"MATERNAL AND NEONATAL OUTCOME IN TWIN PREGNANCY IN TERTIARY CARE CENTRE- A CROSS-SECTIONAL STUDY"

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LIST OF ABBREVIATIONS

APH	-	Ante partum haemorrhage
CHD	-	Congenital heart disease
CRL	-	Crown-rump length
CCT	-	Controlled Cord Traction
DC	-	Dichorionic
DCDA	-	Dichorionic diamniotic
DIC	-	Disseminated intravascular coagulation
FSH	-	Follicle Stimulating Hormone
FHS	-	Foetal heart sounds
FGR	-	Foetal growth restriction
GDM	-	Gestational diabetes mellitus
hCG	-	Human chorionic gonadotropin
HEV	-	Hepatitis E virus
HELLP	-	Hemolysis Elevated Liver Enzymes & Low Platelets
HMD	-	Hyaline membrane disease
TTN	-	Transient tachyponea of newborn
ICU	-	Intensive care unit
ICH	-	Intracranial haemorrhage
IUD	-	Intra Uterine Death
IUFD	-	Intra uterine foetal death
IUGR	-	Intra uterine growth retardation
IUI	-	Intra uterine insemination
IVF	-	In Vitro Fertilization
IVH	-	Intra ventricular haemorrhage
LBW	-	Low birth weight
LSCS	-	Lower segment caesarian section
MC	-	Monochorionic
MCA	-	PSV – Middle Cerebral Artey –Peak Systoloic Volume
MCDA	-	Monochorionic diamniotic
MCMA	-	Monochorionic monoamniotic

MoM	-	Multiples of median
MRI	-	Magnetic resonance imaging
NEC	-	Necrotising enterocolitis
PE	-	Pre-eclampsia
PV	-	Pervaginal
NICU	-	Neonatal intensive care unit
NT	-	Nuchal translucency
PIH	-	Pregnancy induced hypertension
PPH	-	Post partum haemorrhage
PPROM	-	Preterm premature rupture of membrane
PROM	-	Preterm rupture of membrane
RDS	-	Respiratory distress syndrome
ROP	-	Retinopathy of prematurity
TAPS	-	Twin anemia polycythemia sequence
TRAP	-	Twin reversed arterial perfusion
TTTS	-	Twin to twin transfusion syndrome
VLBW	-	Very low birth weight
C-C	-	Cephalic- Cephalic
B-B	-	Breech–Breech
C-B	-	Cephalic- Breech
C-T	–	Cephalic– Transverse
B-T	-	Breech – Transverse
B-C	–	Breech – Cephalic
T-B	-	Transverse- Breech
T-B	-	Transverse- Breech
T-T	-	Transverse– Transverse

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INTRODUCTION

The scientific study of twins and twinning is called as GEMELLOLOGY. Twining is mainly due to environmental & genetic factors such as increased parity & maternal age. Due to reasons like elderly primigravida and the use of assisted reproductive techniques & ovulation inducing agents, the incidence of twin pregnancy is increasing. This increase in twin gestation is due to change in women's attitude regarding child bearing which has resulted in more and more women choosing to postpone child bearing in favour of work and career commitments. This delayed childbearing has resulted in an increased maternal age at conception, which in turn has led to infertility treatment such as ovulation induction, in vitro fertilization and intra cytoplasmic sperm injection as one of the predisposing factors of twin gestation, since fertility decreases with age.

Globally, the highest incidence is found in Sub- Saharan Africa, with average twinning of 20 per 1,000 deliveries compared to 10 per 1,000 deliveries in Europe and 5-6 per 1,000 deliveries in Asia. Japan has the lowest incidence of twins 4/1000, whereas highest incidence has been reported in Nigeria 54/1000. In India, twinning occurs approximately in 1% of all pregnancy and has been responsible for 10% of perinatal mortality [2,4]. The increase of multiple births is a public health concern, the higher rate of preterm of these neonates compromise their survival chances and increase their risk of lifelong disability.

The causes of dizygosity (DZ) twinning are much better understood than the causes of monochorionic (MZ) twinning. DZ twins result from multiple ovulation, which is associated with higher maternal follicle-stimulating hormone (FSH) levels. FSH levels, and thus rates of DZ twinning, vary with season, geography, maternal age, and body

habitus. Increases in DZ twins have been reported in summer months, locations with more daylight hours, and taller, heavier, and older mothers.[1]

Theories for MZ twinning in humans include fertilization of an old ovum with a more fragile zona pellucida or inadequate cytoplasm and with damage to the inner cell mass leading to two separate points of regrowth and splitting of the fertilized ovum.[3] MZ twinning rates are constant across all variables, with the exception of assisted reproduction[1].

Twin pregnancy is associated with increased maternal and perinatal morbidity and mortality as well as healthcare costs. Common maternal complications reported in various studies are nutritional anemia, pregnancy induced hypertension, antepartum hemorrhage, preterm labour and polyhydramnios. The major problems occurring in twin pregnancy are prematurity, low birth weight, intra uterine growth retardation, birth trauma, birth asphyxia, intraventricular hemorrhage, sepsis, necrotizing enterocolitis, respiratory distress syndrome and congenital anomalies and foetal complications peculiar to twin pregnancies. About one fourth of twins require neonatal (NICU) admission. Twins when compared to singleton pregnancy, have a fivefold risk of dying before they reach one year. Mother of a twin pregnancy has a risk of getting transferred to ICU (Intensive Care Unit) at a rate of 3.1%, whereas for a singleton pregnancy it is only 0.3%[2]. It is also responsible for repeated antenatal admissions, longer hospital stay, blood transfusions and increase in operative vaginal or cesarean delivery, post-partum hemorrhage and hysterectomy. Foetal complications are reported to be more in monozygotic pregnancies as compared to dizygotic twins. Monochorionic twin gestations are at higher risk of preterm labour, discordant foetal growth, abnormal vascular communications, foetal malformations, cord complications and stillbirths. Twin pregnancies though accounting for only a lesser percentage for live births, are known to account for a disproportionate percentage for all

the adverse perinatal outcomes. The perinatal complications in MC twin pregnancies are higher than DC twins [3-6]. The reason for such an increase is that MC twins have a shared placenta with vascular anastomoses which in turn leads to shunting of blood between the two twins. Because of the risks involved in twin pregnancies, they demand extremely vigilant antepartum, intrapartum and postpartum care. Vigilant obstetric care & timely intervention not only decreases the maternal morbidity and mortality but also improves the foetal outcome. Hence this study was undertaken to assess the maternal and perinatal complications with twin pregnancy.

OBJECTIVE OF THE STUDY

- **Primary objective:** "To study the maternal & neonatal outcome in twin pregnancy at tertiary care centre"
- **Secondary objective**: "To study the prevalence of twin pregnancy"

REVIEW OF THE LITERATURE:

Study done in the year of 2015, showed that the incidence of twin pregnancy is highest in the age group of 20-30yrs and incidence among primigravida and multigravida were almost the same, most of them delivered vaginally followed by lower segment caesarean section (LSCS). The commonest gestational age at delivery was 33-36 weeks its incidence was 46% and it was the same. Pre-term labour is the most common complication encountered in the mothers. The incidence of low birth weight babies was more common and 5-6% of neonatal deaths were noticed.

In a study done in 2014 by Dr. Bhavana et al. 60% were multigravida. 76.6% had spontaneous conception & 23.3% had ovulation induction. About 73.3% were in age group of 20-25 years. 60% had dichorionic diamniotic twins. 50% of them were complicated with anaemia, 30% with hypertension. 76.6% had preterm deliveries and 23% term deliveries. 47% had spontaneous vaginal delivery versus 53% LSCS. Mean gestational age at delivery was 35.4 weeks. Of 60 babies, 57 % weighed between 1.5-2.5 kg. 50% needed NICU admission, perinatal mortality being 13 (21%), 2 were still births, 7 due to prematurity and low birth weight (LBW). No maternal mortality noted[15].

In a study done in 2015 by Amiben V. Gajera1, Hiremath P. Basavannayya1, C. Kavitha et al, Out of the 100 twin pregnancies 70 patients were booked, incidence of twin pregnancy was highest in the age group of 20-24 years followed by 25-29 years which were 51% and 29% respectively. Least incidence was seen in patients above 35 years which was around 2%, maximum twin pregnancies were a result of spontaneous conception, most of the patients (46%) delivered at 33- 36 weeks of gestation. 5% of patients had abortion at an early gestation. Six women delivered at or before 24 weeks of gestation and only 26% had completed 37 weeks. Vertex-vertex is the most common presentation (60%) followed by vertex- breech presentation (25%), least was either vertex

– transverse or breech – transverse, Majority of the patients delivered vaginally (61%), followed by LSCS (38%)[16].

In a study done in 2015 by Dr. Anjali Vivek Kanhere et al majority of patients 44 (80%) were in age group of 20-30 years. 55% patients were booked and 62% were from urban area. 18 (32%) patients could reach beyond 37 weeks, there were 21 (38%) cases between 34 to 37 weeks and 16 (29%) between 30 to 34 weeks of gestation. Preterm delivery was the commonest complication occurring in 67% of the cases. Cephalic presentation of both the babies occurred in 36% of the cases. 50% of the twins needed admission to NICU for various indications like prematurity, birth asphyxia, low birth weight, meconium staining of liquor & delivery by caesarean section. In our study among the 55 twin births there were 16 (29 %) perinatal deaths and one maternal mortality.

In a study done in 2013 by Dr. C. Manju Yadav et al the incidence of multiple pregnancies was 1.09% of which 235 are twins, 6 triplets and 1 quadruplet. 60.3% of multiple pregnancies is found in age group of 21-25yrs, 41.3% incidence is noted in primigravidas.7.36% have family history of multiple pregnancy ,5.3% in maternal side and 2.06% in paternal side.9.09% taken ovulation induction drugs, 3.3% had past history of twin pregnancy. Maternal complications were preterm labour 43.3%, anaemia 26.03%, hypertensive disorders 19.4%, and severe postpartum haemorrhage 2.4% were seen. Vertex-vertex was the most common presentation noted with 63.6% followed by breech-breech 11.5%. Incidence of caesarean section accounts for 28.5% and exclusively for 2nd twin is 4% and the most common indication was non vertex presentation of 1st twin. Dichorionic placentation accounts for 65.7% monochorionic in 31.3% and trichorionic in 2.4% of cases. Perinatal deaths are highest when birth weight is < 1.5kg, Intertwin delivery interval, gestational age and monochorioncity had a significant association with perinatal

mortality. Perinatal morbidity is twin 1 is 16.7% and twin 2 is 18.5%. No maternal deaths noted[17].

In a study done in 2017 by Gundu Vanaja, Polumuru Usha Devi et al[11] out if 100 twin pregnancy 73 women (73%) were booked and 27 women (27%) were unbooked. Maternal and perinatal complications were more in unbooked cases. Incidence of preeclampsia was 22%, gestational hypertension cases 10% and eclampsia cases twice more than the singleton pregnancy. Incidence of poly-hydramnios 5%, Anemia was 40%, APH was 1%, pre-term labour – 30%. Intrapartum and postpartum complications like PROM – 20%, uterine inertia – 6%, cord prolapse – 2%, PPS – 13%, LSCS rate – 40%[18].

In a similar study done in 2016 by Vidyadhar B. Banga et al, 100 cases of twin gestation delivered at tertiary care referral hospital over a period of fifteen months. It was observed that the incidence of twins was 1.49 %. 76% cases were booked. Preterm labour (84%) was the commonest obstetric complication, nutritional anemia (66%) and pregnancy induced hypertension (18%) were the most common medical complications. The rate of caesarean section was 33%. There were 35 perinatal deaths, of which 20 were early neonatal deaths. Extreme prematurity (37%) and very low birth weight (33%) predisposed majority of perinatal deaths. Causes of neonatal deaths were respiratory distress, fulminant septicemia, pulmonary hemorrhage and DIC. Judicious use of ovulation induction drugs can reduce the incidence of twin gestation[19].

In a study done by Nisha Nathu Thakre & Rajshree Dayanand Katke, in 2017, prematurity was the most common complication among the multiple pregnancies, in both twins (49.6%) and triplets. Followed by 6.1% of the twins with intrauterine foetal death, 3.9% twins having polyhydramnios, 1.5% having congenital anomaly like hydrocephalous, and other neural tube defects, 1.9% twins had IUGR. Among the maternal

risks in multiple pregnancy, the majority of patients developed preterm labour (48.4%) and 14.6% developed PIH, 11.5% patients had PROM, Polyhydramnios was present in 3.8% patients, 1.538% patients had abruption, 1.538% patients had PPH, 3.7% of patients were hypothyroid, amongst others included one case of Heart disease, Autoimmune hepatitis, hepatitis E virus (HEV) positive, HBs Ag positive and tubercular pleural effusion each. The outcome of all the 128 cases of twins and 2 cases of triplets were studied in detail. Of which 70 patients presented in labour and 50 patients were admitted in hospital as high risk pregnancies.[20]

In a study done by Burri Sandhya Rani, Tolety Vijaya Lakshmi in 2017 women were in their fertile age i.e. in between 20-30 years of age (86.6%). In both primigravida and multigravidas, the twins were equal. Preterm labour complications were seen in 88.8% of the patients and pregnancy induced hypertension (PIH) was seen in 11.2% of the patients. Anaemia was the most common complication seen in the patients which constituted to 33.3%. Number of patients who underwent mode of delivery through spontaneous vaginal section were 60 which constituted 66.7%, caesarean section were 25 which constituted 27.7%, instrumental vaginal section were 5 which constituted 5.6%. The number of patients who had the foetal birth weight <1500 grams were 59 which constituted 32.8%, between 1500 grams to 2000 grams were 66 which constituted 36.6%, >2000 grams were 55 which constituted 30.6%. The number of male babies were 110 (61.1%) and female babies were 70 (38.9%). Number of live births were 170 (94.4%), still births were 10 (5.6%). Number of patients admitted in ICU were 100 (55.6%), Neonatal morbidity was seen in 38 patients (21.1%), neonatal mortality was seen in 10 patients (5.6%). The most common cause of neonatal death was septicaemia followed by respiratory distress, pulmonary distress and disseminated intravascular coagulation (DIC) [21].

PHYSIOLOGIC ADAPTATIONS OF THE MOTHER TO TWIN PREGNANACY:

Degree of physiologic adaptation to pregnancy is 3 times exaggerated in multiple pregnancy.[3]

Uterine size in twin pregnancy of 25 weeks period of gestation is equal to that of a term singleton gestation. By term, total uterine volume is 10,000 mL, and weight of the uterus along with its contents exceed 8 kg.[2]

1) Cardiovascular System:

Cardiac output is increased in comparison with singleton gestations, resulting in increased cardiac output. Vascular resistance was low in twin pregnancy throughout pregnancy compared with singleton ones.[2]

2) Endocrine system:

Increased human placental lactogen could be a risk for gestational diabetes in multifoetal pregnancies. There is increased a-fetoprotein level, tidal volume and glomerular filtration rate.[12]

3) Gastrointestinal system:

Increased production of multiple placental proteins such as human chorionic gonadotropin may contribute to clinical conditions such as a greater risk for hyperemesis.[1]

4) Hematologic system:

Plasma volume increases by 500 mL more than the normal along with total body water. There is no corresponding increase in red cell volume resulting in exaggerated hemodilution and anemia.[12]

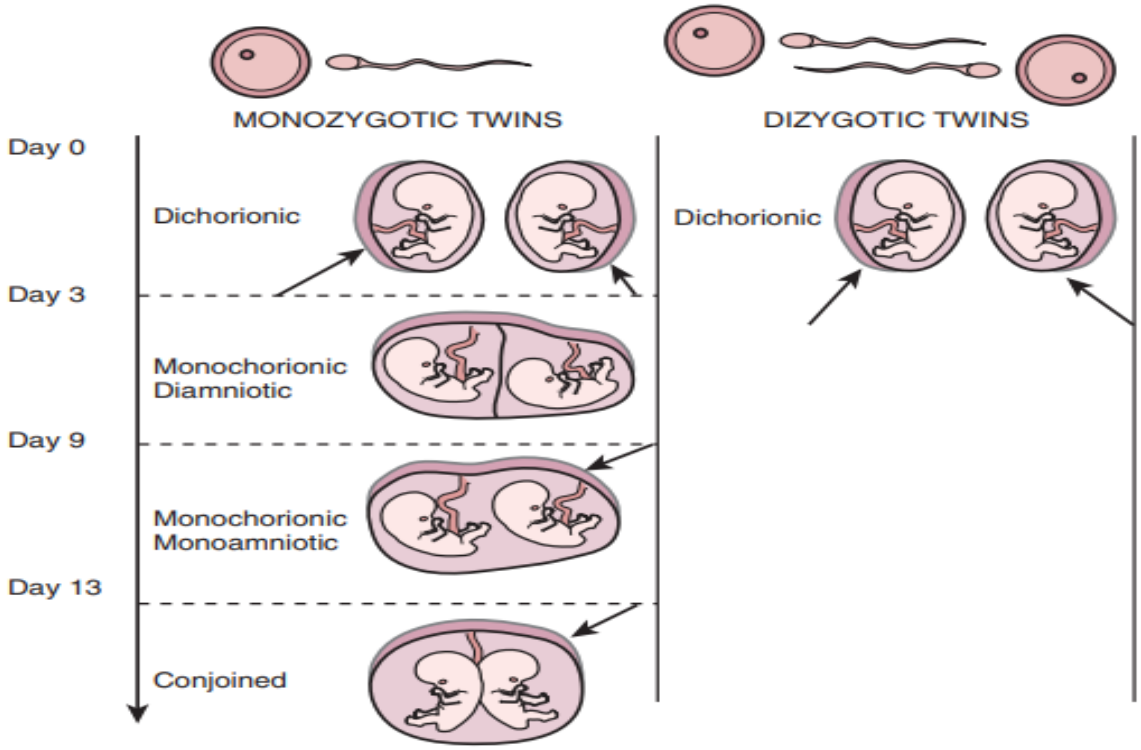
During the early gestation the diastolic blood pressure is low in twin pregnancy as compared with singleton pregnancy and it increases when it is near term. Clinical effects of decreased colloid oncotic pressure are increased dependent edema as well as a heightened sensitivity to pulmonary edema, this risk must be considered while giving tocolysis.[1]

GENESIS OF TWINS

Mechanisms behind cleavage of inner cell mass or fertilized ovum into two genetically same individuals, it is known that timing of this division in early embryonic life determines placentation of twins and its morbidity.

1. Dichorionic diamniotic twins (DCDA): In this division occurs at blastomere stage, within 3 days of fertilization before differentiation of inner-cell mass. Separate embryos grow and develops its own anion & chorion.
2. Diamnionic/Monochorionic (MCDA): Division occurs between 4-8thday following fertilization, where there is two seperate inner-cell mass & amnion.
3. Monochorionic monoamniotic twins (MCMA): The division occur between 7 and 13 days in the primitive germ disc at. The twins lie in the same amniotic sac.
4. Conjoined twins: there is no complete separation of inner-cell mass.

FIGURE 1: ZYGOSITY & TWINNING



RISK FACTORS

1) Maternal Age: Maternal age is an important risk factor for twin pregnancies. Dizygotic twin increases fourfold between the age of 15 and 37 years. The rate of natural twinning rises from 0 at puberty to peak at 37 years of age, when maximal hormonal stimulation increases the rate of double ovulation.[3]
2) Race: The rate of twin pregnancy varies depending on the race & ethnicity. The level of FSH varies among different race. Highest number of twins is seen in Nigeria among the population who consume a type of yarm which stimulates ovulation & lowest frequency is seen in Japan 14-17[1].
3) Heredity: History of twins in the mother side is more significant paternal side. Pregnant women who themselves were twin gave birth to twins at a rate of 1 set

per 58 births. Women who were not twins by birth, but whose husbands were dizygotic twin, delivered twins at a rate of 1 per 116 pregnancies.[3]

4) Parity: Increasing parity independently raises the incidence of twinning in all population. In a two-year study from Nigeria, Olusanya (2012) calculated the effects of multiparity compared with primiparity. They found an eightfold rise in multifoetal gestation rates when parity was ≤4, and a 20-fold rise when parity was ≥5.3.
5) Nutrition: Taller and heavier women had a twinning rate 25 to 30 percent greater than short, nutritionally deprived women. Twinning correlated more with nutrition than with body size.[3]
6) Pituitary Gonadotrophins: The common factor linking race, age, weight, and fertility to multifoetal gestation may be FSH levels. Greater fecundity and a higher rate of dizygotic twinning have been reported in women who conceive within 1 month after stopping oral contraceptives, but not during subsequent months (Rothman, 1977). This due to the sudden release of pituitary gonadotropin in amounts greater than usual during the first spontaneous cycle after stopping hormonal contraception. The paradox of declining fertility but increasing twinning with advancing maternal age can be explained by an exaggerated pituitary release of FSH in response to decreased negative feedback from impending ovarian failure.
7) Infertility Treatment: Ovulation induction with FSH plus human chorionic gonadotropin (hCG) or clomiphene citrate remarkably enhances the likelihood of multiple concurrent ovulation. In vitro fertilization (IVF), the greater the number of embryos that are transferred, the greater the risk of twins and other multifoetal gestations. [3]

DIAGNOSIS

History:

(i) History of infertility treatment, like use of IVF & ovulation induction drugs.

