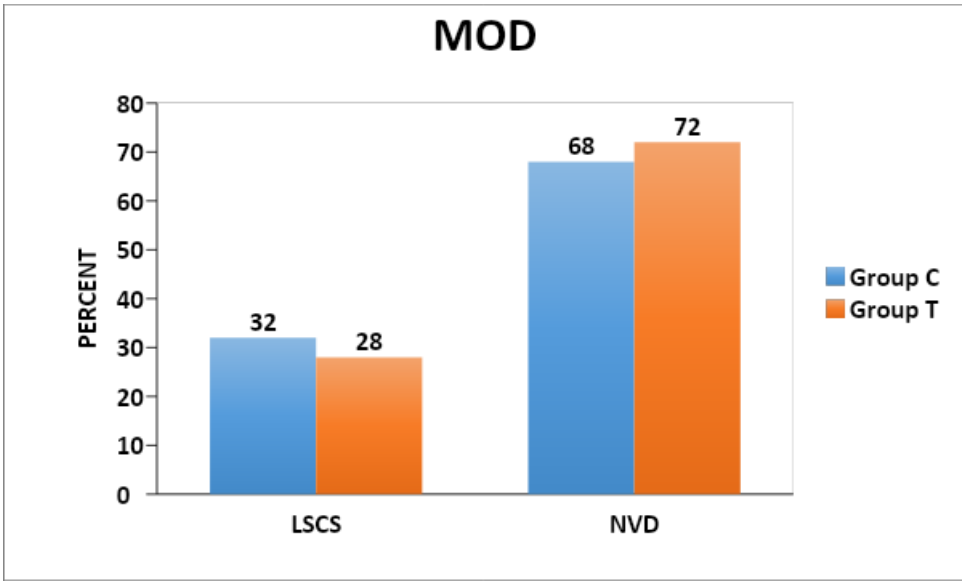


TABLE 12 : DISTRIBUTION OF MOTHERS BLOOD GROUP BETWEEN STUDY GROUPS

MOTHERS BLOOD GROUP	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
A-	0	0	1	2	0.157
A+	10	20	9	18	
AB+	11	22	19	38	
B-	1	2	0	0	
B+	15	30	17	34	
O-	1	2	0	0	
O+	12	24	4	8	
Total	50	100	50	100	

GRAPH 10 : DISTRIBUTION OF MOTHERS BLOOD GROUP BETWEEN STUDY GROUPS

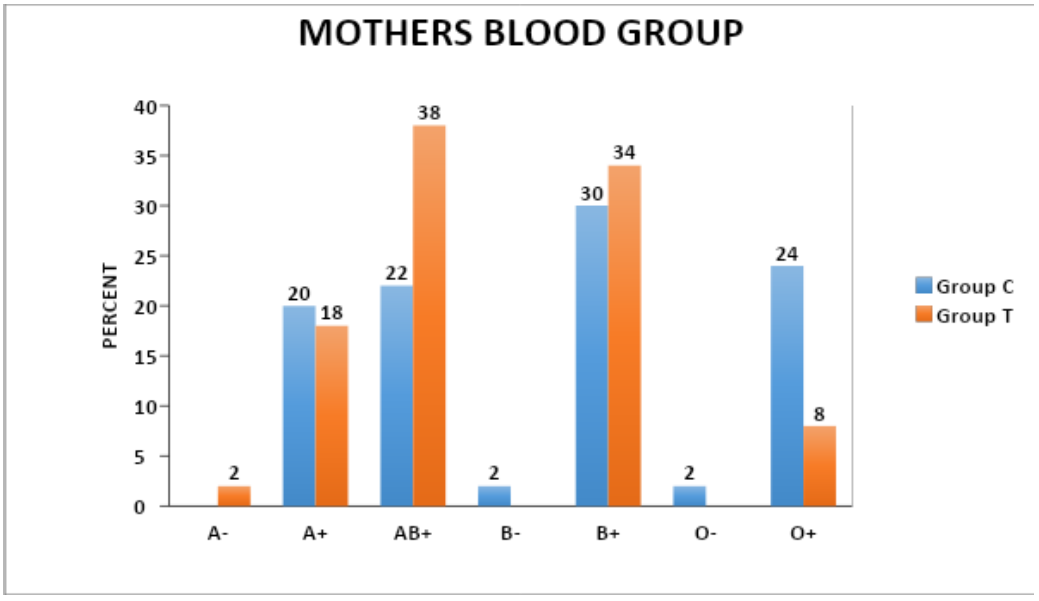


TABLE 13 : DISTRIBUTION OF BIRTH ORDER BETWEEN STUDY GROUPS

BIRTH ORDER	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
1ST	25	50	29	58	0.574
2ND	14	28	9	18	
3RD	5	10	7	14	
>3RD	6	12	5	10	
Total	50	100	50	100	

GRAPH 11 : DISTRIBUTION OF BIRTH ORDER BETWEEN STUDY GROUPS

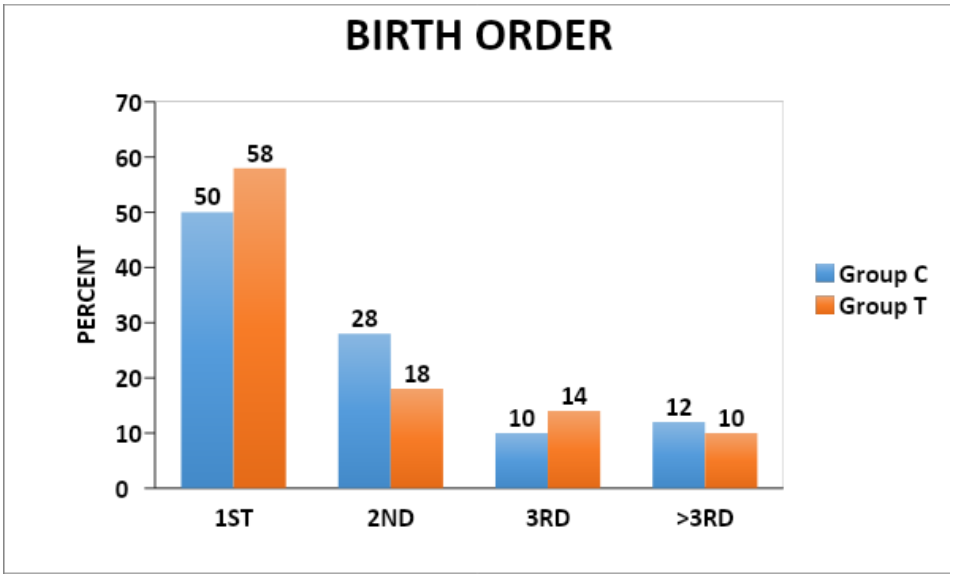


TABLE 14 : DISTRIBUTION OF BW BETWEEN STUDY GROUPS

BW	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
<2.5KG	10	20	13	26	0.476
>2.5KG	40	80	37	74	
Total	50	100	50	100	

GRAPH 12 : DISTRIBUTION OF BW BETWEEN STUDY GROUPS

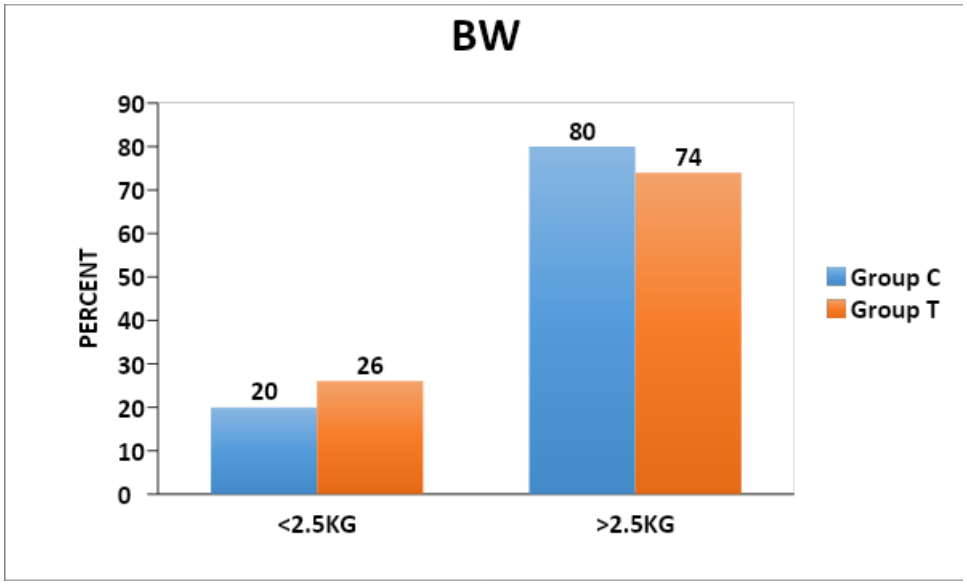


TABLE 15 : DISTRIBUTION OF MEASURES TAKEN BETWEEN STUDY GROUPS

MEASURES TAKEN	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
BMV	3	6	2	4	0.031*
BMV, INTUBATION	2	4	0	0	
INTUBATION	10	20	8	16	
STIMULATION	23	46	35	70	
STIMULATION, BMV	12	24	3	6	
STIMULATION,SUCTION	0	0	2	4	
Total	50	100	50	100	

Note: * significant at 5% level of significance ($p<0.05$)

From the above statistical data, we can tell that the association between the measures taken for resuscitation and the two groups' response is statistically significant (p= 0.031). The caffeine group had more babies who responded to BMV (3 vs 2), BMV followed by intubation (2 vs 0), intubation (10 vs 8), stimulation followed by BMV (12 vs 3), and theophylline group had more babies who responded to stimulation (35 vs 23), and stimulation followed by suctioning (2 vs 0).

GRAPH 13 : DISTRIBUTION OF MEASURES TAKEN BETWEEN STUDY GROUPS

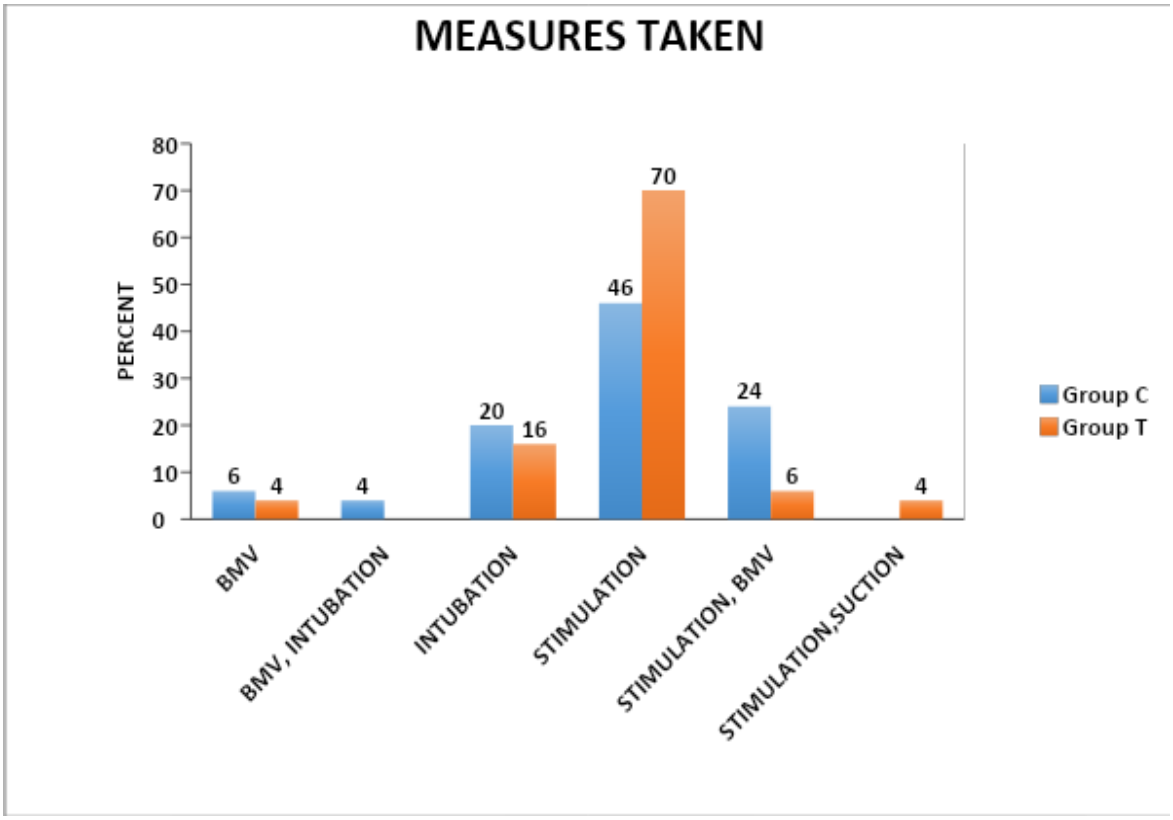


TABLE 16 : TREATMENT BETWEEN STUDY GROUPS

TREATMENT	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
HOOD	18	36	37	74	<0.001*
O2	39	78	42	84	0.444
ABX	50	100	50	100	-
VENTILATION	21	42	8	16	0.004*

Note: * significant at 5% level of significance (p<0.05)

The babies who were assigned to caffeine group underwent ventilation (21 vs 8), whereas babies who were assigned to theophylline group were put on hood (37 vs 18), both of which had a significant p value. Babies who were put on O2 did not have a significant p value (0.444).

