



ISSN: 0975-833X

Available online at <http://www.journalcra.com>

INTERNATIONAL JOURNAL
OF CURRENT RESEARCH

International Journal of Current Research
Vol. 12, Issue, 05, pp.11373-11380, May, 2020

DOI: <https://doi.org/10.24941/ijcr.38684.05.2020>

RESEARCH ARTICLE

PREVALENCE OF SEX RATIO, PRETERM BIRTH RATE, LOW BIRTH WEIGHT RATE, TWIN BIRTH RATE, CONGENITAL ABNORMALITIES, CAESAREAN DELIVERY RATE, MORBIDITY & MORTALITY RATE IN NEONATES BORN IN A TERTIARY CARE HOSPITAL

*Chaudhary Veena

Department of Physiology, World College of Medical Sciences & Research and Hospital, Jhajjar, Haryana, India, Pin-124103

ARTICLE INFO

Article History:

Received 08th February, 2020

Received in revised form

24th March, 2020

Accepted 18th April, 2020

Published online 30th May, 2020

Key Words:

(FT)-full term, (PT)-pre term, (LGA)-large for gestational age, (AGA)-appropriate for gestational age, (SGA)-small for gestational age, (macrosomia)-(4kg or more), Normal weight of baby-(2.5kg-3.99kg), (LBW)- low birth weight (1.5kg-2.499kg), (VLBW)-very low birth weight (1kg-1.499kg), (ELBW)-extreme low birth weight (<1kg), (SVD)-spontaneous vaginal delivery, (FAVD)-forceps assisted vaginal delivery, (VAVD)-ventouse assisted vaginal delivery, LSCS-lower segment caesarian section, (NMR)-neonatal mortality rate, (RH)-Rockland Hospital

ABSTRACT

In this study, the aim was to find out the prevalence of sex ratio, preterm birth rate, low birth weight rate, twin birth rate, congenital abnormalities, caesarean delivery rate, morbidity & mortality rate in a group of neonates born alive in a tertiary care hospital in Delhi, India. These neonates (652 singleton neonates & 16 twins) were born alive to 660 mothers (42.73% primigravida & 57.27% multigravida), in Rockland hospital, from 01.01.2012 till 07.08.2014. In our study of 668 neonates (368 males & 300 females), Sex ratio of birth was 1.23 males/female, preterm birth rate was 9.58%, LBW rate was 11.23%, VLBW rate was 0.3%, ELBW rate was 0.15%, twin birth rate was 1.21% & caesarean delivery rate was 70.9%. The prevalence of congenital abnormalities was 1.35% and congenital heart defects (0.45%) were the most common congenital anomalies, in our study. About 7 neonates (1.05%) were referred to the higher centre. No neonate discharged from Rockland hospital was reported to have bronchopulmonary dysplasia, kernicterus or cerebral palsy on follow up. Besides, the NMR was zero, in our study.

Copyright © 2020, Chaudhary Veena. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Chaudhary Veena. 2020. "Prevalence of sex ratio, preterm birth rate, low birth weight rate, twin birth rate, congenital abnormalities, caesarean delivery rate, morbidity & mortality rate in neonates born in a tertiary care hospital", *International Journal of Current Research*, 12, (05), 11373-11380.

INTRODUCTION

WHO defines preterm birth as all births before 37 completed weeks of gestation, or fewer than 259 days from the first date of a woman's last menstrual period. A developing baby goes through important growth throughout pregnancy—including in the final months and weeks. For example, the brain, lungs, and liver need the final weeks of pregnancy to fully develop.^[4] Preterm birth is the most common cause of death among infants worldwide.^[1] About 15 million babies are preterm each year (5% to 18% of all deliveries).^[2] In the United Kingdom they are about 7.9% and in the United States they are about 12.3% of all births.^[5]

Approximately 0.5% of births are extremely early periviable births, and these account for most of the deaths.^[6] In many countries, rates of premature births have increased between the 1990s and 2010s.^[2] Weight generally correlates to gestational age; however, infants may be underweight for other reasons than a preterm delivery. Neonates of low birth weight (LBW) have a birth weight of less than 2500 g and are mostly but not exclusively preterm babies as they also include small for gestational age (SGA) babies. Weight-based classification further recognizes very low birth weight (VLBW) which is less than 1500 g, and extremely low birth weight (ELBW) which is less than 1000 g.^[3] Almost all neonates in these latter two groups are born preterm. Complications from preterm births resulted in 740,000 deaths in 2013, down from 1.57 million in 1990.^[7] Complications of preterm birth were the leading cause of death in children younger than 5 years of age globally in 2016, accounting for approximately 16% of all deaths, and

*Corresponding author: Chaudhary Veena

Department of Physiology, World College of Medical Sciences & Research and Hospital, Jhajjar, Haryana, India, Pin-124103

35% of deaths among newborn babies. Preterm neonates who survive are at greater risk of a range of short-term and long-term morbidities. Data from the low-to middle income countries are limited. Preterm birth is a crucial global health issue, which must be addressed to reduce neonatal and child mortality globally and reach the sustainable development goals.