(ii) Family history of twins (maternal side).

Symptoms:

(i) increased nausea and vomiting

(ii) cardiorespiratory embarrassment more during near term—such as palpitation or shortness of breath

(iii) increased incidence swelling of legs, varicose veins and haemorrhoids,

(iv) rapid rises in the fundal height & experience increased foetal movements

General Examination:

(i) Anemia is more common than in singleton.

(ii) Excessive weight gain even after ruling out preeclampsia or obesity.

(iii) Increased prevalence of preeclampsia (25%).

Abdominal Examination:

Inspection: barrel shaped abdomen due to overdistension.

Palpation:

(i) uterine height is more than the period of gestation. It is evident from mid pregnancy.

(ii) abdominal girth is more than the singleton term gestation (100 cm).

(iii) multiple foetal parts felt.

(iv) palpation of two foetal heads or three foetal poles makes diagnosis more certain.

Auscultation: two foetal heart sounds (FHS) heard 10cm apart with a difference of 10bpm.

Propable findings

a. Familial history

b. Hyperemesis gravidarum

c. The uterine height is more for the period of gestation

Definitive signs

a. sonography shows the presence of two embryos

b. Palpation of 2 heads

c. Two foetal hearts auscultated at the same time differing in rate by at least 10 beats/min

LIE AND PRESENTATION: Commonest lie of the foetuses is longitudinal (90%) but malpresentations ar0e also common.

(1) both vertex (50%),

(2) first twin vertex and second twin breech (30%),

(3) first twin breech and second twin vertex (10%),

(4) both breech (10%),

(5) first twin vertex and second twin transverse

(6) both twin transverse- rarest rule out the possibility of conjoined twins[7].

USG EVALUATION OF TWIN PREGNANCY

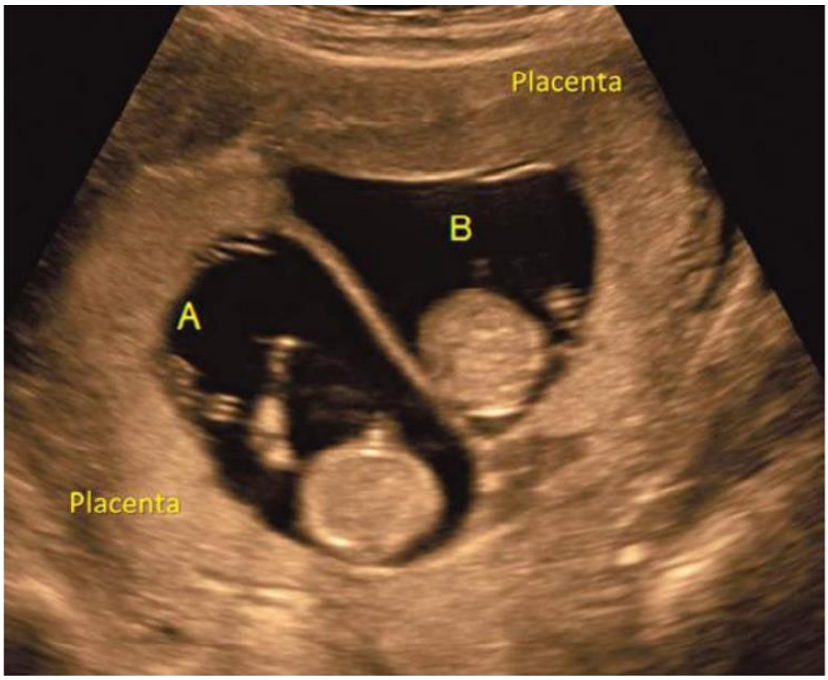
(i) confirming the diagnosis as early as tenth week of pregnancy, (ii) viability of foetuses, vanishing twin in the second trimester, (iii) chorionicity (lambda or twin peak sign), (iv) pregnancy dating, (v) foetal anomalies, (vi) foetal growth monitoring (at every 3–4 weeks interval) for IUGR, (vii) presentation and lie of the foetuses, (viii) twin transfusion (Doppler studies), (ix) placental localization, (x) amniotic fluid volume[7].

Chorionicity

Chorionicity indicates the pregnancy's placental composition. It is determined by the mechanism of twinning and, in MZ twins, by the timing of embryo division[1]. Knowledge of chorionicity is essential in counselling patients on obstetrical and neonatal risks because chorionicity is a major determinant of pregnancy outcome[1]. Determination of chorionicity is highly accurate when performed prior to 14 weeks gestation (100% sensitivity and 99% specificity). Chorionicity determination is simple, a matter of counting the layers that separate the twins. Between 6 and 10 weeks, counting the number of gestational sacs and evaluating the thickness of the dividing membrane is the most reliable method of determining chorionicity[1.] If there are two thin layers (two amniotic sacs) and two thick separate chorionic plates or one fused chorion (beyond 9 weeks) that forms a lambda at insertion on the placenta, then they are dichorionic diamniotic. The lambda sign, consisting of a small triangular wedge of echogenic chorionic tissue observed between layers of the intervening membrane at its base, where it meets the foetal surface of the placenta, is diagnostic of dichorionicity. However, if there are only two thin layers (two amniotic sacs) separating the two twins, then they are monochorionic diamniotic twins. The T-sign, which appears as a thin linear structure, composed of two opposing layers of amnion, forming a perpendicular angle where it intersects the foetal surface of the shared placenta, is

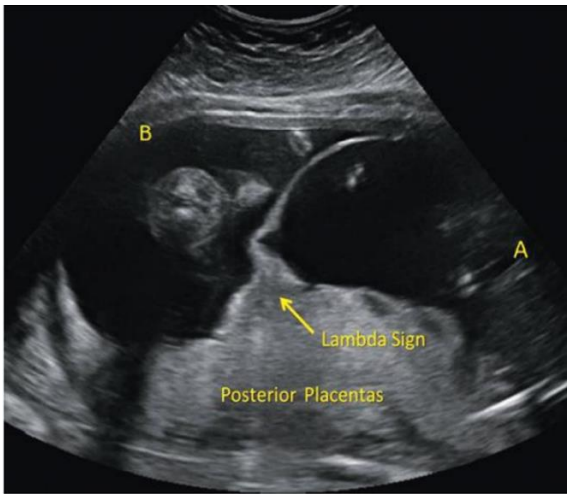
characteristic of monochorionic placentation[4]. Later on in pregnancy, because of close apposition of the amnion and chorion and regression of the chorion laeve, it becomes far more difficult and often not possible at all to determine. Only examination of the placenta after birth will give a definite answer[2]. Although a membrane thickness of 2 mm has been used as a threshold to distinguish between dichorionic and monochorionic twins, it does not perform reliably as a diagnostic test.

FIGURE 2: DCDA twins



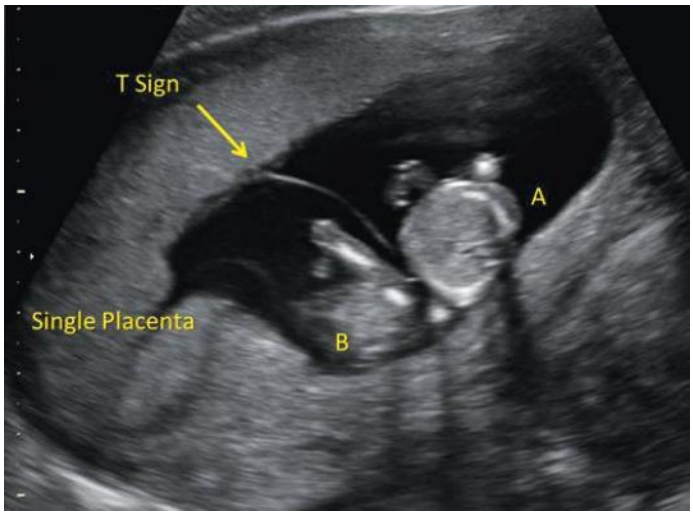
Visualisation of two placenta confirms dichorionicity.

Figure 3: Lambda Sign



The lambda sign (arrow) represents chorionic tissue wedged between layers of the intervening membrane (separating the gestational sacs of twins A and B) where it meets the fetal surface of the abutting placentas. This finding is not always present, but when seen, it is a useful indicator of dichorionicity.

Figure 4: T-sign



T-sign (arrow) formed by the thin inter-twin membrane (composed of two layers of amnion, separating the sacs of A and B) where it meets perpendicular to the foetal surface of the single shared placenta—indicating a monochorionic diamniotic twin pregnancy.

Zygosity

Zygosity refers to the genetic makeup of the twin pregnancy[1]. In contrast to chorionicity, it is not possible to determine zygosity of dichorionic same-sex twins on ultrasound scan. Only genetic examination (DNA fingerprinting) can then determine zygosity, which prenatally would require an amniocentesis of both sacs. After birth, zygosity of same-sex dichorionic twins is best determined on buccal smears from both twins[2].

The division of one fertilized zygote into two does not necessarily result in equal sharing of protoplasmic material. Monozygotic twins may actually be discordant for genetic mutations because of a postzygotic mutation, or may have the same genetic disease but with marked variability in expression. In female foetuses, skewed lyonization can produce differential expression of X-linked traits or diseases. Further, the process of monozygotic twinning is in a sense a teratogenic event, and monozygotic twins have a higher incidence of often discordant malformations[3].

Figure 5: Chorionicity

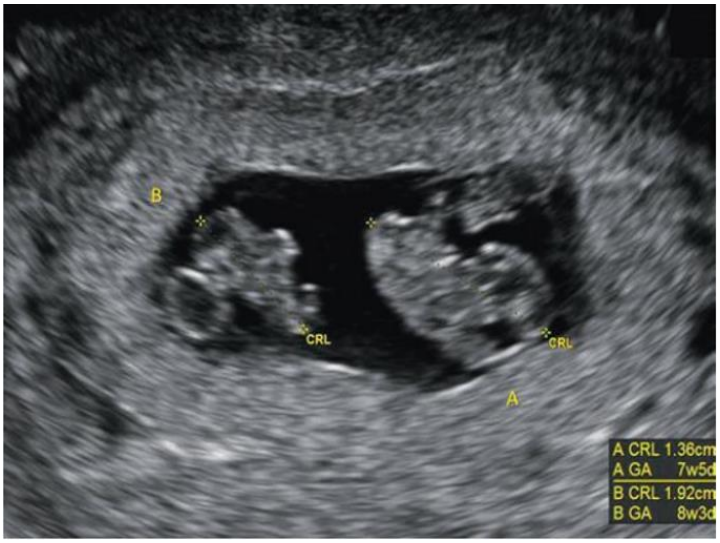
Zygosity	Placenta	Commu-nicating vessels	Intervening membranes	Sex	Genetic features (dominant blood group) DNA fingerprinting	Skin grafting (Reciprocal)	Follow-up
Monozygotic	One	Present	2 (amnions)	Always identical	Same	Acceptance	Usually identical
Dizygotic	Two (most often fused)	Absent	4 (2 amnions 2 chorions)	May differ	Differ	Rejection	Not identical

Pregnancy Dating

Early confirmation of gestational age, with establishment of a fixed due date, is necessary for delivery planning in multiple pregnancies. For multiples conceived by in vitro fertilization (IVF), dating by embryo transfer is comparable to dating by crown-rump length (CRL) in the first trimester. In both spontaneous and IVF conceived multiple

gestations, dating can be uncertain if there is a significant discrepancy in size between the foetuses. In these cases, dating based on the size of the larger decreases the risk of overlooking early FGR, although the smaller CRL has been shown to be more accurate in the estimation of gestational age[4].

Figure 7: Pregnancy dating



Early discrepancy in (CRL) shown between a monochorionic diamniotic twin pair, labeled A and B. GA, gestational age.

Nuchal translucency (NT)

Monochorionic twins have been observed to have increased NT measurements compared to dichorionic twins[22]. The detection rate for Down syndrome in twin pregnancies can be increased by combining maternal age and NT with maternal serum analytes, although it is important that chorionicity be taken into consideration.[23]

Cystic hygroma or hydrops, major cardiac anomalies (both structural and functional), chromosomal or structural abnormalities are associated with enlarged NT.[24,25] they are more common in monochorionic twins. An added benefit of assessing NT in monochorionic twins is that a 20% inter-twin difference in NT measurement is associated

with a greater than 30% risk of foetal death or subsequent development of severe twin to twin transfusion syndrome (TTTS), thereby identifying those cases that warrant increased scrutiny during follow-up sonographically. NT discordance of ≥ 20% had a sensitivity of 52–64% and a specificity of 78–80%, a positive predictive value of 50% and a negative predictive value of 86% for the development of TTTS.[26,27] Discordance in NT of ≥ 20% is found in around 25% of monochorionic twins and the risk of early intra uterine death (IUD) or development of severe TTTS[14].

Anatomy

Twin foetuses should be assessed for the presence of any major anomalies at the first-trimester scan, and a routine second-trimester (anomaly) scan should be performed at around 20 (18–22) weeks [4]. In around 1 in 25 dichorionic, 1 in 15 MCDA and 1 in 6 monoamniotic twin pregnancies, there is a major congenital anomaly that typically affects only one twin. When both twins are found to have a structural malformation, only 10% of dichorionic and 20% of monochorionic twin pairs have the same defect[29]. Of twin pregnancies with congenital anomalies, only one twin is affected in about 90% of cases.[29] Heightened awareness with careful inspection for malformations is warranted whenever scanning twins[4].

The types of malformations were as follows;

•Central nervous system malformations: Hydrocephalus Hydrocephalus & Spina bifida Anancephalic Microphalic

• Siamese twins

• Gastrointestinal tract: Imperforate anus Obstruction of duodenal jejuna junction & tracheoesophageal fistula

• Cardiac Atrial septal defect Transposition of great vessels

• Diaphragmatic hernia

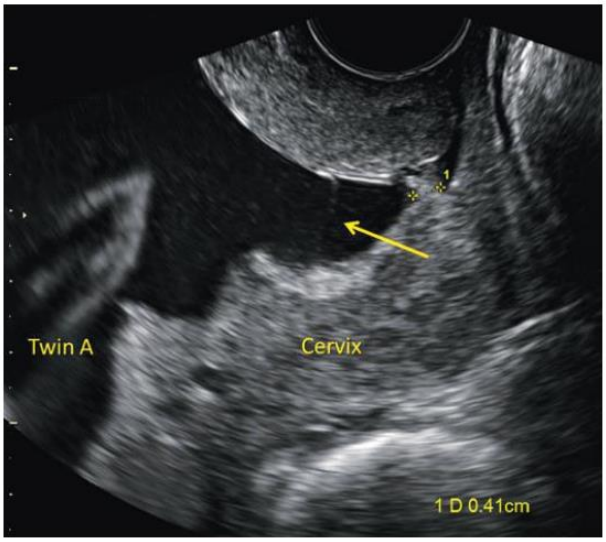
• Unformed foetal elements

• Unknown[36]

CERVICAL LENGTH

Transvaginal sonography is optimal for visualization of the cervix and measurement of its length and its response to the valsalva maneuverer or fundal pressure. In the second trimester, a cervical length of 20 to 25 mm or less is observed in 5% to 10% of twins and increases the likelihood of preterm delivery threefold to fivefold.[37] The negative predictive value of a mid-trimester cervical length measuring greater than 35 mm is over 90%, which provides reassurance to patients carrying twins.[4]

Figure 8: Cervical length



Transvaginal ultrasound image showing a funneled short cervix, measuring 0.41 cm in length, in a monochorionic diamniotic twin gestation with oligohydramnios-polyhydramnios sequence.

MATERNAL COMPLICATIONS:

1. Spoantaneous abortion
2. Preterm Labour
3. Anaemia
4. Pre-eclampsia
5. Pre-term premature rupture of membranes(PPROM)
6. Premature rupture of membranes(PROM)
7. Postpartum haemorrhage
8. HELLP (Hemolysis Elevated Liver Enzymes & Low Platelets)Syndrome
9. Gestational Diabetes
10. Pulmonary edema
11. Abruptio placenta
12. Caesarean hysterectomy
13. Acute fatty liver
14. Peripartum cardiomyopathy
15. Gastrointestinal bleeding
16. Pulmonary embolus
17. Endometritis
18. Hydatiform mole with normal foetus
19. Mortality

NEONATAL COMPLICATIONS:

1. Small for gestational age
2. Intra uterine growth restriction (IUGR)
3. Intra uterine foetal death (IUFD) of one or more
4. Twin to twin transfusion syndrome
5. Twin reverse arterial perfusion syndrome (TRAP)
6. Twin Anemia– Polycythemia Sequence (TAPS)
7. Congenital anomalies
8. Cord entanglement
9. Neonatal death
10. Neonatal intensive care unit (NICU) admission

11. Hyperbilirubinemia
12. Mechanical ventilation
13. Hyaline membrane disease (HMD)
14. Transient tachyponea of newborn (TTN)
15. Retinopathy of prematurity(ROP)
16. Necrotising enterocolitis (NEC)
17. Intracranial haemorrhage (ICH)
18. Sepsis[7,10]

MATERNAL :

During pregnancy:

1. **Nausea and vomiting** occurs with increased frequency and severity.
2. **Anemia** is more due to increased iron and folate requirement by the two. Deficiency of folic acid leads to increased incidence of megaloblastic anemia.
3. **Pre-eclampsia (PE)** (25%) is increased three times over singleton pregnancy. Exposure to superabundance of chorionic villi is the possible explanation. Twofold greater risk of preeclampsia in women diagnosed with gestational diabetes. No specific zygosity confers a greater rate of hypertensive disorder in twin pregnancies.[3]
4. **Hydramnios** (10%) is more common in monozygotic twins and usually involves the second sac. It is perhaps due to increased renal perfusion with consequent increased urinary output which may accompany the hypervolemia in the larger twin[12].
5. **Pre-Term Labor**

The duration of gestation shortens with accruing foetal number. Prematurity is six-fold and tenfold greater in twins and triplets, respectively[3]

Kimberly S. McMohan et al evaluated a strategy for the identification of patients with multiple gestations who are at low risk for preterm delivery. Recommended interventions in an attempt to prevent preterm birth are[38]: •Bed rest •Antibiotics •Cervical circlage •Tocolytic drugs •Progesterone supplementation[15]

Rates of use of antenatal corticosteroids are varied in various hospitals. Antenatal corticosteroids given to women prior to preterm birth had significant health benefits for their babies[10].

National Institute of Health consensus conference regarding use of corticosteroids for induction of lung maturity, it is recommended that corticosteroids should be administered to women with multifoetal gestation before 32 weeks of gestation if they experience preterm labour, premature rupture of membranes or induction of labour is needed for any maternal or foetal indications. Although not scientifically tested, single dose of Betamethasone 12mg each week for those women < 32 weeks of gestation in women with cervical score of <0 or with cervical length of measurement <25mm is recommended.[31]

According to Isaac Blickstein et al, use of routine administration of corticosteroids is controversial. Its use in reduction in incidence of respiratory distress syndrome and its sequelae is not demonstrated. There is no apparent benefit over the rescue approach. In some retrospective study it has been demonstrated that prophylactic use of corticosteroids leads to reduction in birth weight. Moreover there is also concern that repeated use of corticosteroids has some adverse effect on glioma function and hippocampal development, also leads to foetal adrenal suppression.[32]

According to Jane et al, no significant benefit has been demonstrated in prophylactic administration of corticosteroids. This is because of lack of effect which could theoretically be due to sub-therapeutic drug level due to increased plasma volume due to

effect of large feto-placental unit. Notwithstanding, it is generally assumed that the beneficial effect in multifoetal gestation is similar to that of singletons and it is unlikely that any further placebo controlled trials would be acceptable.[33] It is also shown that repeated doses of corticosteroids are not useful, but in fact has an adverse effect on the . Thus prophylactic repeated use of corticosteroids cannot be recommended.[34] Irrespective of plurality, a complete course of antenatal corticosteroids significantly reduced the incidence of respiratory distress syndrome, whereas partial treatment had the same effect as no treatment.[35] Administration of antenatal corticosteroids for foetal maturation in preterm labour is a proven cost effective intervention.[31]

6. **Antepartum hemorrhage** may occur with slight increased frequency. The increased incidence of placenta previa is due to the bigger size of the placenta encroaching on to the lower segment. The separation of normally situated placenta may be due to — (i) increased incidence of preeclampsia, (ii) sudden escape of liquor following rupture of the membranes of the hydramniotic sac, (iii) deficiency of folic acid and (iv) following delivery of the first baby due to sudden shrinkage of the uterine wall adjacent to the placental attachment.[12]
7. **Malpresentation** is quite common in twins compared to singleton pregnancies. In about 70% cases, the first baby is presented by vertex and in 50%, both presented by vertex. It is more common in the second baby. Fortunately, the babies are usually smaller and do not pose much of a problem.
8. **Mechanical distress**, such as palpitation, dysponea, varicosities and hemorrhoids, may be increased compared to a singleton pregnancy[12.]
9. **Gestational diabetes:** The incidence of Gestational diabetes mellitus (GDM) increases in twins compared to singletons. 22 to 39% of triplets have gestational diabetes as compared to twins where the rate is 3 to 6%[7].