GRAPH 14 : TREATMENT BETWEEN STUDY GROUPS

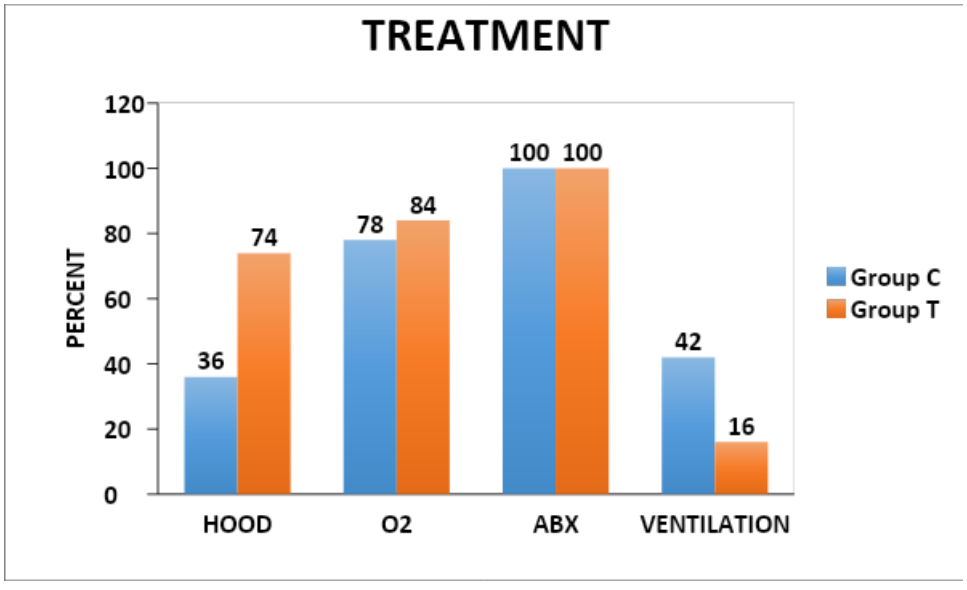


TABLE 17 : THERAPEUTIC HYPOTHERMIA BETWEEN STUDY GROUPS

Parameters	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
THERAPEUTIC HYPOTHERMIA	3	6	1	2	0.307

GRAPH 15 : THERAPEUTIC HYPOTHERMIA BETWEEN STUDY GROUPS

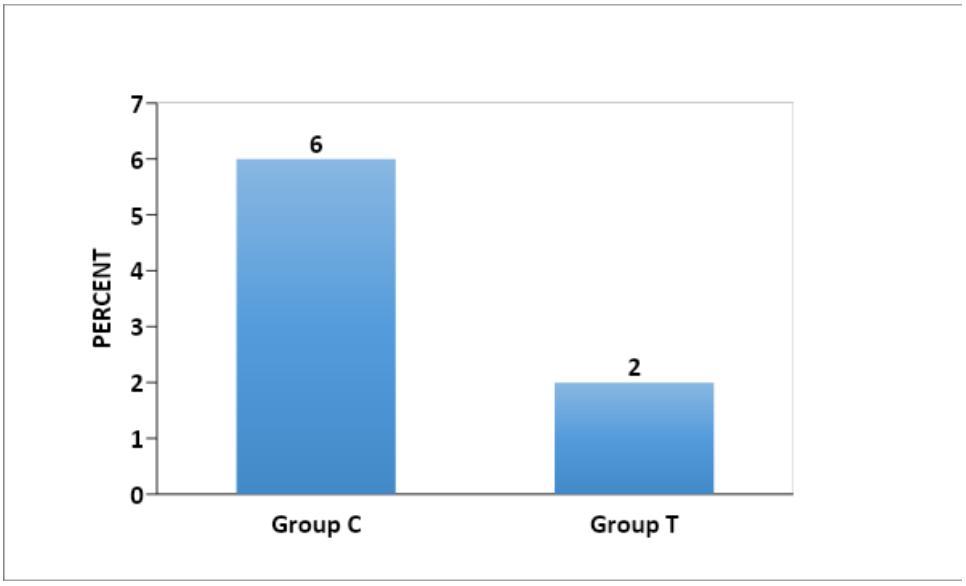


TABLE 18 : HIE STAGE BETWEEN STUDY GROUPS

HIE STAGE	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
I	17	34	28	56	0.017*
II	21	42	19	38	
III	12	24	3	6	
Total	50	100	50	100	

Note: * significant at 5% level of significance ($p<0.05$)

GRAPH 16 : HIE STAGE BETWEEN STUDY GROUPS

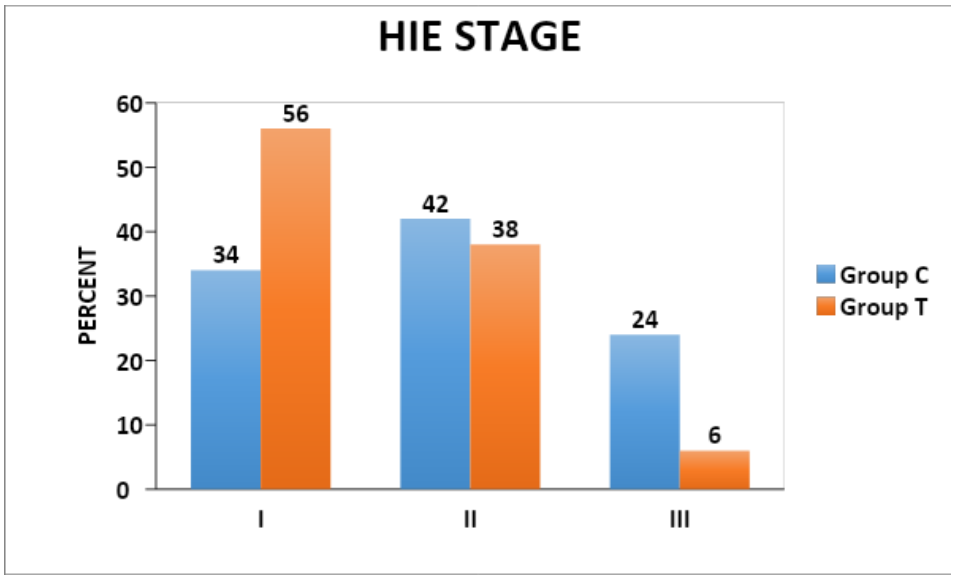


TABLE 19 : DISTRIBUTION OF ABG RESULT BETWEEN STUDY GROUPS

ABG	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
MET. ACIDOSIS	11	22	19	38	0.285
RESP. ACIDOSIS	1	2	2	4	
RESP.ALKALOSIS	8	16	3	6	
RESP.ALKALOSIS + MET. ACIDOSIS	7	14	6	12	

GRAPH 17 : DISTRIBUTION OF ABG RESULT BETWEEN STUDY GROUPS

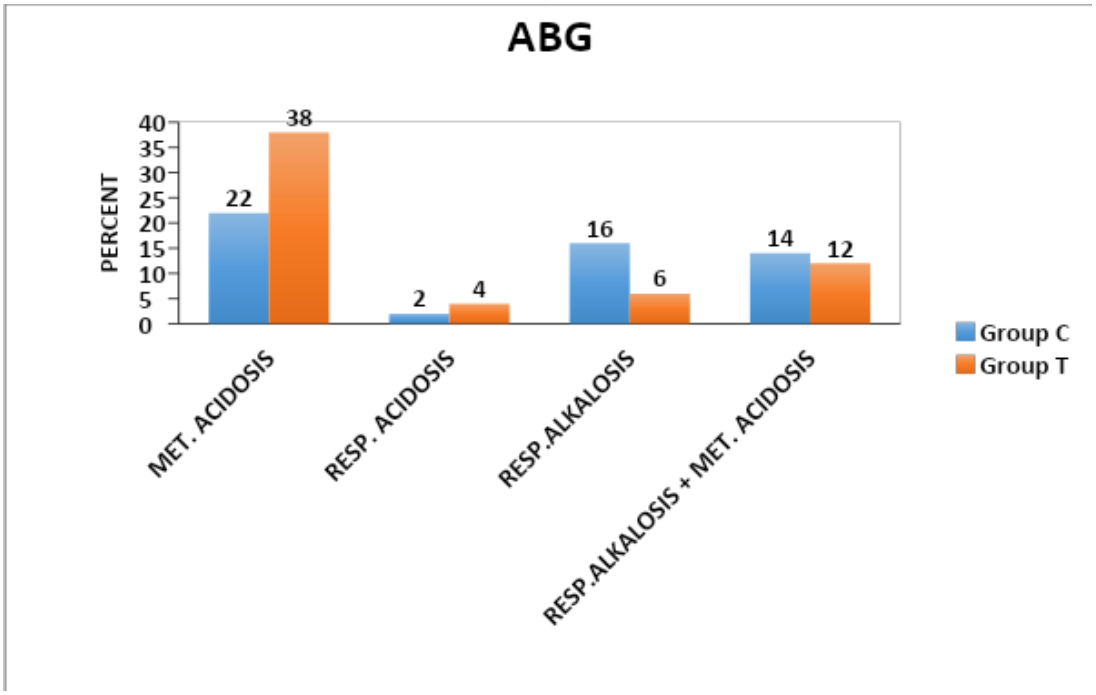


TABLE 20 : DISTRIBUTION OF CONDITION BETWEEN STUDY GROUPS

CONDITION	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
IMPROVED	44	88	42	84	0.564
NOT IMPROVED	6	12	8	16	
Total	50	100	50	100	

GRAPH 18 : DISTRIBUTION OF CONDITION BETWEEN STUDY GROUPS

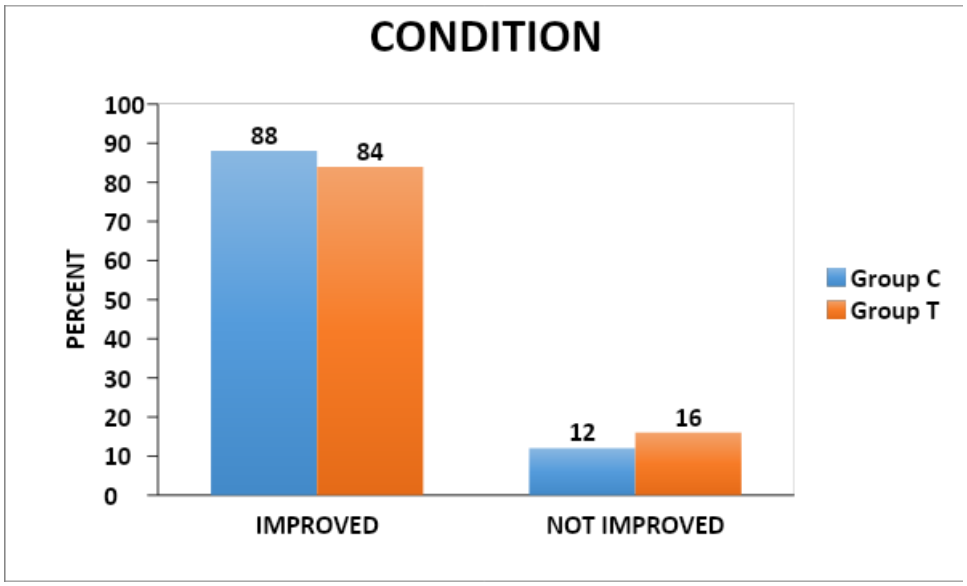


TABLE 21 : DISTRIBUTION OF OUTCOME BETWEEN STUDY GROUPS

OUTCOME	Group Caffeine		Group Theophylline		p value
	N	%	N	%	
AMA	10	20	7	14	0.634
DEATH	1	2	2	4	
DISCHARGED	39	78	41	82	
Total	50	100	50	100	

GRAPH 19 : DISTRIBUTION OF OUTCOME BETWEEN STUDY GROUPS

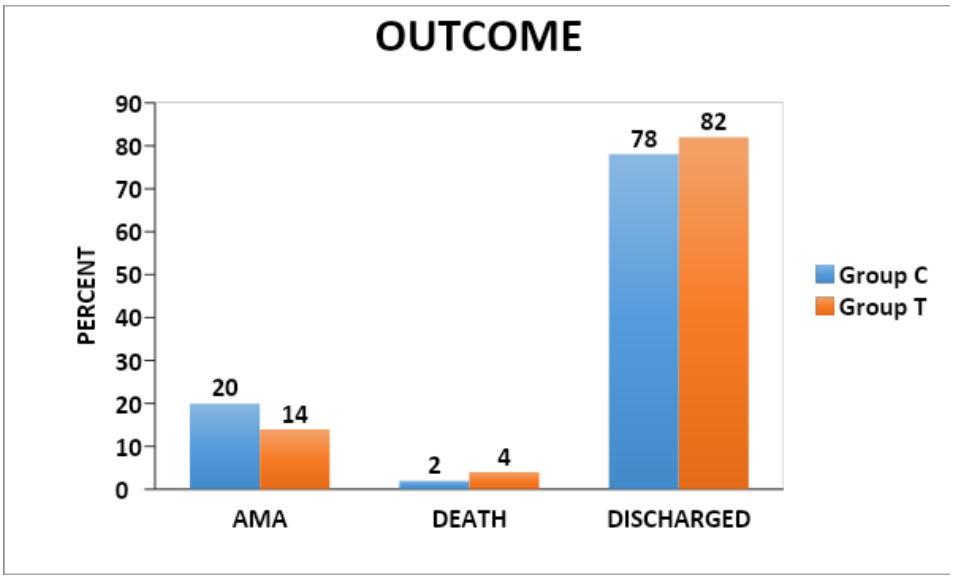


TABLE 22 : DISTRIBUTION OF NICU STAY BETWEEN STUDY GROUPS

Parameters	Group Caffeine		Group Theophylline		p value
	Mean	SD	Mean	SD	
NICU STAY (DAYS)	10.3	7.6	7.7	4.6	0.036*

Note: * significant at 5% level of significance (p<0.05)

GRAPH 20 : DISTRIBUTION OF NICU STAY BETWEEN STUDY GROUPS

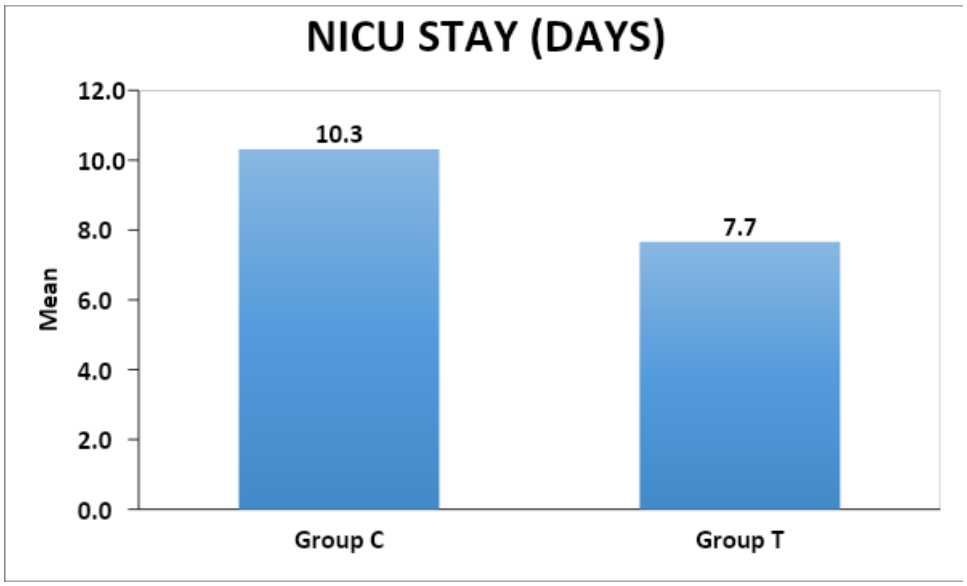


TABLE 23 : LAB PARAMETERS BETWEEN STUDY GROUPS

Parameters	Group Caffeine		Group Theophylline		p value
	Mean	SD	Mean	SD	
TC	19309.0	7727.4	16754.0	5047.2	0.049*
Neutrophil	65.4	15.3	67.8	8.5	0.347
Lymphocyte	29.5	16.5	24.6	9.4	0.069
HB	17.7	2.3	17.8	2.4	0.692
PCV	52.9	7.3	53.3	7.2	0.811
PLT	2.1	0.8	2.2	0.7	0.298