Aims and objectives: In this study, the aim was to find out the prevalence of sex ratio, preterm birth rate, low birth weight rate, twin birth rate, congenital abnormalities, caesarean delivery rate, morbidity & mortality rate in a group of neonates born alive in a tertiary care hospital in Delhi, India.

MATERIALS AND METHODS

Study Setting and Period of Study: The study was conducted in the Department of Paediatrics, Rockland Hospital in Delhi, India during the period from 01 January 2012 to 07 August 2014.

Study Design: The study was a Hospital Based Study, conducted in the Department of Paediatrics, Rockland Hospital in Delhi.

Sample Size: For the present study, 668 neonates (652 singleton neonates & 16 twin neonates) were recorded and studied in Paediatrics Department in Rockland hospital. These neonates were born alive to 660 mothers in Obstetrics & Gynaecology Department in Rockland hospital, during the period from 01.01.2012 till 07.08.2014.

Sampling Design: The study was done as Random Sampling of the neonates that were born in Rockland Hospital, Delhi.

Study Variables: Sex ratio, preterm birth, birth weight, twin birth, congenital abnormality, cesarean delivery and morbidity & mortality rate in a group of neonates

Inclusion Criteria/ Selection Criteria: Participants in the study eligible for inclusion were neonates of either sex, born alive in Rockland hospital during the period from 01.01.2012 till 07.08.2014. Neonates were included after obtaining proper informed written consent from their parent/guardian. Intrauterine deaths were excluded from the study.

Study Characteristics: In this study, 668 neonates born alive in Rockland hospital during the period from 01.01.2012 till 07.08.2014, were recorded and studied. The demographic information, history & physical examination in the patient's questionnaire were recorded. Neonates that satisfied the inclusion criteria were selected and the neonates who did not meet the inclusion criteria were excluded.

Data Collection Methods and Tools: Neonates' history information was collected in questionnaires and the data was collected and reported, and then statistical analysis of data was performed using SPSS software. Calculations of P values were done using QuickCalcs-Graphpad Software.

Statistical Methods and Statistical Interpretation: Chi-square test was used to calculate Two-tailed P values in our study. When presenting P values, it was helpful to use the asterisk rating system as well as quoting the P value: $P < 0.05^*$, it is statistically significant,

$P < 0.01^{**}$, it is very statistically significant,
 $P < 0.001^{***}$, it is extremely statistically significant.

RESULTS AND OBSERVATIONS

For the present study, 668 neonates (652 singleton neonates & 16 twin neonates) were recorded and studied in Paediatrics Department in Rockland hospital. These neonates were born alive to 660 mothers in Obstetrics & Gynaecology Department in Rockland hospital, during the period from 01.01.2012 till 07.08.2014.

The various 652 singleton neonates were as follows:

FT, LGA & Macrosomia-9 males & 3 females,
 FT, AGA & Normal weight-300 males & 250 females,
 FT, SGA & LBW - 12 males & 19 females,
 PT, AGA & Normal weight -16 males & 07 females,
 PT, AGA & LBW - 14 males & 10 females,
 PT, SGA & LBW - 07 males & 02 females,
 PT, SGA & VLBW - 00 male & 02 females,
 PT, SGA & ELBW - 01 male only.

The various 16 twins were as follows:

FT & LGA- nil,
 FT, AGA & Normal weight- 1 male & 2 females,
 FT, SGA & LBW - 4 males & 4 females,
 PT, AGA & Normal weight - 2 males only,
 PT, AGA & LBW- 1 male & 1 female,
 PT, SGA & LBW- 1 male only.

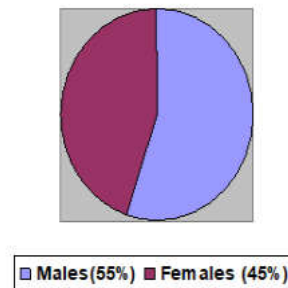


Figure 1. Pie diagram showing prevalence of sex ratio in a group of 668 neonates (368 males & 300 females) in Rockland Hospital, Delhi

In the pie diagram, it is evident that in our study, the males were 55% & the females were 45%, thus the Sex ratio of birth was 1.23 Males/Female. The sex ratio is the ratio of males to females in a population. The two-tailed P value equals 0.0085**, in the Chi-square test. By conventional criteria, this difference was considered to be very statistically significant.

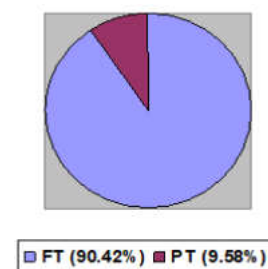


Figure 2. Pie diagram showing prevalence of preterm birth rate in a group of 668 neonates in RH, Delhi

In the present study, it is evident that the maturity rates in the 668 neonates were as follows: Fullterm birth rate was 90.42% (604 neonates) (321 singleton males, 05 twin males, 272 singleton females & 6 twin females) & Preterm birth rate was 09.58% (64 neonates) (38 singleton males, 21 singleton females, 04 twin males & 01 female twin), in the present study. The two-tailed P value was less than 0.0001***, in the Chi-square test. By conventional criteria, this difference was considered to be extremely statistically significant.