Foetal complications

1. Discordancy

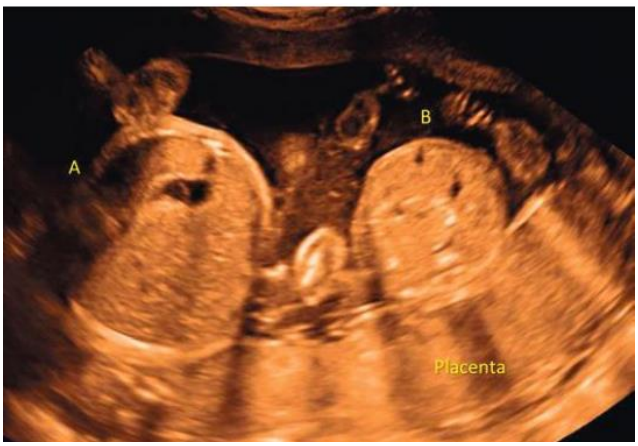
EFW discordance between twins is significantly associated with the risk of perinatal loss. The hazard ratio for the risk of total perinatal loss in twins with an EFW discordance ≥ 25% was found to be 7.3. According to the National Institute for Health and Care Excellence guidance, EFW discordance should be calculated and documented at every scan from 20 weeks onwards.[18] Diagnosis of discordancy can be done by the formula:

Weight of Larger Twin – Weight of smaller Twin

Weight of Larger Twin

The absolute birth weight of the smaller twin of a discordant pair is an important determinant of perinatal morbidity and mortality. Significant discordance in growth occurs in 15% to 25% of monochorionic twins[4].

Figure 9: Discordancy



Significant discordance in abdominal circumferences noted in this monochorionic diamniotic pregnancy, with lagging growth of twin B compared to twin A.

2. Selective foetal growth restriction (sFGR)

sFGR is a term applied to twin pregnancies in which one foetus has an EFW < 10th centile and the intertwin EFW discordance is > 25%[39,40]. 18 The American College of Obstetricians and Gynecologists considers a difference of 15–25% in the EFW to constitute discordant fetal growth[41].

Selective FGR of one twin in a monochorionic pair has been classified into three groups based upon findings on Doppler interrogation of the umbilical artery:

type I :has normal Doppler waveforms with diastolic flow; is greater than 90% (in-utero mortality rates of up to 4%).

type II has persistent absent or reversed end-diastolic flow; and is associated with a high risk of IUD of the growth-restricted twin and/or very preterm delivery with associated risk of neurodevelopmental delay if the other twin survives (IUD of either twin in up to 29% and risk of neurological sequelae in up to 15% of cases born prior to 30 weeks).

type III has intermittent absent or reversed end-diastolic flow in the umbilical artery, have the poorest prognosis with reported 15% to 20% risk of intrauterine foetal demise.

The latency between development of abnormal diastolic flow in the umbilical artery and foetal deterioration necessitating delivery tends to be longer in monochorionic twins compared to singletons with FGR, but frequent surveillance is still warranted once foetal viability is reached. If both twins have an EFW < 10th centile, it should be termed small-for-gestational age[14].

3. IUFD

Spontaneous loss in the first trimester occurs in 15% to 20% of dichorionic twin gestations and may be recognized as an empty sac or absent cardiac activity in one embryo.[42,45.]

Following single IUFD, the following complications are found in monochorionic and dichorionic pregnancies, respectively[43-45]:

- Death of the co-twin: 15% and 3%.
- Preterm delivery: 68% and 54%.
- Abnormal postnatal cranial imaging of the surviving cotwin: 34% and 16%.
- Neurodevelopmental impairment of the surviving cotwin: 26% and 2%[14]

When single intra uterine death (IUD) occurs in a monochorionic twin pregnancy, the woman should be managed at a tertiary-level center with relevant expertise. This should include assessment of fetal doppler, especially middle cerebral artery- peak systolic volume (MCA-PSV), in order to look for signs of fetal anemia in the surviving twin. Conservative management is often the most appropriate course of action. If the pregnancy is at term, iy is recommended to deliver without delay, but if it is preterm, prolonging the pregnancy for the benefit of the surviving twin. If conservative management is chosen, fetal biometry and assessment of umbilical and middle cerebral artery (MCA) Doppler should be scheduled every 2–4 weeks, and delivery should be considered at 34–36 weeks, after a course of maternal steroids. If the MCA-PSV is normal in the first few days, fetal anemia is unlikely to occur later. The fetal brain should be imaged around 4–6 weeks after the death of the cotwin to search for evidence of cerebral morbidity[18].

Figure 9:IUFD

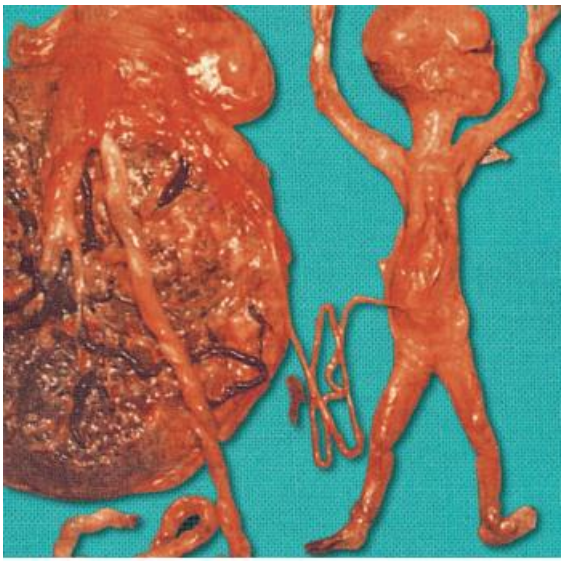
Monozygotic twins in a single amnionic sac. The smaller fetus apparently died first, and the second subsequently succumbed when umbilical cords entwined.

4. **Superfoetation & Superfecundation**

- Superfetation requires ovulation and fertilization during the course of an established pregnancy, which is theoretically possible until the uterine cavity is obliterated by fusion of the decidua capsularis to the decidua parietalis[3].
- Superfecundation refers to fertilization of two ova within the same menstrual cycle but not at the same coitus, nor necessarily by sperm from the same male [3].

5. **Foetus Papyraceous or Compressus** is seen when one of the foetus dies early. Dead foetus is flattened, mummified and compressed between the membranes of the living foetus and the uterine wall. It occur in both varieties of twins, but it is common in monozygotic twins and is found at delivery or earlier by ultrasound.[7]

Figure 10: Foetus Papyraceous

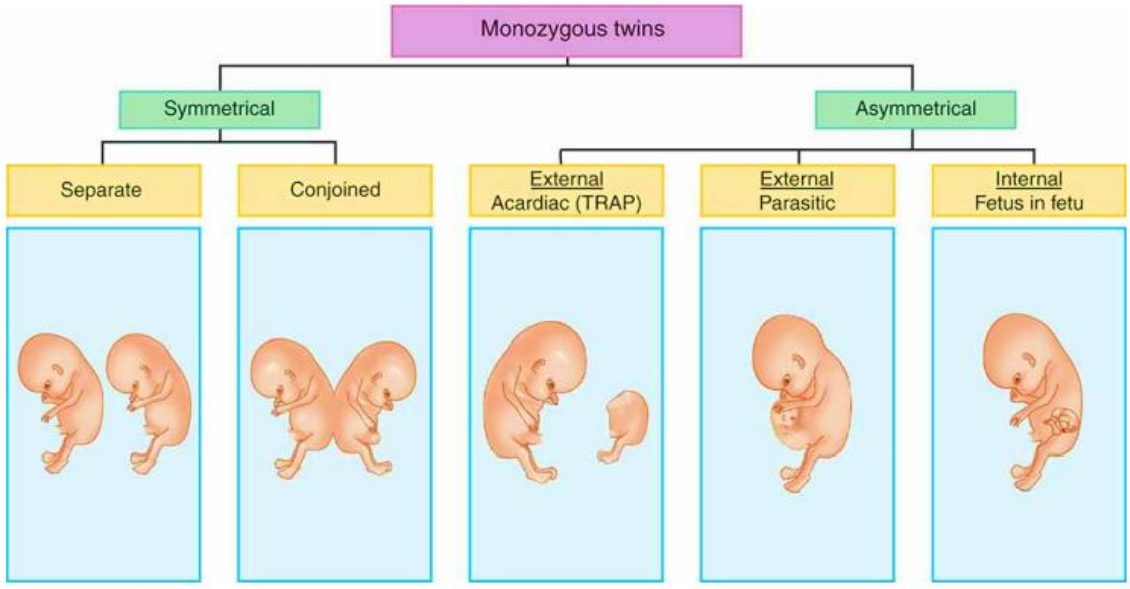


6. **Vanishing Twin**: when one of the dies within14 weeks & "vanishes" by resorption and pregnancy continues with surviving one this revealed by serial sonography. The rate of disappearance is 40%.[11]

SPECIFIC MONOZYGOUS TWIN COMPLICATIONS

7. **External Parasitic Twins**: it has a supernumerary external limbs, often along with some viscera. Functional heart or brain is absent. Parasites results from the demise of the defective. Its surviving tissue attaches itself to and receives vascularity from the normal cotwin. Parasitic twins accounts for more than 4 percent of all conjointed twins and occurs more frequently in male.
8. **Foetus-In-Fetu** in the early first trimester one 1 is enfolded within the other, vertebral or axial bones are found in the fetiform mass however, a functional heart or brain is absent. Their development is arrested in the first trimester[5,8].

Figure 11: Complications of monochorionic twins



9. TTTS

Inter-twin vascular anastomoses are present in virtually all monochorionic placentas, and net flow between the twins is balanced in the majority of cases. In pregnancies affected by TTTS, blood flow becomes unbalanced with one twin, the donor, transferring a net volume (with unidirectional flow through arteriovenous connections) to its co-twin, the recipient.

TTTS also appears to be increased when velamentous cord insertions, for one or both foetuses, into the shared placenta are seen[58]. Sonography is used to categorize TTTS into stages, with less favourable outcomes observed with advanced stages of the disorder & it is recommended every 2 weeks beginning in the second trimester.[52]

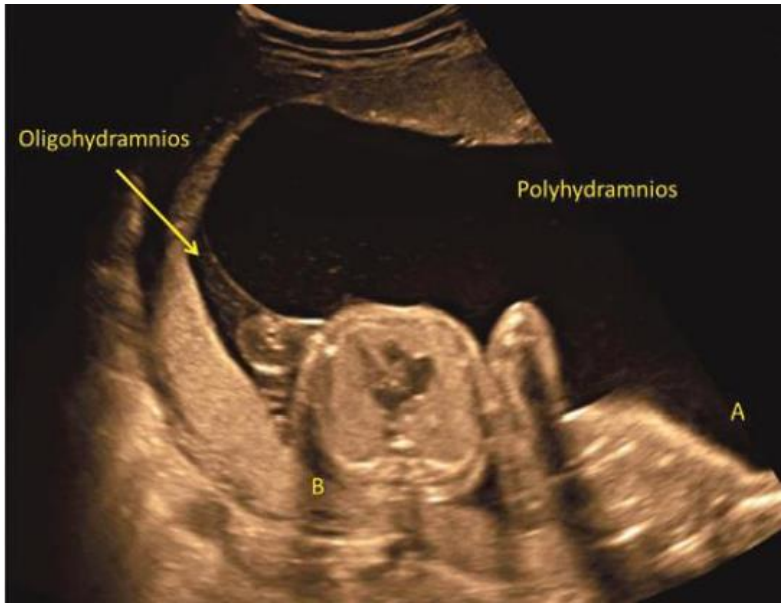
- Stage I—discordant amnionic fluid volumes as described in the earlier paragraph, but urine is still visible sonographically within the bladder of the donor twin
- Stage II—criteria of stage I, but urine is not visible within the donor bladder
- Stage III—criteria of stage II and abnormal Doppler studies of the umbilical artery, ductus venosus, or umbilical vein
- Stage IV—ascites or frank hydrops in either twin
- Stage V—demise of either fetus.[3]

The imbalance of blood flow from the donor to the recipient twin increases preload, resulting in adaptive responses within the recipient's cardiovascular system. Cardiac dysfunction, biventricular hypertrophy, and functional or structural right ventricular outflow obstruction may develop in the recipient twin over time[52]. Central nervous system abnormalities such as hemorrhagic and ischemic white matter changes, which carry a poor prognosis, have been detected in both donors and recipients in cases with TTTS[53].

Management options for TTTS vary depending on gestational age and stage at time of diagnosis. These options may include pregnancy termination, selective reduction of an anomalous growth-restricted or hydropic co-twin, foetoscopic laser photocoagulation of inter-twin placental vascular anastomoses amnioreduction, expectant observation, or delivery. Most cases of TTTS are diagnosed in the second trimester and in ongoing pregnancies with advanced stages of TTTS (stage II-IV), fetoscopic laser photocoagulation of vascular anastomoses within the shared placenta is currently

considered the best therapeutic intervention to improve perinatal survival[52]. This procedure is typically performed between 16 and 26 weeks' gestation and is done in conjunction with post-laser amnioreduction, with aspiration of excess amniotic fluid from the recipient's sac. The management of stage I TTTS is controversial, as only 10% to 30% of cases progress, whereas most remain stable & resolve spontaneously, or do not recur after a single amnioreduction.[54,55] Following fetoscopic laser photocoagulation for advanced TTTS, serial sonographic surveillance is recommended to assess the twins response to treatment. ITTTS resolves with normalization of amniotic fluid volume in each sac, visualization of the donor twin's bladder, and improvement in the recipient twin's cardiac function.[56]The outcome of pregnancies with TTTS is dependent on the gestational age at diagnosis, clinical stage, and progression of disease. Without treatment, perinatal mortality rate in cases with advanced stages of TTTS is 70% to 100%.[52,57] Following intervention with laser to treat TTTS, perinatal survival rate is reported to be 50% to 70%.[52]

Figure 12: TTTS



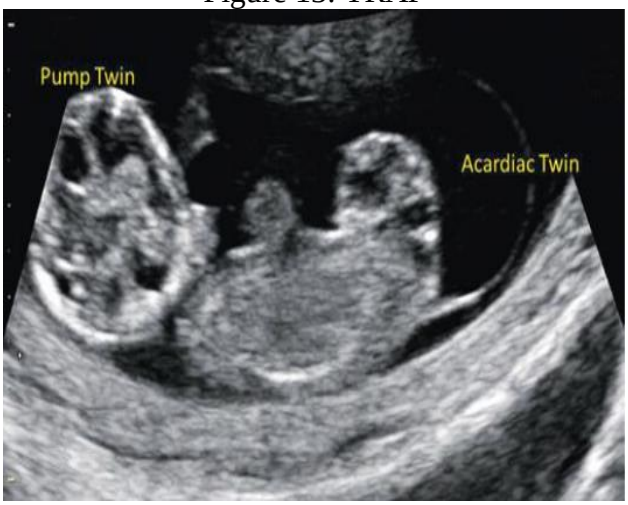
Twin-twin transfusion syndrome with polyhydramnios in the sac of twin A and oligohydramnios in the sac of twin B.

10. TRAP

TRAP is characterized by a pump twin perfusing a dysmorphic acardiac fetus through aberrant arterioarterial anastomoses within the shared single placenta. It complicates approximately 1% of monochorionic twins, with 75% occurring in diamniotic and 25% in monoamniotic twin pairs.[45] The sonographic diagnosis requires monochorionic placentation, a normal appearing pump twin, an abnormal-appearing co-twin without discernible cardiac activity, and reversed arterial flow directed toward, rather than away from, the anomalous acardiac fetus. The acardiac twin often lacks a recognizable head, trunk, and upper extremities but has lower extremity development and demonstrable internal flow on Doppler. The use of colour and spectral duplex Doppler interrogation, which indicate direction and character of flow, is particularly helpful in this setting, to confirm the diagnosis of TRAP. Up to 10% of cases have karyotype abnormalities, and 5% to 10% of pump twins have structural malformations, including cardiac anomalies, so genetic counselling and comprehensive evaluation of the pump twin for cardiac failure are recommended[51]. The risk of developing cardiac failure in the pump twin influences the possible need for in utero intervention; this threat is greatest when the estimated size of the acardiac twin measures 50% or larger than the pump twin.[59,60] One approach is to estimate its weight using the equation for volume of a prolate ellipsoid by multiplying length × width × height (in centimeters) × 0.52 (this factor is used to generate a volume in cubic centimeters and convert this figure into estimated weight, in grams), or to simply compare the abdominal circumferences of the twins.[48-51] Serial sonographic surveillance and foetal echocardiography are warranted to monitor cardiac function of the pump twin and assess for hydrops, as deterioration may be an indication for intervention such as cord occlusion of the acardiac twin, in utero medical therapy, or early delivery depending on gestational age. High-output cardiac failure in the pump twin may also be accompanied by

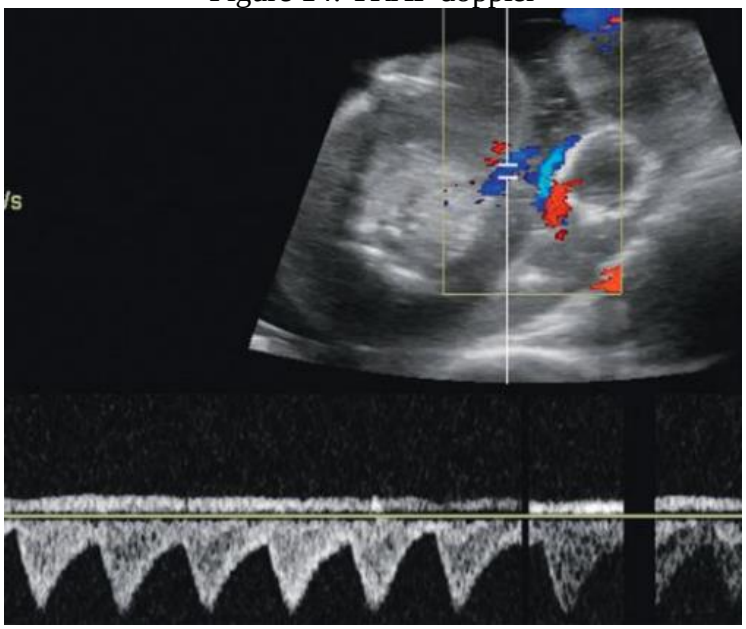
polyhydramnios, placing the patient at increased risk for cervical shortening, premature rupture of membranes, or preterm labour and delivery. Historically, the perinatal mortality rate in TRAP pregnancies was over 50%, but recent series have reported 85% to 90% survival rate of the pump twin with the treatment options available.[4]

Figure 13: TRAP



Longitudinal ultrasound image shows abnormal upper body development of the anomalous acardiac twin, which lacked demonstrable cardiac activity despite continued growth. The image includes an axial view through the brain of the morphologically normal pump twin.

Figure 14: TRAP doppler



Color and spectral duplex Doppler interrogation demonstrates reversed arterial flow directed into the acardiac fetus at the level of the umbilical cord insertion at the anterior abdominal wall.

11. TAPS

Spontaneous TAPS complicates 5% of monochorionic diamniotic twins and is usually diagnosed after birth when one twin is pale and the other plethoric and the twins are found to have discordant hemoglobin values. As in cases of TTTS, it is theorized that inter-twin vascular anastomoses in the single shared placenta result in a chronic imbalance of blood flow from donor to recipient.