Note: * significant at 5% level of significance (p<0.05)

GRAPH 21 : LAB PARAMETERS BETWEEN STUDY GROUPS

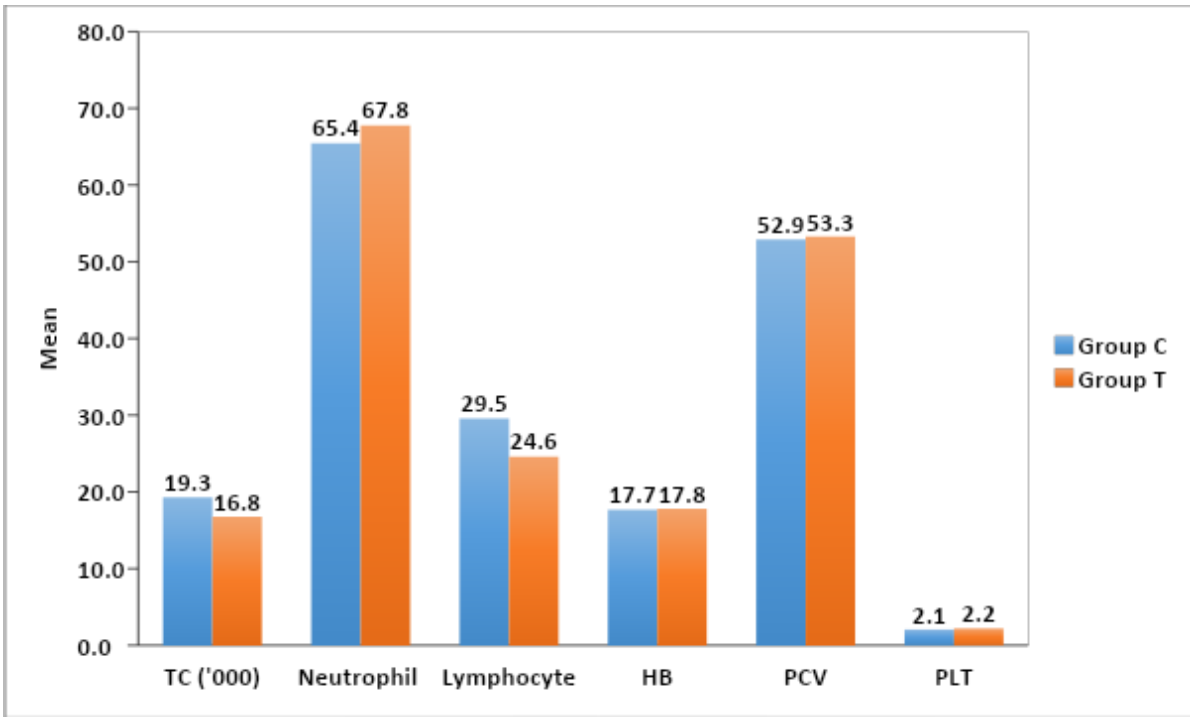


TABLE 24 : OTHERS PARAMETERS BETWEEN STUDY GROUPS

Parameters	Group Caffeine		Group Theophylline		p value
	Mean	SD	Mean	SD	
CRP	14.7	18.1	15.2	18.5	0.900
S. CA	8.9	1.2	8.5	1.1	0.088
CREAT	0.9	0.4	0.9	0.4	0.384

GRAPH 22 : OTHERS PARAMETERS BETWEEN STUDY GROUPS

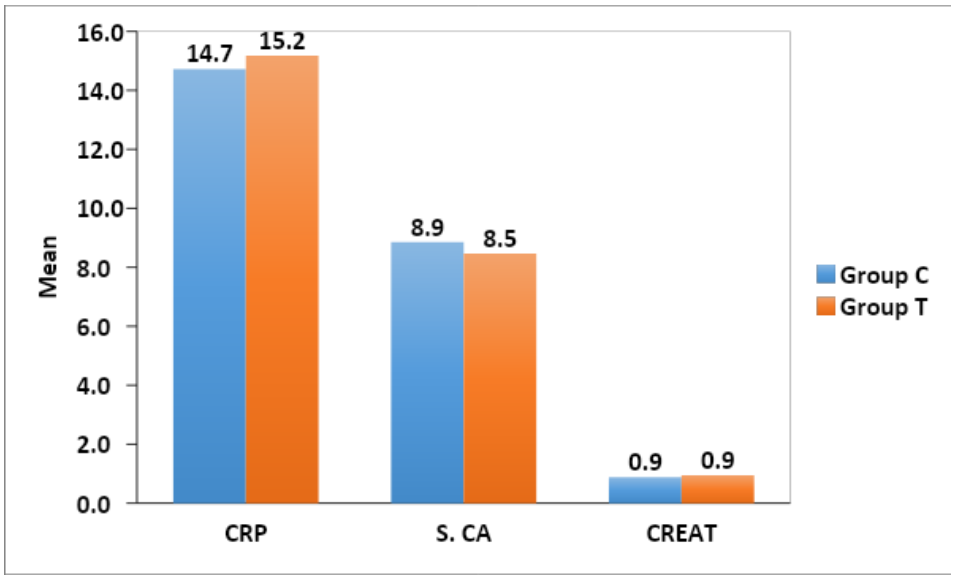
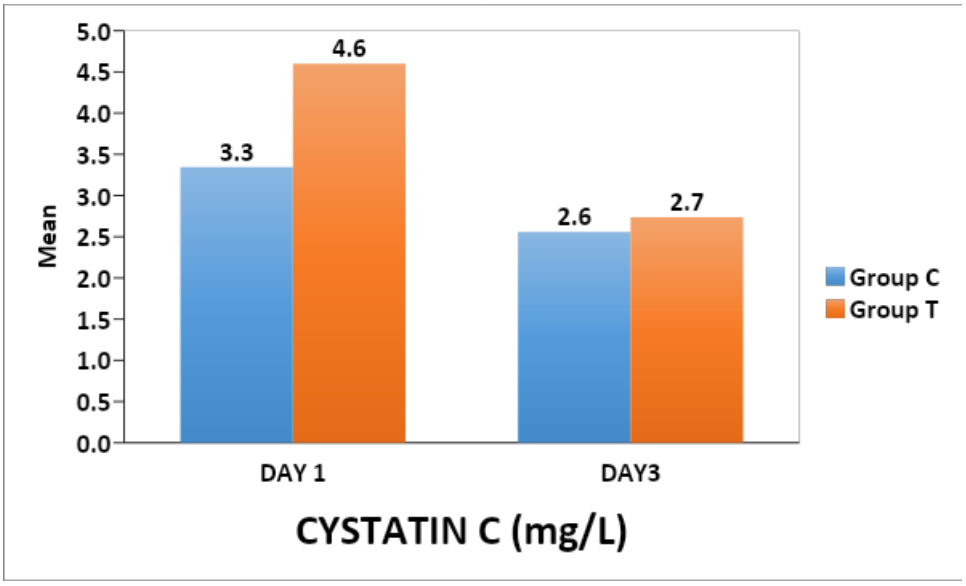


TABLE 25 : CYSTATIN C BETWEEN STUDY GROUPS

CYSTATIN C (mg/L)	Group Caffeine		Group Theophylline		p value
	Mean	SD	Mean	SD	
DAY 1	3.3	1.7	4.6	2.6	0.005*
DAY3	2.6	1.3	2.7	1.5	0.519

Note: * significant at 5% level of significance ($p<0.05$)

GRAPH 23 : CYSTATIN C BETWEEN STUDY GROUPS



Cystatin C levels on Day 1 in theophylline group were higher compared to caffeine group, but the levels on day 3 were better in caffeine group as compared to theophylline group.

DISCUSSION

A total number of 100 newborns with Perinatal Asphyxia were enrolled in this study, with 50 newborns in each group. Sex distribution (P-value:0.677), birth weight(P-value: 0.476), GA(p value: 0.887), mean inborn/outborn (p value: 0.309) are almost same in both the groups where P-value is not significant which indicates both the groups are comparable with same severity.

Results in single tabular form for the ease of comparison:

	Group A (Caffeine)	**Group B (Theophylline)**	**P-value**
Sex distribution	M-28, F-11	M-31, F-19	0.677
Mean Birth weight(in kilograms)	2.7 kilograms(±0.4)	2.8 kilograms(±0.4)	0.329
Mode of delivery	LSCS –16(±0.32) NVD- 34(±0.68)	LSCS- 14±0.28 NVD- 36±0.72	0.663
Mean birth weight (kg)	2.5 (±0.80)	2.5 ±0.74)	0.476
Hood O2 O2 Ventilation	18(±0.36) 39(±0.78) 21(±0.42)	37(±0.74) 42(±0.84) 8(±0.16)	<0.001 0.444 0.004
Therapeutic hypothermia	3	1	0.307
Mean hours of life at admission	22.6(±70.1) hours	14.2 hours (±34.8)	0.446
NICU stay	10.3(±7.6)	7.7(±4.6)	0.036
Number of patients improved	44(88%)	42(84%)	0.564

Number of patients not improved	6 (±12)	8 (±16)	0.564
Number of patients discharged	39	41	0.0634
Number of deaths	1	2	0.0634

The age difference at admission between the two groups is not statistically significant (p=0.446), although the caffeine group has a higher age at admission than theophylline group.

There is not much difference in the statistical significance between the sex of the babies (p=0.677), although more male babies are enrolled in caffeine group and more female babies are enrolled in the theophylline group.

There is not much difference in the statistical significance between the inborn and outborn status of the babies although there were more inborn babies enrolled in caffeine group and more outborn babies enrolled in the theophylline group (p=0.309).

The gestational age of the baby does not have much statistical significance among the groups, although caffeine group has more term babies and theophylline group has more of late preterm and post term babies (p= 0.887).

The gravidity does not have much statistical significance although primigravida and multigravida are equal in caffeine group, and primigravida are more in theophylline group (p=0.548)

The association between the measures taken and the response seen in both the groups is statistically significant. (p=0.031)

There is a statistically significant difference in the babies who were put on hood oxygen in both groups ($p<0.001$)

Babies who received ventilation had a statistically significant association between the two groups ($p=0.004$)

Four babies were put on therapeutic hypothermia and all the babies had recovered without any complications, there is no statistically significant difference between the two groups ($p=0.307$)

The distribution of HIE stages varies significantly between the two groups. ($p=0.017$)

In the 57 babies who developed respiratory distress, allotted to two groups, the incidence of metabolic acidosis and respiratory acidosis is more in the theophylline group, but the incidence of respiratory alkalosis and mixed acid base deficit (respiratory alkalosis) is more in the caffeine group. There is not much statistical significance in between the two groups.

Babies allocated to caffeine group had improved condition (44 in 50) and condition did not improve in 6 babies, whereas in theophylline group 42 babies had improved, whereas 8 babies did not improve.

Out of the 6 babies of caffeine group which went against medical advice, 5 babies condition had improved, and in the theophylline group 4 babies condition improved, but there were financial constraints.

Only 1 baby of caffeine group had died whereas 2 babies of theophylline group died, although the cause of death in none of the babies is due to kidney injury, all three of the babies had intrapulmonary bleed as a complication of DIC and sepsis.

Although the mean duration of NICU stay is longer in the caffeine group, it could be due to the reason that the babies allotted to theophylline group had a higher mortality and also shorter NICU stay due to financial constraints and non improvement of the condition.

Moreover, theophylline is metabolized to caffeine in newborn.

The laboratory parameters are statistically significant for caffeine group as compared to theophylline group, whereas there is not much statistical significance between the other lab parameters like Hb, PCV, Platelet, CRP, serum calcium and serum creatinine levels.

Cystatin C values on day 1 were lower in caffeine group as compared to the theophylline group, cystatin C levels were in the normal ranges in both groups, hence there is not much statistical significance on day 3.

CONCLUSION

Babies enrolled in theophylline group had higher cystatin C levels at Day 1 compared to caffeine group babies, but the babies enrolled in caffeine group had much lesser levels of cystatin C on day 3 compared to theophylline group, hence caffeine appears to be superior to theophylline for managing BA cases and for preventing AKI.

In my study, single dose of caffeine citrate 20mg/kg given iv for prevention of acute kidney injury in asphyxiated newborn and compared with theophylline 8mg/kg iv, the results of caffeine group were comparable to that of theophylline group.

LIMITATIONS OF STUDY

1. Although theophylline is good for preventing AKI, caffeine appears to have comparable efficacy. However, further studies with a bigger sample size need to be done to further enlighten regarding the efficacy of caffeine.
2. More Randomized controlled trials which is ideal to determine the efficacy of caffeine with a multicentric approach need to be done
3. Only clinical diagnosis of BA was done. No EEG/EEG video recording confirmation was done.
4. Ultrasound of kidneys which is an ideal investigation for these cases was not done, hence the ultrasound appreciation of the kidney injury could not be appreciated.
5. Long term follow up for developmental assessment which is more desirable was not done in all patients.

SUMMARY

A prospective randomized comparative study to assess the efficacy of caffeine or theophylline was done at Shri. B. M. Patil Medical College and Research Centre, Vijayapur. 100 babies satisfied the inclusion criteria and were enrolled in the study, with 50 babies in each group respectively, where caffeine and theophylline was used prophylactically as a single dose in each group.

Both groups were comparable and had equal severity of BA as all parameters like sex distribution (P-value:0.677), birth weight(P-value: 0.476), GA (p =0.887), inborn (p=0.309), gravidity (p=0.548), mode of delivery (p=0.663), MBG (p=0.157). Resuscitation measures (p=0.031), treatment given (p<0.001), therapeutic hypothermia (p= 0.307), HIE staging (p=0.017), NICU stay (p=0.036), cystatin C on day 1 is significant (p=0.005).

Though more babies of caffeine group were mechanically ventilated as compared to theophylline group, the babies of caffeine group had a much better outcome as compared to theophylline group.

Though neonates in caffeine group had a longer NICU stay, they did not develop severe complications, urine output was good in all the babies, compared to theophylline, which had a shorter NICU stay, but had complications. Even this group had good urine output.

In my study, caffeine citrate in the dose of 20mg/kg and theophylline in the dose of 8mg/kg single prophylactic dose was given in asphyxiated newborn, caffeine and theophylline are equally effective, caffeine is as good as theophylline in preventing the risk of acute kidney injury. Further larger studies are required to confirm our findings.