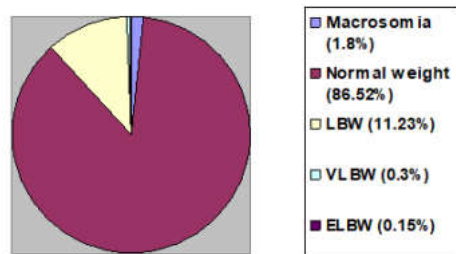


Figure 3. Pie diagram showing prevalence of LBW, VLBW & ELBW rates in a group of 668 neonates in RH, Delhi

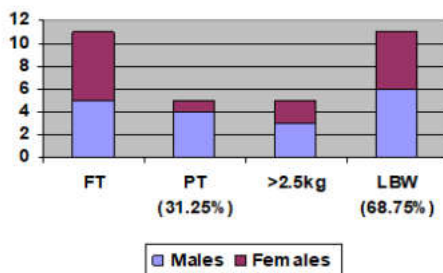


Figure 4. Bar diagram showing prevalence of preterm birth rate & LBW rate in a group of 16 twins in RH, Delhi

In the present study, it is evident that the birth weight rates in 668 neonates were as follows: Macrosomia (4kg or more) rate was 1.8 % (9 males & 3 females), Normal weight (2.5kg-3.99kg) neonates were 86.52% (578 neonates) {316 singleton males, 257 singleton females, 3 twin males & 2 twin females}, LBW rate was 11.23% (75 neonates) {39 (5.84%) term neonates (12 term singleton males, 4 term twin males & 19 term singleton females & 4 term twin females) & 36 (5.39%) PT neonates (21 preterm singleton males, 2 preterm twin males & 12 PT singleton females & 1 preterm twin female)}, VLBW rate was 0.3% (02 singleton females) & ELBW rate was 0.15% (01 singleton male only). Among the 75 (11.23%) LBW neonates, about 39 (5.84%) were term neonates. No term neonate was VLBW or ELBW. No twin was macrosomia, VLBW or ELBW.

In this study, the result shows that prematurity & twins are the 2 most important causes of LBW. The two-tailed P value was less than 0.0001***, in the Chi-square test. By conventional criteria, this difference was considered to be extremely statistically significant. In the present study, it is evident that among the 16 twins, the preterm birth rate was 31.25% (04 males & 01 female). Among the 16 twins, the LBW rate was 68.75% (06 males & 05 females). In this study, the result showed that twin pregnancy is one of the causes of LBW & prematurity. The two-tailed P value equals 0.1336, in the Chi-square test. By conventional criteria, this difference was considered to be not statistically significant.



Figure 5. Pie diagram showing prevalence of twin birth rate in Rockland Hospital, Delhi

In the pie diagram, it is evident that there were 660 mothers who gave birth to 652 singleton babies and 8 twin sets (or 16 twins). The twin birth rate was 1.21%, in our study. The two-tailed P value was less than 0.0001***, in the Chi-square test. By conventional criteria, this difference was considered to be extremely statistically significant.

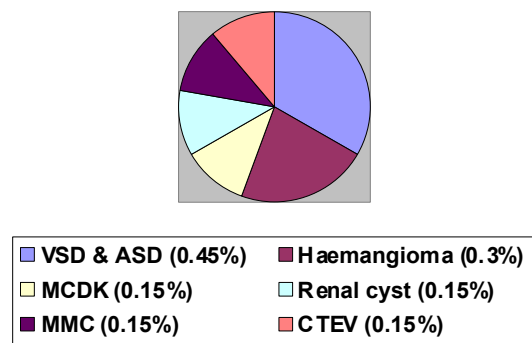


Figure 6. Pie diagram showing prevalence of congenital abnormalities in 9 neonates born in Rockland Hospital, Delhi.

In our study, it is evident that the 9 neonates born with congenital abnormalities were diagnosed as follows:

- FT / Female / AGA / Right Multicystic Dysplastic Kidney (MCDK) (largest cyst size about 14mm X10 mm)
- FT / Male / AGA / Congenital Left Renal Cystic Mass (size about 65mm X 41mm) with Hydronephrosis
- FT / Male / AGA / Hemangioma on right arm triceps area
- FT / Male / AGA / Small Capillary Haemangioma on Right Upper Eyelid
- FT / Male / AGA / Infant of Diabetic Mother / Sacral Meningomyelocele (MMC) (size about 45 mm X 38 mm)
- FT / Female / SGA / Small ASD (2.5mm)
- PT (35weeks+) / Male / AGA / Small VSD (3mm) with Right Ventricle Hypertrophy with mild Tricuspid Regurgitation
- PT (32weeks+) / Male / AGA / Small VSD
- PT (35weeks+) / Male / SGA / Early onset neonatal sepsis /

Left Side Congenital Talipes Equinovarus (CTEV)(Clubfoot) with Deep Annular Bands with Autoamputation of Digits (Absence of distal phalanx in middle & ring finger of both hands, Absence of middle & distal phalanx of index finger of left hand, Absence of distal phalanx in left 2nd toe & Absence of distal phalanx of Great toe, 2nd and 3rd toes of right foot) with Necrosis and Secondary Infection of distal phalanx of index & middle finger of left hand with Syndactyly.

