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Research Article

Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids

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Abstract

The rate of preterm birth sweeps from 5-18% across 184 countries. India has a lofty number of preterm births as well as neonatal deaths due to prematurity. Preterm birth is a risk factor in at least 50% of all neonatal deaths and is the second most common cause of death (after pneumonia) among children under the age of five. In the Indian context, many pregnant women are registered late or are referred to a peripheral center when a preterm delivery is suspected. Many receive an incomplete course (only one dose) of corticosteroids. Therefore, in this proximity of the truncation researcher's attempt to analyze the efficacy of a single dose, to see whether it is as good as two doses in averting impediment, especially RDS in preterm babies. This study aims to determine the differences in survival and short-term morbidity in neonates receiving an incomplete course (one dose) of steroids in comparison to those receiving a complete course (two doses) and to know the relation between co-morbidity with respect to those receiving a complete course of drug (two doses). The study depicts that RDS more common in premature babies who did not receive ANCS that who did. It also shows that requirement of surfactant and no. of doses of surfactant less in babies who received ANCS than babies who did not.

Keywords: Prenatal; Antenatal; Corticosteroids; Preterm birth; RDS; ANCS.

Introduction

A "preterm baby" is defined by the World Health Organisation (WHO) [1] as a child who is born breathing before 37 weeks of pregnancy. Preterm birth rates range from 5 to 18% in 184 nations [2,3]. Both preterm

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births and prematurity-related newborn fatalities are extremely common in India [4]. 35 lakh kids are born prematurely out of an expected 2.6 crore live deliveries in India per year, and of these, 3.03 lakh newborns (or around 10%) die from preterm birth complications [4,5]. Many survivors may live with difficulties for the rest of the lives, including learning, hearing, and vision impairments. The second most prevalent cause of death within children below the age of five, preterm delivery is associated with a minimum of 50% of all newborn deaths [1,2,6]. The frequency of preterm birth has not decreased as a result of perinatology advancements made in the previous 30 years, but there have been notable modifications to perinatal and neonatal morbidity and survivability [3,6,7]. Liggins, et al., were the first to demonstrate a 50% decrease in the incidence of respiratory distress syndrome (RDS) following maternal treatment of corticosteroids [8].

In singleton preterm pregnancies, prophylactic corticosteroids speed up lung development and lower the risk of respiratory distress syndrome (RDS), intraventricular hemorrhage (IVH), necrotizing enter colitis (NEC), early sepsis (EOS), and infant death [7,9-11]. More than 24 hours and <7 days must pass between the start of medication and delivery for a full course of corticosteroids to have the greatest therapeutic benefits [12]. The neonatal effects of a partial course of antenatal corticosteroids (ANCS) are little documented, however incomplete treatments may be advantageous [2,6]. In the Indian context, many pregnant women are registered late or are referred to a peripheral center when a preterm delivery is suspected. Many receive an incomplete course (only one dose) of corticosteroids. Therefore, in this proximity of the truncation researcher's attempt to analyze the efficacy of a single dose, to see whether it is as good as two doses in averting impediment, especially RDS in preterm babies.

Note: No Indian studies could be found that studied the effects of an incomplete course of ANCS.

Aims and objectives

To compare neonates receiving a partial course (one dose) of steroids with those receiving a full course (two doses), in order to ascertain any variations in survivability and short-term morbidity.

To understand the relationship between co-morbidity and those receiving a full course of treatment (two doses).

Rationale of the study

The prevalence of RDS in premature babies will be the main result. Incidence of other morbidities and length of hospital stay will be secondary outcomes.

Review of literature

Preterm births

Preterm birth, according to the WHO, is any birth that takes place prior to 37 weeks of gestation or prior to 259 days having passed since the beginning of a woman's previous menstrual cycle [13]. premature deliveries can be further divided into three groups according to gestational age: severely

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premature (<28 weeks), extremely premature (between 28 and 32 weeks), and intermediate premature (between 32 and 37 full weeks). Moderate preterm deliveries may be further split in order to concentrate on late premature births (34-37 completed weeks) [14].

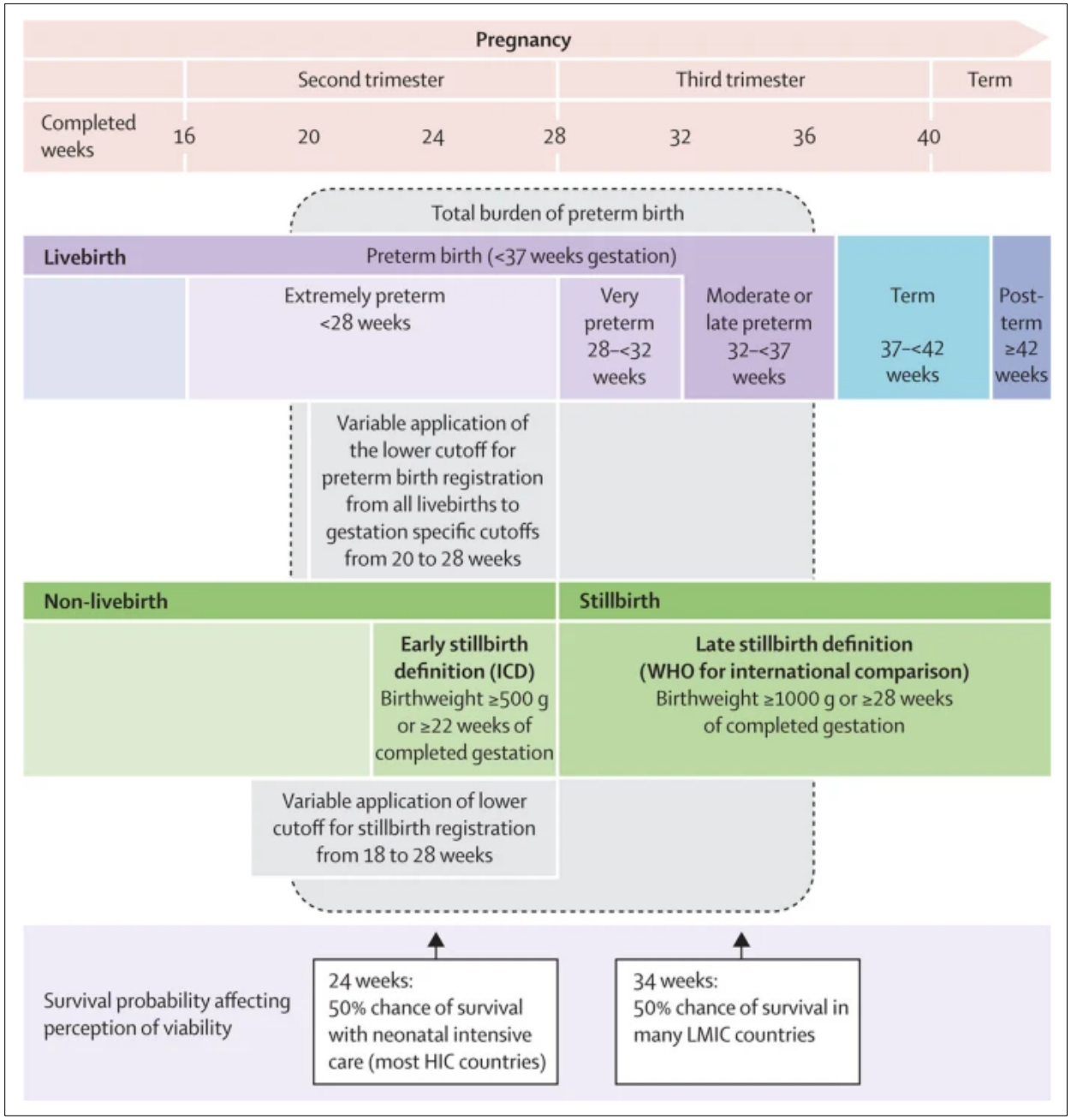

Figure 1: Without sophisticated technology care, over 75 percent of the 1.1 million premature infant deaths each year could be prevented. If made widely accessible, two high priority interventions-Kangaroo Mother Care and ANCS-could rescue 450,000 and 400,000 preterm babies annually, respectively [15].

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Preterm births-Why concentrate on it?

Preterm birth contributes significantly to the short and long-term decline of human potential among survivors globally. Preterm birth problems, which account for 35% of the 3.1 million deaths globally each year, are the most common major cause of newborn fatalities. They are also the second most prevalent cause of death for children under the age of five, right behind pneumonia. Preterm delivery is the major cause of infant death in nearly all superior and middle-income nations [16]. Preterm birth is thought to be a contributing cause in a minimum of 50% of all neonatal deaths, which elevates a baby's risk of dying from other causes as well, including neonatal [17,18] infections.

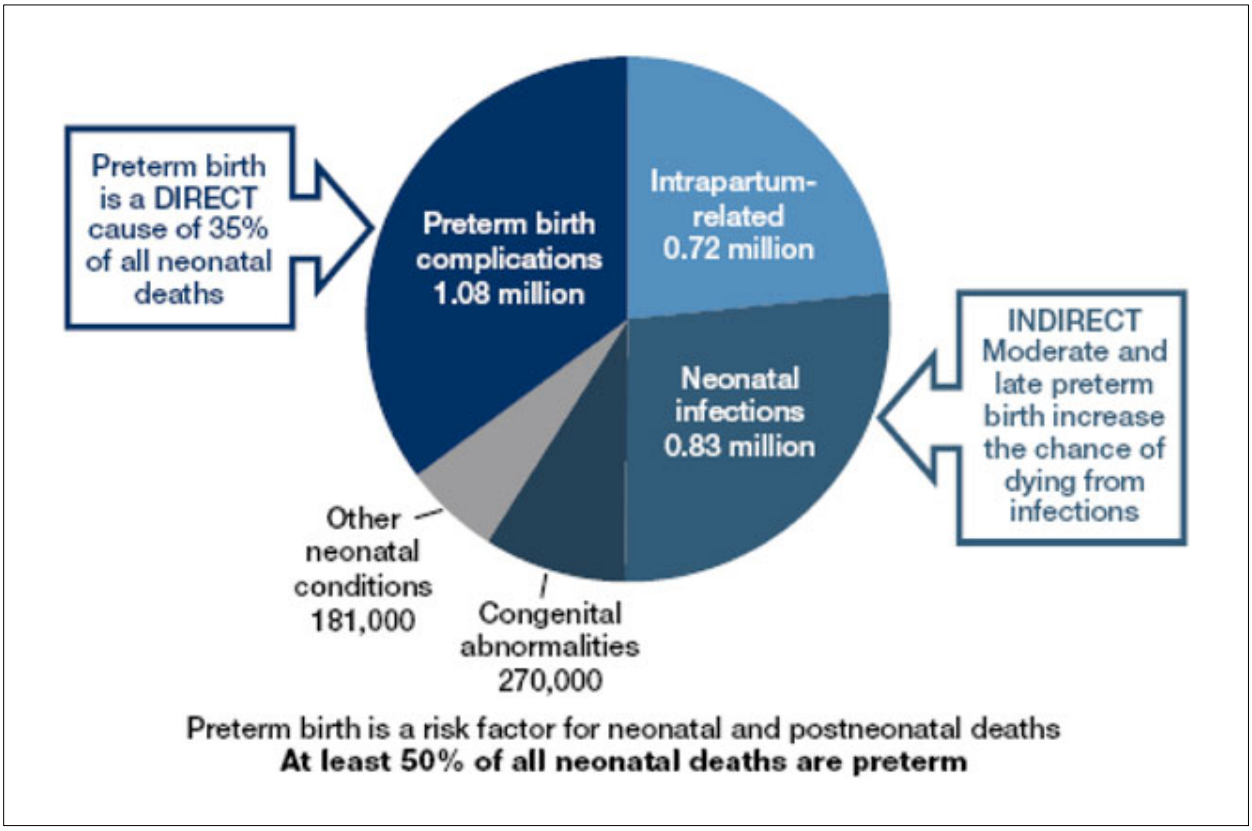

Figure 2: Estimated causes of the 3.1 million newborn deaths that occurred in 193 nations in 2010. Source-Data from 2010 released in Liu L, et al., has been modified from Lawn, et al.

Why do preterm births happen?

There are several different reasons of preterm birth, which can be divided into two main subtypes:

1. Unexpected preterm birth: Pre-labor premature membrane rupture (pPROM) or spontaneous commencement of labour.
2. Preterm delivery initiated by a healthcare provider is defined as an elective caesarean section or labour induction before 37 full weeks of pregnancy for maternal or foetal

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considerations (both "urgent" and "discretionary"), or for other non-medical causes [19].

Spontaneous preterm birth is the consequence of a number of factors interacting to make the uterus contract rapidly and start labour before 37 weeks of gestation. With regard to gestational age [20], as well as environmental and social variables, there are several precursors to spontaneous premature delivery, although in up to half of all instances [21], the reason of spontaneous preterm labour is still unknown.

The interplay of genetic, epigenetic, and environmental risk factors is most likely what causes maternal past experiences with preterm birth, which is a significant risk factor [22]. Young or advanced maternal age, short inter-pregnancy intervals, low maternal body mass index, and many other maternal variables have all been linked to an increased risk of spontaneous preterm birth [23,24]. The uterine overdistension associated with numerous pregnancies is another significant risk factor. Preterm delivery is almost ten times more likely to occur in multiple deliveries (twins, triplets, etc.) than in singleton deliveries [25].

Preterm birth is significantly influenced by infection. Preterm birth risk is enhanced by urinary tract infections, malaria, bacterial vaginosis, HIV, and syphilis [26]. Additionally, other diseases have been more recently demonstrated to be connected to infection, such as "cervical insufficiency" brought on by an escalating intrauterine inflammation and infection with subsequent preterm cervical shortening [27].

Stress, strenuous physical activity, and prolonged standing are some lifestyle elements that can cause spontaneous preterm birth [24]. Periodontal disease, excessive alcohol use, and smoking have all been linked to a higher risk of premature delivery [26].

Preterm birth rates and the underlying causes vary more widely. Due to lower caesarean delivery rates (less than 5% in most African nations) and lower coverage of prenatal monitoring, the highest burden countries globally have relatively low levels. However, a recent investigation in the United States found that over half of all preterm deliveries at 34 to 36 weeks pregnancy that were initiated by providers were performed without a compelling medical reason [28]. Due to mistakes in determining gestational age, unintended preterm birth can also happen when a baby who was considered to be term is delivered electively [29].

Among the more prominent direct causes of medically-indicated preterm birth, severe preeclampsia, placental abruption, uterine rupture, cholestasis, foetal distress, and foetal retardation with abnormal testing have been identified [30]. Preeclampsia and medically necessary preterm birth are both made more likely by underlying maternal illnesses, including as kidney disease, hypertension, obesity, and diabetes.

Thus, the global obesity and diabetes epidemic is likely to have a larger role in the rise in preterm birth rates. More than twice as many babies born to diabetes moms were preterm in one area of the United Kingdom (17% of all births) [20]. In pregnancies following assisted reproductive technologies,

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both maternal and foetal variables are more frequently observed, increasing the probability of both unplanned and provider-initiated preterm births [29,31]. In nations where caesarean delivery is prevalent, it is crucial to distinguish between the various preterm birth causes. Over 20% of preterm deliveries have been identified to be provider-initiated in Scotland and the Netherlands in 2000, compared to slightly under 40% in France and the United States. All of these nations have more aggressive caesarean section policies, which may be contributing to the rise in provider-initiated preterm birth rates [32,33]. According to reports, this rise in preterm birth rates in the US from 1990 to 2007 and a drop in perinatal mortality can be attributed, at least in part, to it [30].

There are no population-based studies from low or middle-income nations available. The reported percentage of premature deliveries that were provider-initiated among infants born in tertiary facilities in nations with low or middle incomes ranged from over 20% in Sudan and Thailand to almost 40% in 51 facilities in Latin America and an academic hospital in Ghana [34-37].

In these nations with limited access to diagnostic tools, provider initiated premature deliveries will make up a comparatively lower share of all preterm births. If failing to deliver electively, these pregnancies will proceed according to the normal course and may commonly result in spontaneous preterm delivery (live or stillbirth) [38].

Programmed attempting to reduce preterm birth must distinguish between unplanned and provider initiated preterm delivery. In the case of provider-initiated premature births, both the underlying conditions (such as preeclampsia) and obstetric policies and practices need to be assessed and treated [39,40]. For unplanned preterm births, the underlying causes must be identified and addressed.

Where and when are preterm birth rates?

Preterm birth variance by country, region, and the world in 2010

New WHO projections of preterm birth rates reveal that 14.9 million infants were delivered preterm in 2010 out of the 135 million alive deliveries globally, representing a preterm delivery rate of 11.1%.