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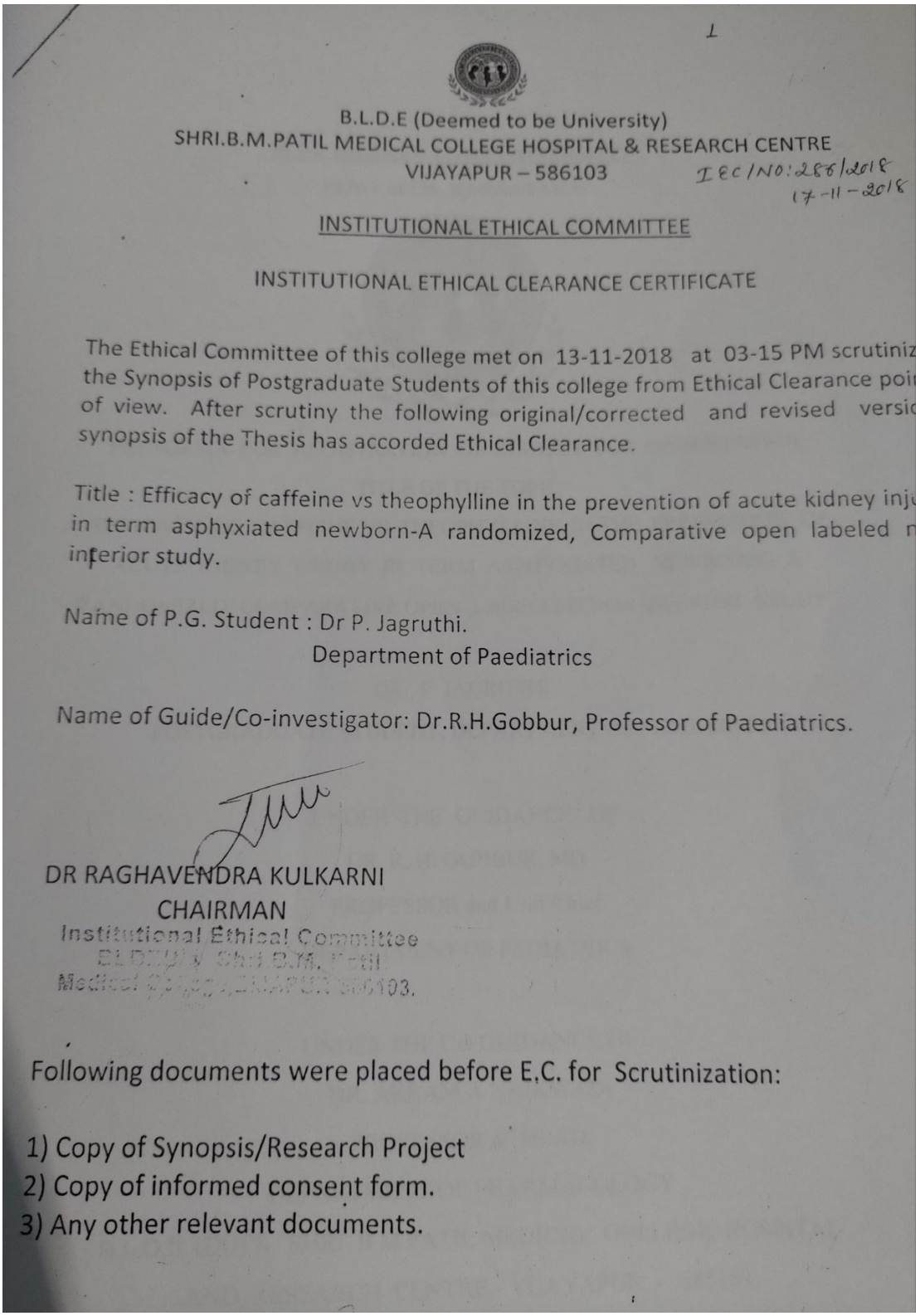
ANNEXURES

ETHICAL CLERANCE CERTIFICATE



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B.L.D.E (Deemed to be University)
SHRI.B.M.PATIL MEDICAL COLLEGE HOSPITAL & RESEARCH CENTRE
VIJAYAPUR – 586103

IEC/NO:286/2018
17-11-2018

INSTITUTIONAL ETHICAL COMMITTEE

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The Ethical Committee of this college met on 13-11-2018 at 03-15 PM scrutiniz the Synopsis of Postgraduate Students of this college from Ethical Clearance poi of view. After scrutiny the following original/corrected and revised versi synopsis of the Thesis has accorded Ethical Clearance.

Title : Efficacy of caffeine vs theophylline in the prevention of acute kidney inj in term asphyxiated newborn-A randomized, Comparative open labeled n inferior study.

Name of P.G. Student : Dr P. Jagruthi.
Department of Paediatrics

Name of Guide/Co-investigator: Dr.R.H.Gobbur, Professor of Paediatrics.

DR RAGHAVENDRA KULKARNI
CHAIRMAN
Institutional Ethical Committee
ELDMC & RI, Shri B.M. Patil
Medical College, VIJAYAPUR 586103.

Following documents were placed before E.C. for Scrutinization:

1) Copy of Synopsis/Research Project
2) Copy of informed consent form.
3) Any other relevant documents.

CONSENT FORM

BLDEA's Shri B.M.PATIL Medical College, Hospital
& Research Centre,Bijapur-586103.

TITLE OF THE PROJECT : **"EFFICACY OF CAFFEINE VS THEOPHYLLINE IN PREVENTION OF ACUTE KIDNEY INJURY IN TERM ASPHYXIATED NEWBORN-A RANDOMIZED, COMPARARTIVE OPEN LABELLED, NON INFERIOR STUDY".**

GUIDE : **Dr. R. H. GOBBUR, MD**
PROFESSOR,
DEPARTMENT OF PEDIATRICS

PG STUDENT : **DR. P. JAGRUTHI**

PURPOSE OF RESEARCH:

I have been informed that the present study will help in assess the clinical profile of all asphyxiated term neonates and late preterm neonates and compare the morbidity reduction associated with the use of caffeine or theophylline, and especially the reduction of AKI incidence in term asphyxiated newborn

PROCEDURE:

I understand that after having obtained a detailed clinical history, thorough clinical examination and relevant investigations, a final work up of the procedure and its outcome is planned.

RISK AND DISCOMFORTS:

I understand that I may experience some pain and discomforts during the examination or during my treatment. This is mainly the result of my condition and the procedures of this study are not expected to exaggerate these feelings which are associated with the usual course of treatment.

BENEFITS:

I understand that my participation in the study will have no direct benefit to me other than the potential benefit of the treatment.

CONFIDENTIALITY:

I understand that the medical information produced by this study will become a part of hospital records and will be subject to the confidentiality. Information of sensitive personal nature will not be part of the medical record, but will be stored in the investigations research file.

If the data are used for publication in the medical literature or for teaching purpose, no name will be used and other identifiers such as photographs will be used only with special written permission. I understand that I may see the photograph before giving the permission.

REQUEST FOR MORE INFORMATION:

I understand that I may ask more questions about the study at any time; Dr. P. Jagruthi at the department of Pediatrics is available to answer my questions or concerns. I understand that I will be informed of any significant new findings discovered during the course of the study, which might influence my continued participation. A copy of this consent form will be given to me to keep for careful reading.

REFUSAL FOR WITHDRAWAL OF PARTICIPATION:

I understand that my participation is voluntary and that I may refuse to participate or may withdraw consent and discontinue participation in the study at any time without prejudice. I also understand that Dr. P. Jagruthi may terminate my participation in the study after he has explained the reasons for doing so.

INJURY STATEMENT:

I understand that in the unlikely event of injury to my baby resulting directly from baby's participation in this study, if such injury were reported promptly, the appropriate treatment would be available to the baby. But, no further compensation would be provided by the hospital. I understand that by my agreements to participate in this study and not waiving any of my legal rights.

I have explained to_____the purpose of the research, the procedures required and the possible risks to the best of my ability.

_____ _____

Dr. P. Jagruthi Date
(Investigator)

PARENTS / GUARDIAN CONSENT STATEMENT:

We confirm that Dr. P. Jagruthi is doing a study on **EFFICACY OF CAFFEINE VS THEOPHYLLINE IN THE PREVENTION OF ACUTE KIDNEY INJURY IN TERM ASPHYXIATED NEWBORN. Dr. P. Jagruthi** has explained to us the purpose of research and the study procedure. We are willing to allow our baby to get treated in Shri B M Patil Medical College Hospital, Vijayapura.

We have been explained about the study, benefits and possible discomforts in detail in our native language and we understand the same. We are aware that baby will get best treatment, and no compensation like financial benefits will be given if our baby's condition deteriorates and any untoward happens, and we will not sue anyone regarding this. Therefore, we agree to give our full consent for baby's participate as a subject in this research project.

_____ _____

(Parents / Guardian) Date

_____ _____

(Witness to signature) Date

PROFORMA

SCHEME OF CASE TAKING

NAME AGE

SEX IP NO.

ADDRESS

DOB DOA

AGE AT ADMISSION

DATE OF DISCHARGE

DATE OF DEATH

GESTATIONAL AGE

GRBS AT ADMISSION

SPO2 AT ADMISSION

MATERNAL HISTORY

AGE OBST. SCORE

CONSANGUINITY LMP EDD

MOTHER'S BLOOD GROUP

H/O ANY RISK FACTORS

BIRTH ORDER

DELIVERED AT: INBORN/ OUTBORN

IF OUTBORN SPECIFY PLACE

DATE & TIME OF DELIVERY MODE OF DELIVERY

BIRTH WEIGHT

APGAR AT BIRTH APGAR AFTER 5 MIN

ANY RESUSCITATION MEASURES TAKEN UP

DURATION OF NICU STAY

H/O NICU ADMISSION

TREATMENT:

1. O2 THERAPY, TYPE OF EQUIPMENT (NP / FACE MASK/ HOOD BOX), CPAP/ VENTILATION, AMOUNT……L/MIN, DURATION…….
2. INTAKE: IV / ORAL ……..
3. ANTI EDEMA MEASURES
4. ANTICONVULSANTS
5. ANTIBIOTICS
6. THEOPHYLLINE / CAFFEINE GIVEN
7. THERAPEUTIC HYPOTHERMIA
8. IV SUPPLEMENTATION OF CALCIUM, MAGNESIUM
9. CORRECTION OF ACIDOSIS IF NEEDED
10. IF PUT ON PHOTOTHERAPY

INVESTIGATIONS: HEMATOLOGICAL

IMAGING: U/S CRANIUM, HR U/S DOPPLER MCA, MRI, CT

ABG

OTHERS

DIAGNOSIS

FOLLOW UP (IF APPLICABLE):

KEY TO MASTER CHART

S.No.	-	serial number
M	-	male
F	-	female
DOB	-	date of birth
DOA	-	date of admission
Adm. Age	-	age at admission
GA	-	gestational age
OBS score	-	obstetric score
PE	-	preeclampsia
APE	-	antepartum eclampsia
MSAF	-	meconium stained amniotic fluid
G.HTN	-	gestational hypertension
MAS	-	meconium aspiration syndrome
PROM	-	premature rupture of membranes
Primi	-	primigravida
LSCS	-	lower segment caesarean section
NVD	-	normal vaginal delivery
B.Wt	-	birth weight
APGAR	-	APGAR score
BMV	-	Bag and mask ventilation

O2	-	Oxygen
ABX	-	antibiotics
IV	-	intravenous
TH	-	therapeutic hypothermia
HIE	-	hypoxic ischemic encephalopathy
BA	-	birth asphyxia
PA	-	Perinatal asphyxia
PPHN	-	persistent pulmonary hypertension of newborn
RD	-	respiratory distress
EOS	-	early onset sepsis
CHD	-	congenital heart disease
HDN	-	haemorrhagic disease of newborn
RDS	-	respiratory distress syndrome
LOS	-	late onset sepsis
IUGR	-	intrauterine growth restriction
Cong. Pneumonia	-	congenital pneumonia
TC	-	total counts
N	-	neutrophil
L	-	lymphocyte
Hb	-	haemoglobin
PCV	-	packed red cell volume
PLT	-	platelet count

CRP	-	C reactive protein
Culture	-	blood culture
ABG	-	arterial blood gases
TSB	-	total serum bilirubin
UCB	-	unconjugated bilirubin
S.Ca	-	serum calcium
U/O	-	urine output
Creat	-	serum creatinine
CystC D1	-	cystatin C day 1
CystC D3	-	cystatin C day 3
IB	-	Inborn
OB	-	Outborn
T. MSAF	-	thick meconium stained amniotic fluid
Sev. PE	-	severe preeclampsia
B.O	-	birth order
Venti	-	ventilation
Imp	-	Improved
NI	-	not improved
G	-	Good
ST	-	Sterile
Out	-	Outcome
Imp	-	Improved

MASTER CHART

S.NO	IP NO.	PHONE NO.	ADDRESS	NAME	Age (d)	SEX	IB/)OB	DOB	DOA	ADM. AGE	GEST.AGE	OBSTETRIC SCORE	ANY RISK FACTORS	MODE	MBG	B.O	B.WT	APGAR (0,5)
1	2019/6176	6362897049	SINDAGI, VIJAYAPUR	B/O PUSPA	1d	F	IB	2/25/2019	2/25/2019	1HR	POST-TERM	PRIMI WITH 43+4WK POG	SEV.PE, APE, T.MSAF	LSCS	O+	1ST	3KG	3/10, 7/10
2	2019/6270	8105952050	MUDDEBIHAL, VIJAYAPUR	B/O SAVITA HIREMATH	1d	M	IB	2/26/2019	2/26/2019	1HR	TERM	PRIMI WITH 37+3WK POG	NONE	NVD	AB+	1ST	2.3KG	4/10, 7/10
3	2019/6370	9902657987	DEVADURG, RAICHUR	B/O SHOBHA KOLYAL	1d	F	OB	2/26/2019	2/26/2019	1HR	TERM	PRIMI WITH 38WK POG	NONE	NVD	O+	1ST	3.3KG	OUTSIDE
4	2019/6484	C	VIJAYAPUR	B/O JASMINE	1d	F	IB	2/27/2019	2/27/2019	1HR	POST TERM	PRIMI WITH 41WK POG	NONE	NVD	A+	1ST	2.6KG	5/10, 8/10
5	2019/7167	9972695686	TONSHYAL, VIJAYAPUR	B/O HEENAKOUSAR	1d	F	IB	3/6/2019	3/6/2019	1HR	TERM	G3P2L2 WITH 39+1WK POG	NONE	LSCS	B+	3RD	2.87KG	3/10, 7/10
6	2019/7515	9900201197	B BAGEWADI, VIJAYAPUR	B/O VIJAYALAXMI	1d	F	IB	3/9/2019	3/9/2019	1HR	POST TERM	G2A1 WITH 41+1WK POG	ABORTION	NVD	O+	2ND	3KG	3/10, 7/10
7	2019/7904	9972060764	INDI, VIJAYAPUR	B/O DRAKSHYANI	1d	M	IB	3/13/2019	3/13/2019	1HR	POST TERM	G3P2L2 WITH 41+2WK POG	THICK MSAF	LSCS	B+	3RD	3.090KG	4/10, 8/10
8	2019/8549	9741511102	INDI, VIJAYAPUR	B/O SUJATA	1d	M	IB	3/19/2019	3/19/2019	1HR	TERM	PRIMI WITH 39WK POG	THICK MSAF	NVD	B+	1ST	2.56KG	3/10, 8/10