Iatrogenic TAPS observed in up to 10% of TTTS cases treated with fetoscopic laser photocoagulation, is more likely to be recognized in utero because of increased sonographic surveillance following laser treatment. The diagnosis is confirmed when peak systolic velocity in the MCA is more than 1.5 multiples of median (MoM) in one twin and less than 0.8 MoM in the co-twin MCA Doppler velocimetry may be the only sonographic marker of TAPS complicating a monochorionic diamniotic twin pregnancy.

Although TAPS and TTTS can occur concomitantly, the observation of both oligohydramnios in one twin and polyhydramnios in the other is not seen in cases of pure "isolated" TAPS. The management of TAPS is controversial, but options include termination, observation, repeat laser intervention, intrauterine foetal transfusion, or delivery, depending on gestational age. The perinatal outcome of TAPS is also variable, ranging from double twin demise to liveborn twins with no obvious long-term sequelae. [65]

FIGURE 15: TAPS staging

Stage	*Antenatal staging*	*Postnatal staging: intertwin Hb diff (g/dL)*
1	Donor MCA-PSV > 1.5 MoM and recipient MCA-PSV < 1.0 MoM, without other signs of fetal compromise	> 8.0
2	Donor MCA-PSV > 1.7 MoM and recipient MCA-PSV < 0.8 MoM, without other signs of fetal compromise	> 11.0
3	Stage 1 or 2 and cardiac compromise in donor (UA-AREDF, UV pulsatile flow, or DV increased or reversed flow)	> 14.0
4	Hydrops of donor twin	> 17.0
5	Death of one or both fetuses, preceded by TAPS	> 20.0

12. Conjoined Twins

They are uniovular twins in whom the embryonic area has failed to split completely and two individuals remain attached. "Siamese" twins are one variety. Incidence is from 1:50,000 to 1:60,000 births. Approximately 70 percent are female. There are 2 main type of conjoint twin.

Diplopagus/Duplicatas complete: there is equal or nearly equal and symmetrical duplication of structures.

Heteropagus (Duplicatas incompleta): only part of the anatomic structure of the foetus is duplicated. One component is smaller and dependent on the other. The most common anatomical arrangements are:

1. Conjoining at the level of the midtorso (73%): a. Thoracophagus: conjoint at the level of chest (40%) b. Xiphophagus or omphalophagus: conjoint at the level of anterior abdominal wall from the xiphisternum to the level of the umbilicus (23%)

2. Conjoining of the lower torso (23%): a. Pygophagus: conjoint at the level of buttocks (18%) b. Ischiophagus: conjoint at the level of ischium (6%)

3. Conjoining of the upper torso (4%): a. Craniophagus— conjoint at the level of head (4%)

Figure 16: Conjoint twins

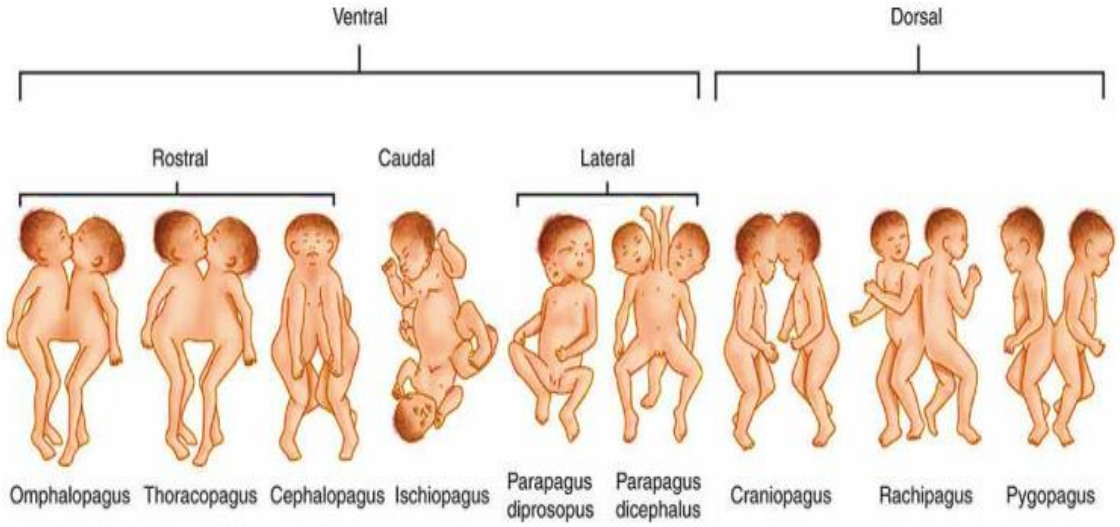


Figure 17: Types of conjoined twins.

Type	Description	Frequency
Thoracopagus	Ventrally joined; thorax to upper abdomen, involves heart	42%
Parapagus dicephalus	Laterally joined; one trunk, two heads	11.6%
Cephalopagus	Laterally joined; top of head to umbilicus, two faces	5.5%
Omphalopagus	Ventrally joined; abdomen to lower thorax, never the heart	5.5%
Parasitic	Asymmetric, fetus in fetus	3.9%
Craniopagus	Skulls joined; shared meninges, not face or trunk	3.4%
Parapagus diprosopus	Laterally joined; one trunk, one head, two faces	2.9%
Ischiopagus	Lower abdomen and pelvic bones joined	1.8%
Rachipagus	Dorsally fused; dorsolumbar vertebrae area	1.0%
Pygopagus	Dorsally fused; perineal and sacrococcygeal area	1.0%
Unspecified	Rare types	21.4%

The antepartum diagnosis of conjoined twins is important for: 1. parental counselling 2. To ensure timely and appropriate referral to other tertiary care service centre and health professionals such as maternal foetal medicine specialists, geneticists, paediatric surgeons, psychologists & etc. 3. Provide option of termination 4. To ensure proper delivery plan which will decrease maternal morbidity 5.To improve survival of the foetuses.

Suspicious factors are: 1. Polyhydramnios is seen in 50% of the cases 2. Finding of single foetal heart in twin pregnancy 3. Lack of engagement when lie is longitudinal 4. Parallel lie (vertex–vertex, breech–breech) 5. An abnormal foetal attitude

Demonstration of a continuous external skin b. Body parts of twins are seen at the same sonar plane c. There is no change in positions of twins to one another on successive scans

d. Face-to-face relationship in case of thoracophagus twins e. Demonstration of single placenta.

2. Magnetic resonance imaging (MRI): Foetal echocardiography

X-ray: This modality may play a minor role in diagnosing cases with bony fusion of the foetal skeletons

Management : The decision to delivery vaginally or by cesarean section is based on the following factors: 1. The possibility of the infants' survival. 2. The gestational age and size of the infants. 3. The extent and location of the union: In many cases, the union is sufficiently flexible that enough movement is possible to allow vaginal delivery with or without manipulation or by forceps. Extensive bony fusion may preclude movement, and vaginal delivery is impossible 4. Foetal presentation 5. The possibility of surgical separation 6. Method of Delivery 1. Cesarean section: This procedure offers the best chance for foetal survival. 2. Vaginal delivery: If the pregnancy is previable, the point and type of union permit mobility, and if the infants are dead, vaginal delivery can be effected without serious injury to the mother. However, dystocia is common, and manipulations such as forceps extraction or traction on the head, legs, or buttocks are necessary 3. Destructive operations: When part of the foetus has been born and complete delivery is not possible, a destructive operation may be the only alternative. Such procedures may include evisceration and amputation of parts of the body. Early diagnosis and careful anatomical mapping of the shared viscera and limbs with liberal use of cesarean section would obviate the need for such destructive procedures.[6]

EFFECTS OF TWIN PREGNANCY

Maternal Effects

1. Because of the increased intrauterine contents is large, the centre of gravity is shifted even more than that of a singleton pregnancy, and there is increased discomfort and fatigue.
2. Pressure against diaphragm leads to dysponea.
3. The metabolic and mechanical loads increased in multiple pregnancy
4. Polyhydramnios is more common than in twin pregnancies.
5. Incidence of gestational diabetes preeclampsia is increased in mothers with twin pregnancy.
6. Anaemia is more common.
7. There is additional weight gain of 35 to 45 pounds.
8. There is increased risk of cholestasis of pregnancy.
9. Twin pregnancy is a risk factor for acute fatty liver disease.
10. Pulmonary edema is common, secondary to volume overload.

Foetal Effects

1. More than 50% of twins have a LBW & on an average second twin is 80gms less than the first twin. This is because of increased preterm birth and twin-specific growth issues

2. Both small babies and excess amniotic fluid leads to an increased chance of malpresentation and operative delivery

3. Perinatal mortality is four times more common in twins.

4.Risk to second twin is greater than of the first.

Reasons include:

a. increased incidence of operative deliveries

b. long interval between the delivery of the twin

c. altered placental hemodynamics and results in foetal anoxia

d. Second twin is in the upper actively contracting unfavourable segment

e. Increased incidence of malpresentation in second twin

5. Congenital malformations common in twins especially cardiovascular defects, and death is more likely to occur due theses anomalies are than than the singleton counterparts.

Effects on Labour

Due to overstretching of uterus following complications happen: a. Preterm labour can occur on an average 3 weeks before. b. Early rupture of membranes is more common c. There is slow progress of labour due to over streched uterine muscles which produces a weak and inefficient contractions. d. There is increased incidence of postpartum hemorrhage e. Malpresentations are more common. f. Cord prolapse is more common with second twin g. There would be cervical incompetence in early trimester of next.[6]

PRINCIPLES OF ANTEPARTUM MANAGEMENT

Key for successful outcome in twin pregnancy is diagnosing early.

ADVICE

DIET: Extra 300 plus Kcal/day is required for twin pregnancy more than the singleton pregnancy & extra proteins is also required to[6].

REST: increased rest at home and early relief from work, from 24 wks is advised (i) to increase the birth weight of babies, (ii) decrease risk of preeclampsia, (iii) prolong duration of pregnancy.

SUPPLEMENT THERAPY:

(i) Iron therapy: increased dose of 100–200 mg per day more than the regular requirement of pregnancy.

(ii) Increased dose of vitamins, calcium and folic acid (5 mg) is required.

Frequent antenatal visit should be recommended to detect anemia, preterm-labor, Foetal growth restriction (FGR) and preeclampsia.

Antepartum Foetal surveillance is done by non-stress test sonography for assessment of foetal growth, amniotic fluid volume and doppler velocimetry every 3–4 weeks interval or earlier when it is required.

Daily use of betamimetics & prophylactic cervical circlage operation have no significant role in prevention of pre-term labor.

Antenatal corticosteroids, single dose is given to women in preterm labor <34 weeks to accelerate foetal lung maturation. Twin develops pulmonary maturation 3–4 weeks prior in comparison with singletons.[7]

1st trimester scan at 11–14 weeks is essential in twin pregnancies to assess gestational age, chorionicity, systematic labelling and to know the aneuploidy risk. In monochorionic twins every two weekly ultrasound is indicated from 16 weeks to screen for TTTS. Serially every 4 weekly scan to be done to assess discordant foetal growth & TTTS.[5] Factors affecting the mode of twin delivery in twins are:

(1) presentation

(2) gestational age

(3) estimated foetal weight

(4) chorionicity

(5) previous operative delivery

(6) skill of the operator[6]

PRE-REQUISITES FOR THE DELIVERY OF TWIN PREGNANCY

1. Delivery should be conducted in tertiary care center with intensive neonatal care units.
2. Collaborative and good communication between health care professionals.
3. Availability of maternal and foetal monitoring systems.
4. Duplicate sets of instruments.
5. A wide-bore intravenous cannulas should be placed.
6. Portable ultrasound machine should be available to check for the presentation of the second twin.
7. Rapid availability of blood products.
8. Skilled obstetricians should be readily available & conduct the delivery
9. An operative theatre for immediate cesarean delivery, if required.
10. An anesthesiologist should be readily available.
11. Two pediatricians, who are skilled in resuscitation of the newborn
12. An adequate number of nursing staff to assist the delivery and to give care to the newborn [11-13]

MANAGEMENT DURING LABOR

Vaginal delivery is allowed when both the twins are/or at least the first twin is with vertex presentation.

FIRST STAGE: same as for singleton foetus, with additional precautions are to be followed:

Adequate bed rest is required to prevent rupture of membranes.

Epidural anaesthesia is preferred as it facilitates in the manipulation of second foetus.

Continuous electronic foetal monitoring should be done.

Blood should be cross matched and kept readily available.

Per vaginal examination is done after rupture of membranes to exclude cord prolapse

DELIVERY OF THE FIRST BABY:

First baby delivery is conducted in the same way as in singleton pregnancy.

(i) Liberal episiotomy should be given after local infiltration with 1% lignocaine.

(ii) Intravenous ergometrine should not be given after first twin delivery.

(iii) 2 clamps should be applied to the cord before cutting, to prevent the blood loss of the second twin in case of monozygotic twin.

(iv) 8–10 cm of the umblical cord is preserved for transfusion & to administer any drug, if required.

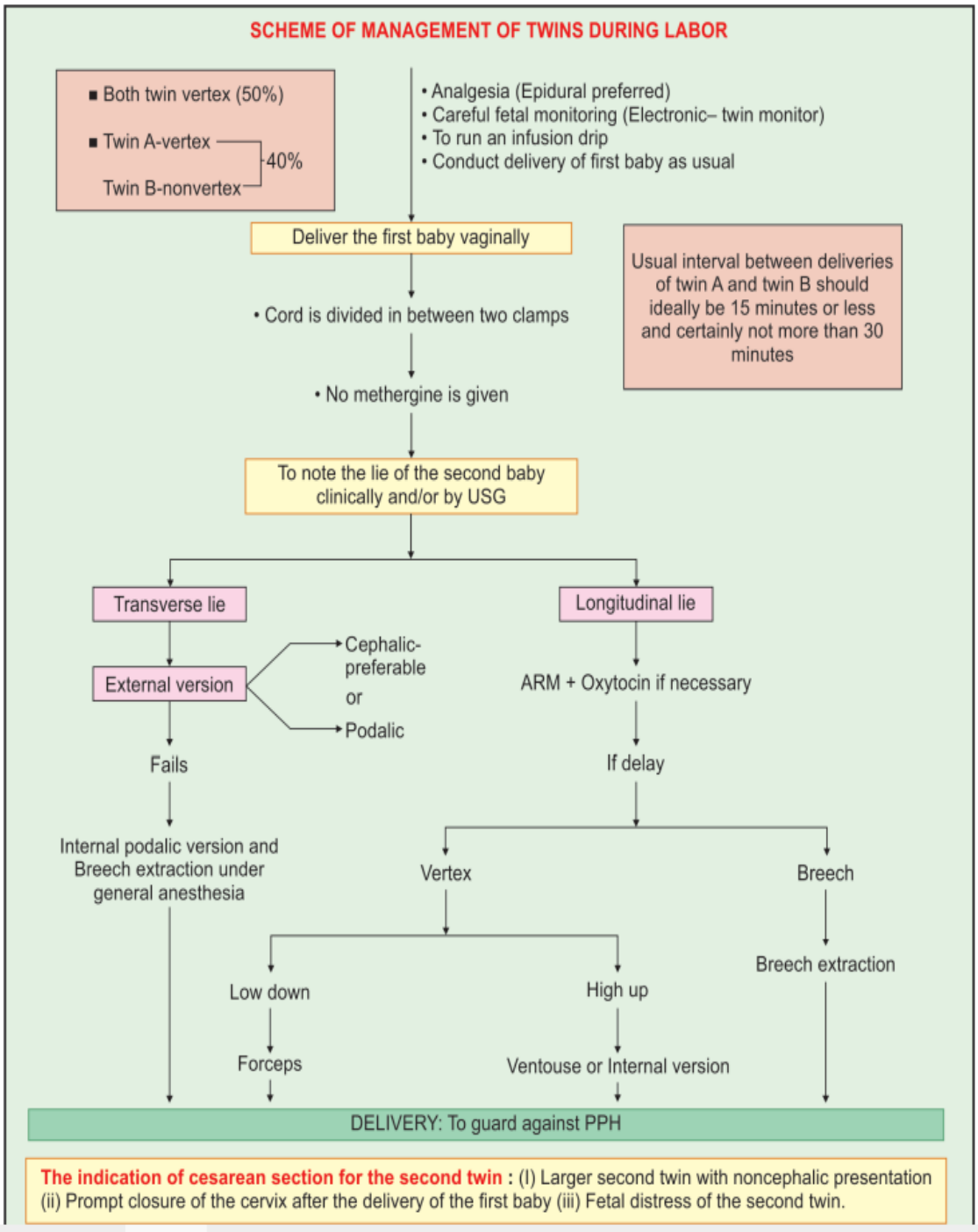
(v) Baby is given to the sister after labelling.

DELIVERY OF SECOND BABY

Principles:

- Delivery of the second twin should be hastened, because there would placental insufficiency due to uterine retraction which occurs after birth of first twin.
- Lie, presentation and Foetal heart sounds (FHS) of second twin is checked either by clinical examination or ultrasound.[1]
- A per vaginal (PV) examination is done to confirm the abdominal findings, status of membranes and to rule out cord prolapse.

FIGURE 18: Scheme of Management of Twins during Labor



INDICATIONS OF CESAREAN SECTION:

There are 3 broad division:

Obstetric indications

(1) Placenta previa

(2)Abruptio placenta

(3) Severe pre-eclampsia

(4) Previous LSCS

(5) First twin with cord prolapse

(5) Uterine contractions which are abnormal

(6) Contracted pelvis.

Twins Indications:

1) Both twins or first twin with non-cephalic presentation
2) Complicated twins pregnancy: IUGR, conjoined twins
3) Monoamniotic twins
4) TTTS in monochorionic twins
5) Both twin in cephalic presentation, further preventing the engagement of the head
6) Antepartum death of first twin
7) Conjoint twins
8) Congenital malformations in one twin

Contentious indications:

1) Death of co-twin
2) Uncomplicated monochorionic twins
3) Maternal request [12]

MANAGEMENT OF THE THIRD STAGE:

1) Routine administration of 0.2 mg methergine IV or oxytocin 10 IU IM after delivery of second baby reduce the risk of PPH. The placenta is to be delivery of placenta is by Controlled Cord Traction (CCT).
2) Vigulant monitoring for PPH is required and any blood loss should be replaced with blood.[11-12]
3) Postpartum hemorrhage is the real danger in twins. It is due to: (i) atony of the uterine muscle due to overdistension of the uterus, (ii) a longer time taken by the big placenta to separate, (iii) bigger surface area of the placenta exposing more uterine sinuses, (iv) implantation of a part of the placenta in the lower segment which is less retractile.

PUERPERIUM:

There is increased incidence of: (1) subinvolution—because of bigger size of the uterus (2) infection because of increased operative interference, preexisting anemia and blood loss during delivery, (3) lactation failure—this is minimized by reassurance and giving her additional support.[12]

MATERIALS & METHODS

Source of data and materials;

- All women with twin pregnancies delivering at KAHER's Dr. Prabhakar Kore Charitable Hospital, Belagavi.

Method of collection of data

a) Study design: A cross sectional study

b) Study setting: KAHER's Dr. Prabhakar Kore Charitable Hospital, Belagavi.

c) Study period: January 2020-December 2020

d) Study duration:1 year

e) Study Population: All women with twin pregnancies delivering in KAHER's Dr. Prabhakar Kore Charitable Hospital, Belagavi.

f) **Inclusion criteria:**

All women with twin pregnancies delivering after 20 weeks of gestation in KAHER's Dr. Prabhakar Kore Charitable Hospital, Belagavi.

g) **Exclusion criteria:**

Twin pregnancy with one IUD and twin pregnancy with one or both with anomaly are excluded.

Maternal data: Maternal age, mode of conception, parity, family history, presentation, chorionicity, ultrasound findings, obstetric complications: (anemia, GDM, abruption, gestational hypertension, preeclampsia, eclampsia, PROM, hydramnios, oligoamnios, others) mode of delivery and indication of C-section in

all women with twin pregnancies delivering after 20 weeks of gestation in KAHER's Dr. Prabhakar Kore Charitable Hospital, Belagavi.

Foetal data: Discordant twins, gestational age at the time of delivery, birth weight, APGAR, NICU admission, perinatal mortality.

h) **Sample size**: According to reference article

Sample size formula: The minimum sample size formula based on prevalence is

$$n = \frac{z_\alpha{}^2 pq}{d^2}$$

where P is the percentage of prevalence and

d is the percentage likely difference in the prevalence.

z_α is linked with the level of significance.

For 5% level of the significance $z_\alpha = 1.96$.

With p = 57, q = (100-57) = 43 and d = 20% of P = 57%, the sample size" is 75.