Thus, in our study, prevalence of congenital abnormalities in 668 neonates was 1.35%. Congenital heart defects (0.45%) were the most commonly reported congenital anomalies in our study. The two-tailed P value was less than 0.0001***, in the Chi-square test. By conventional criteria, this difference was considered to be extremely statistically significant.

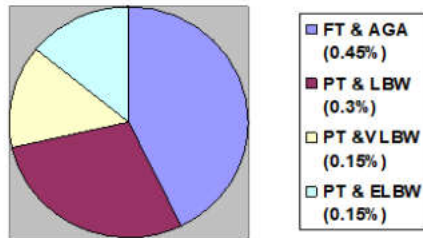


Figure 7. Pie diagram showing prevalence of prematurity & birth weight of 7 referred neonates in RH, Delhi

In our study, it is evident that the maturity, weight & diagnosis of the 7 (1.05%) referred neonates were as follows:

- PT (28-29weeks) / Female / SGA / VLBW / Hyaline Membrane Disease
- PT (29-30weeks)/Male/ SGA /LBW with Presumed Early-Onset Neonatal Sepsis with Apnea with Respiratory Failure (Requiring Mechanical Ventilation)
- PT (31-32 weeks) / Male / SGA / ELBW (920grams) / Hyaline Membrane Disease
- PT (32 weeks) / Female / SGA / LBW / Respiratory Distress Syndrome with Foetal Hydrops with Moderate to Severe Anaemia with Mild Cardiomegaly (To rule out Rh Haemolytic Disease of Newborn (ICT-Positive) & Thalassemia)
- FT / Male / AGA / Perinatal Asphyxia with Thick Meconium-Stained Amniotic Fluid with Meconium Aspiration Syndrome with Respiratory Failure requiring Mechanical Ventilation (Secondary to Pulmonary Oedema with Presumed sepsis with H/O PROM for 4 days)
- FT / Female / AGA / Perinatal Asphyxia
- FT / Female / AGA / Severe Perinatal Asphyxia with Meconium Aspiration

Thus, the referred PT neonates were 0.6% (4 neonates) while the referred FT neonates were 0.45% (3 neonates). The further outcome of these 7 neonates (4 PT & 3 FT) is not known. The two-tailed P value was less than 0.0001***, in the Chi-square test. By conventional criteria, this difference was considered to be extremely statistically significant. In the present study, no neonate discharged from Rockland hospital was reported to have bronchopulmonary dysplasia, kernicterus or cerebral palsy on follow up. The two-tailed P value was less than 0.0001***, in the Chi-square test. By conventional criteria, this difference was considered to be extremely statistically significant. Besides, the neonatal mortality rate (NMR) was zero during the period 01.01.2012 till 07.08.2014, in the Paediatrics Department in Rockland hospital (RH), Delhi, India.

$$\text{NMR} = \frac{\text{Total number of neonatal deaths (0)}}{\text{Total number of live births in RH in one year}} \times 1000$$

Thus NMR=0 in the present study. The two-tailed P value was less than 0.0001***, in the Chi-square test. By conventional criteria, this difference was considered to be extremely statistically significant.

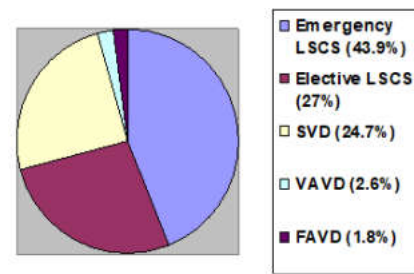


Figure 8. Pie diagram showing prevalence of methods of delivery for 652 singleton neonates & 8 twin sets in RH, Delhi

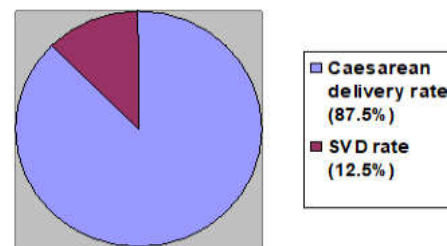


Figure 9. Pie diagram showing prevalence of caesarean delivery rate in 8 twin sets in Rockland Hospital, Delhi

In this study, it is evident that the various methods of deliveries done were approximately: Emergency LSCS- 43.9% (290) cases (285 singleton neonates & 5 twin sets), Elective LSCS- 27 % (178) cases (176 singleton neonates & 2 twin sets), SVD- 24.7% (163) cases (162 singleton neonates & 1 twin set), Ventouse assisted vaginal delivery (VAVD)- 02.6% cases (17 singleton neonates) & Forceps assisted vaginal delivery (FAVD)- 01.8% cases (12 singleton neonates). Thus, the caesarean delivery rate was 70.9%, in our study. The two-tailed P value was less than 0.0001***, in the Chi-square test. By conventional criteria, this difference was considered to be extremely statistically significant. In this study, it is evident that the various methods of deliveries done for 8 twin sets were approximately: LSCS 87.5% (Emergency LSCS- 5 twin sets & Elective LSCS- 2 twin sets), and SVD- 12.5% (1 twin set). Thus, the caesarean delivery rate was 87.5%, in our study of 8 twin sets. The two-tailed P value was equals 0.0339, in the Chi-square test. By conventional criteria, this difference was considered to be statistically significant.