9	2019/8650	9964421233	GUNAKI, VIJAYAPUR	B/O SUJATA UPPAR	1d	F	IB	3/19/2019	3/20/2019	3HR	TERM	PRIMI WITH 39+6WK POG	FACE PRESENTATION	LSCS	AB+	1ST	3.025KG	4/10, 8/10
10	2019/8801	9945900754	SIDDAPUR, VIJAYAPUR	B/O JYOTI MALLESH	1d	F	IB	3/21/2019	3/21/2019	1HR	TERM	PRIMI WITH 38+5WK POG	NONE	NVD	B+	1ST	2.6KG	5/10, 8/10
11	2019/8928	9960716576	AWAJ, SOLAPUR	B/O ASHWINI KOLI	1d	M	IB	3/22/2019	3/22/2019	1HR	TERM	PRIMI WITH 38+4WK POG	NONE	NVD	A+	1ST	3.020KG	6/10, 8/10
12	2019/8975	9964466305	ANAND NAGAR, VIJAYAPUR	B/O GANGA	1d	F	IB	3/22/2019	3/22/2019	1HR	TERM	G4P1L1A2 WITH 40+3WK POG	ABORTIONS, OBST.LABOR	LSCS	O+	4TH	3.5KG	5/10, 8/10
13	2019/9042	0	INDI, VIJAYAPUR	B/O KAVITA	1d	M	IB	3/22/2019	3/22/2019	1HR	TERM	PRIMI WITH 39+6WK POG	PROM, GEST. HTN	NVD	O+	1ST	2.774KG	5/10, 8/10
14	2019/9045	9741394860	AFAZALPUR, KALABURAGI	B/O LAKSHMI NAVI	1d	F	IB	3/23/2019	3/23/2019	1HR	TERM	G3P1D1A1 WITH 38+6WK POG	NEO.DEATH, ABORTION	NVD	B+	3RD	3.3KG	5/10, 8/10
15	2019/9160	9901060618	VIJAYAPUR	B/O ANITA HACHADAD	1d	M	OB	3/24/2019	3/24/2019	21HR	TERM	G2P1L1 WITH 38WK POG	HBSAG POSITIVE, MSAF	LSCS	O+	2ND	3.3KG	OUTSIDE
16	2019/9661	9008818723	INDI, VIJAYAPUR	B/O AKKUBAI KHARAT	1d	M	OB	3/28/2019	3/28/2019	3HR	TERM	G3P2L2 WITH 38+2WK POG	INSTRUMENTAL DELIVERY	NVD	A+	3RD	2.68KG	OUTSIDE
17	2019/9923	9845231546	B BAGEWADI, VIJAYAPUR	B/O SUMITRA	1d	M	IB	3/31/2019	3/31/2019	10HR	POST TERM	PRIMI WITH 41WK POG	RH NEG, GHTN	NVD	B-	1ST	2.5KG	4/10, 8/10
18	2019/10374	9902481412	B BAGEWADI, VIJAYAPUR	B/O SAVITA YARALADDI	3d	M	OB	3/31/2019	4/3/2019	3 DAYS	LATE PRETERM	PRIMI WITH 35+3WK POG	NONE	LSCS	B+	1ST	2.83KG	OUTSIDE
19	2019/11090	8105560464	MUDDEBIHAL, VIJAYAPUR	B/O SIDDAMMA	1d	M	IB	4/10/2019	4/10/2019	1HR	TERM	G2P1L1 WITH 39+3WK POG	T. MSAF, SEV. PE	LSCS	AB+	2ND	2.72KG	5/10, 8/10

20	2019/11449	9880396896	SINDAGI, VIJAYAPUR	B/O YALLAWWA	1d	M	OB	4/11/2019	4/12/2019	14HR	TERM	PRIMI WITH 39WK POG	MSAF	NVD	A+	1ST	3KG	OUTSIDE
21	2019/11463	9686759206	VIJAYAPUR	B/O JAYASHREE	1d	M	IB	4/13/2019	4/13/2019	1HR	TERM	G3P2L2 WITH 40+4WK POG	T. MSAF	NVD	A+	3RD	2.9KG	4/10, 8/10
22	2019/12545	C	JAMAKHANDI, BAGALKOT	B/O PULABAI	1d	M	IB	4/22/2019	4/22/2019	1HR	TERM	PRIMI WITH 38WK POG	RH NEG, HAND PRESENTATION	LSCS	O-	1ST	2.5KG	6/10, 8/10
23	2019/12910	9900876968	RENUKANAGAR, VIJAYAPUR	B/O SHOBHA MANE	1d	M	OB	4/22/2019	4/25/2019	3DAYS	TERM	G3P1L1A1 WITH 37WK POG	ABORTIONS	NVD	B+	3RD	2KG	OUTSIDE
24	2019/12955	9108878875	INDI, VIJAYAPUR	B/O PARAVEEN	1d	F	OB	4/24/2019	4/25/2019	1 DAY	TERM	G2P1L1 WITH 37WK POG	MSAF, MAS	NVD	B+	2ND	3.050KG	OUTSIDE
25	2019/13077	9663319014	SURAPUR, YADAGIRI	B/O MALLAMMA K	1d	M	OB	4/25/2019	4/26/2019	1 DAY	LATE PRETERM	G4P1L1A2 WITH 35WK POG	ABORTION	NVD	AB+	4TH	2.3KG	OUTSIDE
26	2019/16879	9686158965	INDI, VIJAYAPUR	B/O KAVITA MELGADE	1d	M	IB	5/28/2019	5/28/2019	4HR	TERM	PRIMI WITH 40+1WK POG	SEV.PE, ANEMIA	NVD	B+	1ST	3KG	3/10, 5/10
27	2019/18630	9901656697	HOSUR, VIJAYAPUR	B/O AMBIKA MALI	1d	F	IB	6/11/2019	6/11/2019	1HR	TERM	G4P3L3 WITH 38+4WK POG	TRANSVERSE LIE	LSCS	AB+	4TH	2.82KG	5/10, 7/10
28	2019/19787	9900750348	SINDAGI, VIJAYAPUR	B/O KAVERI	1d	M	IB	6/21/2019	6/21/2019	4HR	TERM	PRIMI WITH 40WK POG	NONE	NVD	A+	1ST	2.790KG	6/10, 7/10
29	2019/19916	9535233665	DYABERI, VIJAYAPUR	B/O SAVITA CHAVAN	1d	M	OB	6/22/2019	6/22/2019	1DAY	TERM	PRIMI WITH 37WK POG	MSAF, MAS	NVD	A+	1ST	2.6KG	OUTSIDE
30	2019/20530	9008237202	MUDDEBIHAL, VIJAYAPUR	B/O VIJAYALAXMI S	1d	M	IB	6/27/2019	6/27/2019	1HR	LATE PRETERM	PRIMI WITH 35+3WK POG	APE	LSCS	O+	1ST	2.2KG	3/10, 7/10
31	2019/25214	9743784445	AFAZALPUR, KALABURAGI	B/O ANITA ADAVENAVAR	1d	M	IB	7/31/2019	7/31/2019	3HR	TERM	G3P2L2 WITH 37+1WK POG	PREV. LSCS	LSCS	A+	3RD	2.682KG	3/10, 8/10

32	2019/29427	9611105496	RAJAPUT GALLI, VIJAYAPUR	B/O RAJESHWARI H	1d	F	OB	7/5/2019	7/5/2019	2HR	TERM	G2P1L1 WITH 37WK POG	BREECH PRESENTATION	NVD	B+	2ND	2.82KG	OUTSIDE
33	2019/29266	6360633517	B BAGEWADI, VIJAYAPUR	B/O LAXMI BASAVARAJ	1d	F	IB	9/3/2019	9/3/2019	1HR	TERM	G2A1 WITH 40+1WK POG	IMPEND.ECLAMPSIA, ABORTION	NVD	O+	2ND	2.66KG	6/10, 7/10
34	2019/31984	9481708018	VIJAYAPUR	B/O LAXMI PARMAR	1d	M	OB	9/24/2019	9/24/2019	2HR	TERM	G5P4D1 WITH 38 WK POG	DEATH	NVD	O+	5TH	3.21KG	OUTSIDE
35	2019/32325	9901850254	SINDAGI, VIJAYAPUR	B/O SHASHIKALA	1d	M	IB	9/27/2019	9/27/2019	2HR	TERM	PRIMI WITH 39WK POG	ANEMIA, THROMBOCYTOPENIA	LSCS	AB+	1ST	2.07KG	3/10, 6/10
36	2019/41077	8197363582	DEVADURG, RAICHUR	B/O LAXMI MADIWAL	1d	M	OB	11/18/2019	12/7/2019	20 DAYS	TERM	PRIMI WITH 38WK POG	NONE	NVD	O+	1ST	3.4KG	OUTSIDE
37	2019/38905	9901625670	VIJAYAPUR	B/O BHAGYASHREE B	1d	F	IB	11/20/2019	11/20/2019	1HR	TERM	G2A1 WITH 39+4WK POG	MSAF, MAS, ABORTION	NVD	O+	2ND	2.96KG	4/10, 8/10
38	2019/41878	8217874250	TORAVI, VIJAYAPUR	B/O ARATI HIREMATH	1d	M	IB	12/13/2019	12/13/2019	1HR	TERM	PRIMI WITH 39+2WK POG	NONE	NVD	AB+	1ST	2.97KG	6/10, 8/10
39	2019/40902	9538496711	SINDAGI, VIJAYAPUR	B/O NAJMIN YALAGI	1d	M	OB	12/5/2019	12/5/2019	2HR	TERM	PRIMI WITH 37WK POG	NONE	NVD	AB+	1ST	3KG	OUTSIDE
40	2019/33152	0	INDI, VIJAYAPUR	B/O SAVITA TALAWAR	1d	F	OB	10/4/2019	10/4/2019	6HR	TERM	G2P1L1 WITH 37WK POG	NONE	NVD	B+	2ND	2.75KG	OUTSIDE
41	2019/40210	9901699170	INDI, VIJAYAPUR	B/O SHAHIN	1d	M	OB	11/29/2019	11/30/2019	1DAY	TERM	G2P1L1 WITH 38WK POG	NONE	NVD	B+	2ND	3.170KG	OUTSIDE

42	2019/41958	9901026293	SINDAGI, VIJAYAPUR	B/O NAGAMMA	2d	M	OB	12/12/2019	12/13/2019	2DAYS	TERM	G2P1L1 WITH 39+3WK POG	NONE	NVD	AB+	2ND	2.4KG	OUTSIDE
43	2019/30597	9741712975	ATHANI, BELGAUM	B/O LAKKAWWA	1d	F	IB	9/13/2019	9/14/2019	3HR	TERM	G4P3L3 WITH 38+4WK POG	NONE	NVD	A+	4TH	2.98KG	5/10, 8/10
44	2019/34184	9900366025	B BAGEWADI, VIJAYAPUR	B/O RIJWANA A	1d	F	IB	10/12/2019	10/12/2019	1HR	LATE PRETERM	PRIMI WITH 34+4WK POG	NONE	NVD	A+	1ST	2.3KG	6/10, 7/10
45	2019/34369	7090424677	VIJAYAPUR	B/O RESHMA	1d	M	IB	10/14/2019	10/14/2019	1HR	LATE PRETERM	G4P3L2D1 WITH 34+2WK POG	POLY, DEATH	LSCS	B+	4TH	2.35KG	4/10, 8/10
46	2019/42474	9686260783	TIKOTA, VIJAYAPUR	B/O ASHWINI GAYAKWAD	1d	F	OB	12/17/2019	12/18/2019	3HR	LATE PRETERM	PRIMI WITH 36+2WK POG	MSAF, MAS	NVD	A+	1ST	1.8KG	OUTSIDE
47	2019/34924	9008373475	B BAGEWADI, VIJAYAPUR	B/O SAVITA YARANAL	1d	F	OB	10/17/2019	10/18/2019	4HR	TERM	PRIMI WITH 38WK POG	NONE	NVD	AB+	1ST	2.6KG	OUTSIDE
48	2019/37324	8861665598	INDI, VIJAYAPUR	B/O ASHA	1d	M	OB	11/6/2019	11/6/2019	2HR	TERM	G3P2L2 WITH 38WK POG	NONE	NVD	A+	3RD	3.48KG	OUTSIDE
49	2019/35747	9740338256	B BAGEWADI, VIJAYAPUR	B/O DANAMMA A N	1d	F	IB	10/24/2019	10/24/2019	6HR	TERM	PRIMI WITH 37+5WK POG	SEVERE PE, ANEMIA	NVD	A+	1ST	2.3KG	5/10, 8/10
50	2019/42176	9900394015	SINDAGI, VIJAYAPUR	B/O PRIYANKA H	1d	M	IB	12/15/2019	12/16/2019	4HR	LATE PRETERM	G4P3L3 WITH 33+4WK POG	APE	LSCS	A+	4TH	1.86KG	4/10, 7/10
51	2019/43329	9591046051	B BAGEWADI, VIJAYAPUR	B/O AKSHATA JADHAV	1d	M	OB	12/24/2019	12/24/2019	1HR	TERM	PRIMI WITH 37WK POG	NONE	LSCS	AB+	1ST	2.72KG	OUTSIDE

52	2019/42955	9738450809	VIJAYAPUR	B/O SUMAYYA	1d	M	OB	12/21/2019	12/21/2019	2HR	TERM	G2P1L1 WITH 38WK POG	NONE	NVD	B+	2ND	2.6KG	OUTSIDE
53	2019/35127	9686649946	INDI, VIJAYAPUR	B/O GANGABAI	1d	M	OB	10/19/2019	10/19/2019	10HR	TERM	PRIMI WITH 39WK POG	NONE	NVD	AB+	1ST	3.5KG	OUTSIDE
54	2019/40377	8867508213	VIJAYAPUR	B/O SUNANDA BIRADAR	1d	F	IB	12/2/2019	12/2/2019	1HR	TERM	G4P2D1L1A1 WITH 37+4WK POG	MSAF, DEATH, ABORTION	LSCS	O+	4TH	2.6KG	5/10, 8/10
55	2020/3936	7676345176	BELAGAVI	B/O ARATI MIRJI	1d	M	IB	2/1/2020	2/1/2020	2HR	TERM	G3P1L1A1 WITH 37+6WK POG	ABORTION	LSCS	O+	3RD	2.82KG	6/10, 8/10
56	2020/837	7090855830	CHADACHAN, VIJAYAPUR	B/O SUNANADA BADALI	1d	F	IB	1/7/2020	1/7/2020	1 DAY	TERM	PRIMI WITH 39WK POG	NONE	LSCS	A+	1ST	1.9KG	4/10, 7/10
57	2020/4495	9731880600	NIDONI, VIJAYAPUR	B/O ANITA B	1d	M	OB	2/5/2020	2/6/2020	2HR	LATE PRETERM	PRIMI WITH 36+6WK POG	APE	LSCS	B+	1ST	1.8KG	4/10,7/10
58	2020/4211	9901608785	DYABERI, VIJAYAPUR	B/O SHEELA HARIJAN	1d	F	OB	2/4/2020	2/4/2020	2HR	TERM	G2P1L1 WITH 38WK POG	NONE	NVD	B+	2ND	2.44KG	OUTSIDE
59	2020/3726	9740919847	VIJAYAPUR	B/O JAGADEVI	1d	M	OB	1/31/2020	1/31/2020	1 DAY	TERM	G2P1L1 WITH 39WK POG	NONE	NVD	AB+	2ND	3.42KG	OUTSIDE
60	2020/4775	9008233118	TALIKOTI, VIJAYAPUR	B/O DEVAMMA	1d	M	OB	2/7/2020	2/8/2020	3HR	TERM	PRIMI WITH 39WK POG	NONE	NVD	AB+	1ST	3KG	OUTSIDE
61	2020/4906	9164483828	INDI, VIJAYAPUR	B/O RENUKA PUJARI	2d	M	OB	2/7/2020	2/9/2020	2DAYS	TERM	PRIMI WITH 38WK POG	NONE	NVD	O+	1ST	3KG	OUTSIDE