However, all women with twin pregnancy delivering after 20 weeks in KAHER's Dr. Prabhakar Kore Charitable Hospital, taking my inclusion & exclusion criteria into consideration are included in my study for period of one year.

Statistical Analysis:

Since the study is of observational study the plan of analysis will be as follows.

For the continuous quantitative variables mean and standard deviation will be calculated. For the purpose of comparison if the data is divided into two groups with respect to certain qualitative characteristic, the continuous variables will be compared using suitable tools

of statistics like student's unpaired t test. The pre and post treatment measures will be compared using student's paired t test.

Discrete variables will be represented by median.

The categorical data will be expressed in terms of rates, ratios and percentages. The association between the outcome, clinical and demographic characteristics will be tested using Chi-square test, test of proportion or Fisher's exact test.

For discrete variables nonparametric tests will be used.

Apart from the above suitable tools like correlation, regression etc., will be used according to the need.

Suitable graphs will be used to depict the comparison.

For all the tests the value of p less than 5% (0.05) will be considered significant.

RESULTS

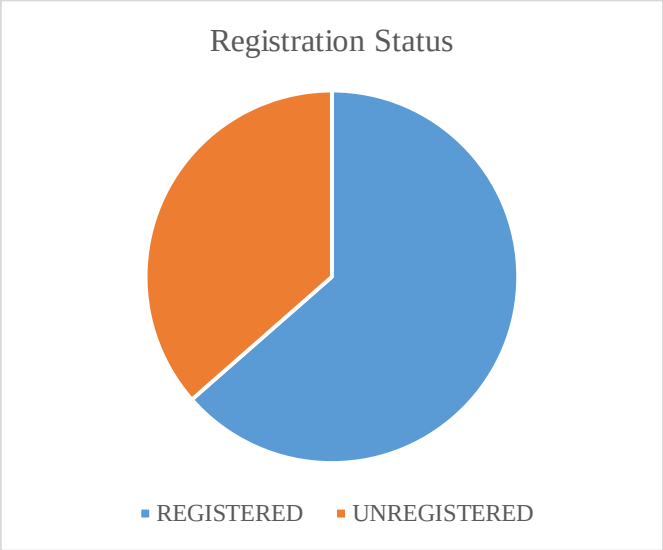
Distribution by Registration Status:

Table 1: Distribution according to the registration status of the participants

Registration Status	**No. of Participants N=75 (100%)**
Registered	45(60%)
Un registered	30(40%)

In our study, majority of the participants were registered 60%.

Graph 1: Distribution according to the registration status of the participants



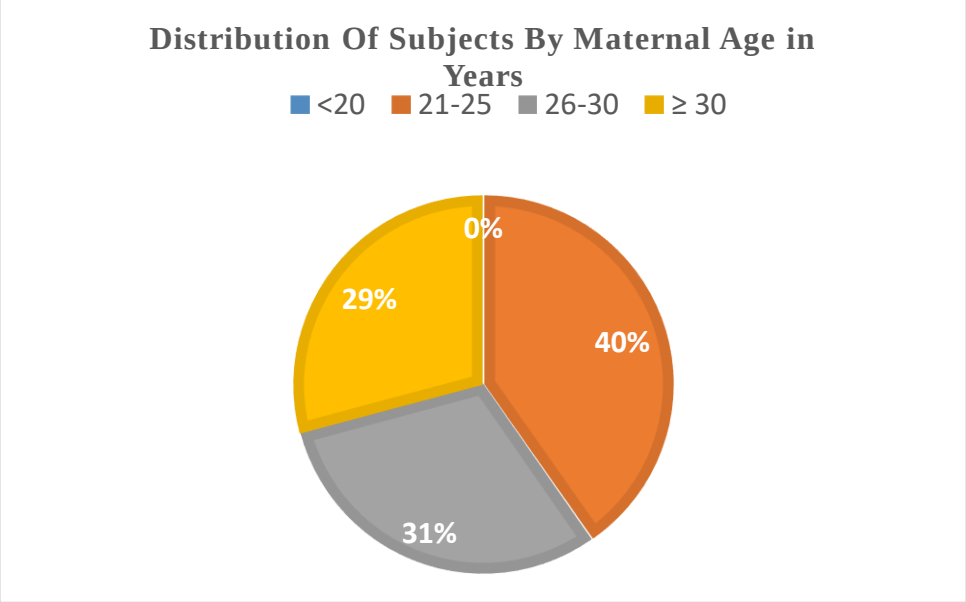
Distribution by age

Table 2: Distribution by age

Age in Yrs	**Number of Subjects N=75 (100%)**
≤ 20	0
21-25	31 (40.28%)
26-30	23 (30.56%)
>31 (29.17%)	21 (29.17%)

In our study out of 75 participants, maximum number of participants belong to 21-25 year which is 40% , followed by 31% of participants among the age group of 26-30 years and 29% participants in the age group of >30years. The mean age observed in our age was 27years.

Graph 2: Distribution By Age

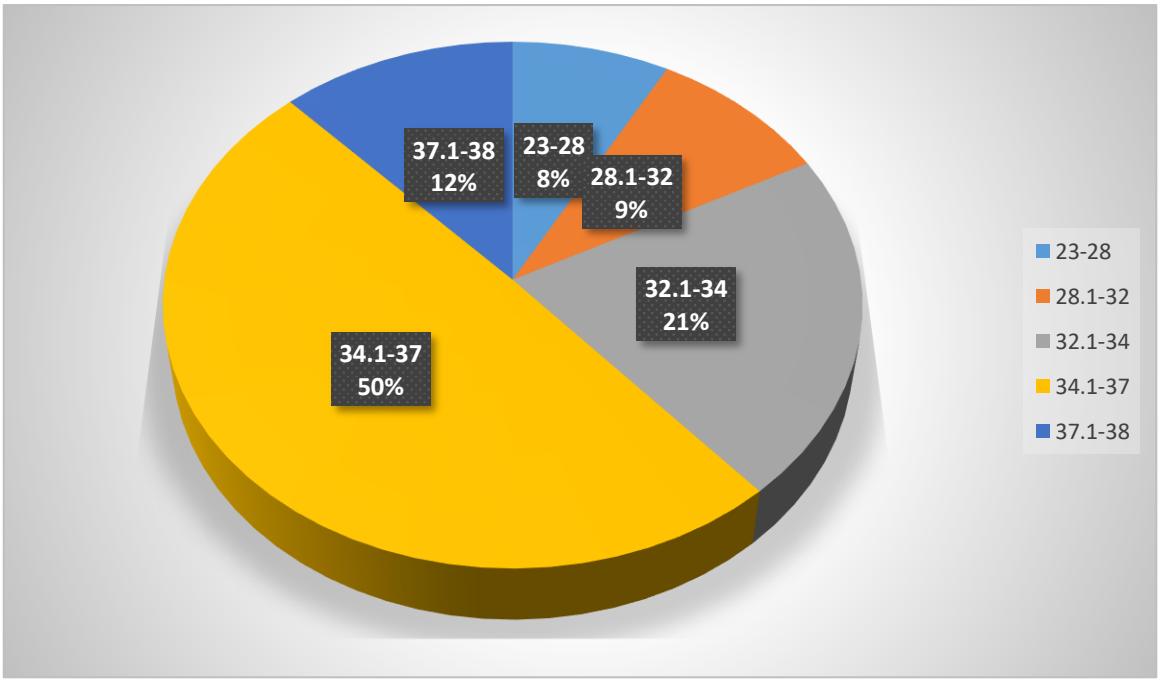


Distribution By Gestational Age

Table 3: Distribution by Gestational Age

Gestational Age (weeks)	**Number of Subjects N=75 (100%)**
23-28	6(8%)
28.1-32	7(9.3%)
32.1-34	16(21.39%)
34.1-37	37 (49.56%)
37.1-38	9(12%)

Graph 3: Distribution by Gestational Age



In our study out of 75 participants, maximum number of participants delivered at a gestational age of 34 weeks+1 day-37 weeks which is 49.5% , 21.9% of participants delivered at a gestational age 32weeks+1day - 34 weeks, 12% delivered at 37weeks+1day-38weeks, 9% delivered at 28weeks+1day-32weeks and 8% delivered within 23weeks-28weeks. No pregnancy was continued beyond 38weeks.

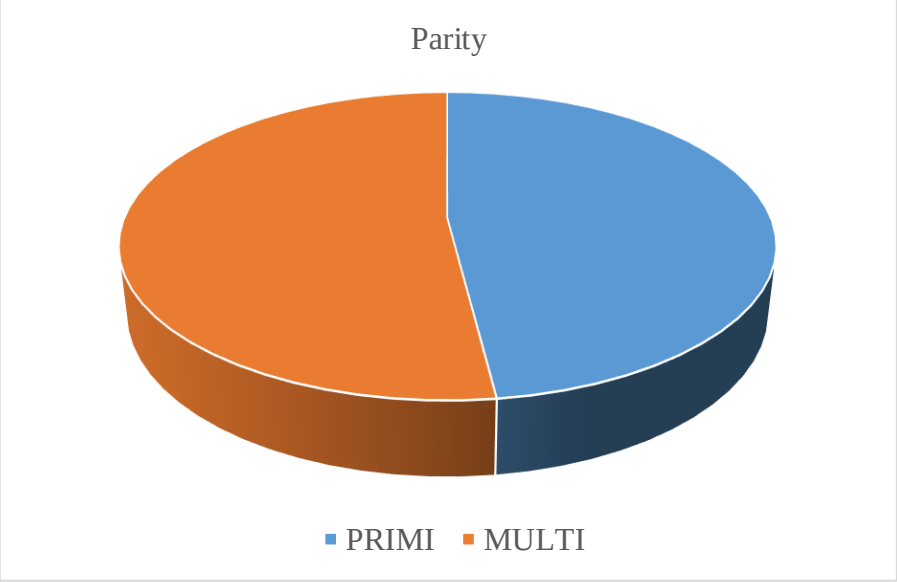
Distribution by Parity

Table 4: Parity

PARITY	**NUMBER OF SUBJECTS** **N=75 (100%)**
Primigravida	34 (48.61%)
Multigravida	41(52.83%)

In our study, out of 75 participants there were 52.8% multigravida & 48.6% are primigravida.

Graph 4: Parity



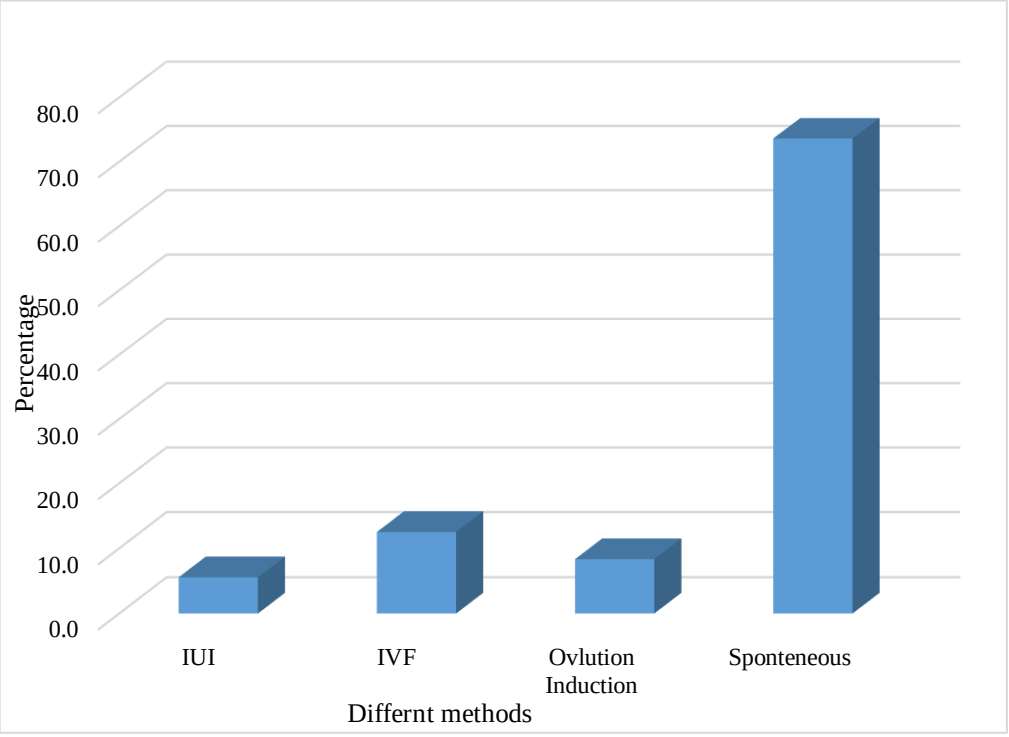
Different Modes of Conception

Table 5: Different Modes of Conception

Mode of Conception	**No of Subjects Percentage** **N=75 (100%)**
Spontaneous	56 (73.16%)
IVF	9 (12.5%)
Ovulation Induction	6 (8.3%)
IUI	4 (5.6%)

In our study out of 75 participants, maximum number of participants conceived spontaneously which is 73.1%, 12.5% of participants conceived by IVF, 8.3% conceived by ovulation induction and 5.6% conceived by IUI.

Graph 5: Different Modes of Conception



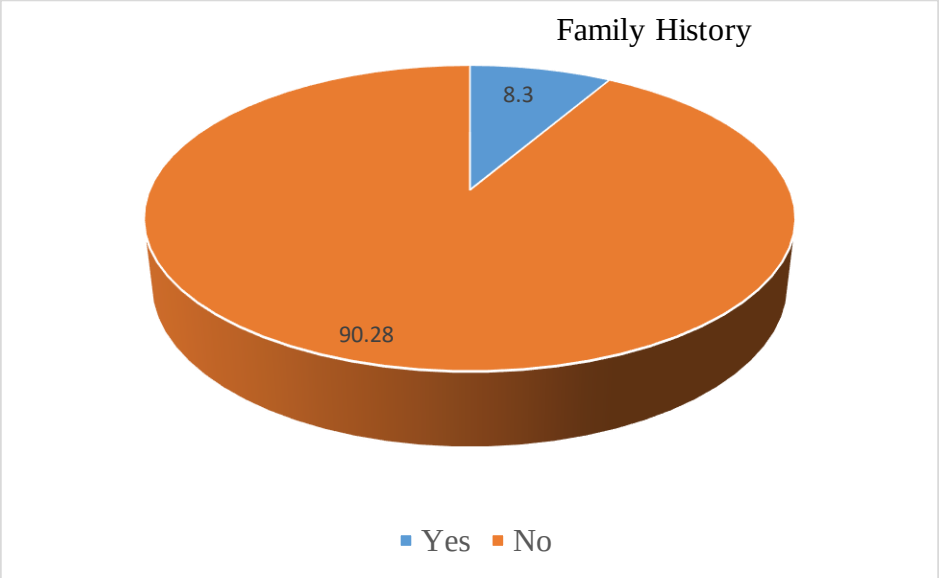
Family History of Twin Pregnancy

Table 6: Family History of Twin Pregnancy

Family History of Twins	**Number of Subjects (%)** **N=75 (100%)**
Yes	6(8.3%)
No	69(91.7%)

In our study out of 75 participants, only 8.3% had a family history of twin pregnancy and maximum number of participants had no family history of twin pregnancy which is 91.7%.

Graph 6: Family History of Twin Pregnancy



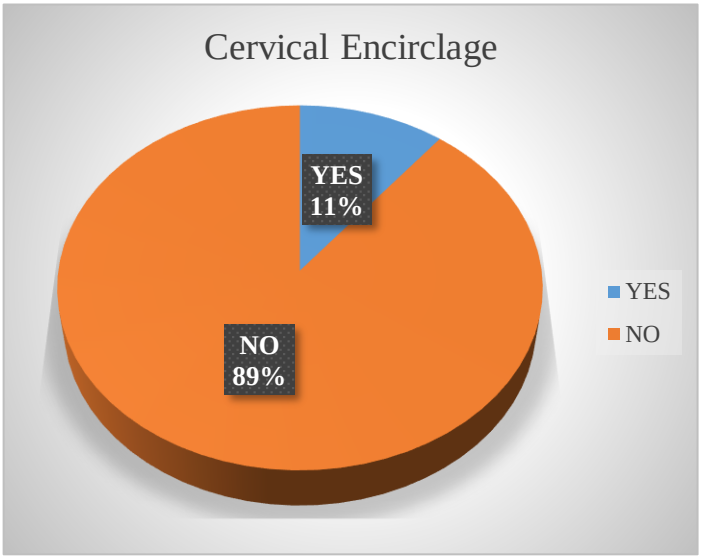
Cervical Encirclage

Table 7: Distribution according to patients who underwent Cervical Encirclage (N=75)

Cervical Encirclage	**No. of Participants** **N=75 (100%)**
Yes	8(10.7%)
No	67(89.3%)

In our study, out 75 twin pregnancy, only 8 of them had uderwent cervical encirclage.

Graph 7:Distribution according to patients who underwent cervical encirclage



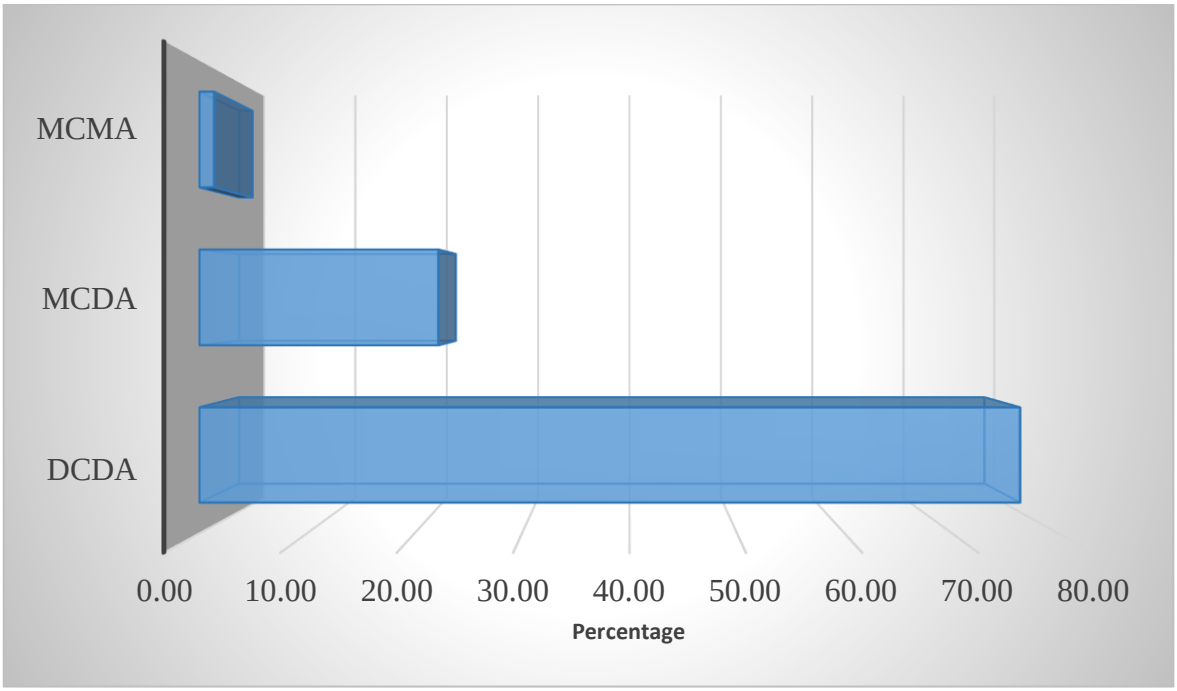
Chorionicity

Table 8: Chorionicity

Chronicity	**Number of Subjects (%)** **N=75 (100%)**
DCDA	58 (76.39%)
MCDA	15(22.22%)
MCMA	2(1.39%)

In our study out of 75 participants, most common chorionicity was DCDA which is 76.3%, MCDA was 22.2% & MCMA twins is 1.39%.