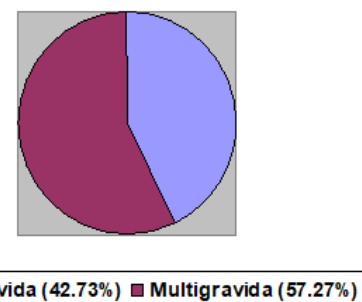


Figure 10. Pie diagram showing prevalence of primigravida mothers in Rockland Hospital, Delhi

In this pie diagram, it is evident that the primigravida mothers in our study were about 282 (42.73%) and multigravida mothers were about 378 (57.27%). The two-tailed P value equals 0.0002***, in the Chi-square test. By conventional criteria, this difference was considered to be extremely statistically significant. No maternal death was reported, where 660 deliveries were recorded in the study period. The two-tailed P value was less than 0.0001***, in the Chi-square test. By conventional criteria, this difference was considered to be extremely statistically significant.

DISCUSSION

For the present study, 668 neonates (652 singleton neonates & 16 twins) were recorded and studied in Paediatrics Department in Rockland hospital. These neonates were born to 660 mothers in Obstetrics & Gynaecology Department in Rockland hospital, during the period 01.01.2012 till 07.08.2014.

Following references support our observations:

- Among non-twin births, male singletons are slightly (about five percent) more common than female singletons. The rates for singletons vary slightly by country. For example, the sex ratio of birth in the US is 1.05 males/female,^[26] while it is 1.07 males/female in Italy.^[27]
- In our study of 368 male neonates & 300 female neonates, the Sex ratio of birth was 1.23 Males/Female. The males were about 55% & females were 45%.
- In 2010, an estimated 14.9 million babies (uncertainty range 12.3–18.1 million) were born preterm, 11.1% of all livebirths worldwide, ranging from about 5% in several European countries to 18% in some African countries. More than 60% of preterm babies were born in south Asia and sub-Saharan Africa, where 52% of the global livebirths occur. Preterm birth also affects rich countries, for example, USA has high rates and is one of the ten countries with the highest numbers of preterm births. Of the 65 countries with estimated time trends, only three (Croatia, Ecuador, and Estonia), had reduced preterm birth rates 1990–2010 (Blencowe *et al* June 2012).^[3]
- About 15 million babies are preterm each year (5% to 18% of all deliveries).^[2] In many countries, rates of premature births have increased between the 1990s and 2010s.^[2]
- The estimated global preterm birth rate for 2014 was 10.6%, equating to an estimated 14.84 million live preterm births in 2014. 12.0 million (81.1%) of these preterm births occurred in Asia and sub-Saharan Africa. Regional preterm birth rates for 2014 ranged from 13.4% in North Africa to 8.7% in Europe. India, China, Nigeria, Bangladesh, and Indonesia accounted for 57.9 million (41.4%) of 139.9 million livebirths and 6.6 million (44.6%) of preterm births globally in 2014. Globally, we estimated that the preterm birth rate was 9.8% (8.3–10.9) in 2000, and 10.6% (9.0–12.0) in 2014 (Vogel JP, *et al* 2018).^[15]
- In the United States, the preterm birth rate declined for the seventh straight year in 2013 to 11.39%; the low birth weight (LBW) rate was essentially unchanged at 8.02%.^[5] The preterm birth rate changes in that analysis were instead driven by higher multiple birth rates, as well as a higher rates of preterm birth among multiples.
- Overall, the preterm birth rate was 9.58%, in our present study.
- As weight is easier to determine than gestational age, the World Health Organization tracks rates of low birth weight (< 2500 grams), which occurred in 16.5 percent of births in less developed regions in 2000.^[2] It is estimated that one third of these low birth weight deliveries are due to preterm delivery. Almost all neonates in the VLBW & ELBW groups are born preterm^[3].
- Overall, the LBW rate was 11.23%, the VLBW rate was 0.3% & the ELBW rate was 0.15% in our study. All VLBW & ELBW neonates were preterm in our study.
- In our study, among the 16 twins, the preterm birth rate was 31.25% (04 males & 01 female) and the LBW rate was 68.75% (06 males & 05 females).
- Multiple pregnancies are much less likely to carry to full term than single births, with twin pregnancies lasting on average 37 weeks, three weeks less than full term.^[36]
- It is very common for twins to be born at a low birth weight. More than half of twins are born weighing less than 5.5 pounds (2.5 kg), while the average birth weight of a healthy baby should be around 6–8 pounds (3–4 kg).^[37] This is largely due to the fact that twins are typically born premature. Premature birth and low birth weights, especially when under 3.5 pounds (1.6 kg), can increase the risk of several health-related issues, such as vision and hearing loss, mental disabilities and cerebral palsy.^[38]
- About 1 in 90 human births (1.1%) results from a twin pregnancy.^[28]
- In 2008, Massachusetts has emerged as the most prolific producer of multiple births in the United States. The Massachusetts State has a twin birth rate of 4.5 for every 100 live births, compared with a national rate of 3.2.^[23]
- The human twin birth rate in the United States rose 76% from 1980 through 2009, from 9.4 to 16.7 twin sets (18.8 to 33.3 twins) per 1000 births.^[33] In Latin America, South Asia (India, Pakistan, Bangladesh, Nepal), and Southeast Asia, the lowest rates are found; only 6 to 9 twin sets per 1000 live births. North America and Europe have intermediate rates of 9 to 16 twin sets per 1,000 live births.^[35] The West African country of Benin has the highest national average of twinning, with a rate of 27.9 twins per 1,000 births, i.e. 2.79%.^[24]
- The birth rate of twin sets was 1.21% (or 12 twin sets per 1000 live births), in our study.
- It is estimated that 75% of twin pregnancies in the United States were delivered by caesarean section in 2008.^[29] In comparison, the rate of caesarean section for all pregnancies in the general population varies between 14% and 40%.^[30]
- The caesarean delivery rate was 87.5%, in our study of 8 twin sets.