62	2020/6321	0	SINDAGI, VIJAYAPUR	B/O PAVITRA	1d	M	OB	2/19/2020	2/19/2020	2HR	LATE PRETERM	PRIMI WITH 35+3WK POG	MSAF, MAS	NVD	B+	1ST	2.4KG	OUTSIDE
63	2020/6579	8618148782	INDI, VIJAYAPUR	B/O MALLAMMA	1d	M	IB	2/22/2020	2/22/2020	1HR	POST TERM	PRIMI WITH 41WK POG	MSAF, MAS	NVD	O+	1ST	3KG	5/10, 6/10
64	2020/7019	9900794257	SINDAGI, VIJAYAPUR	B/O SAVITA YATANUR	1d	M	OB	2/26/2020	2/27/2020	2HR	TERM	G2P1L1 WITH 38WK POG	NONE	NVD	B+	2ND	2.5KG	OUTSIDE
65	2020/2333		SURAPUR, YADAGIRI	B/O AISHABEGUM	1d	M	OB	1/15/2020	1/20/2020	5 DAYS	TERM	PRIMI WITH 38WK POG	NONE	NVD	B+	1ST	3KG	OUTSIDE
66	2020/7275	9945113950	VIJAYAPUR	B/O GEETA	1d	M	OB	2/27/2020	2/27/2020	2HR	TERM	G4P3L3 WITH 37WK POG	NONE	NVD	AB+	4TH	3.3KG	OUTSIDE
67	2020/11619	8884377664	VIJAYAPUR	B/O SUJATA MAJJAGI	1d	M	OB	4/17/2020	4/17/2020	5HR	TERM	PRIMI WITH 37WK POG	MSAF, MAS	LSCS	AB+	1ST	3.2KG	OUTSIDE
68	2020/9527	9611324553	BAGALKOT	B/O GOURAMMA	1d	M	OB	3/15/2020	3/16/2020	1 DAY	TERM	PRIMI WITH 39WK POG	MSAF, MAS	NVD	AB+	1ST	2.7KG	OUTSIDE
69	2020/8869	0	VIJAYAPUR	B/O RENUKA	1d	F	OB	3/10/2020	3/11/2020	12HR	TERM	G3P1L1D1 WITH 37WK POG	DEATH	NVD	A+	1ST	2.5KG	OUTSIDE
70	2020/10217	9901729260	TALIKOTI, VIJAYAPUR	B/O SHANKARAMMA HA	3d	M	OB	3/20/2020	3/23/2020	3 DAYS	TERM	PRIMI WITH 37WK POG	MSAF, MAS	NVD	B+	1ST	2.5KG	OUTSIDE
71	2020/10224	9108325155	TIKOTA, VIJAYAPUR	B/O MAHANANDA	1d	M	OB	3/22/2020	3/23/2020	12HR	TERM	PRIMI WITH 37WK POG	MSAF, MAS	NVD	AB+	1ST	2.86KG	OUTSIDE
72	2020/10022	7019789676	INDI, VIJAYAPUR	B/O SHANKARAMMA HU	1d	M	IB	3/20/2020	3/20/2020	1HR	POST-TERM	PRIMI WITH 42+6WK POG	OBST. LABOR, MSAF	LSCS	A+	1ST	3.065KG	3/10, 8/10
73	2020/7812	0	INDI, VIJAYAPUR	B/O NIRMALA	1d	F	OB	3/2/2020	3/2/2020	6HR	TERM	PRIMI WITH 37WK POG	NONE	NVD	B+	1ST	3KG	OUTSIDE

74	2020/10221	8904218166	VIJAYAPUR	B/O SHRUTI	1d	F	OB	3/22/2020	3/23/2020	12HR	TERM	PRIMI WITH 37WK POG	MSAF, MAS	NVD	B+	1ST	2.5KG	OUTSIDE
75	2020/8834	9900678007	B BAGEWADI, VIJAYAPUR	B/O SAVITA	4d	F	OB	3/6/2020	3/10/2020	4DAYS	TERM	PRIMI WITH 38WK POG	NONE	LSCS	B+	1ST	2.8KG	OUTSIDE
76	2020/10316		INDI, VIJAYAPUR	B/O NAGAVENI	2d	F	OB	3/22/2020	3/24/2020	2DAYS	TERM	G2P1L1 WITH 37WK POG	NONE	NVD	B+	2ND	2.2KG	OUTSIDE
77	2020/10550	9945196309	INDI, VIJAYAPUR	B/O ASMA	1d	F	OB	3/30/2020	3/30/2020	9HR	TERM	G2P1L1 WITH 37WK POG	NONE	NVD	AB+	1ST	2.5KG	OUTSIDE
78	2020/10869		GULBARGA	B/O ROOPA	1d	M	OB	4/4/2020	4/5/2020	1 DAY	TERM	PRIMI WITH 38WK POG	MSAF, MAS	NVD	B+	1ST	2.6 KG	OUTSIDE
79	2020/11875		SINDAGI, VIJAYAPUR	B/O MEENAKSHI	1d	M	OB	4/21/2020	4/21/2020	3HR	TERM	PRIMI WITH 39+6WK POG	NONE	NVD	B+	1ST	2.6KG	OUTSIDE
80	2020/11619	8884377664	VIJAYAPUR	B/O SUJATA	1d	M	OB	4/17/2020	4/17/2020	3HR	TERM	PRIMI WITH 37WK POG	MSAF, MAS	LSCS	AB+	1ST	3.2KG	OUTSIDE
81	2020/12473		JORAPUR, VIJAYAPUR	B/O SHASHIKALA	1d	M	IB	5/5/2020	5/5/2020	1HR	TERM	PRIMI WITH 37+2WKPOG	MSAF, MAS	LSCS	AB+	1ST	3.4KG	6/10, 8/10
82	2020/14224		INDI, VIJAYAPUR	B/O SUNITA KARATH	1d	M	OB	6/3/2020	6/3/2020	5HR	TERM	G4P3L3 WITH 38+4WK POG	NONE	NVD	AB+	4TH	3.410KG	OUTSIDE
83	2020/13124	7841984782	VIJAYAPUR	B/O DEEPA	9d	M	OB	5/9/2020	5/18/2020	9 DAYS	TERM	G2P1L1 WITH 38WK POG	NONE	NVD	AB+	2ND	2.7KG	OUTSIDE
84	2020/12738	9902211419	VIJAYAPUR	B/O SOUJANYA	1d	F	OB	5/10/2020	5/10/2020	1HR	TERM	PRIMI WITH 37WK POG	RH NEG, MSAF, MAS	NVD	A-	1ST	3KG	OUTSIDE

85	2020/15678	9980148988	INDI, VIJAYAPUR	B/O KARISHMA	1d	M	IB	6/24/2020	6/24/2020	7HR	LATE PRETERM	PRIMI WITH 36+4WK POG	SEV. PE	NVD	B+	1ST	2.1KG	6/10, 8/10
86	2020/13238	9972401701	SURAPUR, YADAGIRI	B/O VIJAYALAXMI	1d	M	IB	5/20/2020	5/20/2020	1HR	TERM	G2P1L1 WITH 40+4 WK POG	MSAF, MAS	NVD	A+	2ND	2.7KG	6/10, 8/10
87	2020/12942		SINDAGI, VIJAYAPUR	B/O MAHANANDA	1d	F	OB	5/19/2020	5/20/2020	2HR	TERM	G2P1L1 WITH 37WK POG	NONE	LSCS	AB+	2ND	2.7KG	OUTSIDE
88	2020/13376		B BAGEWADI, VIJAYAPUR	B/O MAHABUBI	1d	F	OB	5/22/2020	5/22/2020	2HR	TERM	G6P5L5 WITH 39+3WK	MSAF, MAS	NVD	B+	6TH	2.196KG	OUTSIDE
89	2020/13179	7406406366	MUDHOL, BAGALKOT	B/O SOUJANYA	10d	F	OB	5/9/2020	5/19/2020	10DAYS	TERM	G2P1L1 WITH 37WK POG	NONE	NVD	AB+	2ND	2.57KG	OUTSIDE
90	2020/16896	9986227287	VIJAYAPUR	B/O ALINA	1d	M	OB	7/14/2020	7/14/2020	2HR	TERM	PRIMI WITH 38WK POG	NONE	NVD	AB+	1ST	3KG	OUTSIDE
91	2020/17351	7676399189	B BAGEWADI, VIJAYAPUR	B/O SAVITA KUMBAR	1d	M	IB	7/22/2020	7/22/2020	4HR	POST TERM	G3P2L2 WITH 41+2WK POG	SEV. PE	NVD	B+	3RD	2.6KG	5/10, 9/10
92	2020/13522		SOLAPUR	B/O DRAKSHYANI	1d	F	OB	5/24/2020	5/25/2020	2HR	TERM	G2P1L1 WITH 38WK POG	MSAF, MAS	NVD	B+	2ND	3.99KG	OUTSIDE
93	2020/13112		SINDAGI, VIJAYAPUR	B/O SAVITA BIRADAR	1d	M	OB	5/18/2020	5/18/2020	2HR	LATE PRETERM	PRIMI WITH 34WK POG	OLIGO	LSCS	AB+	1ST	1.8KG	OUTSIDE
94	2020/14942		VIJAYAPUR	B/O BHAGYA	1d	M	OB	6/14/2020	6/14/2020	5HR	TERM	PRIMI WITH 38WK POG	PROM	LSCS	AB+	1ST	2.46KG	OUTSIDE

95	2020/14960	9731966135	CHADACHAN, VIJAYAPUR	B/O SAVITA DATTI	3d	M	OB	6/12/2020	6/15/2020	60HR	TERM	G2P1L1 WITH 37+6WK POG	HBSAG POSITIVE	NVD	B+	2ND	3KG	OUTSIDE
96	2020/14437	9901596869	INDI, VIJAYAPUR	B/O SUDHA	2d	F	OB	6/6/2020	6/8/2020	2DAYS	TERM	G2P1L1 WITH 39+3WK POG	MSAF, MAS	LSCS	AB+	2ND	3.1KG	OUTSIDE
97	2020/14168	9632144625	VIJAYAPUR	B/O BAYAKKA	1d	M	OB	6/3/2020	6/3/2020	3HR	TERM	PRIMI WITH 37WK POG	MSAF, MAS	NVD	AB+	1ST	3KG	OUTSIDE
98	2020/13129	9741970355	SINDAGI, VIJAYAPUR	B/O SIDDAMMA	1d	M	OB	5/18/2020	5/18/2020	4HR	LATE PRETERM	G2P1L1 WITH 34WK POG	NONE	NVD	AB+	2ND	1.9KG	OUTSIDE
99	2020/9327	9900666076	VIJAYAPUR	B/O AKKUBAI	1d	F	OB	3/15/2020	3/15/2020	2HR	TERM	PRIMI WITH 37WK POG	NONE	NVD	B+	1ST	2.51KG	OUTSIDE
100	2020/17094	6361066188	INDI, VIJAYAPUR	B/O MAHANANDA	1d	M	IB	7/17/2020	7/17/2020	3HR	POST TERM	G3P2L2 WITH 41+2WK POG	MSAF	LSCS	O+	3RD	2.1KG	5/10, 8/10
101	2020/19032	9663415739	SINDAGI, VIJAYAPUR	B/O VIJAYALAXMI PUJARI	1d	F	OB	8/19/2020	8/19/2020	6HR	LATE PRETERM	G3P2L2 WITH 36+6WK POG	NONE	NVD	A+	3RD	2.2KG	OUTSIDE

Sl No	MEASURES TAKEN	TREATMENT	TH	NICU STAY	DIAGNOSIS	TC (N/L)	HB	PCV	PLT	CRP	S. CA	CULTURE	ABG(pH Pco2 Po2 HCO3)	INTERPRETATION	TSB/UCB	U/O	CREAT	CYST C (mg/L) D1	CYST C (mg/L) D3	CONDITION	OUT	FOLLOW UP
1	INTUBATION	VENTI, ABX, O2		1 MO	BA WITH HIE III WITH MENINGITIS	13710 (42/51)	19.7	66.2	0.69	7	9.3	ST (BL.)	7.45/9.5/100/6.5	RESP. ALKALOSIS	NOT DONE	G	0.5	3.64	3.581	IMP	DIS	1MO, 3MO
2	BMV	HOOD, O2, IV ABX		4 DAYS	BA WITH HIE I	19140 (79/12)	16.8	53.4	2.49	4	8.9	ST (BL.)	NOT DONE		20.9/18.3	G	0.7	3.057	3.011	IMP	AMA	
3	STIMULATION, BMV	HOOD, O2, IV ABX		6 DAYS	BA WITH HIE I WITH MSAF	27040 (89/16)	19.8	59.5	3.05	12	9.5	ST (BL.)	NOT DONE		NOT DONE	G	0.9	3.626	3.545	IMP	DIS	0
4	STIMULATION	HOOD, O2, IV ABX		7 DAYS	BA WITH HIE I	19830 (72/20)	22.2	70.7	1.79	3	11	ST (BL.)	NOT DONE		19.8/18.3	G	0.6	2.389	2.285	IMP	DIS	0
5	INTUBATION	VENTI, IV ABX		6 DAYS	BA WITH HIE II WITH FACE PRESENTATION	25150 (61/22)	17.6	54	2.53	10	9.2	ST (BL.)	7.29/45.4/117/21.1	RESP. ACIDOSIS	NOT DONE	G	0.9	1.824	1.711	IMP	DIS	1MO, 3MO
6	BMV, INTUBATION	VENTI, ABX, O2		3DAYS	BA WITH HIE III	34390 (42/52)	15.1	50.3	2.78	3	10	ST (BL.)	7.23/12.5/159/5.1	MET. ACIDOSIS	NOT DONE	G	1.1	3.937	3.877	NI	AMA	0
7	STIMULATION	O2, IV ABX		4 DAYS	BA WITH HIE I	16350 (67/25)	18.4	56.9	1.99	2	9	ST (BL.)	NOT DONE		NOT DONE	G	0.7	2.604	2.423	IMP	DIS	1 MO
8	INTUBATION	O2, IV ABX		3 DAYS	BA WITH HIE I	14700 (72/21)	16.4	51	3.21	1	9	ST (BL.)	NOT DONE		NOT DONE	G	0.9	3.095	2.906	IMP	AMA	0