Graph 9: Chorionicity



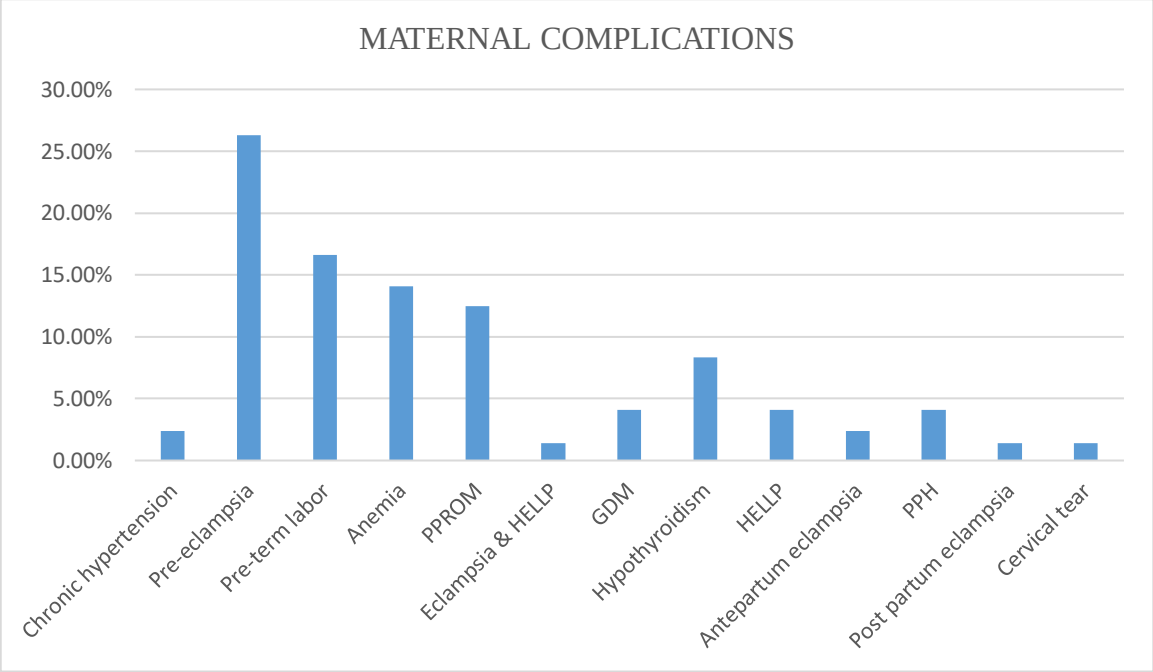
Maternal Complications

Table 9: Maternal Complications

Complications	**Number of Subjects N=75 (100%)**
Ante-Partum Complications	
Pre-eclampsia	23(26.28%)
Pre-term labor	30(60.67%)
Anemia	10(14.09%)
PPROM	9(12.5%)
GDM	8(4.17%)
Hypothyroidism	8(8.33%)
HELLP	3(4.1%)
Ante-partum eclampsia	3(4.1%)
Chronic Hypertension	2(2.39%)
Abruption placenta	1(1.39%)
Placenta previa	1(1.39%)
Intra-Partum Complications	
PPH	3(4.1%)
Cervical tear	5(6.6%)
Post-Partum Complications	
Post-partum eclampsia	1(1.39%)

In our study most common antenatal complication observed was pre-term labor followed by pre-eclampsia which is 60% and 26.2% are respectively. Other complications are PPROM, anemia, pre-eclampsia, HELLP, GDM, hypothyroidism, eclampsia & PPH.

Graph 10: Maternal Complications

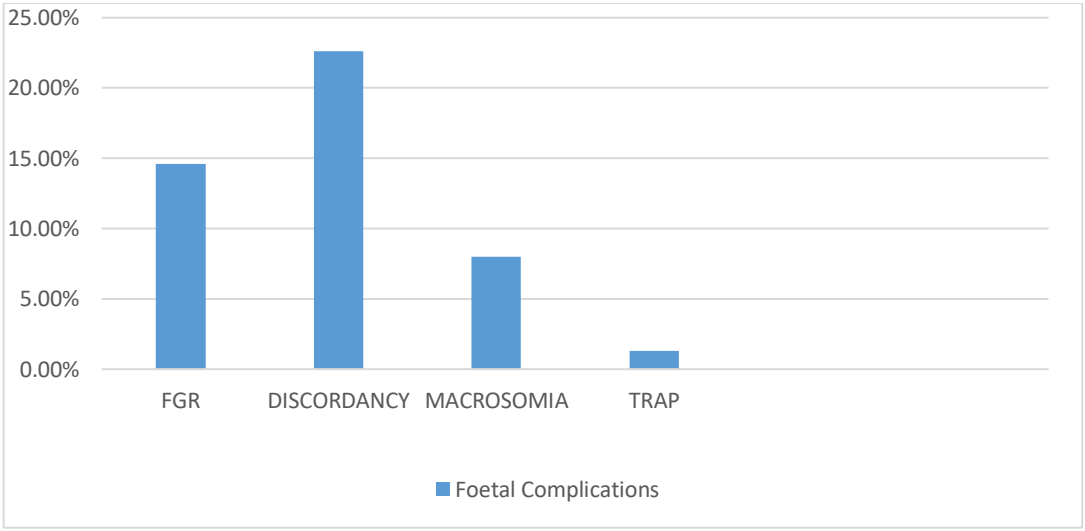


Foetal Complications

Table 10: Foetal Complications

Complications	**No. of Cases N=75 (100%)**
FGR	11(20%)
Discordancy	26(38.6%)
TRAP	1 (1.34%)
TTTS	0

Graph 10: Foetal Complications



In our study, there were 20% FGR, 26.6% discordant twin, 8% were macrosomic babies & 1% had TRAP.

Mode of Delivery

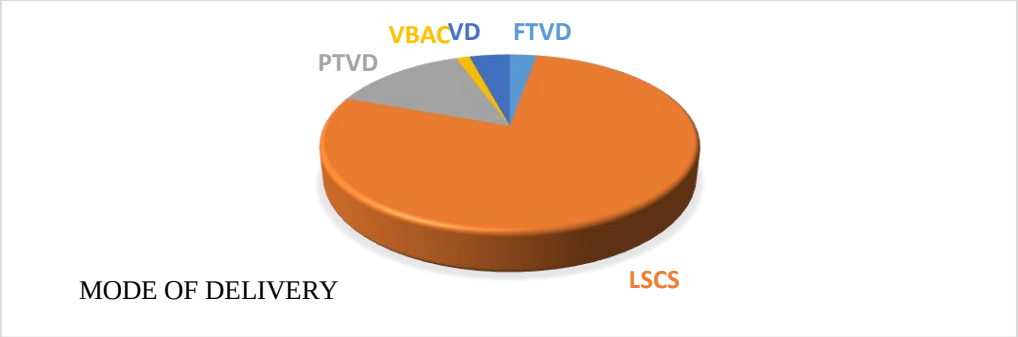
Table11: Mode of Delivery

Mode of Delivery	**Number of Subjects (%)** **N=75 (100%)**
LSCS	**55(77.7%)**
Pre-Term Elective LSCS	3(4%)
Pre-Term Emergency LSCS	46(61%)
Full- Term Elective LSCS	3(4%)
Full- Term Emergency LSCS	3(4%)

Vaginal Delivery	**20 (26.6%)**
PTVD	15(18.6%)
FTVD	2(2.7%)
Ventouse delivery	2(2.7%)
VBAC	1 (1.39%)

In our study, most common mode of delivery was cesarean section which was 77.7% of which 13.3% were elective LSCS & emergency LSCS were 61%, of which there were 3 full-term elective and emergency LSCS & 3 elective and 46 emergency pre-term LSCS. 18.6% had pre-term vaginal delivery (PTVD), 2.7% had full term vaginal delivery plus one full term ventouse delivery. One patient delivered by vaginal birth after cesarean for which ventouse was applied (VBAC).

Graph 11: Mode of Delivery



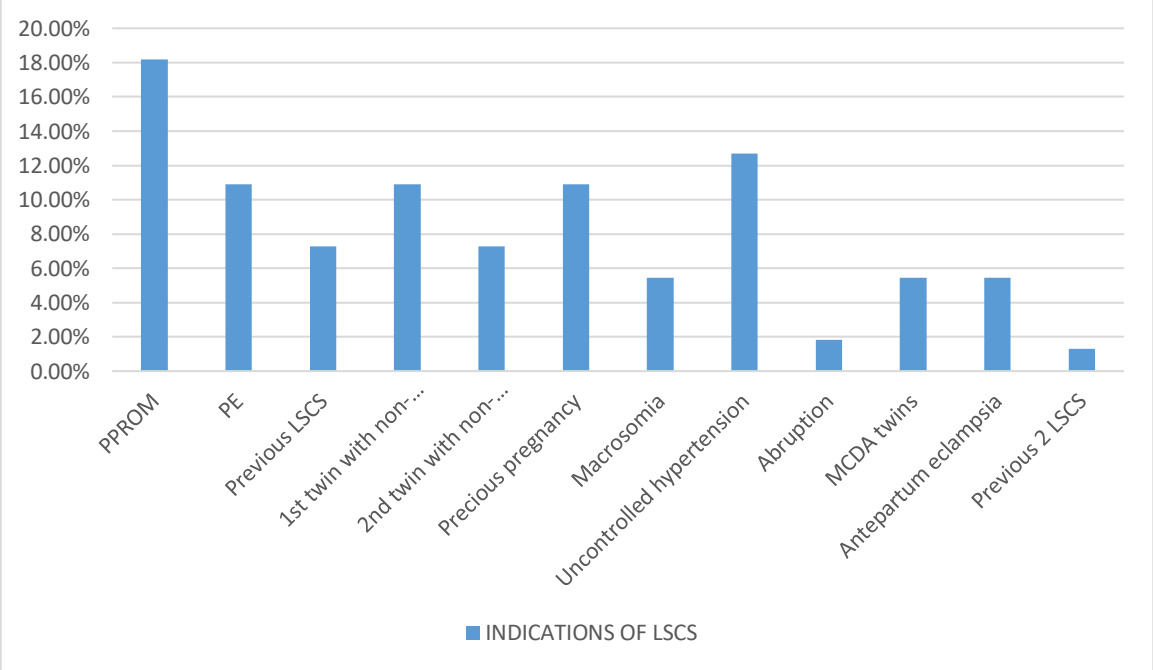
Indications of LSCS

Table 12: Indications of LSCS

Indications of LSCS	**No. of LSCS(N=55)**
PPROM	10(18%)
Uncontrolled Pre-eclampsia	7(12.9%)
1st twin in non-vertex presentation	7(12.9%)
Pre-eclampsia	7(12.9%)
Precious pregnancy	6(8%)
2nd twin in non-vertex presentation	5(6.6%)
Previous LSCS	3(4%)
Macrosomia	3(4%)
Antepartum eclampsia	2(2.6%)
MCDA twins	2(2.6%)
Abruption	1(1.3%)
TRAP with polyhydramnios with PPROM	1(1.3%)
Previous 2 LSCS	1(1.3%)

In our study, most common indication of cesarean is PPROM. Cesarean section was done in 55 patients out of 75 patients in view of premature pre-term rupture of membranes in 10 patients (18%), uncontrolled hypertension in 7 patients (12.9%), first twin in non-vertex presentation in 7 patients (12.9%), pre-eclampsia in 7 patients (12.9%), precious pregnancy in 6 patients(8%), second twin in non-vertex presentation in 5 patients(6.6%), previous cesarean section in 4 patient(5.3%), macrosomia in 3 patients(4%), ante-partum eclampsia in 2 patients(2.6%), MCDA twin in 2 patients(2.6%), abruption placenta in 1 patient(1.3%), Previous 2 LSCS in 1 patient(1.3%) & TRAP with polyhydramnios with PPROM in 1 patient(1.3%).

Graph 12: Indications of LSCS



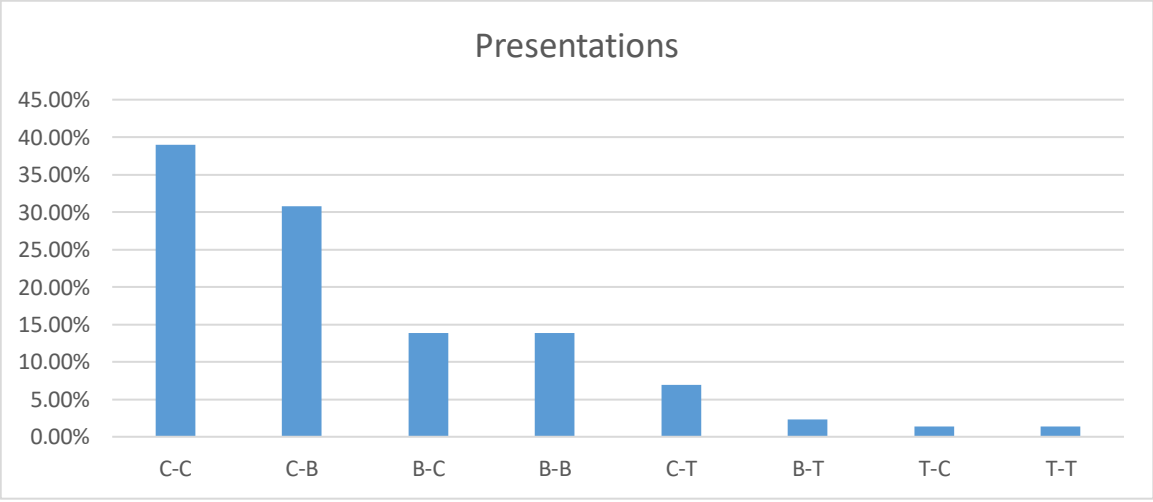
Presentations

Table 13: Presentations

Presentation	**Number of Subjects (%)** **N=75 (100%)**
C-C	26(38.94%)
C-B	20 (30.78%)
B-C	10(13.89%)
B-B	10(13.89%)
C-T	6(6.94%)
B-T	2 (2.28%)
T-C	1(1.39%)
T-T	1(1.39%)

In our study most common presentation observed was both cephalic-cephalic which is 38.9%, cephalic-breech presentation was 30.7%, followed by breech-cephalic & both breech presentation were 10% and transverse-cephalic and both transverse were 1.3%.

Graph 13: Presentations

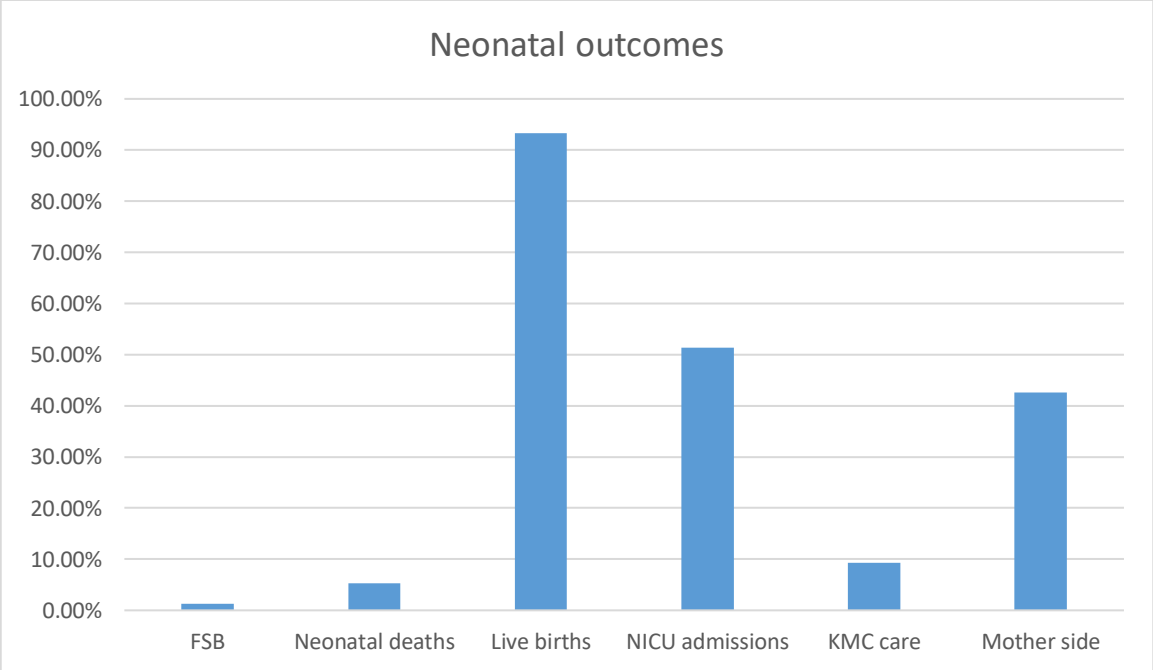


NEONATAL OUTCOMES:

Table 14: Neonatal Outcomes

Neonatal Outcomes	**Total (N=150)**
FSB	2(1.3%)
Neonatal deaths	8(5.3%)
Live births	148(98.7%)
NICU admissions	72(48.6%)
KMC care	13(9.3%)
Mother side	63(42.6%)

Graph 14: Neonatal Outcomes



In our study, they were 148 live births, 2 fresh still births & 8 neonatal deaths. Mean birth weight of twin-A & twin-B is 1.8kg and Mean APGAR score of twin-A & twin-B is 6/10 in 3minutes & 7/10 in 5 minutes of life.

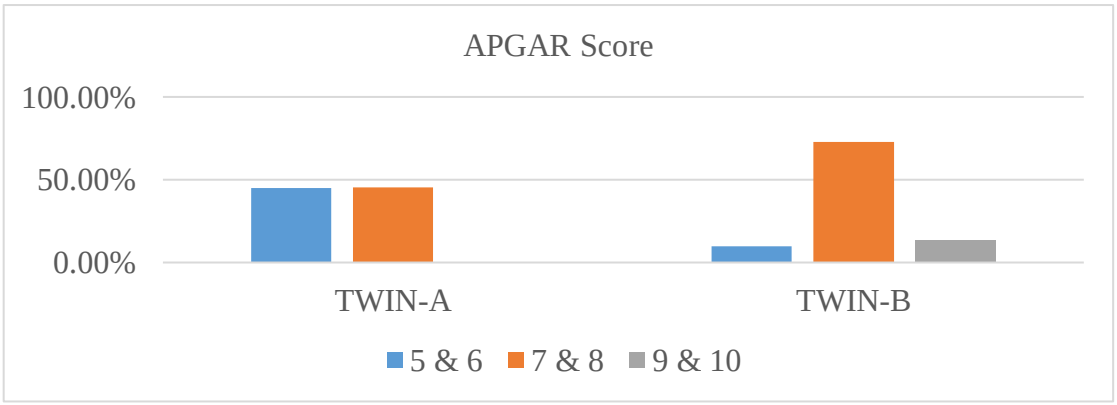
APGAR score

Table 15: APGAR score

	APGAR Reading at 1mins & 3 mins	**Number / Percentage (N=148/100%)**
TWIN-A	5&6	37(50%)
	7&8	37(50%)
	9&10	0
TWIN-B	5&6	10(13.88%)
	7&8	54(73%)
	9&10	10(13.88%)

In our study, twin-A had a APGAR score only of 7/10 at 1 minutes & 8/10 at 3 minutes & 5/10 at 1 minutes & 6/10 at 3 minutes at equal proportion, twin-B most common APGAR score observed was 7/10 at 1 minutes of & 8/10 at 3 minutes which is 73% followed by 9/10 at 1 minutes & 10/10 at 3 minutes & 5/10 at 1 minutes & 6/10 at 3 minutes which is 13.8%.

Graph 15: APGAR Score

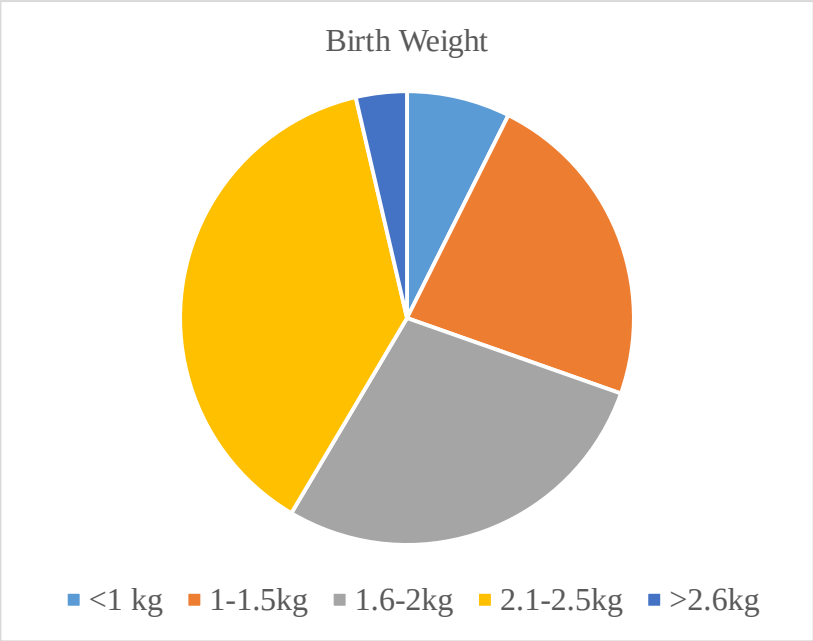


BIRTH WEIGHT

Table 16: Birth Weight

Birth Weight in Kg	**No. of Babies (%)(N=148)**
<1	10(6.8%)
1-1.5	31(20.9%)
1.6-2	42(28.4%)
2.1-2.5	60(40.5%)
>2.6	5(3.5%)

Graph 16: Birth Weight



In our study, 6.8% of babies were found to have a birth weight of less than 1kg, 20.9% had a birth weight between 1-1.5 kg, 28.4% had a birth weight of 1.6-2kg, 40.5% had a birth weight of 2.1-2.5 kg which is the most common birth weights & 3.5% babies had birth weight of >2.6kg.