Following references partly support our observations:

- Common complications of preterm birth are high rates of respiratory distress syndrome, bronchopulmonary dysplasia, necrotising enterocolitis, sepsis, periventricular leucomalacia, seizures, intraventricular haemorrhage, cerebral palsy, infections, feeding difficulties, hypoxic ischaemic encephalopathy, and visual and hearing problems. (Vogel JP, *et al*, 2014).^[14]

- In our study, no neonate discharged from Rockland hospital was reported to have bronchopulmonary dysplasia, kernicterus or cerebral palsy on follow up.
- Complications of preterm birth were the leading cause of death in children younger than 5 years of age globally in 2016, accounting for approximately 16% of all deaths, and 35% of deaths among newborn babies. Preterm neonates who survive are at greater risk of a range of short-term and long-term morbidities. (Vogel JP, *et al* 2018).^[15]
- Preterm birth is the most common cause of death among infants worldwide.^[1] Complications from preterm births resulted in 0.81 million deaths in 2015 down from 1.57 million in 1990.^{[3][7]} The chance of survival at 22 weeks is about 6%, while at 23 weeks it is 26%, 24 weeks 55% and 25 weeks about 72%.^[8] The chances of survival without any long-term difficulties are lower.^[9] Approximately 0.5% of births are extremely early perivable births, and these account for most of the deaths.^[6]
- Among 1822 births, the total prevalence of major congenital anomalies was 230.51 (170.99–310.11) per 10 000 births. Congenital heart defects were the most commonly reported anomalies in the cohort with a prevalence of 65.86 (37.72–114.77) per 10 000 births. This first cohort study from India establishes that the congenital anomaly rates were high, affecting one in forty four births in the cohort. In this cohort, congenital anomalies were the second largest cause of neonatal deaths.^[44]
- In our study, prevalence of congenital abnormalities in 668 neonates was 1.35%. Congenital heart defects (0.45%) were the most commonly reported congenital anomalies in our study.
- Neonatal mortality rate of India fell gradually from 85.2 deaths per thousand live births in 1969 to 22.7 deaths per thousand live births in 2018.^[42]
- In our study, no neonate was born less than 28 weeks. In the present study, the neonatal mortality rate (NMR) was zero. In the present study, about 7 neonates (1.05%) were referred to the higher centre. The further outcome of these 7 neonates (3 FT & 4 PT) is not known.
- India's Maternal Mortality Ratio (MMR) has seen a decline from 130 per 1 lakh live births in 2014-2016 to 122 per 1 lakh live births in 2015-2017.^[43]
- No maternal death was reported, where 660 deliveries were recorded in our study period.

Following studies don't support our observations

- The Yoruba people have the highest rate of twinning in the world, at 45–50 twin sets (90–100 twins) per 1000 live births,^[34] possibly because of high consumption of a specific type of yam containing a natural phytoestrogen which may stimulate the ovaries to release an egg from each side. In Central Africa, there are 18–30 twin sets (or 36–60 twins) per 1000 live births.^[35]
- The twin birth rate was 1.21%, in our study.
- In the United States, in 2013, the caesarean delivery rate declined to 32.7% from 32.8% for 2012.^[5]
- In our study, the caesarean delivery rate was 70.9%.

Summary

In this study, the aim was to find out the prevalence of sex ratio, preterm birth rate, low birth weight rate, twin birth rate,

congenital abnormalities, caesarean delivery rate, morbidity & mortality rate in a group of neonates born alive in a tertiary care hospital in Delhi, India. For the present study, 668 neonates (652 singleton neonates & 16 twin neonates) were recorded and studied in Paediatrics Department in Rockland hospital. These neonates were born alive to 660 mothers in Obstetrics & Gynaecology Department in Rockland hospital, during the period 01.01.2012 till 07.08.2014. Participants that satisfied the inclusion criteria were selected and the participants who did not meet the inclusion criteria were excluded. Neonate's history information was collected in questionnaires and data was collected and reported, and then statistical analysis of data was performed using SPSS software. Calculations of P values were done using QuickCalcs-Graphpad Software. The Chi-square test was used to analyze the collected data. In our study, the 668 neonates were born alive to 660 mothers (42.73% primigravida & 57.27% multigravida) by LSCS in 70.9% cases & by vaginal delivery in 29.1% cases, in Rockland hospital, during the period from 01.01.2012 till 07.08.2014.