More than 60% of preterm births take place in sub-Saharan Africa and South Asia, where 9.1 million babies (12.8%) are thought to be born prematurely each year. Africa and Asia have the highest absolute number of preterm births of any continent due to the high birth rates and fertility rates compared to other parts of the world [41].

The ten nations with the most preterm births [41] are:

- India has a population of 3 519 100.
- China has a population of 172 300.
- Nigeria has 7,73,600.
- Pakistan has 7,48,100.
- Indonesia has 6,75,700.
- The United States has 5,17,400.
- Bangladesh has 4,24,100.
- The Philippines has 3,48,900.
- Brazil has 2,79,300.

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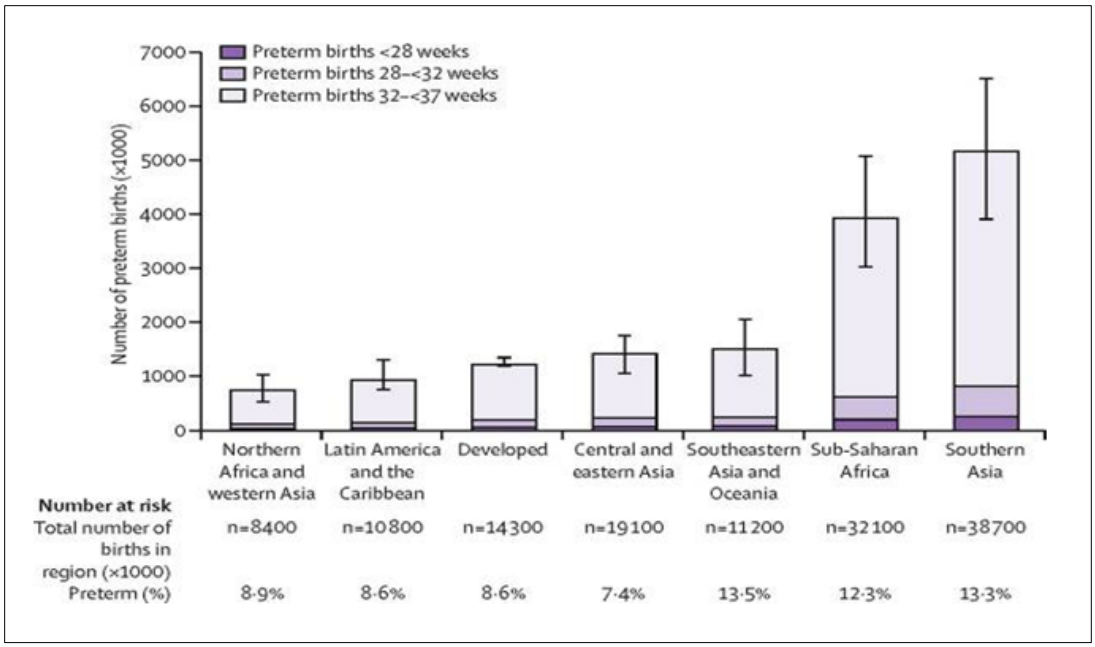

Figure 3: Over 60% of preterm births occur in Africa and South Asia, although preterm birth is an issue that impacts the entire world. Average preterm birth rates in lower-income countries are 12% in comparison to 9% in higher-income ones. Within nations, less fortunate households are more vulnerable [41].

Figure 4: Preterm births per year among high-income, middle-income, low-income, and low-income countries with facility care but limited space staff and equipment.

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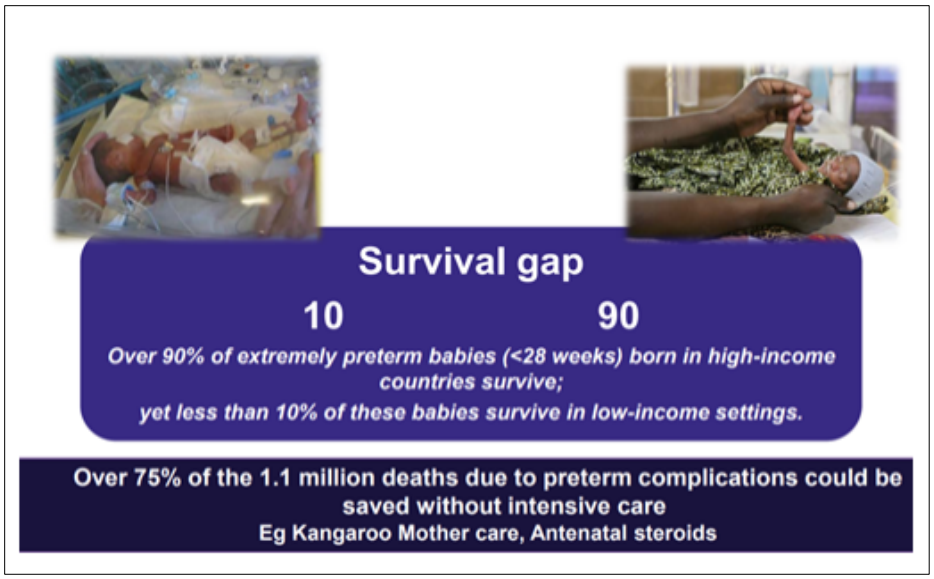

Figure 5: Survival gap. Over 1 million of the preterm births die.

Infants who are both preterm and smaller for the gestational stage are at significantly higher risk of dying [42]. Mortality rates rise as gestational age decreases. 16% of all premature births, or babies born before 32 weeks, are made up of this group [41]. Although advances in medical care have enhanced survival and long-term results for very and extremely premature babies in high-income nations, mortality and morbidity are still highest among these infants across all areas [43]. In high-income settings, 60% of infants delivered at <28 weeks of gestation survived in 1990, with almost two-thirds living without impairment [44]. Nearly 95% of infants delivered in these high-income nations between 28 and 32 weeks survive, and more than 90% do so without any disability. In comparison, just 30% of infants born between 28 and 32 weeks in a number of developing nations survive, with practically all infants born at or before 28 weeks dying within the initial few days of life. These very or extremely premature infants contribute to the majority of mortality in all settings, particularly in low-income nations when even basic treatment is absent [45].

Trends in preterm births from 1990 to 2010

A growing burden of preterm birth is indicated by the overall number and rates of premature delivery for 65 nations in Europe, the Americas, and Australasia from 1990 to 2010 [46].

- Preterm babies occurring between 32 and 37 weeks (late and moderate premature) have increased over the past few decades in some countries, which helps to explain some of this increase [47].
- The projected total amount of preterm births in these nations grew from 2.0 million in 1990 to approximately 2.2 million in 2010, despite a decline in the total amount of live births [41].

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Source	Causes
Fetal	Fetal distress
	Multiple gestation
	Erythroblastosis
	Nonimmune hydrops
Placental	Placental dysfunction
	Placenta previa
	Abruptio placenta
Uterine	Bicornuate uterus
	Incompetent cervix (premature dilation)
Maternal	Preeclamsia
	Chronic medical illness (cyanotic heart , renal diseases)
	infections
	Drug abuse
Other	Premature rupture of membranes
	Polyhydramnios
	Trauma
	Iatrogenic

Table 1: Identifiable causes of preterm birth [48].

Source	Neonatal problems
Respiratory	Respiratory Distress Syndrome
	Broncho Pulmonary Dysplasia
	Pnemothorax ,Pnemomediastinum
	Interstitiel Empysema
	Apnea
	Congenital Pnemonia
Cardiovascular	Patent ductus aeteriosus
	Hypotension
	Bradycardia (with apnea)
Hematologic	Anemia (early or late)
Gastrointestinal	Poor gastric function-poor motility
	Necrotizing enterocolitis
	Hyperbilirubinemia-direct and indirect

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	Spontaneous gastrointestinal isolated perforation
Metabolic-endocrine	Hypocalcemia
	Hypoglycemia
	Hyperglycemia
	Late metabolic acidosis
	Hypothermia
	Osteopenia
Central nervous system	Intraventricular Hemorrhage
	Seizures
	Periventricular leukomalacia
	Retinopathy of prematurity
	Deafness
	Hypotonia
Renal	Hyponatremia
	Hypernatremia
	Hyperkalemia
	Edema
	Renal tubular acidosis
Infections	Congenital, perinatal, nosocomial, bacterial, viral, fungal, protozoal.

Table 2: Neonatal problems associated with premature infants [48].

Prevention of preterm deliveries-WHO recommendations [49]

Ten main suggestions (and 17 supplementary sub-recommendations) including ANC, tocolysis, magnesium sulphate, antibiotic prophylaxis, Kangaroo mother care, ongoing positive airway pressure therapy, plastic wraps, and oxygen therapy (for the newborn) were adopted as a result of the WHO Technical Consultation. The strength of the supporting data was rated as "very low", "low", "moderate", or "high" for each recommendation. The GDG qualified the course and efficacy of each recommendation by taking into account the quality of the evidence as well as additional considerations, such as the proportion of benefits to harms, the principles and choices of stakeholders, and the impact of the intervention's resource requirements. The Table 3-5 provides a summary of the guidelines for maternal and newborn strategies to enhance the health outcomes for preterm infants.

These suggestions will be regularly reviewed and updated in compliance with WHO guidelines for developing guidelines, with significant reviews and revisions occurring a minimum of every five years.

Maternal interventions	Recommendations	Strength of recommendations and quality of the evidence
Antenatal corticosteroids to improve newborn outcomes	Antenatal corticosteroid therapy is recommended for women at risk of preterm birth from 24 weeks to 34 weeks of gestation when the following conditions are met : • Gestational age assessment can be accurately undertaken. • Preterm birth is considered eminent. • There is no clinical evidence of maternal infection. • Adequate childbirth care is available (including the capacity to recognize and safely manage preterm labour and birth). • The preterm newborn can receive adequate care if needed (including resuscitation, thermal care, feeding support, infection treatment and safe oxygen use).	Strong recommendation based on moderate-quality evidence of newborn outcomes and low-quality evidence of maternal outcomes.
	For eligible women, antenatal corticosteroid should be administered when preterm birth is considered eminent within 7 days of starting treatment, including within the first 24 hours.	Strong recommendation based on low-quality evidence.
	Antenatal corticosteroid therapy is recommended for women at risk of preterm birth irrespective of whether a single or multiple birth is anticipated.	Strong recommendation based on low-quality evidence.
	Antenatal corticosteroid therapy is recommended in women with preterm prelabour rupture of membranes and no clinical signs of infection.	Strong recommendation based on moderate-quality evidence of new born outcomes and low-quality evidence of maternal outcomes.
	Antenatal corticosteroid therapy is not recommended in women with chorioamnionitis who are likely to deliver preterm.	Conditional recommendation based on very-low quality evidence.
	Antenatal corticosteroid therapy is not recommended in women undergoing planned caesarean section at late preterm gestations (34-36+6 weeks).	Conditional recommendation based on very-low quality evidence.
	Antenatal corticosteroid therapy is recommended in women with hypertensive disorders in pregnancy who are at risk of imminent preterm birth.	Strong recommendation based on moderate-quality evidence of new born outcomes and low-quality evidence of maternal outcomes.

Table 3: Summary list of WHO recommendations on interventions to improve preterm birth outcomes-Antenatal corticosteroids to improve newborn outcomes.

Maternal interventions	Recommendations	Strength of recommendation and quality of the evidence
Antenatal corticosteroids to improve newborn outcomes	Antenatal corticosteroid therapy is recommended for women at risk of imminent preterm birth of a growth restricted fetus.	Strong recommendation based on very low-quality evidence
	Antenatal corticosteroid therapy is recommended for women with pre-gestational and gestational diabetes who are at risk of imminent preterm birth, and this should be accompanied by interventions to optimize maternal blood glucose control.	Strong recommendation based on very low-quality evidence
	Either intramuscular (IM) dexamethasone or IM betamethasone (total 24 mg in divided doses) is recommended as the antenatal corticosteroid of choice when preterm birth is imminent.	Strong recommendation based on low-quality evidence
	A single repeat course of antenatal corticosteroid is recommended if preterm birth does not occur within 7 days after the initial dose, and a subsequent clinical assessment demonstrates that there is a high risk of preterm birth in the next 7 days.	Conditional recommendation based on moderate-quality evidence for newborn outcomes and low-quality evidence for maternal outcomes
Tocolytics for inhibiting preterm labour	Tocolytic treatments (acute and maintenance treatments) are not recommended for women at risk of imminent preterm birth for the purpose of improving newborn outcomes.	Conditional recommendation based on very low-quality evidence
Magnesium sulfate for fetal protection against Neurological complications	The use of magnesium sulfate is recommended for women at risk of imminent preterm birth before 32 weeks of gestation for prevention of cerebral palsy in the infant and child.	Strong recommendation based on moderate-quality evidence

Table 4: Summary list of WHO recommendations on interventions to improve preterm birth outcomes-Antenatal corticosteroids to improve newborn outcomes, tocolytics for inhibiting preterm labour, and magnesium sulfate for fetal protection against neurological complications.

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Maternal interventions	Recommendations	Strength of recommendation and quality of the evidence
Antibiotics for preterm labour	Routine antibiotic administration is not recommended for women in preterm labour with intact amniotic membranes and no clinical signs of infection.	Strong recommendation based on moderate-quality evidence.
	Antibiotic administration is recommended for women with preterm prelabour rupture of membranes.	Strong recommendation based on moderate-quality evidence.
	Erythromycin is recommended as the antibiotic of choice for prophylaxis in women with preterm prelabour rupture of membranes.	Conditional recommendation based on moderate-quality evidence.
	The use of a combination of amoxicillin and clavulanic acid ("co-amoxiclav") is not recommended for women with preterm prelabour rupture of membranes.	Strong recommendation based on moderate-quality evidence.
Optimal mode of delivery	Routine delivery by caesarean section for the purpose of improving preterm newborn outcomes is not recommended, regardless of cephalic or breech presentation.	Conditional recommendation based on very low-quality evidence.
Thermal care for preterm newborns	Kangaroo mother care is recommended for the routine care of newborns weighing 2000 g or less at birth and should be initiated in health-care facilities as soon as the newborns are clinically stable.	Strong recommendation based on moderate-quality evidence.
	Newborns weighing 2000 g or less at birth should be provided as close to continuous Kangaroo mother care as possible.	Strong recommendation based on moderate-quality evidence.
	Intermittent Kangaroo mother care, rather than conventional care, is recommended for newborns weighing 2000g or less at birth, if continuous Kangaroo mother care is not possible.	Strong recommendation based on moderate-quality evidence.
Thermal care for preterm newborns	Unstable newborns weighing 2000 g or less at birth, or stable newborns weighing less than 2000 g who cannot be given Kangaroo mother care, should be cared for in a thermoneutral environment either under radiant warmers or in incubators.	Strong recommendation based on very low-quality evidence.

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	There is insufficient evidence on the effectiveness of plastic bags/wraps in providing thermal care for preterm newborns immediately after birth. However, during stabilization and transfer of preterm newborns to specialized neonatal care wards, wrapping in plastic bags/wraps may be considered as an alternative to prevent hypothermia.	Conditional recommendation based on low-quality evidence.
Continuous positive airway pressure for newborns with respiratory distress syndrome	Continuous positive airway pressure therapy is recommended for the treatment of preterm newborns with respiratory distress syndrome.	Strong recommendation based on low-quality evidence
	Continuous positive airway pressure therapy for newborns with respiratory distress syndrome should be started as soon as the diagnosis is made.	Strong recommendation based on very low-quality evidence.

Table 5: Summary list of WHO recommendations on interventions to improve preterm birth outcomes-Antibiotics for preterm labour, optimal mode of delivery, thermal care for preterm newborns, and continuous positive airway pressure for newborns with respiratory distress syndrome.

Syndrome of respiratory distress

The incidence of RDS is inversely associated with pregnancy duration and birth weight, and it mostly affects premature infants. It occurs in 60-80% of infants under 28 weeks of gestation, 15-30% in those among 32 and 36 weeks, and hardly ever in those after 37 weeks (nelson). It used to be known as hyaline membrane disease (HMD), and it's a condition that affects premature newborns and is brought on by a lack of pulmonary surfactant in the alveoli [48].

Risk Increases with	**Risk Decreases with**
Maternal diabetes Multiple births Cesarean delivery Precipitous delivery Asphyxia Cold stress Maternal history of previously affected infants	Pregnancies with chronic or pregnancy-associated hypertension Maternal heroin use Prolonged rupture of membranes Antenatal corticosteroid prophylaxis

Table 6: Risk Factors [48].