BABIES REQUIRING SPECIAL CARE

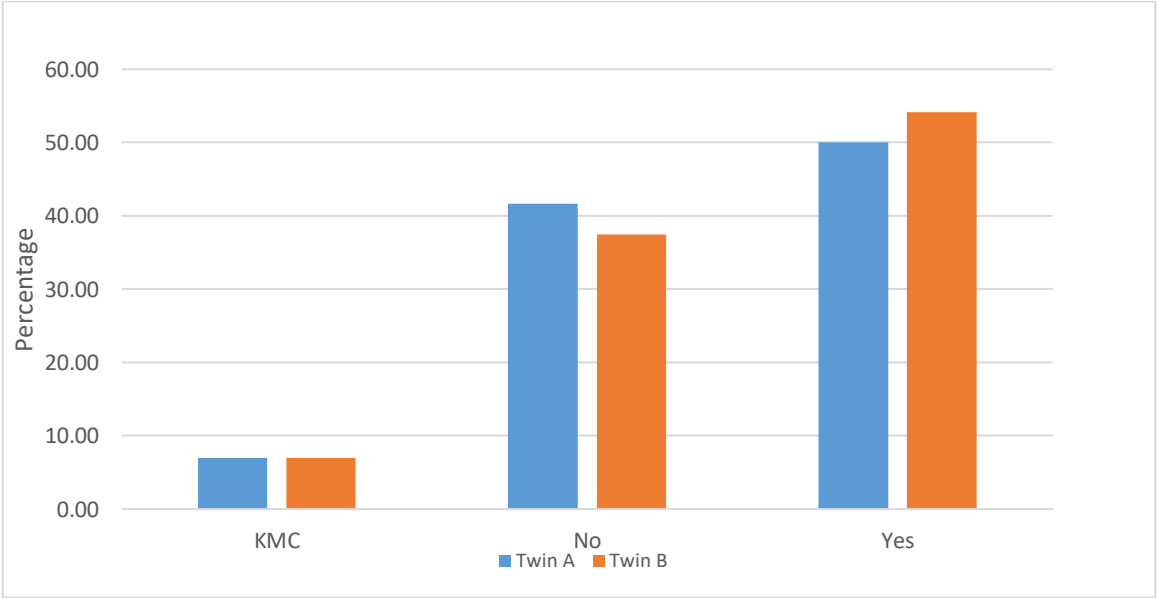
Table 17: **BABIES REQUIRING SPECIAL CARE**

NICU care	TOTAL NO. OF BABIES (N=72)
Twin A	35 (47.3%)
Twin B	37(54.17%)

KMC care	TOTAL NO. OF BABIES (N=13)
Twin-A	5(6.7%)
Twin-B	8(10.8%)

In our study, among twin-A, 50% of babies required NICU care, 6.7% of babies required kangaroo mother care KMC and 45.9%(34) of babies were with the mother. Among twin-B, 54.1% of babies required NICU care, 10.8% of babies required kangaroo mother care KMC and 39.2%(29) of babies were on the mother side.

Graph 17: Babies Requiring Special Care



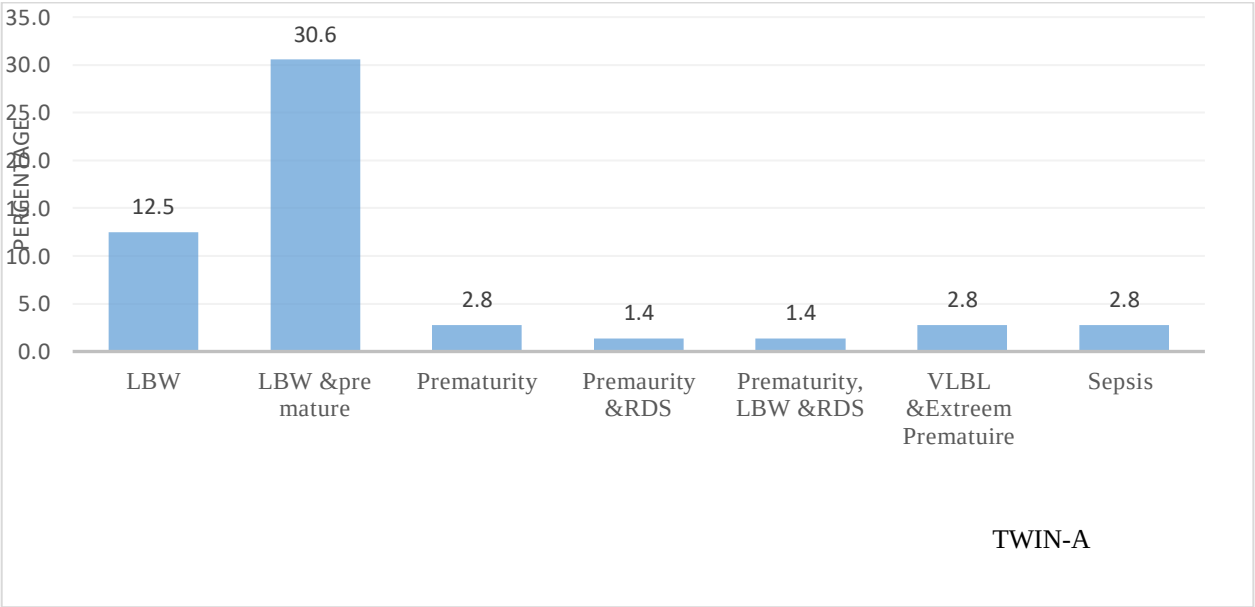
INDICATION FOR NICU Admissions

Table 18: Indication for NICU Admissions

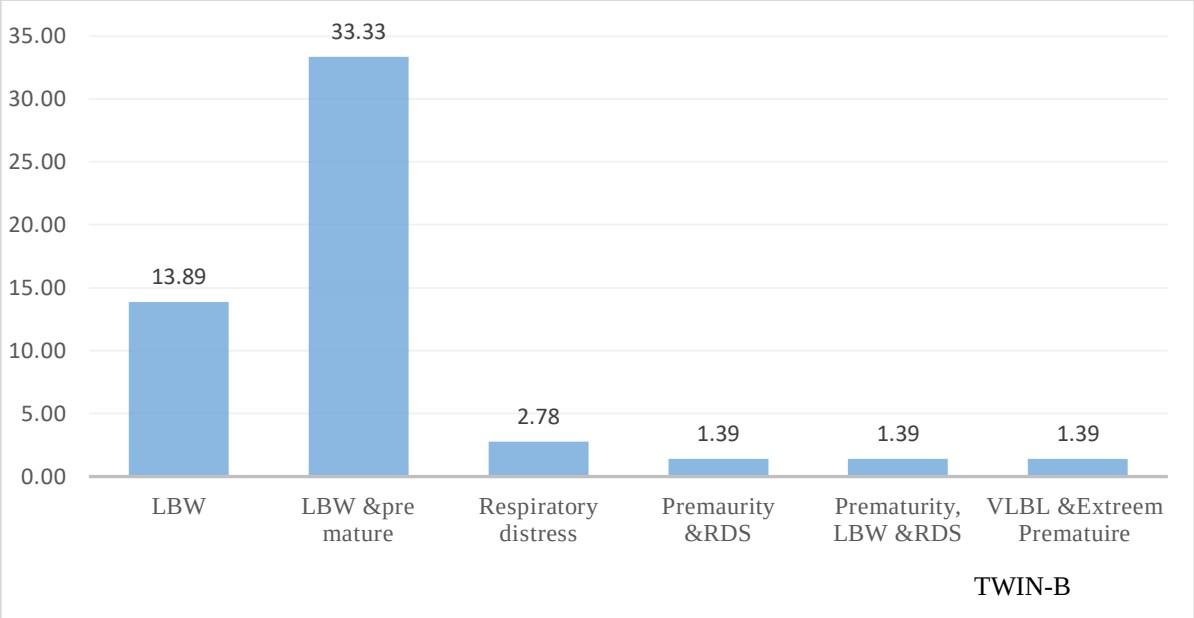
Indication	NICU Admissions (%)
LBW	19 (26.5%)
LBW and prematurity	40(55.56%)
Prematurity	2(2.78%)
Premaurity &RDS	2 (1.39%)
Prematurity, LBW &RDS	2(1.39%)
VLBL & Extreme Prematurity	3(2.78%)
Sepsis	2(2.78%)
Respiratory distress	2(2%)
TOTAL	72(100%)

In our study most common cause of NICU admission was low birth weight & prematurity & prematurity which are 55.5% & 26.5% respectively.

Graph 18: Indication for NICU admission for twin A



Graph 19: Indication for NICU admission for twin B



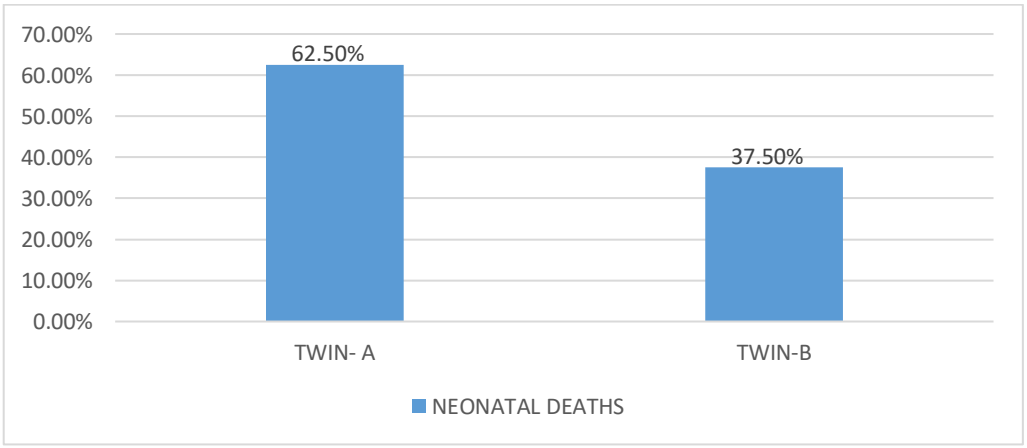
Neonatal Deaths

Table 19: Neonatal Deaths

Neonatal Deaths	**Number**
Twin A	5
Twin B	3

In our study, there were 8 neonatal deaths. 5 deaths were among twin- A babies & only 3 deaths among twin-B.

Graph 20: Neonatal Deaths



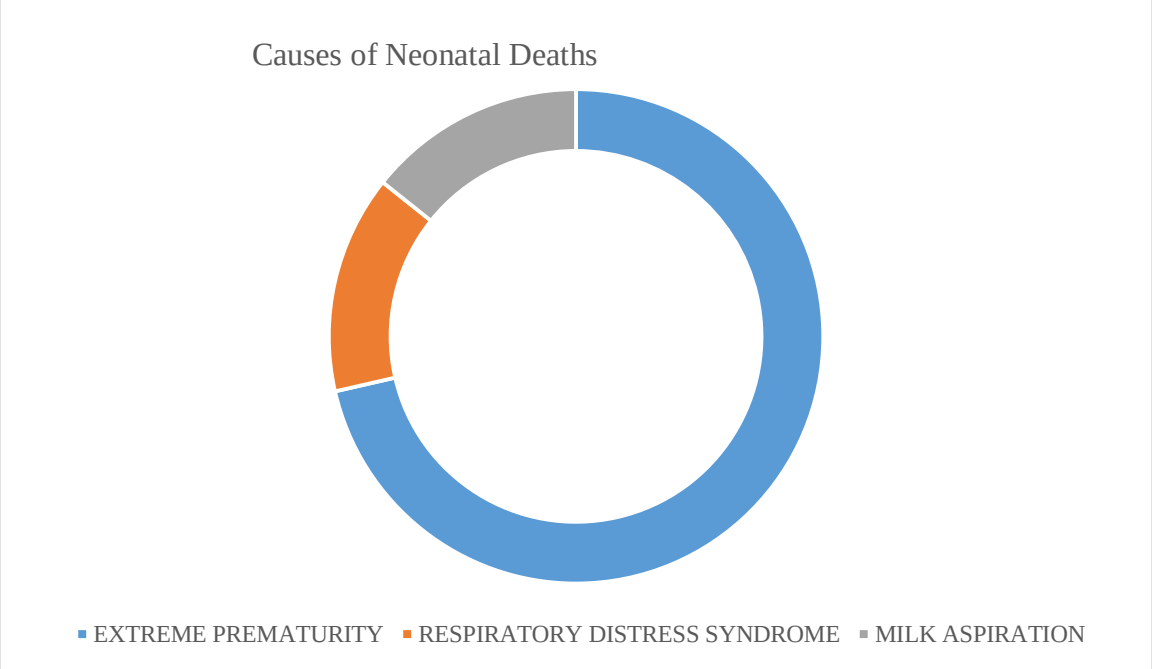
CAUSES OF NEONATAL DEATHS

Table 20: Causes of Neonatal Deaths

Causes of Neonatal Deaths	No of Deaths(N=8)
Extreme Pre-Maturity	6
Respiratory Distress Syndrome	1
Milk Aspiration	1

In our study, most common cause of neonatal mortality is extreme prematurity among 6 babies, and other reasons were respiratory distress syndrome & milk aspiration.

Graph 21: Causes of Neonatal Deaths



SECONDARY OUTCOME

- The prevalence of twin pregnancy in KAHER's Dr. Prabhakar Kore Charitable Hospital, taking my inclusion & exclusion criteria into consideration is 2.3% of 3150 deliveries.

DISCUSSION

This study is conducted in KAHER'S Dr. Prabhakar Kore hospital, Belagavi a tertiary care centre. The primary objective is to evaluate the maternal and foetal complications of twin pregnancy.

Table 21:COMPARISON OF INCIDENCE OF TWINS

AUTHORS	YEAR	INCIDENCE
Vidyadhar B. Bangal et al,	2011	1.49%
Naushaba Rizwan et al;	2010	1.4%
Gundu Vanaja et al	2017	3%

In our study the incidence is 2.3%.The incidence of twinning and higher order multiple gestation has increased dramatically over the last two decades. The greatest contributor to this explosion in multiple gestation has been delayed fertility and the use of assisted reproductive technology. Since multiple gestation has been associated with multiple complications, so the physician should be careful in selecting the patients for ovulation inducing drugs, to prevent further complications. The incidence of twin pregnancy is similar to the studies done in the past and remains constant.

Table 22: COMPARISON OF MATERNAL AGE

AUTHORS	**YEAR**	**MATERNAL AGE (range)**
ARUNADEVI et al , TAMILNADU	2009	25-29yrs 30%
VIDYADHAR et al, MUMBAI	2011	20-30yrs 87%
SHILPA et al, BANGALORE	2013	20-25yrs 73%
MANJU YADAV , et al VISAKAPATANAM	2015	20-29yrs 60%
NAIROBI et al, Kenyatta,	2017	26-30yrs 37%
PRESENT STUDY	2020	21-25yrs 40%

The most common age group for the incidence of twins according to our study was 21 to 25 years. In both mono and dichorionic pregnancies the common age group was 25 – 29 years. As the age increases, the incidence of dichorionicity is found to be increasing. Study by Shilpa et al conducted at Bangalore had a similar incidence of twinning at the age group of around 25 years.

Table 23 :COMPARISON OF GESTATIONAL AGE

AUTHORS	**YEAR**	GESTATIONAL AGE
ARUNADEVI et al , TAMILNADU	2009	34-37 weeks 36%
VIDYADHAR et al , MUMBAI	2011	34-36weeks 34%
SHILPA et al, BANGALORE	2013	34-37weeks 51%
MANJU YADAV , et al VISAKAPATANAM	2015	34-36weeks 50%
NAIROBI et al, Kenyatta,	2017	33-36weeks 46%
Lakshmikantha et al,	2018	>38weeks 46.3%
PRAVALLIKA et al, Bangalore	2019	33-36weeks 44%

In our study the most common gestational age at delivery is 34.1-37weeks, which is 49.5%. Most of the participants delivered in late pre-term gestational age. Study by Shilpa et al conducted at Bangalore had a similar results.

Table 24: COMPARISON OF PARITY IN TWIN PREGNANCIES

AUTHORS	**YEAR**	**No. of multigravida subjects**
ARUNADEVI et al , TAMILNADU	2009	57%
VIDYADHAR et al , MUMBAI	2011	49%
SHILPA et al, BANGALORE	2013	60%
MANJU YADAV , et al VISAKAPATANAM	2015	66%
NAIROBI et al, Kenyatta,	2017	79%
Lakshmikantha51	2018	41%
PRAVALLIKA et al, Bangalore	2019	52%

In our study there were 48% of primigravida and 52% of multigravida. This is similar to findings observed in the previous studies which states that as the parity increases, the incidence of dichorionicity is found to increase.

Table 25: COMPARISON OF MODE OF CONCEPTION

AUTHORS	**YEAR**	NO. OF SPONTANEOUS CONCEPTION
ARUNADEVI et al , TAMILNADU	2009	70%
SHILPA et al, BANGALORE	2013	60%
MANJU YADAV , et al VISAKAPATANAM	2015	75%
NAIROBI et al, Kenyatta,	2017	56%
PRAVALLIKA et al, Bangalore	2019	67.9%

In our study there were 73% of spontaneous conception, 12.5% had IVF conception, 8.3% conceived after ovulation induction & 5.6% conceived after IUI. This result was similar to the study by Manju Yadav et al conducted in 2015.

COMPARISON OF CHORIONICITY OF TWIN PREGNANCY

Out of 75 twin pregnancy, there were 76% DCDA twins, 22.2 % of MCDA twins and 2% of MCMA twins. In a study conducted by Arunadevi et al during 2012 there were 62% of DCDA twins, 30.8 % of MCDA twins and 4% of MCMA twins. There results were similar to our study.

Table 26: Comparison between MCDA and DCDA

Variable	Mean (SD)		P value
	MCDA (n=16)	DCDA(n=55)	
Age (Years)	26.12(3.4)	28.4(5.1)	0.14
Gestation age (week)	34(3.4)	34.36(2.9)	0.0001
LSCS	14(87.5%)	42(76.26%)	0.33
Spontaneous	16(100%)	36(35.45%)	0.006

(P values were calculated by t test and/or chi square test, P<0.05 considered to be significant.)

Table 27: COMPARISON OF MATERNAL COMPLICATIONS

ANTENATAL COMPILCATIONS	ARUNADEVI et al , TAMILNADU	VIDYADHAR et al , MUMBAI	SHILPA et al, BANGALORE	MANJU YADAV , et al VISAKAPATANAM	NAIROBI Et al, Kenyatta,	Present study
ANAEMIA	20%	66%	24%	7%	12.8%	14%
PRE-TERM LABOR	40%	84%	60%	69%	53%	60%
PRE-ECLAMPSIA	25%	18%	-	24%	25%	26%
GDM	-	-	3.3%	1%	1%	4%
PPH	18%	-	40%	3%	12%	5%
ECLAMPSIA	4%		3.3%	1%	1%	4%

Anaemia:

Anaemia is one the most important and common medical complication in multifetal pregnancy even in singleton pregnancy. In multifetal gestation its incidence is increased because of further increase in number of foetuses, more increase in maternal blood volume and thus there is increased demand for iron and folic acid. 2% (2) patients had preterm labour and anaemia, 2% (2) patients had anaemia with gestational hypertension, 2% (2) patient had hypothyroidism with anaemia. In the present study, total incidence of anaemia were 14%, which is comparable with that study conducted by Nairobi et al which is 20%.

Preterm labour:

The incidence of preterm labour in the present study is compared with those of other authors in the above table. Incidence of preterm labour in the present study is almost equal to that of other studies. 15 patients came in active stage of labour. 12 patients had antenatal complications such as which made termination of pregnancy compulsion such as PPROM in 9 patients. Most of the patients had irregular antenatal checkups and improper counselling of mothers in antenatal period regarding risk of preterm labour. In the present study, 16.6% (12) patients were had only preterm labour, 1.39% (1) patients had preterm labour with anaemia, 12.5% (9) patient had preterm labour with PPROM, 6% (3) patients had preterm labour with chronic hypertension. Total 31 (62%) patients had preterm labour. Present study is comparable with the study conducted by Arunadevi et al.

8 patients underwent cervical encirclage, of which 3 patients had a cervical length of <2.5cm and 5 patients had a cervical length of 2.5-3cm at the time of encirclage.