In our study of 668 neonates (368 males & 300 females), the Sex ratio of birth was 1.23 males/female, preterm birth rate was 9.58%, LBW rate was 11.23%, VLBW rate was 0.3%, ELBW rate was 0.15% & twin birth rate was 1.21%. The prevalence of congenital abnormalities was 1.35% and the congenital heart defects (0.45%) were the most commonly reported congenital anomalies in our study. In our study, no neonate was born less than 28 weeks. In the present study, about 7 neonates (1.05%) were referred to the higher centre. The further outcome of these 7 neonates (3 FT & 4 PT) is not known. In the present study, no neonate discharged from Rockland hospital was reported to have bronchopulmonary dysplasia, kernicterus or cerebral palsy on follow up. Besides, the NMR was zero, in our study. By conventional criteria, this difference was considered to be extremely statistically significant.

Conclusion

From this study of 668 neonates (368 males & 300 females), it is concluded that the Sex ratio of birth was 1.23 males/female, preterm birth rate was 9.58%, LBW rate was 11.23%, VLBW rate was 0.3%, ELBW rate was 0.15%, twin birth rate was 1.21% & caesarean delivery rate was 70.9%. The prevalence of congenital abnormalities was 1.35% and the congenital heart defects (0.45%) were the most commonly reported congenital anomalies in our study. In the present study, about 7 neonates (1.05%) were referred to the higher centre. The further outcome of these 7 neonates (3 FT & 4 PT) is not known. In the present study, no neonate discharged from Rockland hospital was reported to have bronchopulmonary dysplasia, kernicterus or cerebral palsy on follow up. Besides, the NMR was zero, in our study. By conventional criteria, this difference was considered to be extremely statistically significant.

REFERENCES

1. Preterm Labor and Birth: Condition Information". National Institutes of Health. 3 November 2014. Archived from the original on 2 April 2015. Retrieved 7 March 2015.
2. World Health Organization (November 2014). "Preterm birth Fact sheet N°363". who.int.
3. Blencowe H, *et al*. National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time