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Etiology [48]

1. Prematurity-decreased production and storage of surfactant.
2. Genetic disorder-defects in Surfactant Protein B, C and Surfactant Transporter gene (ABC transporter 3 [ABCA3].
3. Asphyxia, hypoxia, and pulmonary ischemia-particularly when combined with hypovolemia, hypotension, and cold stress-may reduce the generation of surfactant since it depends in part on regular pH, temperature, and perfusion.
4. Examples of family causes of infant respiratory distress (not RDS) include pulmonary lymphangiectasia, alveolar capillary dysplasia, mucopolysaccharidosis, acinar dysplasia, and mucopolysaccharidosis.

Surfactant: Function and pathogenesis of RDS [48]

By 20 weeks of gestation, surfactant exists in high levels in foetal lung homogenates, but it takes longer for it to get to the surface of the lungs. In the amniotic fluid between 28 and 32 weeks of pregnancy, it manifests. After 35 weeks of gestation, lung surfactant levels are typically mature.

Dipalmitoyl phosphatidylcholine (lecithin), phosphatidylglycerol, apoproteins (surfactant proteins SP-A, SP-B, SP-C, and SP-D), and cholesterol are the main components of surfactant.

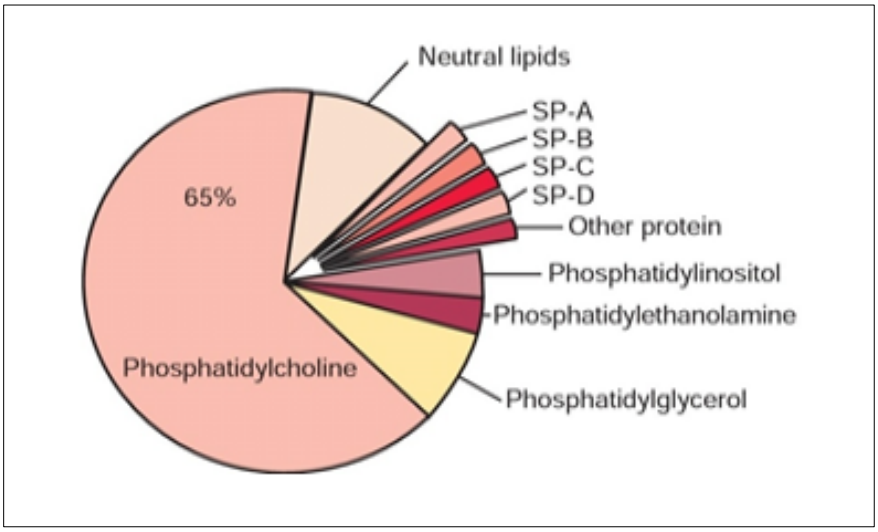

Figure 6: Components of surfactant.

RDS is mostly brought on by a surfactant deficit (reduced synthesis and secretion). High surface tension and the lack of pulmonary surfactant are related to the inability to reach a sufficient FRC and the propensity of the impacted lungs to become atelectatic. The production and storage of phospholipids increases with gestational age in type II alveolar cells. These surface-active substances discharged into the alveoli, where they aid to maintain alveolar stability by lowering surface tension and preventing tiny

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air gaps from collapsing during end-expiration.

The amounts made or released may not be adequate for fulfilling postnatal demands due to immaturity. Small respiratory units, a flexible chest wall, and insufficient surfactant synthesis or release all contribute to atelectasis, which causes perfused but unventilated alveoli. Hypoxia, reduced lung compliance, small tidal volumes, an increase in physiologic dead space, and inadequate alveolar ventilation are all brought on by this, and the end result is hypercapnia. Acidosis, hypoxia, and hypercapnia together cause pulmonary artery vasoconstriction and enhanced right-to-left shunting across the ductus arteriosus and foramen ovale as well as within the lung itself.

The ejection of protein-rich material into the alveolar spaces is caused by the progressive harm to epithelial and endothelial cells caused by atelectasis (atelectrauma), volutrauma, ischemia injury, and oxygen toxicity.

In RDS, the lungs are less flexible due to alveolar atelectasis, hyaline membrane development, and interstitial edema, therefore more pressure is needed to expand the alveoli and tiny airways. The highly flexible chest wall of a preterm newborn provides less resistance than that of a mature infant to the lungs' innate propensity to collapse. As a result, at end-expiration, atelectasis may occur as the volume of the thorax and lungs gradually approach the residual volume.

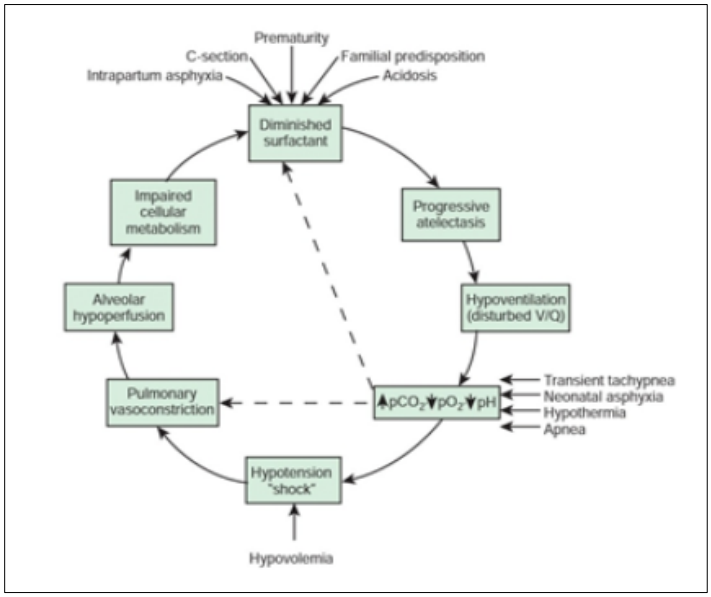

Figure 7: Surfactant-Pathogenesis of RDS.

Management [50]

The European Consensus Guidelines for the Management of Respiratory Distress Syndrome have been updated for 2016. RDS management seeks to provide medicines in order to increase survival while reducing potential adverse consequences, for instance the risk of BPD. These recommendations

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revise the first three recommendations following a rigorous evaluation of the most recent data accessible in early 2016. Researchers have used a similar approach, summarizing the pertinent problems that need to be taken into account and then offering evidence-based recommendations backed by a GRADE number to represent the authors' opinions on the quality of the evidence supporting each suggestion [51]. Here is a summary of the strength of the recommendations and the calibre of the evidence.

Quality of evidence	
High quality	A
Moderate quality	B
Low quality	C
Very low quality	D
Strength of recommendation	
Strong recommendation for using intervention	1
Weak recommendation for using intervention	2

Table 7: Representations of quality of evidence and strength of recommendations [51].

Recommendations for prenatal care

1. Women at high risk of preterm birth (28-30 weeks' gestation) should be admitted to perinatal clinics with experience in the care of RDS (C1).
2. From the time a pregnancy is declared probably viable until 34 weeks of gestation, clinicians should administer a single course of prenatal corticosteroids to all women at risk of preterm delivery (A1).
3. If the first course of prenatal steroids was given more than 1-2 weeks ago and the gestational age is between 32 and 34 weeks when another obstetric indication occurs, one repeat course of antenatal steroids may be indicated (A2).
4. Up to 39 weeks, CS who are not in labour may also be evaluated for antenatal steroids (B2).
   To perform an early CS, there must be a compelling medical justification; elective CS should not be done before 39 weeks of pregnancy.
5. If there is no indication of chorio-amnionitis (C2), a course of prenatal steroids may also be taken into consideration in late preterm pregnancy when there is a chance of an early birth.
6. To avoid needless hospitalisation and the use of tocolytic medications

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and/or prenatal steroids, cervical length and fibronectin measures should be taken into consideration in women who have premature labour symptoms (B2).

7. In order to complete a course of prenatal corticosteroids and/or transfer the baby in utero to a perinatal centre, clinicians might think about using tocolytic medications temporarily in very preterm pregnancies (B1).

Recommendations for stabilizing the delivery room

1. To encourage placentofetal transfusion, if at all possible, postpone clamping the umbilical cord for a minimum of 60 seconds (B1).
   If delayed clamping of the cord is not an option, cord milking is a viable substitute (B2).
2. A blender should be used to regulate oxygen during resuscitation. For infants born before 28 weeks of gestation, an initial oxygen concentration of 30% is suitable, and for those born between 28 and 31 weeks, one of 21-30%.
   From birth on, changes either upward or downward should be directed by pulse oximetry (B2).
3. Stabilise infants who are self-breathing with CPAP of at least 6cm H_2O administered through a mask or nasal prongs (A1).
   For newborns who are consistently apnoeic or bradycardic, gentle positive pressure lung inflations utilising roughly 20-25cm H_2O peak inspiratory pressure should be employed (B1).
4. Infants who have not reacted to positive pressure breathing using a face mask should not be intubated (A1). Surfactant (B1) should be administered to infants whose stabilisation requires intubation.
5. For newborns under 28 weeks of gestation, radiant warmers should be placed beneath plastic bags or occlusive wrapping to lower the risk of hypothermia (A1).

Therapy with surfactants recommendations

1. Natural surfactant preparations should be administered to infants with RDS (A1).
2. Early rescue surfactant administration should be a routine practise (A1), however there are times when it should be done in the delivery room, such as when a patient needs to be intubated for stabilisation (B1).
3. Early on in the course of the illness, rescue surfactant should be administered to infants with RDS. A recommended procedure would be to treat newborns with FiO_2 requirements >0.30 and newborns with FiO_2 requirements >0.40 when the gestation is 26 weeks (B2).
4. For rescue therapy, poractant alfa at a starting dose of 200mg/kg is superior than poractant alfa or beractant at a dose of 100mg/kg (A1).
5. Infants who are not responding to CPAP should be investigated for 5 INSURE (A2).

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6. For newborns who spontaneously breathe, LISA or MIST might be used instead of INSURE (B2).
7. If there are indications of continuing RDS, such as an ongoing need for MV and/or oxygen, more doses of surfactant may need to be given (A1).

Oxygen supplementation beyond recommendations for stabilization

1. The goal for preterm infants getting oxygen must be between 90 and 94% saturation (B2).
2. To do this, alarm limits of 89 and 95% are recommended (D2).

Support for non-invasive respiratory

Strategies for mechanical ventilation

Recommendations:

1. When alternative techniques for respiratory support were unsuccessful in infants with RDS, MV should be employed after stabilisation (A1).
   Reduce MV duration as much as possible (B2).
2. Focused tidal volume ventilation must be used because it lowers BPD and intraventricular haemorrhage, shortens ventilation time, and prolongs life (A1).
3. Avoid hypocarbia (A1) and severe hypercarbia (C2) because they both raise the risk of brain damage. As long as the pH is above 7.22 while weaning from MV, a mild degree of hypercarbia is acceptable (B2).
4. Caffeine must be administered to help patients to wean off of MV (A1). All infants who are treated on non-invasive respiratory support (C1) who are at high risk of requiring MV, such as those with birth weights under 1,250g, should be given early caffeine consideration.
5. Babies who are still on MV after 1-2 weeks should be given the option of a brief tapering course of low-dose dexamethasone to help with extubation (A2).
6. Until more safety information is available, it is not possible to prescribe inhaled steroids as a regular treatment for BPD.

Recommendation for surveillance and supportive care

Always keep your core temperature within 36.5 and 37.5 $^{\circ}$C (C1).

Recommendations for initial fluids and nutritional support

1. Most newborns should begin receiving 70-80ml/kg/day of intravenous fluids while being housed in a humid incubator, while some very immature infants might require more (B2).
   Fluid intake must be individualised based on weight loss and serum salt levels (D1).
2. Sodium intake should be limited during the first few days of life while paying close observation to fluid balance and electrolyte levels, and then resumed after the onset of diuresis (B1).
3. Starting parenteral feeding from birth is recommended. From day 1, protein

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intake can be begun at 2-2.5g/kg/day (B2).

Additionally, lipids ought to be introduced on day 1 and swiftly increased to 3.0g/kg/day when tolerated (C2).

4. If the infant is hemodynamically stable, enteral feeding with maternal milk should begin the first day (B1).

Antibiotics recommendation

When a baby has RDS, antibiotics are frequently started till sepsis has been proven out, but regulations must be in place to reduce unnecessary exposure and narrow the antibiotic spectrum.

Penicillin or ampicillin combined with an aminoglycoside (D2) is a typical treatment.

Once sepsis has been ruled out, antibiotics should be withdrawn as soon as possible (C1).

Recommendations for regulating blood pressure and perfusion

1. Rather than relying just on numerical results, treatment of hypotension is advised when it is supported by signs of poor tissue perfusion, such as oliguria, acidosis, and impaired capillary return (C2).
2. Concentrations of 2Hb should be kept within acceptable ranges.

   For infants receiving respiratory support, a recommended Hb threshold is 11.5g/dl (haematocrit 35%) in week 1, 10g/dl (haematocrit 30%) in week 2, and 8.5g/dl (haematocrit 25%) beyond 2 weeks of age (C2).
3. Ibuprofen should be utilised because there is less temporary renal failure or NEC when compared to indomethacin if a decision is made to seek therapeutic closure of the PDA (A2).

Recommendations for pain and sedation

1. It is not suggested to routinely administer morphine infusions to ventilated preterm newborns (C2).
2. Opioids should only be administered when clinical judgement and an assessment of pain indications warrant it (D1).

Miscellaneous recommendations

1. For RDS convoluted by congenital pneumonia (C1), surfactant can be utilised.
2. After a pulmonary haemorrhage, oxygenation can be enhanced using surfactant therapy (C1).
3. Only premature infants participating in clinical studies or those with extreme hypoxemia caused by verified pulmonary hypertension should be treated with iNO (D2).

Premature births and premature babies: The use of prenatal steroids

The following recommendations are made by the American College of Obstetricians and Gynaecologists [8]:

1. Pregnant women between 24 and 33 weeks of gestation who are at risk for an early birth within seven days, including those with ruptured membranes and several

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gesticulations, are advised to take a single course of corticosteroids.
It may also be taken into account for expecting mothers starting at 23 0/7 weeks of gestation who are in danger of premature delivery within 7 days, regardless of the status of membrane rupture and regardless of the number of fetuses.

2. A family's choice regarding resuscitation is linked to the injection of corticosteroids for pregnant women throughout the peri-viable phase who are at risk of premature birth within 7 days and should be taken within that context.
3. For pregnant women within 34 and 36 weeks of gestation who are at risk for a preterm birth within seven days and who have not previously taken prenatal corticosteroids, a single session of betamethasone is advised.
4. Repeat classes on a regular basis or multiple-course sequences (more than two) aren't currently advised.
5. Women who are under 34 weeks of gestational age, who are at risk of giving birth prematurely within 7 days, and whose past course of prenatal corticosteroids was injested more than 14 days ago, should be given the option of taking a single repeat course of these medications.
6. If the clinical situation warranted it, rescue course corticosteroids might be administered as soon as 7 days after the last dose.
7. There is debate over whether to offer a subsequent or rescue treatment with corticosteroids with premature (or prelabor) rupture of membranes (pPROM), and there is not enough data to support either doing so or not.
8. It is important to enable ongoing monitoring of long-term effects following in utero corticosteroid exposure.
9. Strategies for enhancing the appropriate and timely administration of the ANCS are successful and should be promoted.

Selection of steroid

A single treatment with corticosteroids is advised for expectant mothers who are between 24 and 33 weeks along with those who are starting at 23 weeks and are at risk of premature delivery within seven days [52-54]. Regardless of the condition of the membranes, just one treatment of ANCS should be regarded standard practice for all preterm deliveries, according to a Cochrane meta-analysis [53,55].

The most extensively researched corticosteroids are betamethasone and dexamethasone, which are typically recommended for prenatal therapy to hasten foetal organ development. Both have almost equal biologic activities and may traverse the placenta while in the active state.

Both have minimal immunosuppressive effects with brief use and no mineralocorticoid activity. Although there is only a single methyl group difference between betamethasone and dexamethasone, betamethasone has an extended half-life due to its lower clearance and wider volume of distribution [56].

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The 2000 Consensus Panel [57] of the Eunice Kennedy Shriver National Institute of Child and Human Development (NICHD) examined all reports that were available regarding the security and effectiveness of betamethasone and dexamethasone. The conclusion that betamethasone must be used in preference to dexamethasone was not supported by a considerable body of scientific evidence. There were no distinctions in perinatal mortality or changes in biophysical activity among the 10 studies that made up a Cochrane review on the subject, however dexamethasone therapy did reduce the frequency of intraventricular hemorrhage [57]. Less frequently, unfavorable neurological outcomes were noted 18 to 22 months following betamethasone exposure, according to observational research [58]. These contradictory and scant data are not deemed adequate to suggest one corticosteroid treatment over another.