9	STIMULATION, BMV	HOOD, O2, IV ABX		8 DAYS	BA WITH HIE I	14930 (72/22)	22.3	66.2	1.18	3	9.3	NOT DONE	NOT DONE		14.6/13	G	0.8	2.765	2.149	IMP	DIS	0
10	STIMULATION	O2, IV ABX		7 DAYS	BA WITH HIE I	27570 (74/20)	15.7	49	2.49	3	9.3	ST (BL.)	NOT DONE		10.6/8.7	G	0.8	2.584	2.393	IMP	DIS	0
11	STIMULATION	O2, IV ABX		7 DAYS	BA WITH HIE I WITH RESPIRATORY DISTRESS	24260 (65/23)	16.5	51.9	2.31	9	8.9	ST (BL.)	NOT DONE		16.9/14.8	G	0.9	2.65	1.302	IMP	DIS	0
12	STIMULATION	O2, IV ABX		5 DAYS	BA WITH HIE I	18860 (73/19)	17.7	57	1.81	5	10	ST (BL.)	NOT DONE		13.6/12.4	G	0.7	2.294	2.813	IMP	DIS	0
13	STIMULATION, BMV	HOOD, O2, IV ABX		4 DAYS	BA WITH HIE II	19280 (55/38)	15.8	50.7	2.19	5	8.4	ST (BL.)	NOT DONE		17.5/16	G	0.8	2.364	1.637	IMP	DIS	0
14	STIMULATION	HOOD, O2, IV ABX		5 DAYS	BA WITH HIE I	14440 (60/30)	18.5	59	2.83	7	9.3	ST (BL.)	NOT DONE		12.5/10.1	G	0.8	1.772	2.273	IMP	DIS	0
15	STIMULATION	O2, IV ABX		5 DAYS	BA WITH HIE II	19520 (87/6)	20	60.7	1.88	4	8.7	ST (BL.)	NOT DONE		NOT DONE	G	0.6	2.515	2	IMP	DIS	0
16	BMV, INTUBATION	VENTI, ABX, O2		8 DAYS	BA WITH HIE III	30240 (67/26)	14.1	43.9	3.01	4	10	ST (BL.)	NOT DONE		NOT DONE	G	0.8	3.497	3.48	IMP	DIS	0
17	STIMULATION, BMV	HOOD, O2, IV ABX		8 DAYS	BA WITH HIE II	20040 (71/23)	17.3	56	2.17	12	11	ST (BL.)	NOT DONE		1.9/1.2	G	0.7	3.937	3.454	IMP	DIS	
18	INTUBATION	VENTI, IV ABX		7 DAYS	BA WITH HIE III	4790 (23/63)	13.8	39.4	0.78	6	9.9	ST (BL.)	7.15/71.6/37/24	RESP. ACIDOSIS	9.7/8.9	G	0.8	9.069	3.953	NI	AMA	

19	STIMULATION	O2, IV ABX		7 DAYS	BA WITH HIE I WITH RESPIRATORY DISTRESS	18180 (76/15)	21.4	64	2.48	13	9.9	ST (BL.)	NOT DONE		15.9/13	G	0.9	2.507	1.967	IMP	DIS	1MO
20	INTUBATION	VENTI, ABX, O2		7 DAYS	BA WITH HIE III	21060 (76/15)	15.9	49	3.59	4	8.6	ST (BL.)	7.54/16.1/186/13.8	RESP. ALKALOSIS	NOT DONE	G	1	3.716	3.643	IMP	AMA	
21	STIMULATION	O2, IV ABX		7 DAYS	BA WITH HIE I	23250 (68/25)	15.2	47.3	1.86	3	9.3	NOT DONE	7.36/30.6/52/16.6	RESP. ALKALOSIS+MET. ACIDOSIS	NOT DONE	G	0.8	2.14	1.48	IMP	DIS	1MO
22	STIMULATION	O2, IV ABX		13 DAYS	BA WITH HIE I WITH RESPIRATORY DISTRESS	16040 (69/22)	21.8	63.4	2.16	8	12	ST (BL.)	NOT DONE		17.1/15.8	G	0.8	2.631	2.614	IMP	DIS	1 MO
23	STIMULATION	O2, IV ABX		13 DAYS	BA WITH HIE I	7390 (71/16)	18.1	55.2	1.52	8	10	ST (BL.)	NOT DONE		NOT DONE	G	0.8	3.047		IMP	DIS	
24	STIMULATION	O2, IV ABX		11 DAYS	BA WITH HIE II WITH RESPIRATORY DISTRESS	15370 (85/9)	15.3	45.8	1.84	7	7.2	ST (BL.)	NOT DONE		NOT DONE	G	1.1	2.383	1.494	IMP	DIS	1 MO
25	STIMULATION, BMV	HOOD, O2, IV ABX		11 DAYS	BA WITH HIE II	8190 (79/14)	15	49.2	0.84	45	7.2	KLEBSIELLA	NOT DONE		10.6/8	G	0.8	3.956	3.655	IMP	DIS	
26	INTUBATION	VENTI, ABX, O2		11 DAYS	BA WITH HIE II	12390 (78/17)	14.4	43.9	1.49	3	9.1	ST (BL.)	7.53/19.7/307/16.5	RESP. ALKALOSIS	NOT DONE	G	0.7	6.375	3.195	IMP	DIS	
27	STIMULATION, BMV	O2, IV ABX		6 DAYS	BA WITH HIE I	26570 (62/28)	19.4	60.7	1.91	8	8.9	ST (BL.)	NOT DONE		NOT DONE	G	0.8	3.585	3.329	IMP	DIS	
28	STIMULATION, BMV	O2, IV ABX		6 DAYS	BA WITH HIE II	19420 (40/50)	18.8	59.3	2.62	6	9.4	ST (BL.)	NOT DONE		12.5/11	G	0.8	3.785	3.731	IMP	DIS	

29	INTUBATION	VENTI, ABX, O2	TH	15 DAYS	BA WITH HIE III	14160 (77/13)	16.9	51	1.72	1	8.6	ST (BL.)	7.28/36.9/69/16.9	MET. ACIDOSIS	2.2/1	G	0.9,0.8, 0.6	2.444	2.042	IMP	DIS	
30	BMV	HOOD, O2, IV ABX		10 DAYS	BA WITH HIE I	8030 (58/31)	17.5	53.6	2.1	1	8.3	ST (BL.)	NOT DONE		8/7.1	G	0.8	1.489	1.941	IMP	DIS	1 MO
31	BMV	O2, IV ABX		14 DAYS	BA WITH HIE I	15860 (68/23)	14.9	41.4	2.39	2	8	ST (BL.)	NOT DONE		9.1/8.6	G	0.8	1.602	1.353	IMP	DIS	
32	INTUBATION	VENTI, ABX, O2	TH	7 DAYS	BA WITH HIE II	20420 (72/19)	15.5	45.6	1.78	5	6.2	ST (BL.)	7.3/38.8/124/18.6	MET. ACIDOSIS	5.3/4.5	G	0.6	2.433	1.376	IMP	DIS	1 MO
33	BMV	HOOD, O2, IV ABX		3 DAYS	BA WITH HIE I	15550 (75/17)	20.9	59.4	1.71	4	9.3	ST (BL.)	NOT DONE		10.9/10	G	0.6	2.237	2.197	IMP	DIS	
34	STIMULATION	O2, IV ABX		5 DAYS	BA WITH HIE II	31450 (60/37)	16.8	50.7	2.56	2	9.4	ST (BL.)	7.3/20.7/133/10	MET. ACIDOSIS	9.5/8	G	0.7	3.266	2.357	IMP	DIS	
35	INTUBATION	VENTI, IV ABX		3 DAYS	BA WITH HIE II	15000 (56/39)	19.6	59.8	1.27	5	11	ST (BL.)	7.22/25.8/288/10.2	MET. ACIDOSIS	NOT DONE	G	0.6	3.986	2.773	NI	AMA	
36	STIMULATION	VENTI, IV ABX		14 DAYS	BA WITH HIE II WITH ASPIRATION	5580 (55/30)	17.6	38.5	3.35	46	9.5	ST (BL.)	7.32/41.2/289/20.7	MET. ACIDOSIS	0.5/0.3	G	0.5	1.974	2.144	IMP	DIS	0
37	STIMULATION, BMV	HOOD, O2, IV ABX		10 DAYS	BA WITH HIE I	20220 (59/37)	17.9	56.6	0.62	69	9.3	ST (BL.)	7.34/33.4/62/17.5	MET. ACIDOSIS	10.4/9.9	G	1	1.928	1.674	IMP	DIS	
38	STIMULATION	HOOD, O2, IV ABX		8 DAYS	BA WITH HIE II	26030 (39/55)	16.5	50.5	2.19	63	8	ST (BL.)	7.55/4.6/173/4	RESP.ALKALOSIS	6.8/6	G	0.9	3.329	1.371	IMP	DIS	1MO
39	STIMULATION, BMV	HOOD, O2, IV ABX		20 DAYS	BA WITH HIE II	27100 (84/8)	17.4	53	2.87	44	8.1	ST (BL.)	7.43/14.1/170/9.1	RESP.ALKALOSIS + MET. ACIDOSIS	NOT DONE	G	0.9,0.4,0.5	2.223	2.024	IMP	DIS	0

40	STIMULATION	O2, IV ABX		3 DAYS	BA WITH HIE II	15980 (71/21)	20.4	62.6	2.72	1	8.5	ST (BL.)	7.36/23.8/135/13.2	RESP.ALKALOSIS + MET. ACIDOSIS	8.4/8	G	0.6	4.816	2.047	IMP	AMA	0
41	INTUBATION	VENTI, IV ABX		1 MO	BA WITH HIE III	32140 (80/14)	14.7	43	2.78	52	7.4	ST (BL.)	7.41/32.9/73/20.3	RESP.ALKALOSIS + MET. ACIDOSIS	NOT DONE	G	1	2.341	1.676	IMP	AMA	0
42	STIMULATION	HOOD, O2, IV ABX		10 DAYS	BA WITH HIE II	17200 (75/18)	20.4	59.2	2.1	32	9.1	ST (BL.)	NOT DONE		9.1/8	G	0.6	9.448	3.056	IMP	DIS	0
43	STIMULATION	HOOD, O2, IV ABX		6 DAYS	BA WITH HIE II	19490 (66/25)	14.2	42.8	1.77	1	8.6	STREP SPP.	NOT DONE		NOT DONE	G	0.8	3.266	2.408	IMP	DIS	0
44	BMV	HOOD, O2, IV ABX		9 DAYS	BA WITH HIE I WITH PPHN	14300 (65/26)	18	53.6	2.55	4	6.5	ST (BL.)	7.37/18.9/130/10.6	RESP. ALKALOSIS + MET. ACIDOSIS	13.4/10.6	G	0.9	3.531	3.437	IMP	DIS	
45	SUCTION, STIMULATION	HOOD, O2, IV ABX		7 DAYS	DPA WITH HIE II	11890 (49/36)	22.9	66	2.41	2	8.5	NOT DONE	7.42/37.7/205/17.5	RESP. ACIDOSIS	5.8/5.3	G	0.7	8.66	3.605	IMP	DIS	
46	STIMULATION	HOOD, O2, IV ABX		15 DAYS	DPA WITH HIE I WITH MAS, PPHN	22490 (78/17)	22.7	65.8	0.81	1	9.3	ST (BL.)	7.37/25.2/143/14.2	RESP.ALKALOSIS + MET. ACIDOSIS	NOT DONE	G	0.7	3.813	2.817	IMP	DIS	0
47	STIMULATION	HOOD, O2, IV ABX		3 DAYS	DPA WITH HIE I	13310 (69/22)	22.9	67	2.02	1	10	ST (BL.)	NOT DONE		NOT DONE	G	1	3.68	3.267	IMP	DIS	
48	INTUBATION	VENTI, IV ABX		6 DAYS	DPA WITH HIE III	23470 (85/10)	18.4	56.9	1.48	50	7	ST (BL.)	7.20/30.2/225/11.4	MET. ACIDOSIS	NOT DONE	G	1.6	9.64		NI	AMA	0
49	STIMULATION	HOOD, O2, IV ABX		8 DAYS	DPA WITH HIE I	12100 (67/26)	13.2	40.2	2.16	6	9.4	ST (BL.)	7.33/20.3/109/10.5	MET. ACIDOSIS	9.9/8.6	G	0.7	9.017	2.255	IMP	DIS	

50	STIMULATION, BMV	VENTI, IV ABX		16 DAYS	BA WITH HIE II	17070 (62/30)	16	48.6	1.26	21	8.1	ST (BL.)	NOT DONE		NOT DONE	G	1.9, 0.5	2.669	2.62	IMP	DIS	
51	STIMULATION	HOOD, O2, IV ABX		3 DAYS	BA WITH HIE I	15020 (62/29)	19.1	53.4	3.22	5	9	ST (BL.)	7.35/28.6/54/15.4	MET. ACIDOSIS	NOT DONE	G	0.7	3.223	2.404	IMP	DIS	0
52	STIMULATION	VENTI, ABX, O2	TH	12 DAYS	BA WITH HIE III	11420 (51/42)	20.2	59.4	2.12	8	9	ST (BL.)	7.42/20.1/283/12.8	RESP.ALKALOSIS + MET. ACIDOSIS	7.3/6	G	0.7	2.687	1.918	IMP	DIS	
53	STIMULATION	HOOD, O2, IV ABX		6 DAYS	DPA WITH HIE II	18600 (74/19)	15.8	48.5	2.25	1	8.2	ST (BL.)	7.43/15.7/128/10.2	RESP.ALKALOSIS + MET. ACIDOSIS	11.3/10.8	G	1.7, 1.1	4.306	3.267	IMP	DIS	0
54	STIMULATION, BMV	HOOD, O2, IV ABX		7 DAYS	BA WITH MSAF WITH RD	15020 (67/27)	16.5	50.5	2.25	14	8.3	ST (BL.)	7.18/17.3/95/6.3	MET. ACIDOSIS	9.5/9	G	1.1	9.017	1.747	IMP	DIS	0
55	STIMULATION	HOOD, O2, IV ABX		7 DAYS	BA WITH HIE I	13800 (49/44)	16.2	46.5	3.06	4	8.7	ST (BL.)	7.53/18.6/198/15.6	RESP. ALKALOSIS	6.3/5.5	G	0.8	6.598	2.946	IMP	DIS	
56	INTUBATION	VENTI, IV ABX		26DAYS	BA WITH HIE III	12100 (36/51)	20.3	56.9	1.79	22	7.7	ST (BL.)	NOT DONE		9.4/8.6	G	1,0.4	2.908	1.414	IMP	DIS	3MO
57	INTUBATION	VENTI, IV ABX		14 DAYS	BA WITH HIE III	9800 (50/43)	16.9	57.5	1.41	51	8	ST (BL.)	7.49/14.2/193/10.7	RESP. ALKALOSIS	11.2/11	G	1.1	2.459	1.229	NI	AMA	0
58	STIMULATION	VENTI, IV ABX		1 MO	BA WITH HIE II	22290 (71/20)	15.5	45.5	3.08	5	7.9	ST (BL.)	NOT DONE		NOT DONE	G	0.8	2.216	1.783	IMP	DIS	0
59	STIMULATION	HOOD, O2, IV ABX		10 DAYS	BA WITH HIE II	20520 (74/17)	17.6	51.1	2.61	19	10	ST (BL.)	7.5/21.9/202/17	RESP.ALKALOSIS	10/9.5	G	0.7	3.238	2.244	IMP	AMA	0