- trends since 1990 for selected countries: a systematic analysis and implications. *The Lancet*. Volume 379, Issue 9832, 9–15 June 2012, Pages 2162–2172
4. Centers for Disease Control and Prevention. (n.d.). Preterm birth. Retrieved September 17, 2013, from <http://www.cdc.gov/reproductivehealth/maternalinfanthealth/PretermBirth.htm>
 5. Mathews, T. J.; Minino, A. M.; Osterman, M. J. K.; Strobino, D. M.; Guyer, B. (20 December 2010). "Annual Summary of Vital Statistics: 2008". *Pediatrics*. 127 (1): 146–157. doi:10.1542/peds.2010-175. ISSN 0031-4005. PMC 4079290. PMID 21173001.
 6. American College of Obstetricians Gynecologists; Society for Maternal-Fetal Medicine (October 2017). "Obstetric Care consensus No. 6: Periviable Birth". *Obstetrics and Gynecology*. 130 (4): e187e199. doi:10.1097/AOG.0000000000002352. PMID 28937572.
 7. GBD 2013 Mortality and Causes of Death Collaborators (January 2015). "Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013". *Lancet*. 385 (9963): 117–71. doi:10.1016/S0140-6736(14)61682-2. PMC 4340604. PMID 25530442.
 8. Cloherty and Stark's Manual of Neonatal Care (8 ed.). Lippincott Williams & Wilkins. 2016. p. 161. ISBN 9781496367495.
 9. Jarjour IT (February 2015). "Neuro developmental outcome after extreme prematurity: a review of the literature". *Pediatric Neurology*. 52 (2):143–52. doi: 10.1016/j.pediatrneurol. 2014.10.027. PMID 25497122.
 10. Saigal S, Doyle LW (January 2008). "An overview of mortality and sequelae of preterm birth from infancy to adulthood". *Lancet*. 371 (9608): 261–9. doi:10.1016/S0140-6736(08)60136-1. PMID 18207020.
 11. March of Dimes. (2012). *The March of Dimes Foundation Data Book for Policy Makers: Maternal, Infant, and Child Health in the United States 2012*. Retrieved March 5, 2014, from <http://www.marchofdimes.com/materials/Databookforpolycymakers.pdf>
 12. "Data and statistics". World Health Organization. Archived from the original on 16 February 2007.
 13. Subramanian, KNS (18 June 2009). "Extremely Low Birth Weight Infant". *eMedicine*. Archived from the original on 21 November 2008. Retrieved 26 August 2009.
 14. Vogel JP, Chawanpaiboon S, Watananirun K, Lumbiganon P, Petzold M, Moller AB, *et al*. Global, regional and national levels and trends of preterm birth rates for 1990 to 2014: protocol for development of World Health Organization estimates. *Reprod Health* 2016;13(1):76.
 15. Vogel JP, *et al*. The global epidemiology of preterm birth, Best Practice & Research Clinical Obstetrics and Gynaecology (2018), <https://doi.org/10.1016/j.bpobgyn.2018.04.00>
 16. WHO. Countries, 2017. <http://www.who.int/countries/en/> (accessed Sept 13, 2017).
 17. Mikkelsen L, Phillips DE, AbouZahr C, *et al*. A global assessment of civil registration and vital statistics systems: monitoring data quality and progress. *Lancet* 2015; 386: 1395–406.
 18. WHO. World Health Statistics 2015. Geneva: World Health Organization; 2015. http://www.who.int/gho/publications/world_health_statistic/s/2015/en/ (accessed Oct 7, 2018).
 19. Hamilton B, Martin J, Osterman M. National vital statistics reports. Births: preliminary data for 2015. Atlanta, GA: US Department of Health and Human Services; 2015.
 20. WHO. Civil registration and vital statistics 2013: challenges, best practice and design principles for modern systems. Geneva, Switzerland; 2013.
 21. WHO. Making every baby count: audit and review of stillbirths and neonatal deaths. 2016. http://www.who.int/maternal_child_adolescent/documents/stillbirth-neonatal-death-review/en/ (accessed Oct 7, 2018).
 22. WHO. Preterm birth. Fact sheet: reviewed November 2016. <http://www.who.int/news-room/fact-sheets/detail/preterm-birth> (accessed Oct 25, 2018).
 23. Schweitzer, Sarah (2008-06-17). "Massachusetts, land of twins". *Boston.com*. Retrieved 2018-01-08.
 24. Countries With Most Twins Identified". *Live Science*. Retrieved 2018-01-08.
 25. Behrman RE, Stith Butler A, eds. Institute of Medicine, Committee on Understanding Preterm Birth and Assuring Healthy Outcomes. *Preterm Birth: Causes, Consequences, and Prevention*. Washington, DC: The National Academies Press; 2007.
 26. "United States: People". *The World Factbook*. Central Intelligence Agency. 2008-09-04. Retrieved 2008-10-02.
 27. "Italy: People". *The World Factbook*. Central Intelligence Agency. 2008-09-04. Retrieved 2008-10-02
 28. Asch, Richard H.; John Studd (1995). *Progress in Reproductive Medicine Volume II*. Informa. ISBN 978-1-85070-574-1. ISSN 1358-8702. OCLC 36287045.
 29. Lee HC, Gould JB, Boscardin WJ, El-Sayed YY, Blumenfeld YJ (2011). "Trends in caesarean delivery for twin births in the United States: 1995–2008". *Obstet Gynecol*. 118 (5): 1095–101. doi:10.1097/AOG.0b013e3182318651. PMC 3202294. PMID 22015878.
 30. Women can choose Caesarean birth - BBC article by James Gallagher. 2011.
 31. Lee HC, Gould JB, Boscardin WJ, El-Sayed YY, Blumenfeld YJ (2011). "Trends in caesarean delivery for twin births in the United States: 1995–2008". *Obstet Gynecol*. 118 (5): 1095–101. doi:10.1097/AOG.0b013e3182318651. PMC 3202294. PMID 22015878.
 32. Women can choose Caesarean birth - BBC article by James Gallagher. 2011. ^ Orwant, Jon. "Heterogeneous learning in the Doppelgänger user modeling system." *User Modeling and User-Adapted Interaction* 4.2 (1994): 107–130.
 33. Martin, Joyce A.; Hamilton, Brady E.; Osterman, Michelle J.K. "Three Decades of Twin Births in the United States, 1980–2009" [1], National Center for Health Statistics Data Brief, No. 80, January 2012
 34. Zach, Terence; Arun K Pramanik; Susannah P Ford (2007-10-02). "Multiple Births". *WebMD*. Retrieved 2008-09-29.
 35. Smits, Jeroen; Christiaan Monden (2011). Newell, Marie-Louise (ed.). "Twinning across the Developing World". *PLOS ONE*. 6 (9): e25239. doi:10.1371/journal.pone.0025239. PMC 3182188. PMID 21980404.
 36. Elliott, JP (December 2008). "Preterm labor in twins and high-order multiples". *Clinical Perinatology*. 34 (4): 599–609. doi:10.1016/j.clp.2007.10.004. PMID 18063108. Unlike singleton gestation where identification of patients at risk for PTL is often difficult, every multiple gestation is at risk for PTL, so all patients can be managed as being at risk.

37. Risks Linked With Twin Births". WebMD. Retrieved 2015-10-23.
38. Very Low Birthweight - Online Medical Encyclopedia - University of Rochester Medical Center". www.urmc.rochester.edu. Retrieved 2015-10-23.
39. Pregnant with twins: potential complications". BabyCentre. Retrieved 2015-10-26.
40. Biswas, A; Su, LL; Mattar, C (Apr 2013). "Caesarean section for preterm birth and, breech presentation and twin pregnancies". Best Practice & Research. Clinical Obstetrics & Gynaecology. 27 (2): 209–19. doi:10.1016/j.bpobgyn.2012.09.002. PMID 23062593.
41. Are there more male twins or female twins?". Washington State Twin Registry. Retrieved 24 July 2018.
42. India Neonatal mortality rate, 1960-2018 - knoema.com
43. Maternal death rate declining: report - The Hindu.Nov 8, 2019
44. Prajka Bhide, Pooja Gund, Anita Kar. Prevalence of Congenital Anomalies in an Indian Maternal Cohort: Healthcare, Prevention, and Surveillance Implications. PLoS One. 2016; 11(11): e0166408. Published online 2016 Nov 10. doi: 10.1371/journal.pone.0166408 PMID:PMc5104451.