The recommended course of treatment is for either two 12mg doses of betamethasone administered intramuscularly 24 hours apart, or four 6mg doses of dexamethasone administered intramuscularly every 12 hours [53].

Based on the clinical scenario, the initial dose of antenatal corticosteroids must be given even if it is unlikely that a second dose can be given as therapy with corticosteroids for a period of no more than 24 hours continues to be correlated with a substantial decrease in neonatal morbidity and mortality. However, no extra benefit has been observed for courses of prenatal corticosteroids with administration durations shorter than those indicated earlier, frequently referred to as "accelerated dosing," even when birth appears imminent [53].

The ANCS's mode of action

The lungs and certain other tissues mature as a result of corticosteroid activation of developmentally controlled expression of genes and physiologic activities [59]. The formation of type 1 and type 2 pneumocytes is accelerated by ANCS, which results in morphological and biochemical alterations that enhance gas exchange and lung mechanics (maximal lung capacity, compliance) [60-65]. The generation of surfactant proteins and enzymes required for phospholipid synthesis is increased by the induction of type 2 pneumocytes, which also increases the production of surfactant.

Other effects of ANCS include activation of pulmonary beta-receptors, which play a crucial role in surfactant discharge and the uptake of alveolar fluid when activated [61] and induction of foetal lung antioxidant enzymes. The epithelial Na+ channel gene expression is up-regulated, which is important for absorption of lung fluid after birth [66].

Effectiveness of ANCS

Because ANCS are linked to significantly lower incidence of RDS, newborn death, and IVH, clinicians should provide ANCS therapy to women at risk of preterm delivery. Antenatal exposure to corticosteroids improves the effectiveness of newborn surfactant therapy [67,68]. Regardless of ethnicity or gender, there is proof of benefit in all significant subgroups of preterm infants. Crowley's initial meta-analysis shown

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a definite advantage for using ANCS after pPROM in lowering RDS [69].

Because corticosteroid medication reduces the cost and length of neonatal intensive care, healthcare organisations and services should have policies and practises in place for ANCS treatment. However, the possible increase in very-low-birthweight infant survival as well as the usage of surfactant will have an impact on the ANCS' total economic impact.

One particular treatment for ANCS does not seem to be connected with any substantial deleterious effects on the mother or the foetus. Up to 20 years of long-term follow-up on ANCS therapy survivors from randomised trials has revealed no negative neurological or cognitive effects. Whether or not the membranes are ruptured at the time of treatment, corticosteroid administration does not seem to raise the risk of either foetal or maternal infection [61,70-73].

Studies conducted in the past

The incidence of RDS, newborn death, and IVH is decreased with ANCS therapy, according to a Cochrane meta-analysis of 18 randomised studies [74].

According to Sotiriadis, et al's., Cochrane database systematic studies, prophylactic betamethasone reduces admission to special care or neonatal critical care unit for respiratory distress after elective caesarean section [7].

Taeusch HW, et al., performed a potential double-blind randomised clinical trial in 127 infants born to 122 women who were administered either steroid (dexamethasone phosphate) or placebo in order to determine whether glucocorticoid treatment reduces the incidence of RDS in preterm born children. Steroids are helpful at lowering the risk of RDS, according to the study's findings [11].

According to ACOG, giving ANCS to a pregnant woman who is in danger of having a preterm baby soon is highly linked to lower neonatal morbidity and mortality. In comparison to neonates whose moms did not undergo ANCS, those whose mothers did experience RDS, IVH, NEC, and death have considerably reduced severity, frequency, or both [8].

The research in this area was assessed in a study carried out by the National Institutes of Health (NIH) first consensus meeting in 1994.

Researchers clearly showed that using ANCS lowers the frequency of RDS in children born between 29 and 34 weeks of pregnancy but merely lowers the severity of RDS in newborns between 24 and 28 weeks. Additionally, there was proof of a decline in the prevalence of IVH in babies born between 24- and 28-weeks' gestation without any negative effects on the mother or fetus.

All pregnant women within 24 and 34 weeks of pregnancy who are at susceptible to premature birth within 7 days should get one dose of corticosteroids, according to the study's final guideline [75].

A single course of ANCS therapy given to women susceptible for preterm delivery decreased the frequency and extent of RDS and perinatal mortality in children, according to a randomised control trial on premature infants done by Liggins G and Howie R [2].

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Shanks, et al., conducted a randomised controlled trial at Barnes-Jewish Hospital in St Louis, Missouri, to ascertain the fetal lung maturity in pregnancies between 34 and 36 weeks. ANCS or no treatment was randomly assigned to women with negative fetal lung maturity. In pregnancies with confirmed fetal lung immaturity, the researchers came to the conclusion that one dose of ANCS administered after 34 weeks dramatically promotes fetal lung maturity and lowers neonatal morbidity [5].

(Cochrane Pregnancy and Childbirth's Trials Register -17 February 2016) Roberts D, Brown J, Medley N, and Dalziel S conducted 30 trials in which corticosteroids were given to women at risk of preterm birth (a total of 7774 women and 8158 children). Researchers demonstrated that one dose of corticosteroids, administered to the mother during premature labour and before to the baby's birth, aids in the baby's lung development and lessens difficulties like breathing issues [10].

The McKinlay, CJCA Crowther, P Middleton, and J.E. Harding study on repeat ANCS for pregnant women at risk of preterm birth (4730 women and 5700 newborns) found significant benefits for infants from ANCS administration, but the use of repeat dose(s) is debatable. In light of the advantages for the newborn, repeated doses of glucocorticoids should be taken into consideration in females at threat of premature delivery 7 or more days after an initial treatment [9].

Ballard, et al's., non-randomized study comparing premature neonates who received multiple courses of ANCS to those who received only one course in 710 neonates between 25 and 32 weeks of gestation found that multiple courses did not improve outcomes and were linked to higher mortality, slower foetal growth, and prolonged adrenal suppression [3].

Farhid A Kasab [6] conducted a prospective study on 200 pregnant women in the 34^{th} to 37^{th} weeks of pregnancy who were at a high risk of premature labour between October 2012 and August 2013 at Al-Azhar university hospitals. The effect of incomplete course versus no doses of dexamethasone, after 34 weeks gestational age, given prophylactically to women at threat of preterm labour was studied. It was determined that the usage of steroids, even after 34 weeks of pregnancy, had a considerable positive impact on the health of the foetus. ANCS reduced RDS in babies born by caesarean section at term. Researchers also found that though incomplete, the course of ANCS improved the APGAR scores at one min and five min [6].

According to Ewa Romejko-Wolniewicz, et al., a partial steroid treatment course decreased infant mortality and IVH (grades III and IV) among babies born between 24- and 35 weeks' gestation, but had no appreciable impact on RDS [76].

The effects of an unfinished course of ANC on newborn morbidity and mortality of premature babies was evaluated by Costa S, et al., [77].

Researchers discovered some advantages in infants between 25 and 27 weeks of gestation, no difference in results between 32 and 34 weeks, and varying outcomes between these two extremes.

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In a multicenter retrospective cohort study, Wong, et al., examined 2549 infants under <29 weeks of gestation who were admitted to NICUs to determine the variations in longevity, short and long-term morbidity for neonates acquiring no ANCS or an unfinished course of steroids, in comparison to those receiving a complete course.

The study's network of 10 neonatal intensive care units (NICUs) in Australia operated over a defined geographic area.

Researchers came to the conclusion that while ANCS still increases the chance of survival for newborns born at 29 weeks of gestation and decreases the risk of NEC and severe IVH morbidities in the short term, it has no impact on long-term neurodevelopment [78].

A retrospective study was done by S Sen, A Reghu, and S D Ferguson to compare the effectiveness of one dose of ANCS given 4-24 hours before delivery on a total of 226 infants.

In surfactant-treated preterm newborns, researchers discovered that even one dosage of ANCS given 4-24 hours before birth was clinically equivalent to the National Institutes of Health's suggested schedule [79].

Elimian, et al., evaluated the impact of ANC given insufficiently on perinatal mortality and morbidity. Researchers examined 125 neonates exposed to 12mg of betamethasone and 104 neonates who weren't given any steroids.

The infants were born between 23 and 34-weeks' gestation. Researchers came to the conclusion that even a partial course of ANCS is linked to a decrease in neonatal mortality, the requirement for vasopressin, and the rate of IVH in premature babies [80].

Materials and methods

Study area

The present study was undertaken in the Department of Paediatrics, St Philomenas Hospital, Viveknagar, Bangalore.

An Institutional ethical clearance will be obtained as per the norms, written informed consent will be obtained from all the patients. The inclusion and exclusion criteria will be employed to collect the relevant data.

Period of study

The study was conducted between Oct 2016 to April 2018 (one and half years) in neonatal intensive care and post-natal wards in Department of paediatrics in St Philomena`s hospital Bangalore.

Inclusion criteria

Preterm babies of gestational age 36^{+6} weeks or less, delivered in St Philomena's Hospital or out-born preterm babies, of gestational age 36^{+6} weeks or less, admitted to the NICU.

Exclusion criteria

Babies with major congenital anomalies, preterm babies with unknown ANCS status, multiple gestation, babies with death within 48 hours secondary to intrapartum causes such as cord prolapse, difficult labour, ante partum hemorrhage.

Ethical Clearance

The ethical clearance was obtained from Ethics committee, St Philomena`s hospital, at beginning of study.

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Informed consent

The parents of babies fulfilling the selection criteria were selected and explained about the study and written informed consent was obtained.

Methodology

This study includes all babies as mentioned above admitted to St Philomena's Hospital, Bangalore.

The inference of the study will be based on various maternal factors like age of the mother, parity, presence or absence of antenatal risk factors, number of doses of ACNS given, duration between steroids and birth of the baby as well as fetal factors like gestational age, birth weight, requirement of resuscitation at the time of birth, requirement of surfactant, presence or absence of complications and other factors as mentioned in detail in the study proforma.

Study design

A prospective observational study design will be used to evaluate the hypothetical results.

A total 144 cases will be considered for the study group.

The sample size was calculated in accordance with optimal design techniques cited from the academic text book 'Recent Statistical techniques in clinical research" authored by Basavarajaiah.

$$n = \frac{Z_\alpha * 0.15}{\text{arc sin}\sqrt{0.80} - \text{arc sin}\sqrt{0.30}}$$

Where Z_α=1.96Z_α and 15% has inclusion with RDS design effect, 30% is the critical region for rejection of null hypothesis and 80% is power of the test.

The demographic profile, patient history and relevant data will be collected from case sheets (maternal and neonatal) and direct questioning of the mother.

Collected data will be analyzed by using R statistical software. Receiver operating characteristic analysis (ROC), Kaplanmeir model and ANOVA will be used to test the hypothetical results.

Data analysis and interpretation

Data were entered into Microsoft Excel (Windows 7; Version 2007) and then analyses were performed using the Statistical Programme for Social Sciences (SPSS) for Windows software (version 22.0; SPSS Inc, Chicago).

Frequencies and percentages were determined for categorical data, while mean and standard deviation (SD) were derived for continuous variables. When appropriate, Fishers and Chi-square tests are utilised to evaluate the relationship between the variables. The data that had been assessed was displayed graphically using pie charts and bar charts. The 0.05 level of significance was chosen as the cutoff.

Results and observations

In the study of total n=216 antenatal mothers.

This graph shows the distribution of subjects on the basis of age of mothers.

- 5.1% are aged <20 years
- 83.3% are aged 21-30 years
- 11.6% are aged 31-40 years

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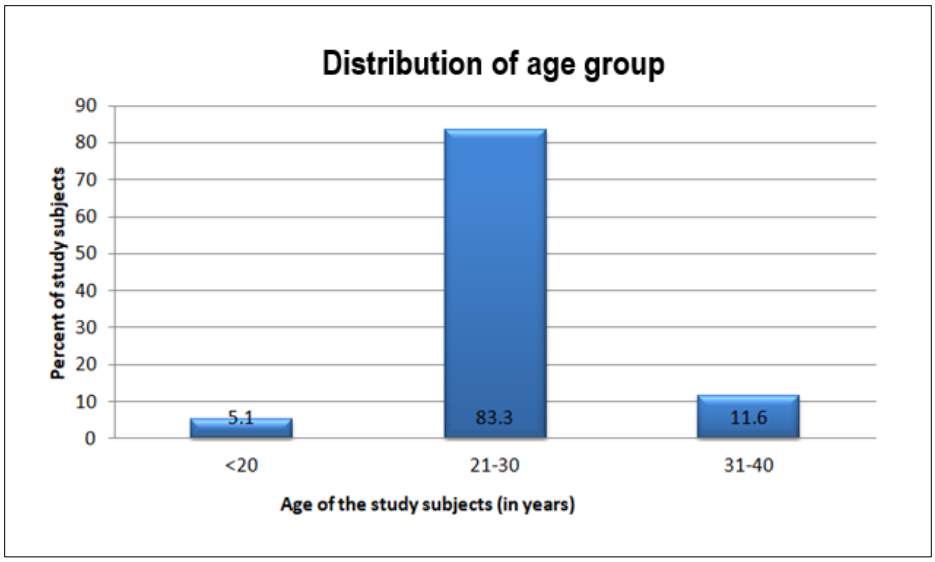

Figure 8: Age distribution of samples.

Age (In years)	Number	Percent
<20	11	5.1
21-30	180	83.3
31-40	25	11.6

Table 8: Distribution of study subjects according to the age group (N=216).

Parity	Number	Percent
Primi	121	56
Multi	95	44

Table 9: Distribution of study subjects according to the parity (N=216).

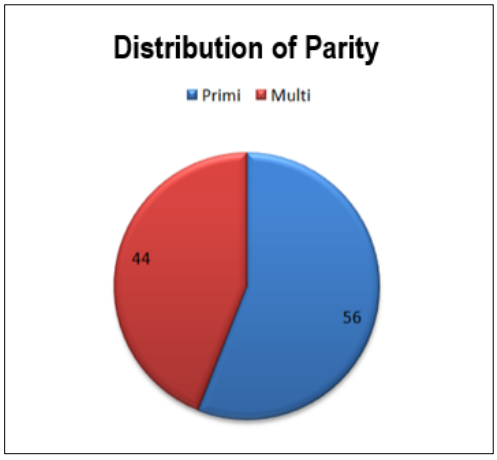

Figure 9: Distribution of study subjects according to the parity.

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In the study of total n=216 antenatal mothers. The Figure 8 illustrates the graph showing the distribution of subjects on the basis of parity.

1. 56% are primi.
2. 44% are multi.

The Figure 9 illustrates the graph showing the distribution of subjects on the basis of gestational age of mothers which showed:

1. 6% are between 28-31+6 gestational age.
2. 22.2% are between 32-34+6 gestational age.
3. 71.8% are between 35-36+6 gestational age.

Gestational age (In weeks)	Number	Percent
28 to 31 ± 6	13	6
32 to 34 ± 6	48	22.2
35 to 36 ± 6	155	71.8

Table 10: Distribution of study subjects according to the gestational age (N=216).

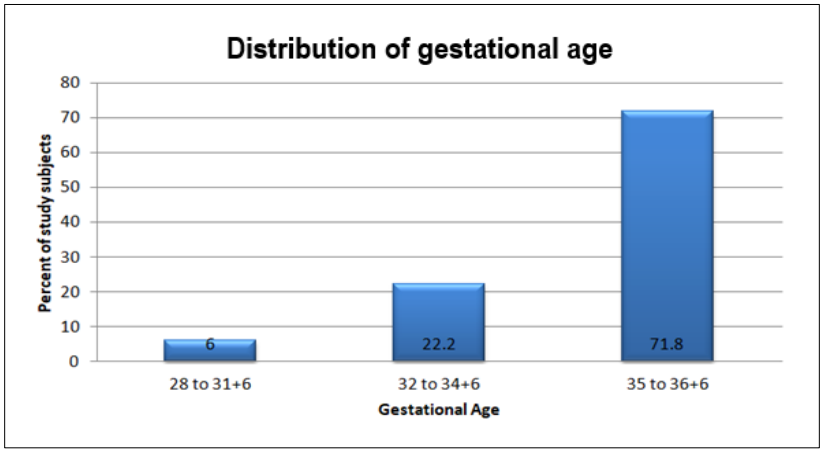

Figure 10: Distribution of study subjects according to the gestational age.

Complications	Number	Percent
Nil	7	3.2
PIH	49	22.7
GDM	33	15.3
PROM	61	28.2
Maternal Infection	7	3.2
Multiple complications	21	9.7
Others	17	7.9
Preterm labour+pPROM	21	9.7

Table 11: Distribution of study subjects according to the complications (n=216).

Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

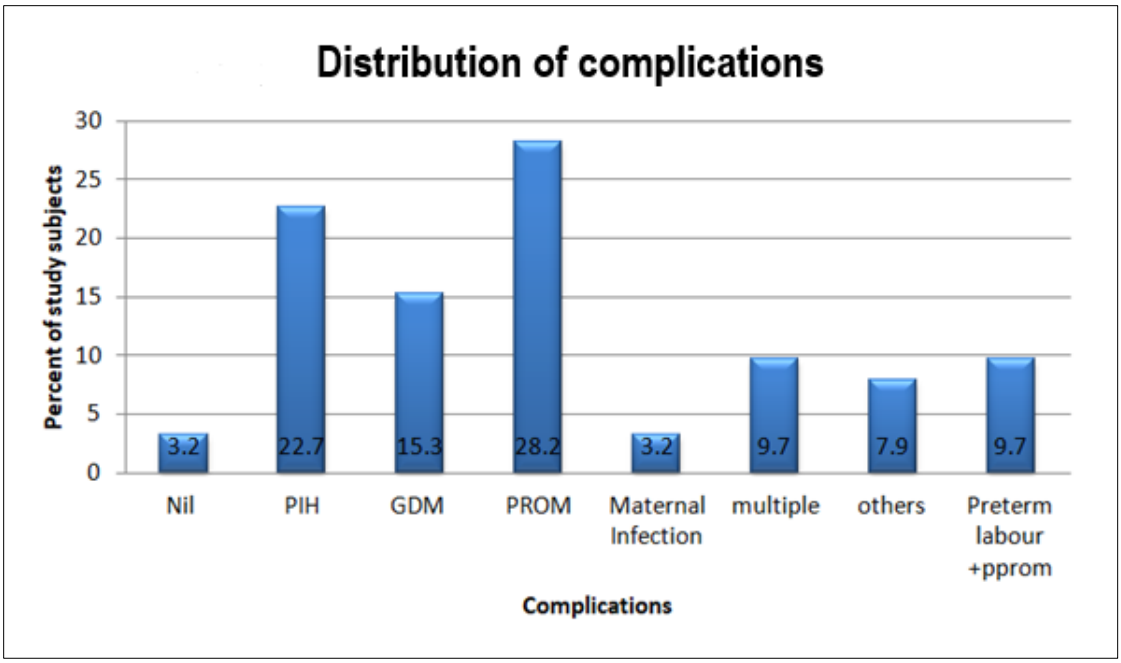

Figure 11: Distribution of study subjects according to the complications.

The Figure 10 graph shows the distribution of subjects on the basis of complications observed:

1. Most common complication observed was PROM (28.2%) followed by PIH (22.7%).
2. Others include Placental abruption, Oligohydramnios, Polyhydramnios, Decreased foetal movements.
3. Multiple includes PIH+Hypothyroidism, GDM+hypothyroidism, PIH+PROM.

The figure 11 graph displays a breakdown of subjects according on how many steroid doses subjects received. Out of 216 subjects:

1. 72(33.3%) antenatal mothers did not receive steroids.
2. 72(33.3%) antenatal mothers receive one dose of steroid.
3. 72(33.3%) antenatal mothers receive two doses.

Number of doses	Number	Percent
0	72	33.3
1	72	33.3
2	72	33.3

Table 12: Distribution of study subjects according to the number of doses of steroids (N=216).

Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

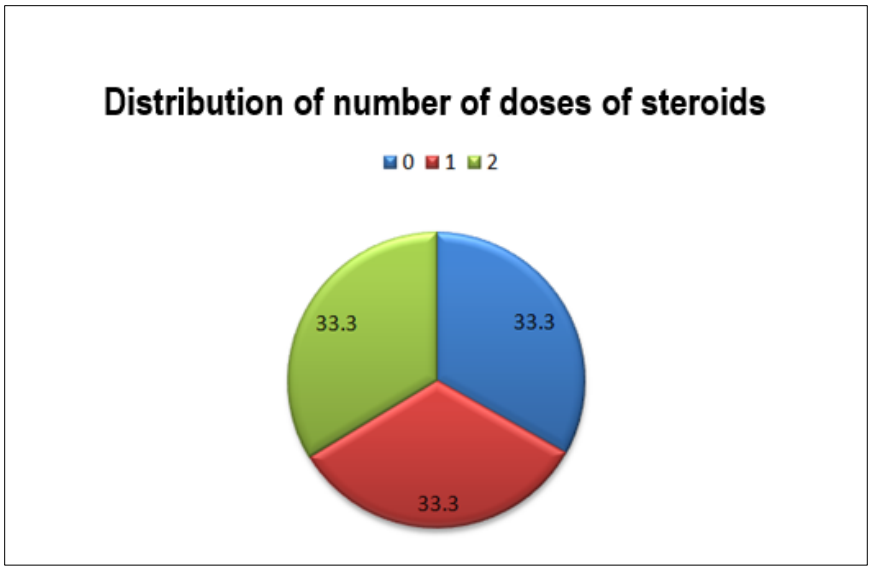

Figure 12: Distribution of study subjects according to the number of doses of steroids.

Interval between steroid and delivery	Number	Percent
NA	70	32.4
<24 hrs	83	38.4
24 hrs to 7 days	58	26.9
>7 days	5	2.3

Table 13: Distribution of study subjects according to the interval between steroid and delivery (N=216).

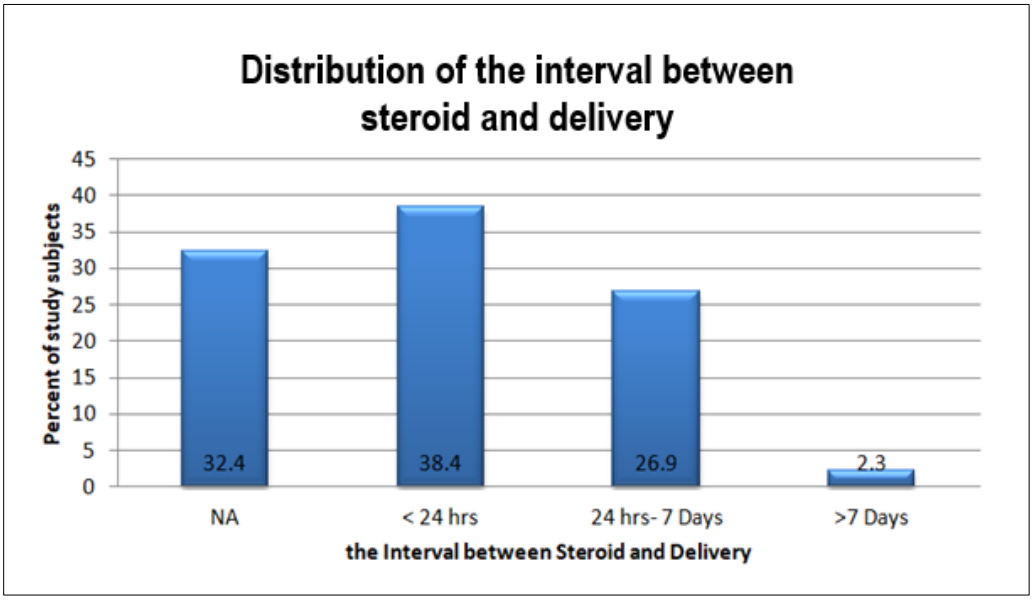

Figure 13: Distribution of study subjects according to the interval between steroid and delivery.

Babu RM | Volume 5; Issue 3 (2023) | Mapsci-JRBM-5(3)-131 | Research Article
Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

In the study (Figure 12) of total 216 subjects:

1. 38.4% received two doses within 24 hours of delivery.
2. 26.9% received between 24hrs to 7 days of delivery.
3. 2.3% received more than 7 days of delivery.

In the study (Figure 13) of total n=216 subjects:

1. 73(33.3%) subjects received two doses of antenatal steroids.
2. In that 51(23.6%) received within 12hrs duration.
3. And 22(10.2%) received within 24 hrs duration.

Interval between 2 doses	Number	Percent
NA	143	66.2
12 hrs. apart	51	23.6
24 hrs. apart	22	10.2

Table 14: Distribution of study subjects according to the interval between 2 doses (N=216).

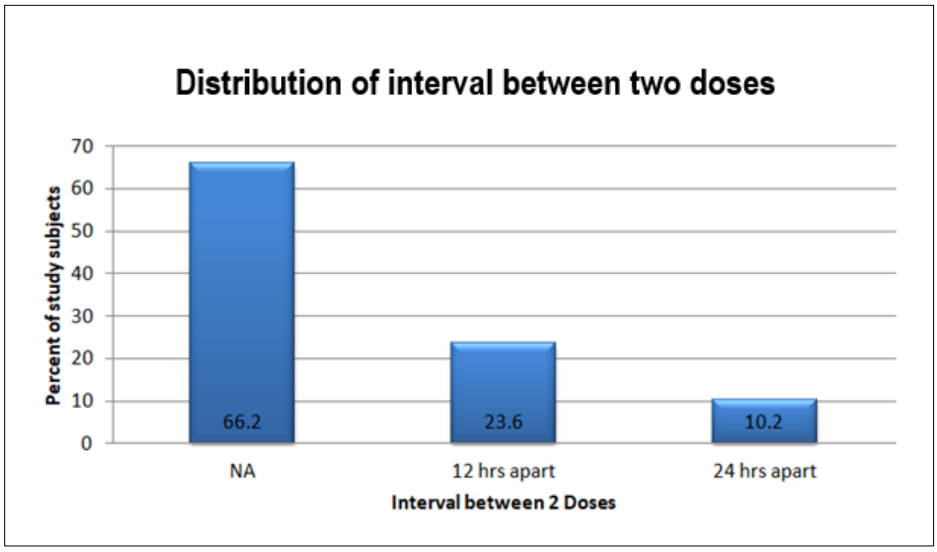

Figure 14: Distribution of study subjects according to the interval between 2 doses.

1st dose	Number	Percent
No steroid	72	32.9
<6 hours	39	18.1
7 to 12	29	13.4
13 to 24	47	22.2
25 to 48	20	9.3
>48	9	4.2

Table 15: Distribution of study subjects according to the 1st dose and delivery (N=216).

Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

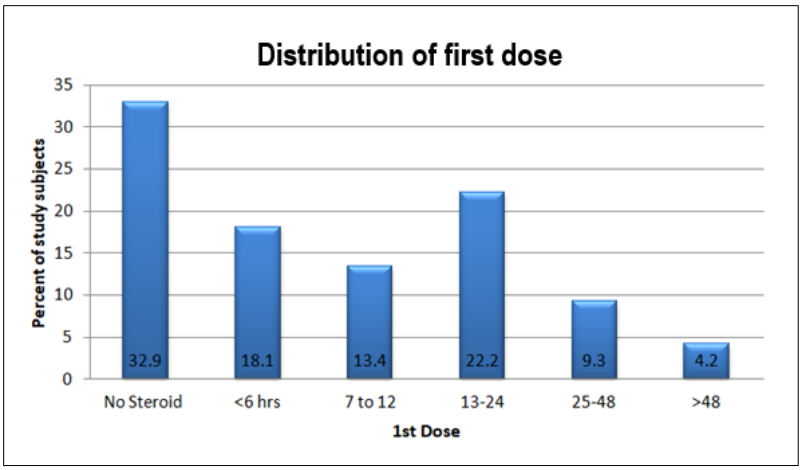

Figure 15: Distribution of study subjects according to the 1st dose and delivery.

In the study (Figure 14) of total n=216 subjects

1. 72(33.3%) mothers received one dose of antenatal steroid.
2. In that 39(18.1%) received within 6 hrs of delivery.
3. 29(13.4%) received between 7-12 hrs of delivery.

In the study (Figure 15) of total n=216 subjects

1. Common reason for preterm delivery is maternal factor (90.7%).

Reason for delivery	Number	Percent
Maternal factor	196	90.7
Fetal factor	20	9.3

Table 16: Distribution of study subjects according to the reason for delivery (N=216).

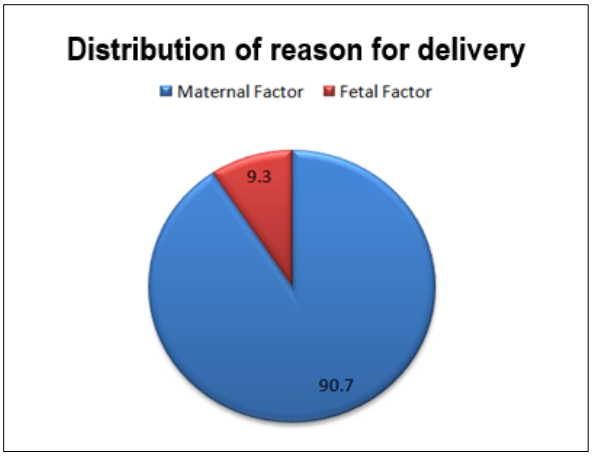

Figure 16: Distribution of study subjects according to the reason for delivery.

Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

Birth weight (Kg)	Number	Percent
<1	2	0.9
1 to 1.49	13	6
1.5 to 1.99	38	17.6
2.0 to 2.99	160	74.1
>3	3	1.4

Table 17: Distribution of study subjects according to the birth weight (N=216).

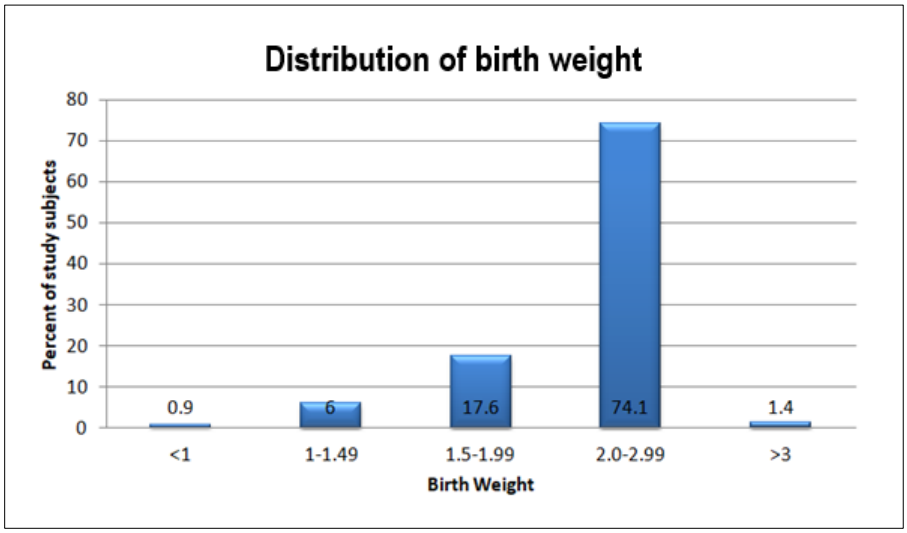

Figure 17: Distribution of study subjects according to the birth weight (N=216).

In the study (Figure 16) of total n=216 subjects

- 2(0.9%) born with <1kg of birth weight.
- 13(6%) babies between 1-1.49kg.
- 38(17.6%) babies between 1.5-1.99kg.
- 160(74.1%) babies between 2-2.99kg.
- 3(1.4%) babies >3kg.

In the study (Figure 17) of total n=216 subjects

- 11(5.1%) babies require resuscitation in that 10(4.6%) babies resuscitated with BNM and 1(0.5%) baby required intubation.

Resuscitation	Number	Percent
1a (BNM)	10	4.6
1b (Intubation)	1	0.5
Yes	11	5.1
No	205	94.9

Table 18: Distribution of study subjects according to the requirement of resuscitation at birth (N=216).

Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

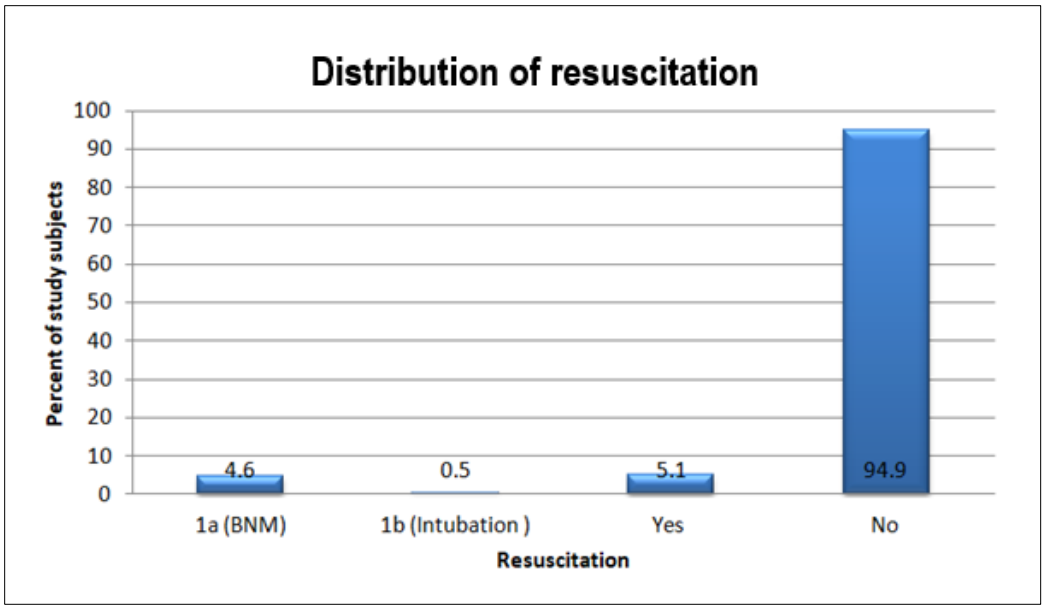

Figure 18: Distribution of study subjects according to the requirement of resuscitation at birth.