60	STIMULATION	HOOD, O2, IV ABX		10 DAYS	BA WITH HIE II	28690 (89/7)	19.1	55.7	2.76	9	8.6	ST (BL.)	7.39/18.5/128/10	RESP.ALKALOSIS + MET. ACIDOSIS	5.4/4.4	G	1, 0.7	3.524	2.268	IMP	DIS	0
61	STIMULATION	HOOD, O2, IV ABX		9 DAYS	BA WITH HIE II	22000 (80/13)	17	47.8	2.38	14	8	ST (BL.)	NOT DONE		10.5/10	G	0.7	2.771	1.791	IMP	DIS	1MO
62	STIMULATION	VENTI, IV ABX		8 DAYS	BA WITH HIE II	20470 (65/29)	16.9	51.3	1.38	10	8.4	ST (BL.)	7.50/14.8/167/11.4	RESP. ALKALOSIS	NOT DONE	G	0.7	2.176	2.96	NI	DEATH	0
63	INTUBATION	HOOD, O2, IV ABX		7 DAYS	BA WITH HIE II WITH MAS, PPHN	21970 (65/26)	15.8	47.6	2.46	21	8.2	ST (BL.)	7.26/25.5/193/11	MET. ACIDOSIS	NOT DONE	G	1	4.204	2.634	IMP	DIS	0
64	STIMULATION	VENTI, IV ABX		2 DAYS	BA WITH HIE III	39930 (44/46)	18.6	57.7	1.96	0	0	ST (BL.)	7.13/11.5/148/3.7	MET. ACIDOSIS	NOT DONE	G	1	2.398	2.363	NI	AMA	0
65	STIMULATION	O2, VENTI, ABX		1 MO	BA WITH HIE III	24510 (81/12)	16.7	44.9	2.33	14	9.9	ST (BL.)	7.38/36.8/149/21.3	NORMAL	NOT DONE	G	1.1, 1.3, 0.7	3.565	2.304	IMP	DIS	0
66	STIMULATION	HOOD, O2, IV ABX		2 DAYS	BA WITH HIE I	10530 (61/32)	18	51	1.91	10	7.7	ST (BL.)	NOT DONE		NOT DONE	G	0.8	8.013	2.922	NI	AMA	0
67	STIMULATION	HOOD, O2, IV ABX		4 DAYS	DPA WITH MAS WITH PPHN	20940 (74/16)	19	55.4	2.76	65	7.6	ST (BL.)	7.30/36.7/48/17.7	MET. ACIDOSIS	NOT DONE	G	0.9	3.641	1.117	IMP	DIS	0
68	STIMULATION	HOOD, O2, IV ABX		8 DAYS	DPA WITH HIE I	15440 (72/21)	13.2	39	1.74	25	9	ST (BL.)	NOT DONE		8.2/7.5	G	0.5	2.089	0.164	IMP	DIS	
69	STIMULATION, BMV	HOOD, O2, IV ABX		17 DAYS	DPA WITH HIE II	6810 (70/20)	21.2	60.1	1.9	10	9.5	ST (BL.)	NOT DONE		NOT DONE	G	1.1	1.117	0.227	IMP	DIS	
70	STIMULATION	VENTI, IV ABX		3 DAYS	BAWITH HIE II WITH MAS, PPHN	18290 (83/12)	16.4	46.5	1.17	31	8.5	ST (BL.)	7.30/23.1/175/17.1	MET. ACIDOSIS	NOT DONE	G	2.8	0.226	9.64	NI	AMA	

71	STIMULATION	HOOD, O2, IV ABX		6 DAYS	DPA WITH NEONATAL SEIZURES	17490 (81/13)	16.8	51.3	1.44	20	8.5	ST (BL.)	NOT DONE		1.4/1	G	0.7	0.226	0.223	IMP	DIS	
72	STIMULATION	HOOD, O2, IV ABX		8 DAYS	DPA WITH PPHN	13560 (60/32)	17.8	52.8	1.62	25	8.7	E.COLI	NOT DONE		9.1/8.6	G	0.5	7.135	0.224	IMP	DIS	
73	STIMULATION, BMV	VENTI, IV ABX		1 MO	DPA WITH HIE II	34210 (82/11)	18.2	54.5	2.31	43	9.3	ST (BL.)	7.67/22/44/26	RESP. ALKALOSIS	1.4/1	G	0.6,0.6	3.614	0.224	IMP	DIS	0
74	STIMULATION	HOOD, O2, IV ABX		8 DAYS	BA WITH HIE II WITH MAS, PPHN	22390 (56/40)	18.8	58.1	2.38	55	7.6	ST (BL.)	7.18/14.1/194/5	MET. ACIDOSIS	NOT DONE	G	1.4	3.384	2.524	IMP	DIS	
75	SUCTION, STIMULATION	VENTI IV ABX		19 DAYS	DPA WITH HIE II WITH RDS	21110 (64/28)	16.6	48.4	2.59	4	8.1	ST (BL.)	7.30/10.9/201/5.2	MET. ACIDOSIS	7.9/7	G	1.9, 0.4	3.259		IMP	DIS	0
76	STIMULATION, BMV	VENTI, IV ABX		8 DAYS	DPA WITH MAS, PPHN, EOS, CHD	9000 (51/31)	19.6	57.2	0.29	4	6.7	ST (BL.)	7.16/28/117/9.5	MET. ACIDOSIS	13.5/11.5	G	1.8, 0.8,0.4	5.65		NI	DEATH	0
77	STIMULATION	HOOD, O2, IV ABX		10 DAYS	BA WITH HIE I WITH CLASSICAL HDN	5240 (51/45)	19.4	54.8	2.53	13	7.2	ST (BL.)	NOT DONE		NOT DONE	G	1.1, 0.6	6.286	3.934	IMP	DIS	0
78	INTUBATION	VENTI, IV ABX		17 DAYS	BA WITH HIE III WITH MAS	11050 (78/13)	14.7	41.4	0.28	4	6.3	ST (BL.)	7.29/34/81/15.7	MET. ACIDOSIS	NOT DONE	G	1.3, 1.7,1.5,0.7	6.707	3.599	IMP	DIS	
79	INTUBATION	VENTI, IV ABX		2 DAYS	BA WITH HIE II	16620 (76/19)	20.8	60.8	1.24	0	0	NOT DONE	7.26/37.3/108/16.2	MET. ACIDOSIS	NOT DONE	G	1.2	2.8	8.934	NI	DEATH	
80	STIMULATION	HOOD, O2, IV ABX		4 DAYS	DPA WITH MAS, PPHN	20940 (74/16)	19	55.4	2.76	65	7.6	ST (BL.)	7.30/36.7/48/17.7	MET. ACIDOSIS	NOT DONE	G	0.9	3.179		IMP	DIS	
81	STIMULATION	HOOD, O2, IV ABX		7 DAYS	DPA WITH PPHN	23630 (62/33)	15.5	46.2	2.86	13	9.1	ST (BL.)	7.16/37.5/95/12.9	MET. ACIDOSIS	NOT DONE	G	0.6	6.094	3.672	IMP	DIS	0

82	STIMULATION	HOOD, O2, IV ABX	TH	7 DAYS	BA WITH HIE II	20170 (82/11)	16.7	49.2	2.49	4	9.1	ST (BL.)	7.24/39.4/194/16.3	MET. ACIDOSIS	NOT DONE	G	0.8, 0.6, 0.5	3.463		IMP	DIS	0
83	STIMULATION	HOOD, O2, IV ABX		21 DAYS	DPA WITH RDS	5900 (57/41)	19	57.9	2.47	18	9.2	ST (BL.)	7.50/16.1/145/12.4	RESP. ALKALOSIS	12/9.1	G	1.7, 1, 0.7	6.812	3.529	IMP	DIS	0
84	STIMULATION	HOOD, O2, IV ABX		8 DAYS	BA WITH HIE II WITH MAS, PPHN	17700 (65/28)	13.9	40.9	2.68		9.5	ST (BL.)	NOT DONE		1.9/1.5	G	0.8	6.094	1.828	IMP	DIS	0
85	STIMULATION	HOOD, O2, IV ABX		6 DAYS	DPA WITH IUGR	10800 (55/35)	20.2	60.2	2.55	27	7.4	ST (BL.)	7.38/21.1/104/12.1	RESP.ALKALOSIS + MET. ACIDOSIS	NOT DONE	G	1.2	9.822	3.513	IMP	DIS	0
86	STIMULATION	HOOD, O2, IV ABX		2 DAYS	DPA WITH MAS, PPHN, WITH RDS	19490 (70/19)	19.4	56.5	2.08	20	8.3	ST (BL.)	NOT DONE		NOT DONE	G	1	3.979		NI	AMA	0
87	STIMULATION	HOOD, O2, IV ABX		4 DAYS	BA WITH HIE II	20090 (70/23)	16.5	50.2	2.18	5	8.1	NOT DONE	7.36/25.7/106/14.3	RESP.ALKALOSIS + MET. ACIDOSIS	NOT DONE	G	0.8	9.448		NI	AMA	0
88	STIMULATION, BMV	HOOD, O2, IV ABX		6 DAYS	BA WITH HIE II WITH MAS, PPHN, RDS	17810 (69/16)	12.4	36.1	2.24	13	0	NOT DONE	NOT DONE		NOT DONE	G	0.5	3.141	2.634	IMP	DIS	0
89	STIMULATION	HOOD, O2, IV ABX		6 DAYS	BA WITH HIE I WITH LOS	19860 (60/32)	16.3	48.9	4.61	12	10	ST (BL.)	NOT DONE		NOT DONE	G	0.6	2.611	0.47	IMP	DIS	0
90	STIMULATION	HOOD, O2, IV ABX		3 DAYS	BA WITH HIE II	15420 (70/23)	18.4	54.5	1.67	15	6.6	ST (BL.)	7.35/30.8/167/16.5	MET. ACIDOSIS	NOT DONE	G	1.1	3.442	2.999	IMP	DIS	0
91	STIMULATION	HOOD, O2, IV ABX		7 DAYS	BA WITH HIE II WITH MAS WITH PPHN	17620 (73/19)	20.6	58.1	2.31	13	9.5	ST (BL.)	7.43/22.2/121/14.5	RESP.ALKALOSIS + MET. ACIDOSIS	NOT DONE	G	1.5, 1.3	6.59	6.549	IMP	DIS	0

92	INTUBATION	VENTI, IV ABX		13 DAYS	BA WITH HIE II WITH CONG.PNEUMONIA	17390 (73/18)	19.2	55.5	2.32	19	8.3	ST (BL.)	7.30/34.7/108/16.4	MET. ACIDOSIS	NOT DONE	G	0.5	7.436	3.916	IMP	DIS	
93	STIMULATION	HOOD, O2, IV ABX		21 DAYS	BA WITH HIE I WITH RDS	19860 (62/23)	18	52.5	2.24	6	7.5	ST (BL.)	7.37/36.3/114/20.3	NORMAL	NOT DONE	G	1.5	8.934		IMP	DIS	0
94	STIMULATION	HOOD, O2, IV ABX		10 DAYS	DELAYED PERINATAL ADAPTATION	10600 (50/38)	19.1	57.3	1.88	5	8.6	ST (BL.)	7.27/39.3/92/17.6	MET. ACIDOSIS	NOT DONE	G	0.9	3.388	2.28	IMP	DIS	0
95	STIMULATION	HOOD, O2, IV ABX		10 DAYS	DPA WITH HIE II	19130 (64/20)	17.7	50.9	1.44	7	9.6	ST (BL.)	7.4/21.9/79/13.8	RESP.ALKALOSIS + MET. ACIDOSIS	NOT DONE	G	1.5	3.749	3.184	IMP	DIS	
96	STIMULATION	HOOD, O2, IV ABX		4 DAYS	DPA	7770 (66/25)	19.3	59.3	0.81	14	9.4	ST (BL.)	7.33/17/218/8.7	MET. ACIDOSIS	NOT DONE	G	0.6	6.886	3.613	IMP	DIS	0
97	STIMULATION	HOOD, O2, IV ABX		7 DAYS	DPA WITH MAS, PPHN	15990 (76/17)	16.2	48.2	2.62	9	8.2	ST (BL.)	7.22/41.1/140/16.3	MET. ACIDOSIS	NOT DONE	G	1.1	2.097	0.996	IMP	DIS	0
98	STIMULATION	HOOD, O2, IV ABX		9 DAYS	BA WITH HIE II	20200 (60/32)	16.3	46	3.38	6	8.8	ST (BL.)	NOT DONE		10/9.6	G	0.5	3.273	2.034	IMP	DIS	
99	INTUBATION	VENTI, IV ABX		3 DAYS	BA WITH HIE III	15740 (51/40)	21.5	64	2.63	89		ST (BL.)	7.19/39.8/386/14.8	MET. ACIDOSIS	NOT DONE	G	0.9	8.013	2.33	NI	AMA	0
100	STIMULATION	HOOD, O2, IV ABX		7 DAYS	DPA WITH MAS, PPHN	9380 (70/23)	21.2	61.1	2.39	16	9.2	ST (BL.)	7.49/13.4/129/10	RESP. ALKALOSIS	12.7/10.4	G	1	3.452	2.256	IMP	DIS	0
101	STIMULATION	HOOD, O2, IV ABX		9 DAYS	DPA WITH HIE I	13140 (71/19)	16.4	49.1	2.04	5	8.9	ST (BL.)	7.32/29.2/18.3/14.7	MET. ACIDOSIS	NOT DONE	G	0.7	2.611	2.364	IMP	DIS	0