Respiratory support	Number	Percent
Yes	56	25.9
No	160	74.1

Table 19: Distribution of study subjects according to the respiratory support at birth (N=216).

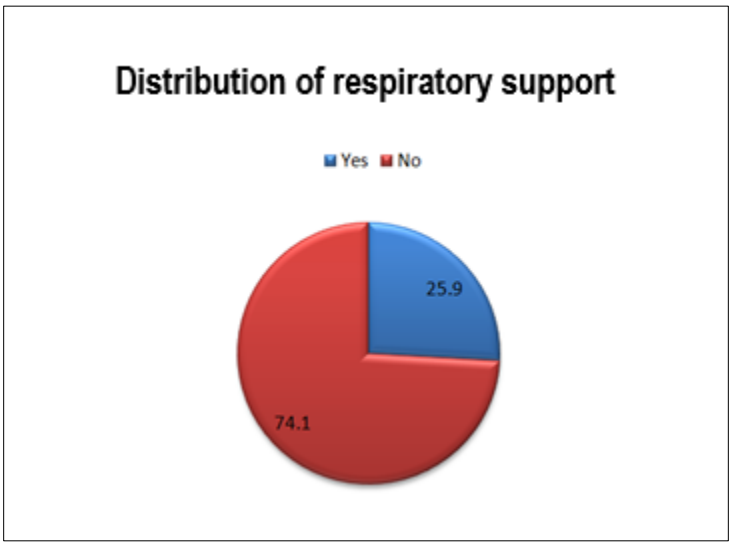

Figure 19: Distribution of study subjects according to the respiratory support at birth.

Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

In the study (Figure 18) of total n=216 subjects

- 56(25.6%) babies required respiratory support in the form of oxygen, CPAP, Mechanical ventilation.

In the study (Figure 19) of total n=216 subjects

- 10(4.6%) required surfactant administration.

Surfactant	Number	Percent
Yes	10	4.6
No	206	95.4

Table 20: Distribution of study subjects according to the requirement of surfactant after birth (N=216).

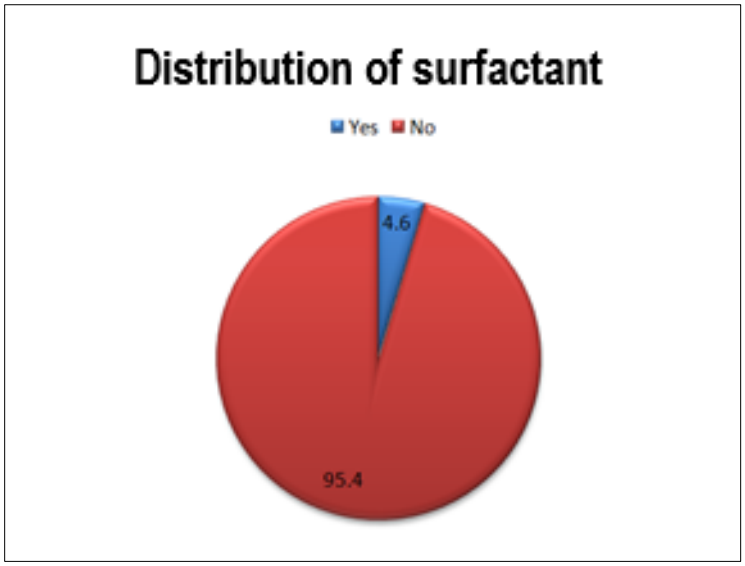

Figure 20: Distribution of study subjects according to the requirement of surfactant after birth.

RDS	Number	Percent
Yes	12	5.6
No	204	94.4

Table 21: Distribution of study subjects according to the RDS (N=216).

Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

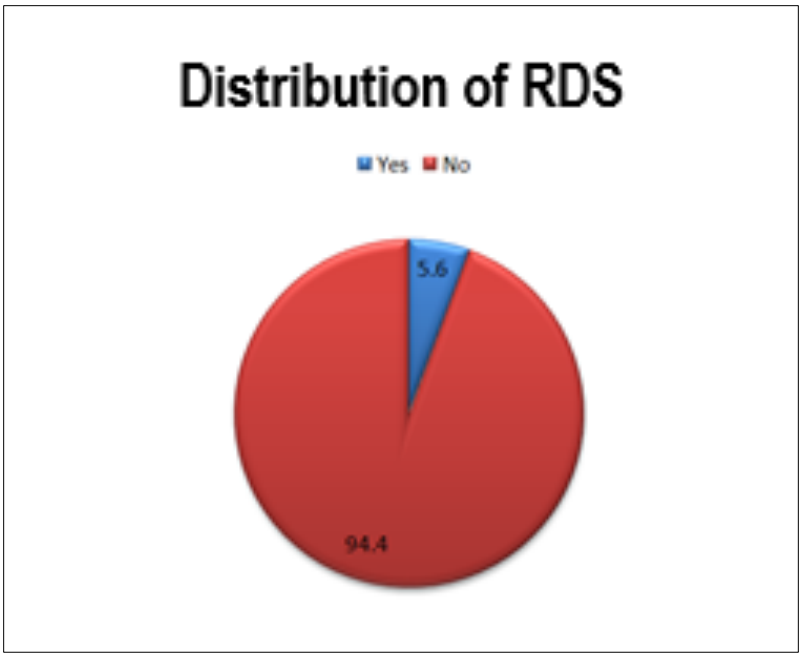

Figure 21: Distribution of study subjects according to the RDS.

In the study (Figure 20) of total n=216 subjects:

- 12(5.6%) babies had RDS.

In the study (Figure 21) of total n=216 subjects:

1. 119(55.1%) babies required NICU admission.
2. In those 35(16.2%) babies required <7 days NICU stay.
3. 38(17.6%) babies required between 1-2 weeks.
4. 24(11.1%) babies required between 2-4 weeks NICU stay.

Duration of ICU stay (in days)	Number	Percent
No	119	55.1
<7 days	35	16.2
1 to 2 weeks	38	17.6
2 to 4 weeks	24	11.1

Table 22: Distribution of study subjects according to the duration of ICU stay (N=216).

Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

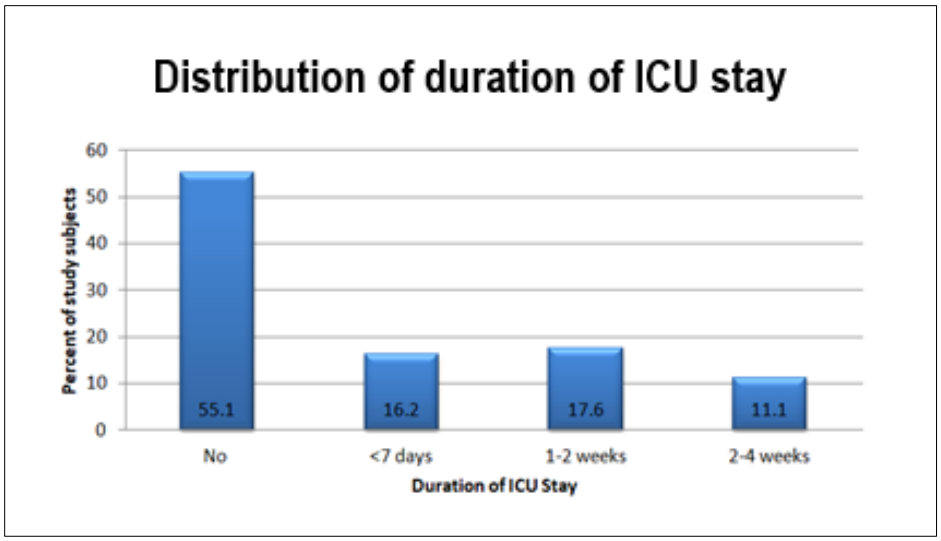

Figure 22: Distribution of study subjects according to the duration of ICU stay.

TTNB	Number	Percent
Yes	45	20.8
No	171	79.2

Table 23: Distribution of study subjects according to the TTNB (N=216).

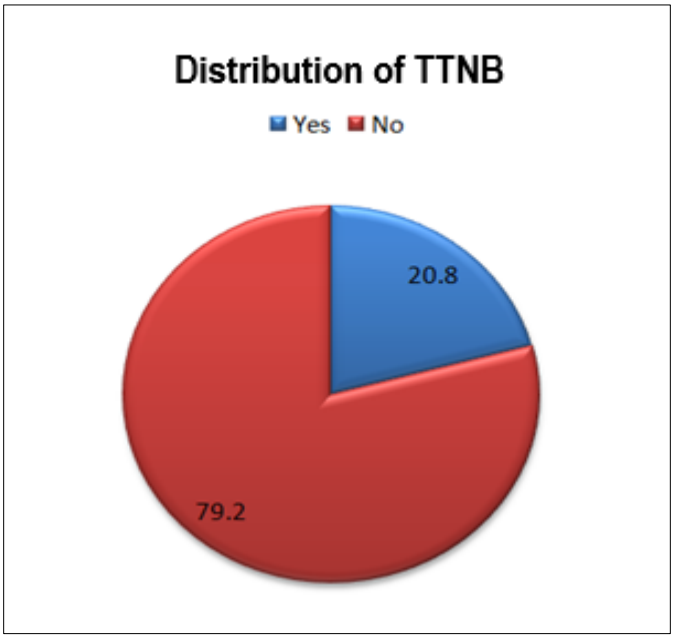

Figure 23: Distribution of study subjects according to the TTNB (N=216).

Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

In the study (Figure 22) of total 216 subjects

- 45 (20.8%) babies had TTNB.

In the study (Figure 23) of total n=216 subjects

- There is no statistical significance between birth weight and antenatal steroids (p=0.5).

		Birth weight				Total
		1	2	3	4	
Number of doses	0 Count	1	2	2	4	9
	%Row	11.1%	22.2%	22.2%	44.4%	100%
	1 Count	0	4	4	9	17
	%Row	0%	23.5%	23.5%	52.9%	100%
	2 Count	0	6	8	10	24
	%Row	0%	25%	33.3%	41.7%	100%
Total	Count	1	12	14	23	50
	%Row	2%	24%	28%	46%	100%

Table 24: Association between steroids and birthweight. P=0.502. 1=<1kg; 2=1-1.49kg; 3=1.5-1.99kg; 4=2-2.99kg.

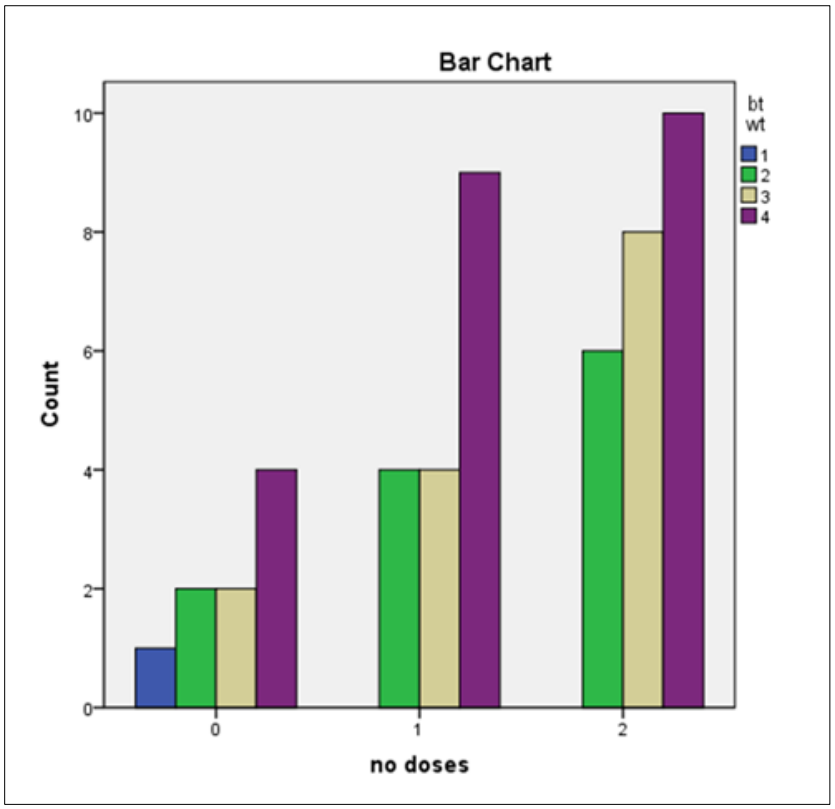

Figure 24: Association between steroids and birthweight.

Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

		Resuscitation			Total
		1a	1b	2	
Number of doses	0 Count	3	0	6	9
	%Row	33.3%	0%	66.7%	100%
	1 Count	1	1	15	17
	%Row	5.9%	5.9%	88.2%	100%
	2 Count	2	0	22	25
	%Row	13%	0%	87.5%	100%
Total	Count	6	1	43	50
	%Row	14%	2%	84%	100%

Table 25: Association between number of doses and requirement of resuscitation at birth. P=0.033. 1a=bag and mask; 1b=intubation; 2=on resuscitation.

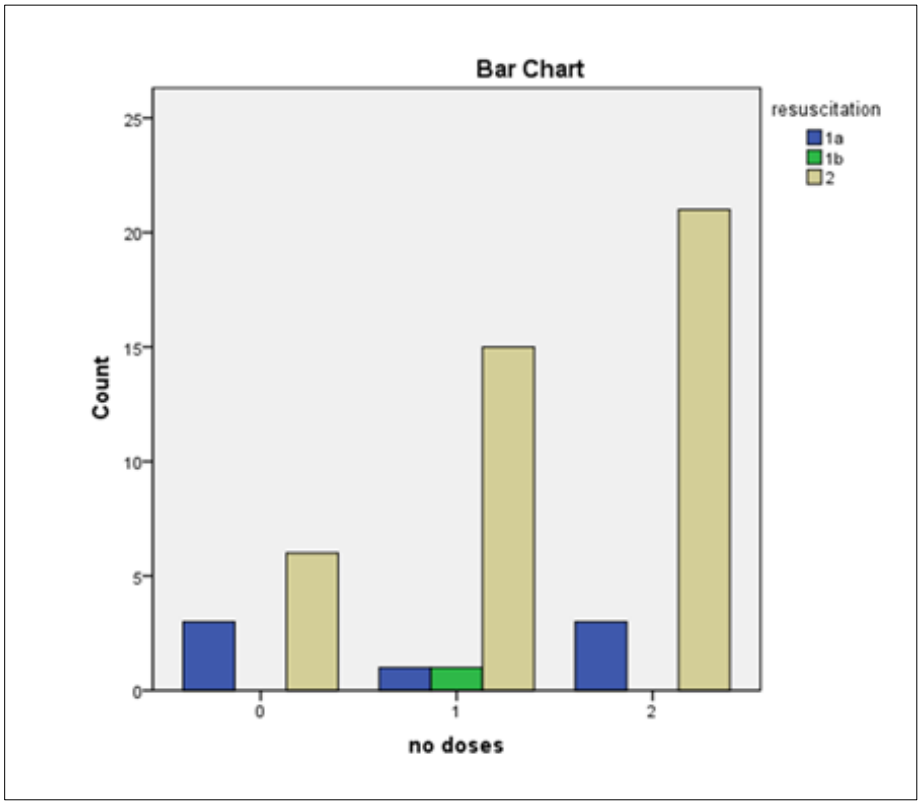

Figure 25: Association between number of doses and requirement of resuscitation at birth.

Babu RM | Volume 5; Issue 3 (2023) | Mapsci-JRBM-5(3)-131 | Research Article
Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

In the study (Figure 24) of total 216 subjects

1. 7 babies out of 50 early pre-terms required resuscitation at birth.
2. In those 6 babies required bag and mask ventilation and one baby required intubation.

In the study (Figure 25) of total n=216 subjects

1. 12 babies had RDS in those 7 babies did not receive antenatal steroids and 2 babies received 1 dose, 3 babies received two doses of steroids antenatal period.
2. Even one dose beneficial compare to zero dose in reducing RDS.
3. In this study researchers found significant association was found between antenatal steroids in reducing RDS in preterm babies (p value <0.001).

		RDS		Total
		1	2	
Number of doses	0 Count	7	2	9
	%Row	77.8%	22.2%	100%
	1 Count	2	15	17
	%Row	11.8%	88.2%	100%
	2 Count	3	21	24
	%Row	12.5%	87.5%	100%
Total	Count	12	38	50
	%Row	24%	76%	100%

Table 26: Association between RDS and steroids. P<0.001. 1=Babies with RDS; 2=Babies without RDS.

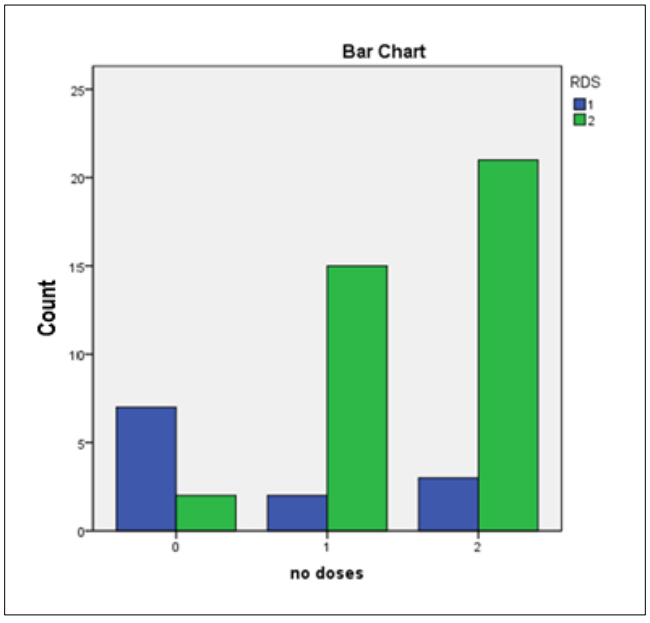

Figure 26: Association between RDS and steroids. 1=Babies with RDS; 2=Babies without RDS.

Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

Crosstab				
		TTNB		Total
		1	2	
Number of doses	0 Count	1	8	9
	%Row	11.1%	88.9%	100%
	1 Count	3	14	17
	%Row	17.6%	82.4%	100%
	2 Count	9	15	24
	%Row	37.5%	62.5%	100%
Total	Count	13	37	50
	%Row	26%	74%	100%

Table 27: Association between TTNB and steroids. P=0.912. 1=babies with TTNB; 2=babies without TTNB.

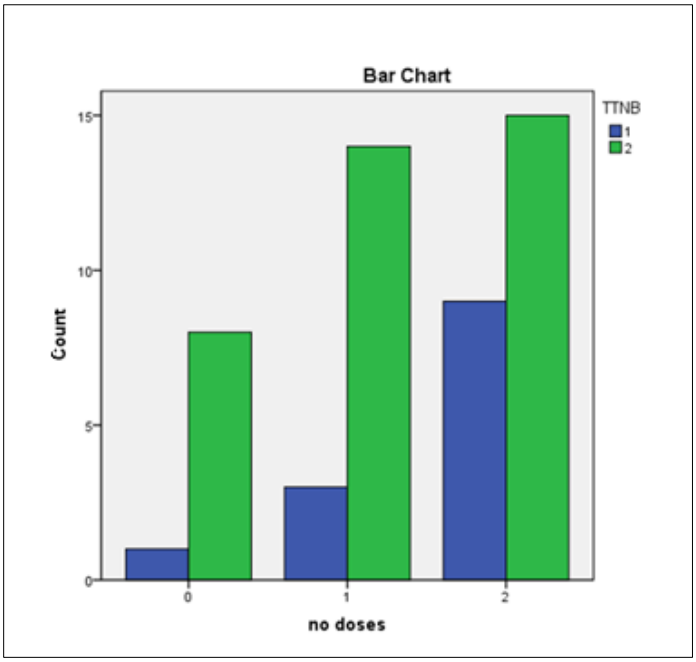

Figure 27: Association between TTNB and steroids. 1=babies with TTNB; 2=babies without TTNB.

In the study (Figure 26) of total n=216 subjects

1. Total of 13 babies had TTNB.
2. In this researcher found that there is no statistically significant association between antenatal steroids and TTNB.

In the study (Figure 27) of total n=216 subjects

1. 50 babies had hypoglycaemia after birth in those 25 babies early preterm's, 25 babies are late preterm's.
2. In the study researcher found that there is no statistical association between antenatal steroids and hypoglycaemia after birth (p=0.9).

Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

		Hypoglycemia		Total
		1	2	
Number of doses	0 Count	4	5	9
	%Row	44.4%	55.6%	100%
	1 Count	9	8	17
	%Row	52.9%	47.1%	100%
	2 Count	12	12	24
	%Row	50%	50%	100%
Total	Count	25	25	50
	%Row	50%	50%	100%

Table 28: Association between number of doses of steroids and hypoglycemia. P=0.919. 1=early preterm's; 2=late preterm's.

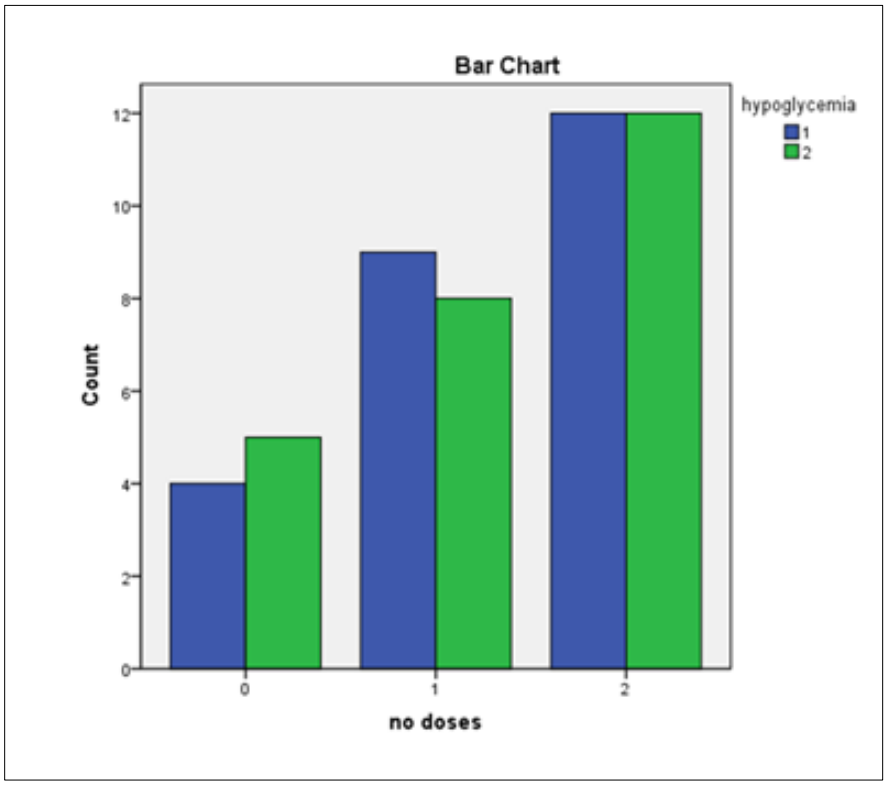

Figure 28: Association between number of doses of steroids and hypoglycemia. 1=early preterm's; 2=late preterm's.

Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

		Surfactant		Total
		1	2	
Number of doses	0 Count	5	4	9
	%Row	55.6%	44.4%	100%
	1 Count	2	15	17
	%Row	11.8%	88.2%	100%
	2 Count	1	23	24
	%Row	8.3%	91.7%	100%
Total	Count	8	42	50
	%Row	18%	82%	100%

Table 29: Association between surfactant and steroids. P<0.005. 1=babies required surfactant; 2=babies did not required surfactant.

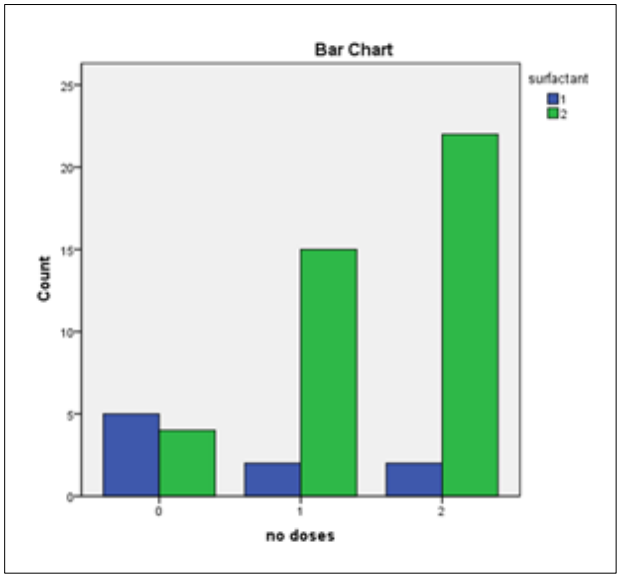

Figure 29: Association between surfactant and steroids. 1=babies required surfactant; 2=babies did not required surfactant.

In the study (Figure 28) of total n=216 subjects; in this early preterm's 50 subjects

1. 8 babies required surfactant.
2. In those 5 babies did not receive antenatal corticosteroids (55.6%).
3. 2 babies received one dose of antenatal corticosteroids (11.8%).
4. And one baby received two doses of antenatal steroids (8%).
5. In the study researchers found statistical significance between who received antenatal steroids and less requirement of surfactant (p <0.05).

In my study (Figure 29) of total n=216 subjects

1. Early preterms were in this study 50.
2. 27 babies required respiratory support.

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DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

3. In those 8 babies did not receive antenatal steroids.
4. 5 babies received one dose and 14 babies received two doses.
5. In the study researchers found statistical significance between steroids and respiratory support (p=0.013).
6. There is significance between babies who received steroids and not received steroids but there is no significant between one dose and two doses in decreasing respiratory support in early preterm' s.

		Respiratory support		Total
		1	2	
Number of doses	0 Count	8	1	9
	%Row	88.9%	11.1%	100%
	1 Count	5	12	17
	%Row	29.4%	70.6%	100%
	2 Count	14	10	24
	%Row	58.3%	41.7%	100%
Total	Count	27	23	50
	%Row	54%	46%	100%

Table 30: Association between steroids and respiratory support. P=0.013. 1=babies with respiratory support; 2=babies without respiratory support.

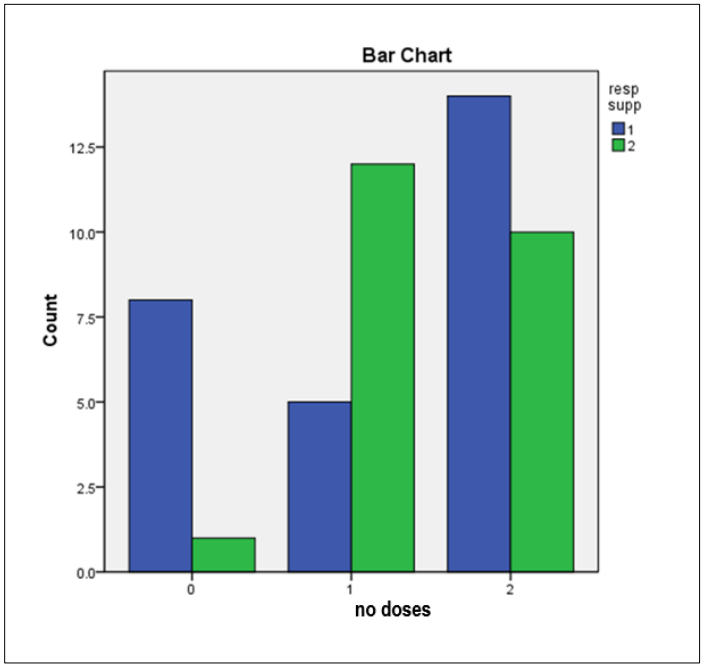

Figure 30: Association between steroids and respiratory support. 1=babies with respiratory support; 2=babies without respiratory support.

Citation: Babu RM, Reddy VI, Kumar KV, Bilagi AP. Study of Perinatal Outcome in Premature Babies with Complete and Incomplete Course of Antenatal Corticosteroids. J Regen Biol Med.2023;5(3):141-196.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-5(3)-131

		Sepsis		Total
		1	2	
Number of doses	0 Count	1	8	9
	%Row	11.1%	88.9%	100%
	1 Count	0	17	17
	%Row	0%	100%	100%
	2 Count	3	21	24
	%Row	12.5%	87.5%	100%
Total	Count	4	46	50
	%Row	8%	92%	100%

Table 31: Association between number of doses of steroids and sepsis. P=0.324. In the study of total n=216 subjects; in this early preterm's 50, 1=babies with sepsis; 2=babies without sepsis.

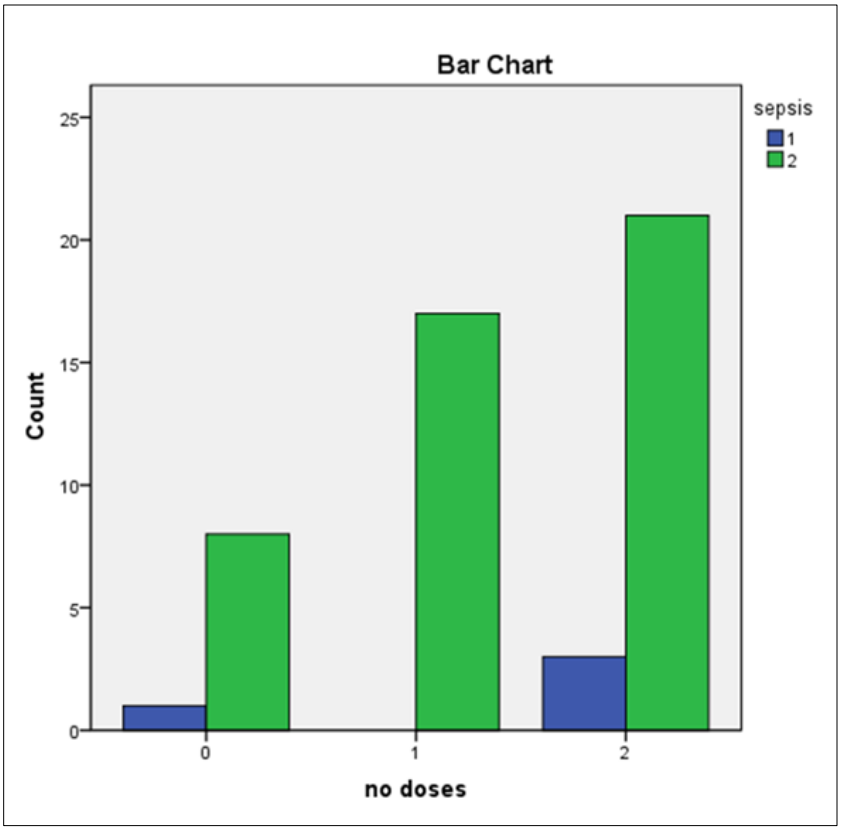

Figure 31: Association between number of doses of steroids and sepsis. n=216; early preterm's 50, 1=babies with sepsis; 2=babies without sepsis. It was found that there is no significant statistical association between antenatal steroids and sepsis.

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		Number of days in NICU				Total
		0	1	2	3	
Number of doses	0 Count	0	1	3	4	9
	%Row	0.00%	11.10%	33.30%	44.40%	100.00%
	1 Count	0	3	8	6	17
	%Row	0.00%	17.60%	47.10%	35.30%	100%
	2 Count	0	4	11	9	24
	%Row	0.00%	16.70%	45.80%	37.50%	100%
Total	Count	0	8	22	19	50
	%Row	0.00%	16.00%	44.00%	38.00%	100.00%

Table 32: Association between number of doses of steroids and NICU stay. P=0.525. 1=<7 days; 2=1-2 weeks; 3=2-4 weeks.

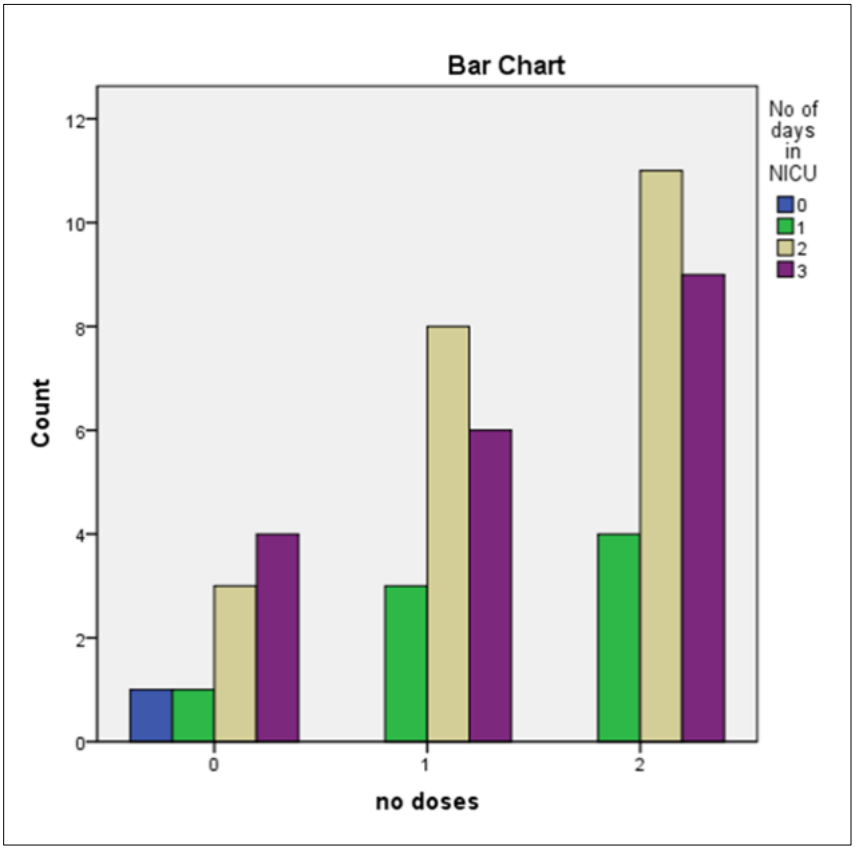

Figure 32: Association between number of doses of steroids and NICU stay. P=0.525. 1=<7 days; 2=1-2 weeks; 3=2-4 weeks.

Babu RM | Volume 5; Issue 3 (2023) | Mapsci-JRBM-5(3)-131 | Research Article
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Association between number of doses of steroids and NICU stay:

1. Out of 50 early preterm babies included in the study it is seen that 8(16%) subjects required NICU stay of <7 days, 22(44%) subjects required NICU stay of 1-2 weeks and 19(38%) subjects required NICU stay of 2-4 weeks.
2. Of the 50 early preterm babies included in the study 9 subjects did not receive any ANCS, 17 subjects received one dose of ANCS and 24 subjects receive two doses of ANCS prior to delivery.
3. Out of 9 babies who did not receive ANCS 1 baby (11.1%) need NICU stay of <7 days, 3(33.3%) babies required NICU stay of 1-2 weeks and 4(44.4%) babies required NICU stay of 2-4 weeks.
4. Out of 17 babies who received one dose of ANCS 3 babies (17.6%) need NICU stay of <7 days, 8(47.1%) babies required NICU stay of 1-2 weeks and 6(35.3%) babies required NICU stay of 2-4 weeks.
5. Out of 24 babies who received two doses of ANCS 4 babies (16.7%) need NICU stay of <7 days, 11(44.8%) babies required NICU stay of 1-2 weeks and 9(37.5%) babies required NICU stay of 2-4 weeks.

Discussion

The current investigation was carried out in the Neonatal Intensive Care Unit as a prospective observational study and post-natal wards in the Department of Paediatrics, St Philomena`s Hospital Bangalore, to compare early outcome among premature babies who have received one dose, two doses and no antenatal corticosteroids. The study included a total of 216 subjects which were preterm babies defined as born <36+6 weeks of gestation.

The 216 study subjects have been divided into 2 groups based on the gestational age of the baby as early preterm (<34 weeks) and late preterm(34+1weeks to 36+6 weeks).Out of the total 216 subjects, 50 babies were early preterm and 166 babies were late preterm.

The mothers who were admitted with expected preterm delivery within 24 hrs were included. The number of doses of steroids the mother has received in the antenatal period was noted and the preterm neonates after birth were included in the study. Out born preterm babies brought soon after birth were also included in the study.

The preterm new-borns were observed for the outcomes like Requirement of resuscitation, Requirement of respiratory support, Respiratory distress syndrome, Requirement of surfactant, Sepsis, Hypoglycaemia, Number of days of NICU stay and Birth weight in correlation with ANCS administration in the mother. PDA, IVH and NEC were also considered as possible outcomes, but the data was insufficient to consider any association.

The collected data was entered in the excel sheet. Statistical analysis was done and it was found that: Use of antenatal corticosteroids decreased the incidence of RDS, requirement of resuscitation at birth, requirement of

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respiratory support and post-natal surfactant requirement. In the study it was found that even a single dose of steroids was as effective as two doses of steroids and was proven to be beneficial in reducing the above outcomes.

Out of the 216 antenatal mothers included in the study, those who received one dose of steroid, 18.1% received ANCS within 6 hours of delivery, 13.4% received ANCS within 12 hours of delivery. Out of those who received two doses of ANCS, 38.4% received two doses within 24 hours of delivery, 26.9% received between 24 hours to 7 days prior to delivery and 2.3% received it more than 7 days prior to delivery. Of the Early preterm babies included in the study 25(50%) subjects has received 2 doses of ANCS, 17(34%) subjects received 1 dose of ANCS and 8(16%) subjects did not receive ANCS. It was found that only 12.5% of those who received two doses of ANCS required resuscitation at birth, 5.9% of those who received even a single dose of ANCS required resuscitation at birth, whereas 33.3% of those who had not received any steroids required resuscitation at birth which was statistically significant (p value <0.05).

Hence concluding that even dose of steroid can be effective and beneficial than not having received any steroids. Though the percentage of subjects requiring resuscitation at birth after having received two doses of steroids is higher than that of those who have received one dose of steroids, this could be because of the fact that those who received two doses were too premature and required some amount of resuscitation at birth.

Similar results were found in a cohort study conducted by Drummond, et al., [81] on all newborn infants admitted to the neonatal ICU between January 2006 and December 2011 who weighed less than 1,500g and had a gestational age of less than or equal to 34 weeks. The three primary neonatal illnesses were present, neonatal resuscitation was required, and hospital mortality were the key outcomes that were examined. Prenatal corticosteroids reduced infant mortality (OR=3.0; 95%CI 1.4-6.5) and resuscitation needs (OR=2.4; 95%CI 1.1-5.0) compared to those who did not receive them.

In the study, Out of the early preterm babies included ,It was found that only 58.3% of those who received two doses of steroids required respiratory support after birth, only 29.4% of those who received one dose of steroids required respiratory support after birth, whereas 88.9% of those who had not received any steroids required respiratory support at birth which was statistically significant (p value=0.013).

Hence the percentage of subjects who have received even one dose steroids requiring respiratory support is less than those who received two doses, but this again must be due to the fact that those requiring two doses were extreme pre-terms and required some respiratory support after birth. Hence from this it's clear that even one dose of steroids is beneficial than giving no steroids.

Prenatal corticosteroids were observed to reduce the prevalence of respiratory distress syndrome in 2003, according to Fabiola Meneguela, et al's., research [82]. There was a reduction in the requirement for, the dosages of exogenous surfactant administered, and the number of days necessitating artificial

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breathing among newborns exposed to prenatal corticosteroids. Additionally, the use decreased the number of hospital fatalities (OR:0.51; 95% CI:0.38-0.82), demonstrating that prenatal steroids could potentially lessen the need for postpartum respiratory support.

Of the early preterm babies In the study , only 12.5% of those who received two doses of steroids had RDS after birth, And only 11.8% of those who received one dose of steroids had RDS after birth, whereas 77.8% of those who had not received any steroids had RDS after birth which was statistically significant (p value <0.01) . These results were alarming, that a major percentage of subjects benefitted from even a single dose of steroids.

According to ACOG, giving ANCS to a pregnant woman who is in danger of having a preterm baby soon is highly linked to lower neonatal morbidity and mortality. In comparison to neonates whose moms did not undergo ANCS, those whose mothers did experience RDS, IVH, NEC, and death have considerably reduced severity, frequency, or both [8].

Numerous research that dates back many years have supported this claim. A prospective double-blind randomised clinical trial was conducted in 1979 by Tauscher HW, et al., to see if glucocorticoid therapy lowers the threat of RDS in prematurely born infants [83].

In this study, 127 infants born to 122 mothers were randomly assigned to receive either steroid (dexamethasone phosphate) or a placebo. The study found that steroids work well at lowering the threat of RDS [11].

(Cochrane Pregnancy and Childbirth's Trials Register-17 February 2016) Roberts D, Brown J, Medley N, and Dalziel S conducted 30 trials in which corticosteroids were given to women at risk of preterm birth (a total of 7774 women and 8158 children). Researchers demonstrated that one dose of corticosteroids, administered to the mother during early labour and before to the baby's birth, aids in the baby's lung development and lessens difficulties like breathing issues [10].

Of the early preterm babies in the study , it is seen that only 8.3% of those who received two doses of steroids required surfactant after birth, only 11.8% of those who received one dose of steroids required surfactant after birth, whereas 55.6% of those who had not received any steroids required surfactant after birth which was statistically significant (p value <0.005).

In order to assess the prevalence and appropriateness of antenatal corticosteroid medication, as well as the impact on the incidence and care of respiratory distress syndrome (RDS) and associated consequences, Maria Katarzyna, et al., did a retrospective study in Poland.

Over the course of six months in 2013, 54 facilities (including 42 tertiary and 12 secondary referral centres) provided care for 987 neonates who were under ≤32 weeks' gestation. 749 babies whose mothers had taken prenatal steroids made up the research group. 238 babies were in the non-steroid group. Researchers discovered that prenatal steroids could really lessen the need for surfactant after birth because the children of

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moms who received them required surfactant therapy less frequently (70% vs. 78%; p=0.0143).

Of the early preterm babies included in the study, it is seen only 50% of those who received two doses of steroids had hypoglycemia after birth, only 52.9% of those who received one dose of steroids had hypoglycemia after birth, whereas 44.4% of those who had not received any steroids had hypoglycemia after birth which was statistically not significant (p value=0.919). hence the study showing there is no relation between hypoglycemia in newborn first 48 hours and antenatal steroids .

Similar conclusions were reached by Spencer G Kuper, et al's., [84] examination at Harper University of Alabama at Birmingham's Department of Obstetrics and Gynaecology and Centre for Women's Reproductive Health.

Researchers found that the prevalence of hypoglycemia was similar in neonates who had a full ACS between 2-7 days before delivery compared to those who received a full ACS more than 7 days before childbirth (20.4 vs 25.4%, AOR 1.5, 95%CI 0.80-2.94).

Between those who had any ACS and those who didn't, there was no difference in the prevalence of newborn hypoglycemia throughout the course of the first 48 hours of life (23.0 vs 16.1%, AOR 1.32, 95%). Researchers therefore came to conclusions based on the investigation. There was no correlation between the time of ACS intake and the lowest potential neonatal blood sugar in the first 48 hours of life, regardless of how many more ACS doses were taken (partial, full, or repeat course).

Out of 50 early preterm babies included in the study it is seen that 8(16%) subjects required NICU stay of <7 days, 22(44%) subjects required NICU stay of 1-2 weeks and 19(38%) subjects required NICU stay of 2-4 weeks. Of the 50 early preterm babies included in the study 9 subjects did not receive any ANCS, 17 subjects received one dose of ANCS and 24 subjects receive two doses of ANCS prior to delivery. Out of 9 babies who did not receive ANCS 1 baby (11.1%) need NICU stay of <7 days, 3(33.3%) babies required NICU stay of 1-2 weeks and 4(44.4%) babies required NICU stay of 2-4 weeks Out of 17 babies who received one dose of ANCS 3 babies (17.6%) need NICU stay of <7 days , 8(47.1%) babies required NICU stay of 1-2 weeks and 6(35.3%) babies required NICU stay of 2-4 weeks Out of 24 babies who received two doses of ANCS 4 babies (16.7%) need NICU stay of <7 days , 11(44.8%) babies required NICU stay of 1-2 weeks and 9(37.5%) babies required NICU stay of 2-4 weeks (p value 0.525) . In the study researchers found that there is no statistical significance between the ANCS and length of NICU stay.

Joice Fabiola Meneguel Ogata, et al., [85] In a study titled "Costs of hospitalisation in premature infants: impact of antenatal steroid therapy," premature babies without congenital abnormalities who were delivered between January 2006 and December 2009 in a tertiary, public university hospital was included. The gestational age was between 26 and 32 weeks. 211 (96%) of the 220 patients whose charts satisfied the inclusion criteria had the records reviewed. When 170

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newborns obtained a minimum of one dose of prenatal corticosteroid medication and 41 babies did not, researchers found a significant decrease in the amount of time spent in the neonatal intensive care unit (NICU). The overall cost decreased by 38% (p=0.008) and the length of stay in the NICU decreased by 49% (p=0.011) for survival with gestational ages under 30 weeks. In the study researchers found ANCS decrease length of NICU stay.

In the study the group including late preterm babies are also compared the morbidities mentioned with ANCS but as the incidence of respiratory morbidities is very low in late preterm babies requires a larger sample size hence the study did not show a statistical significance in late preterm babies. The frequency and extent of RDS in premature infants are greatly reduced by antenatal corticosteroid treatment. Despite having limited access in low and middle-income countries, antenatal steroid treatment is quite effective at reducing neonatal mortality and morbidity. This strategy has the potential to yearly preserve at least five lakh newborn lives if completely scaled up. When premature delivery seems likely in female within 24 and 34 weeks of gestation, every attempt should be made to begin prenatal corticosteroid medication.

Summary

Most of previous studies did not emphasize on the importance single dose of ANC in preterm babies hence the study "Perinatal outcome in premature babies with complete (two doses) and incomplete course (one dose) of antenatal corticosteroids" focus on the same. The study was conducted between Oct 2016 to April 2018 (one and half years) in neonatal intensive care and post-natal wards in Department of paediatrics in St Philomena1s hospital Bangalore.

The study included a total of 216 subjects, out of which 72 babies did not receive ANCs, 72 babies received one dose of ANCs and 72 babies received two doses of ANCs. The 216 study subjects have been divided into 2 groups based on the gestational age of the baby as early preterm (<34 weeks) and late preterm(34+1weeks to 36+6 weeks).Out of the total 216 subjects, 50 babies were early preterm and 166 babies were late preterm. The study found that use of antenatal corticosteroids decreases the incidence of RDS, requirement of resuscitation at birth, requirement of respiratory support and surfactant requirement post-natal period.

In the investigation, it was discovered that even one dose of steroids was advantageous in minimizing the aforementioned outcomes and was just as beneficial as two doses of steroids. It was found that requirement of resuscitation and interventions in delivery room less in babies who received ANCS than who did not. The study showed requirement of respiratory support less in premature babies who received ANCS than who did not. In the study only researchers found that RDS more common in premature babies who did not receive ANCS that who did. The study showed that requirement of surfactant and no of doses of surfactant less in babies who received ANCS than babies who did not.

The study showed that there is no relation between hypoglycemia in newborn first 48 hours and antenatal steroids.

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Conclusion

In the research, it was discovered that just one dose of steroids was just as beneficial as two doses of steroids and was advantageous in lowering the respiratory difficulties in preterm infants who were born early. It was found that requirement of resuscitation and interventions in delivery room less in babies who received ANCS than who did not.

The study showed requirement of respiratory support less in premature babies who received ANCS than who did not.

In the study researchers found that RDS more common in premature babies who did not receive ANCS that who did.

The study showed that requirement of surfactant and no of doses of surfactant less in babies who received ANCS than babies who did not.

Strengths

1. This is a study on the effectiveness of single dose steroid on preterm babies. This study clearly shows the benefit of even a single dose steroid as compared to no steroids.
2. Study could analyse required sample size for it to be significant.
3. This study also looked into other associated factors which could be linked to poor outcome in pre-terms, hence useful in taking adequate measures to reduce morbidity in pre-terms.

Limitations

1. The study should be extended to a bigger sample size for better results.
2. The outcome in early pre-terms and late pre-terms needs to be separately studied.

Recommendations

1. ANCS reduces the respiratory complications in early preterm babies.
2. Even a single dose of ANCS is found to be very effective in preventing the respiratory complications in early preterm babies.
3. From the study researchers strongly recommend to administer at least single dose of ANCS to mothers in whom preterm delivery is expected.
4. Obstetricians and Paediatricians should have Knowledge about ANCS as timely administration helps in reducing the respiratory complications in preterm babies.

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Babu RM | Volume 5; Issue 3 (2023) | Mapsci-JRBM-5(3)-131 | Research Article
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