Severe pre-eclampsia:

12.5% (9) patients had only severe preeclampsia, 1.39% (1) patients had preterm labour with severe preeclampsia, 1.39% (1) patients had preterm labour with anaemia and severe preeclampsia, 1.4% (1) patients had severe preeclampsia with IUGR and 1.4%(1) patient had severe preeclampsia and antepartum haemorrhage. In the present study the total incidence of pre-eclampsia is 26% which is comparable with the study conducted by Manju Yadav et al which is 24%.

Antepartum haemorrhage:

As plurality increases, the risk of placental abruption rises. Although relatively uncommon, placental abruption is a major cause of fetal and neonatal mortality. The incidence of antepartum haemorrhage in present study was 1.39% which was associated with preeclampsia and anaemia and it is comparable with that of study conducted by Shilpa et al which is 3.5%.

When other maternal complications were analysed, Chronic hypertension was 2%, GDM & hypothyroidism were 8% Eclampsia, HELLP & PPH were 3% and abruption & placenta previa were 1%, of twin pregnancies.

Table 28: COMPARISON OF MODE OF DELIVERY

AUTHORS	**YEAR**	**LSCS**
ARUNADEVI et al , TAMILNADU	2009	62%
VIDYADHAR et al , MUMBAI	2011	63%
SHILPA et al, BANGALORE	2013	68%
MANJU YADAV , et al VISAKAPATANAM	2015	61%
NAIROBI et al, Kenyatta,	2017	73%
PRAVALLIKA et al, Bangalore	2019	54%
Present study	2020	77%

- In our study, the most common mode of delivery was LSCS which is 55, of which there were 10 elective LSCS (13.3%) & 45 (61%) were emergency LSCS, of which there were 3 full-term elective and emergency LSCS & 3 elective and 46 emergency pre-term LSCS.. There were 15 pre-term deliveries plus one pre-term ventouse delivery. There were 3 full term vaginal delivery plus one full term ventouse delivery. Most of the vaginal deliveries were conducted at either extreme pre-term or early pre-term gestation. There was aslo a vaginal birth after caesarean section was also conducted at a gestational age of 26 weeks 6 days for which ventouse was applied to cut short the second stage of labor. Among the ventouse delivery, full term ventouse delivery was conducted in a cardiac disease cases to cut short second stage of labor and pre-term ventouse was applied for the VBAC to cut short the second stage of labour.
- The mode of presentation was analysed. Out of the 75 twin deliveries, 38.9% were of both cephalic presentation, 30.7% were of cephalic & breech, 13.89% were of breech & cephalic, 13.89% were both breech, cephalic & transverse were 6.9%, transverse & breech was 2.28% & 1% of breech & transverse. The most common mode of presentation was vertex/vertex in both MC and DC pregnancies which was similar to the results in the study conducted by Arunadevi et al.
- In our study, most common indication of cesarean is twins with PPROM. Cesarean section was done in 55 patients out of 75 patients in view of premature pre-term rupture of membranes in 10 patients (18%), uncontrolled hypertension in 7 patients (12.9%), first twin in non-vertex presentation in 7 patients (12.9%), pre-eclampsia in 7 patients (12.9%), precious pregnancy in 6 patients(8%), second twin in non-vertex presentation in 5 patients(6.6%), previous cesarean section in 4 patient(5.3%), macrosomia in 3 patients(4%), ante-partum eclampsia in 2

patients(2.6%), MCDA twin in 2 patients(2.6%), abruption placenta in 1 patient(1.3%) & TRAP with polyhydramnios with PPROM in 1 patient(1.3%).

- Out of 26 cephalic-cephalic presentation, 11 had a vaginal delivery & 15 underwent LSCS, of which 5 underwent LSCS in view of previous LSCS, 4 underwent LSCS in view of precious pregnancy, 3 underwent LSCS in view of DCDA with severe PE & 3 underwent LSCS in view of MCDA twins.
- Out of 20 cephalic-breech presentation, 6 had a vaginal delivery & 14 underwent LSCS of which 5 underwent LSCS in view of second twin with non-vertex presentation and MCDA twins & 4 underwent LSCS in view of DCDA twin with severe PE.
- Out of 10 breech-cephalic presentation, 2 had a vaginal delivery & 8 underwent LSCS. Out of 10 breech-breech presentation, 2 had a vaginal delivery & 8 underwent LSCS. Out of 5 vertex-transverse presentation, 5 of them underwent LSCS. All participants underwent LSCS among breech–transverse, transverse-cephalic & transverse-transverse presentations.
- Postnatal complication observed in our study were post-partum eclampsia which is 1% & PPH was 3%
- Maternal Mortality: Since complications associated with multifetal gestation are more when compared to that singleton pregnancy, the incidence of maternal mortality is also higher. No maternal mortality was observed in our study.

Table 29: COMPARISON OF NEONATAL OUTCOME

NEONATAL OUTCOME	ARUNADEVI et al , Tamilnadu	VIDYADHAR et al , Mumbai	SHILPA et al, Bangalore	MANJU YADAV , et al Visakapatanam	NAIROBI et al, Kenyatta,	PRAVALIKA et al Bangalore
BIRTH WEIGHT (range)	1.5-2KG 54%	1.5-2KG 35%	1.5-2.5KG 60%	1.5-2KG 29%	1.5-2KG 60%	1.5-2KG 35.4%
NICU ADMISSION	66%	51%	50%	26%	4.3%	75%
NEONATAL DEATH	16%	11%	5%	6.5%	-	5.4%
CAUSE OF NEONATAL DEATH	RDS & SEPSIS	SEPSIS 12%	RDS 11.6%	-	-	EXTREME PREMATURITY 75%

- Out of 75 twin deliveries, 1% were fresh still births seen in MCDA twins with birth weight of 420gms-480gms. This is in contrast to the results of the study by Arunadevi et al who showed that still birth were similar among MC & DC pregnancies.
- Out of 75 twin deliveries, TWIN-A & TWIN-B babies had a mean birth weight of 1.8Kg and 6.9% were found to have a birth weight of less than 1kg, 21.5% had a birth weight between 1–1.5 kgs, 29.6% had a birth weight of 1.6-2kg, 37.1% had a birth weight of 2.1-2.5kg which is the most common birth weights & 3.4% babies had birth weight of >2.6kg. The results were not similar to the study done by Pravalika et al.
- In our study, the commonest APGAR score observed in twin- A babies is 7/10 at 1 minutes & 8/10 at 3 minutes & 5/10 at 1 minutes & 6/10 at 3 minutes at equal

proportion and twin-B the most common APGAR score observed was 7/10 at 1 minutes & 8/10 at 3 minutes of 73% . The results were not similar to the study done by Pravalika et al.

- In our study, among twin-A, 50% of babies required NICU care, 6.7% of babies required kangaroo mother care KMC and 45.9%(34) of babies were with the mother. Among twin-B, 54.1% of babies required NICU care, 10.8% of babies required kangaroo mother care KMC and 39.2%(29) of babies were on the mother side. Indications for NICU admissions were RDS in 4.2%, LBW in 12.5%, LBW & prematurity in 30.56%, VLBW in 2.78% & prematurity in 10%. The most common cause for NICU admission was LBW due to prematurity. Neonatal complications were were not similar to the study done by Pravalika et al.
- In multifetal gestation the incidence of perinatal mortality is higher than singleton pregnancy because the incidence of preterm birth, IUGR, LBW, fetal distress is more common in multifetal gestation compared with singletons. In our study, there were 8 early neonatal deaths. 5 deaths were among twin- A babies & only 3 deaths among twin-B. The most common cause of neonatal death was extreme prematurity among 6 babies who were delivered at a gestational age ranging from 24weeeks 6days - 25weeks 4 days with birth weights ranging from 470gms – 750gms. Other 2 babies were also pre-term babies of 31 weeks 1 days -33 weeks 2 days. and other reasons were respiratory distress syndrome & milk aspiration.

LIMITATIONS OF THE STUDY

Following are limitations of this study:

- This study was conducted in a tertiary center therefore the findings may not adequately reflect the entire Belagavi region.
- Conclusions and deductions from this study cannot be assertive because of the small sample size.

SUMMARY

The present study was a cross-sectional study conducted to determine maternal and fetal outcomes factors of twin pregnancy. The study was carried out at the Department of Obstetrics and Gynaecology of KAHER's Dr. Prabhakar Kore Charitable Hospital, Belagavi, Karnataka for a period of one year. Patient population included women who delivered macrosomia babies in labour room from January 2020 to January 2021. A total of 75 women were selected for enrollment based on inclusion criteria. Data was collected in form of structured questionnaires and analyzed statistically.

Key findings of this study have been summarized as follows:

1. Incidence of multifetal gestation is 2.3% .

2. In the present study, the incidences of multifetal gestation were higher in multigravida (52.8%) primigravida (48.6%).

3. The common age group made out in our study was 21 to 25 years (40.2%).

4. Family history of multiple gestation were present only in 6(8.3%) cases and were absent in 69(90.2%) cases.

5. In the present study 56 cases (73.1%) were had concieved spontaneously and 9 cases (12.5%) were had concieved after IVF.

6. Out of 75 twin pregnancies, 76.3% were DCDA, 22.2% were MCDA and 2.4% were MCMA.

7. The mean gestational age of delivery in our study 34+1-37weeks.

8. Preterm labour incidence were 16.7%.

9. Incidence of anaemia were 14.%.

10. Incidence of severe pre-eclampsia were 26.3% and eclampsia was 5.3%, respectively.

11. Incidence of PPROM were 12.5%.

12. LSCS was the most common mode of delivery for both MCDA and DCDA followed by vaginal delivery in our study.

In our study, most common indication of cesarean is PPROM.

13. In our study, the most common presentation observed was both cephalic-cephalic which is 38.9%.

14. Post-partum haemorrhage were present in 4.1%.

15. In our study, they were 148 live births, 2 fresh still births & 8 neonatal deaths.

16. In our present study 35% had a birth weight of 2.1-2.5 kg which is the most common birth weights.

17. In our study, among twin-A, 50% of babies required NICU care, 6.7% of babies required kangaroo mother care KMC and 45.9%(34) of babies were with the mother. Among twin-B, 54.1% of babies required NICU care, 10.8% of babies required kangaroo mother care KMC and 39.2%(29) of babies were on the mother side.

18. Causes of neonatal mortality were extreme preterm birth, respiratory distress syndrome & milk aspiration syndrome.

19. Congenital anomalies were found in 2 twins, one anal imperforation and one was congenital heart disease (small ASD).

20. There were no maternal mortality in our study.

CONCLUSION

- Multiple pregnancy is a high risk pregnancy.
- Twin pregnancies are associated with variety of maternal and foetal complications.
- It is highly advisable to determine the chorionicity at 11-14 weeks of gestation as each type of placentation carries different prognosis and morbidity.
- Regular ultrasound study and if needed Doppler study for the growth and wellbeing of the twins particularly monochorionic twins is mandatory.
- The increase of multiple births is a public health concern, the higher rate of preterm of these neonates compromise their survival chances and increase their risk of lifelong disability.
- Common maternal complications reported in various studies are nutritional anemia, pregnancy induced hypertension, antepartum hemorrhage, preterm labour and polyhydramnios.
- Foetal complications are reported to be more in monozygotic pregnancies as compared to dizygotic twins. Monochorionic twin gestations are at higher risk of preterm labour, discordant foetal growth, abnormal vascular communications, foetal malformations, cord complications and stillbirths.

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ANNEXURE - I

CONSENT FOR PARTICIPATION IN RESEARCH STUDY

Mrs. _____ we are requesting you to enroll yourself in study title is **"MATERNAL AND PERINATAL OUTCOME IN TWIN PREGNANCY IN TERTIARY CARE CENTRE- A CROSS-SECTIONAL STUDY"** conducted by Post Graduate in M.S. Obstetrics and Gynaecology J.N. Medical College, Belgaum under KLE university, Belgaum.

Objectives /purpose of study:

Respected Madam we request you to participate in our study as you are eligible for participating and your participation in this study is important as it helps u to know the maternal and fetal outcomes of twin pregnancy, which will help in the effective management of future twin pregnancy.

Your participation in research is voluntary. Your decision whether to participate in the study or not will not change present or future health care services offered to you and will not affect your relationship with J.N. Medical College. If you decide to participate you are free to withdraw at any time. All pregnant women meeting the inclusion criteria will be recruited in our study.

Procedure Involved:

If you agree to enroll yourself in my study, you will be interviewed regarding your present, past and family history, then you will be clinically examined in detail.

Risks and Benefits:

There are no potential risks and discomforts associated with our study. The benefits of taking part in this research is, your participation being valuable contribution to medical research to improvise treatment currently practiced.

Withdrawal from study:

You can withdraw at any time from the study. There will be no penalty for withdrawal. You can be removed from the study if necessary.

Privacy and Confidentiality:

The only people who will know that you are the research subject will be the members of the research team. No information about you or information provided by you during the research will be disclosed to others without your written permission except:

1. In emergency to protect your rights and welfare.
2. If required by law.

Institutional/sponsor's policy:

In the event of any injury related to the study, treatment will be made available through KLE's Hospital & MRC, Belgaum. There is no compensation or payment for such medical treatment by law. If you are injured you may contact Post graduate student, Department of Obstetrics and Gynaecology, KLE's Hospital& MRC.

Financial Incentives for participation:

No financial incentives are being offered to enrolled patients. It is purely being done with the idea of research and all the cost of the study will be borne by the investigator. You will not be reimbursed for any expenses for participation in this research.

Contact details:

In case you have any questions related to the study, in future or in case of study related injury or illness, you can contact Post graduate student, Department of Obstetrics and Gynaecology, KLE's Hospital and MRC.

Authorization to Publish Results:

When the results of the research are published or discussed, in a conference, no information will be displayed that would disclose your identity. Any information that is obtained in connection with this study and that can be identified with you will remain confidential. Results of the study will be used to improve maternal and perinatal outcome.

Consent statement:

I, _____ voluntarily agree for participating in this study. By signing this consent form I am not giving up any of my legal rights, I may withdraw from the study anytime. I am signing the consent form after having read or been read form in my own vernacular language, including the risks and the benefits and having all my questions answered.

Participant Name : _____

Signature or the Left Thumb Print of Participant : _____

Investigators Name: _____ Signature: _____

Witness Name : _____ Signature: _____

Date: _____

SCREENING FORM

Screening number: | | | | | |

Date of screening (dd-mm-yyyy): _____

First name: _____

Middle name: _____

Last name: _____

Husband's name: _____

Age (years): _____

IP number: _____

Address: H.no-_____

Street-_____

Taluka-_____

District-_____

Phone number-_____

Landline(optional)-_____

ANNEXURE - II

PROFORMA

Name	
Age	
Address	
Phone number	
Occupation	
Patient No:	

MATERNAL DATA:

REGISTERED	YES NO
MODE OF CONCEPTION	
PARITY	
FAMILY H/O TWIN PREGNANCY	YES NO
CHORIONICTY DCDA MCDA MCMA	
PRESENTATION VERTEX-VERTEX VERTEX- BREECH VERTEX-TRANSVERSE BREECH-VERTEX BREECH- BREECH BREECH- TRANSVERSE BOTH TRANSVERSE	
USG FINDINGS	

ANTENATAL COMPLICATIONS ANAEMIA GDM ABRUPTION PLACENTA PREVIA PRE-ECLAMPSIA ECLAMPSIA PROM HYDRAMINOS OLIGOHYDRAMINOS OTHERS	
GESTATIONAL AGE AT THE TIME OF DELIVERY	
MODE OF DELIVERY VAGINAL DELIVERY C- SECTION	
INDICATION OF C- SECTION	
POST PARTUM HAEMORRHAGE	

FETAL DATA

	TWIN A	TWIN B
OUTCOMES OF BIRTH LIVE BIRTH STILL BIRTH		
BIRTH WEIGHT <1 Kg 1-1.5 Kg 1.5-2 Kg 2-2.5 Kg >3 Kg		
APGAR SCORE		
NICU ADMISSION		
INDICATION OF NICU ADMISSION		
PERINATAL MORTALITY If yes, resaon		

Impression :

ANNEXURE – III

ETHICAL CLERANCE

K.L.E. ACADEMY OF HIGHER EDUCATION AND RESEARCH
(Deemed to-be- University)
Accredited 'A' Grade by NAAC (2nd Cycle) Placed in Category 'A' by MHRD (GoI)
JAWAHARLAL NEHRU MEDICAL COLLEGE,
NEHRU NAGAR, BELAGAVI-590010 (KARNATAKA-INDIA)
Website: http//www.jnmc.edu
E-Mail : dome@jnmc.edu
Phone: (+ 91-(0)831 Office : 2472550
Principal: 2471701
Fax No. +91 (0)831 – 2470759

Ref: MDC/DOME/ 192 **Date: 24/12/2019**

To,
BJ0119001
PG student in Obstetrics and Gynecology,
J.N.Medical College,
BELAGAVI.

Sub: Institutional Ethical Clearance for the study.

With reference to the above, we wish to inform you that your proposed research project titled **"MATERNAL AND PERINATAL OUTCOME IN TWIN PREGNANCY IN TERTIARY CARE CENTRE- A CROSS -SECTIONAL STUDY"**, is ethical and justifiable. The proposed research project has been cleared by the JNMC Institutional Ethics Committee on Human Subjects Research.

(Dr. Anita Dalal)
Member Secretary
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

(Dr. Roopa M Bellad)
Chairman,
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

ANNEXURE – IV
MASTER CHART

IP NO	EGISTRATIC	NAME	AGE	PARITY	MODE OF CONCEPTION	FAMILY H/	CHORIONICI	ESENTATIC	USG	ANTENATAL & POSTNATAL COMPLICATION	GESTATIOI	MODE OF I	INDICATION	BIRTH WEIGHT		APGAR SCORE		NICU ADMISSION		INDICATIONS		PERINATAL MORTALITY					
														TWIN A	TWIN B	TWIN A	TWIN B	TWIN A	TWIN B	TWIN A	TWIN B	TWIN A	TWIN B				
992893	UR	ASHWINI JAYAPRAKASH JO	39	PRIMI	IVF	Y	DCDA	B-V	N & INCREASED RESI	GDM ON INSULIN & CHRONIC HTN	33W 1 D	LSCS	DCDA TWIN V	1.6	2.1	7/10 & 8/1	6/10 & 7/1	Y	Y	PREMATUI	PREMATUI	NO	NO				
993690	UR	GOWRI SHANKAR PUJERI	27	G2P1L1	SPONTANEOUS	N	DCDA	V-B	BOTH NORMAL	GEST HTN	36W	LSCS	PREV LSCS WI	1.8	1.9	6/10 & 7/1	6/10 & 7/1	Y	Y	LBW	LBW	NO	NO				
996028	R	VIDYA PREMANAND NANI	24	G2A1	SPONTANEOUS	N	DCDA	B-V	NCE ON DOPPLER &	HYPOTHYROIDISM	36W 3D	LSCS	DCDA TWIN V	2	1.8	7/10 & 8/1	7/10 & 8/1	Y	Y	LBW	LBW	NO	NO				
1000023	UR	CHANDRA SHIVAPPA NERE	45	PRIMI	OVULATION INDUCTION	N	DCDA	V-V	N B NORML WITH IN	MODERATE ANEMIA & MILD PE	36W	LSCS	TWIN WITH	2.3	1.8	6/10 & 7/1	6/10 & 7/1	Y	Y	LBW	LBW	NO	NO				
1000144	UR	BHARATI TOPPANNAVAR	20	PRIMI	SPONTANEOUS	N	DCDA	V-B	ORMAL TWIN B MAC	GDM ON MNT DIET	37W	LSCS	SECOND TWII	2.4	2.6	8/10 & 9/1	8/10 & 9/1	N	N			NO	NO				
1004438	R	SANJEEVANI BHANDEERGI	32	G4P2L3A1	SPONTANEOUS	Y	MCDA	T-T	NORMAL	GEST HTN	34W 2D	LSCS	PREV 2 LSCS V	2	2	7/10 & 8/1	7/10 & 8/1	Y	Y	LBW	LBW	NO	NO				
1005101	R	DEEPIKA PRAVEEN PARVA	32	G2P1L1	IVF	Y	DCDA	B-V	NORMAL	PPROM	36W 4D	LSCS	DCDA WITH P	2.3	2.3	8/10 & 9/1	8/10 & 9/1	N	N			NO	NO				
1004337	R	RESHMA SANDEEP BHATK	25	PRIMI	SPONTANEOUS	N	DCDA	V-B	DISCORDANCY OF 11	GEST HTN & HYPOTHYROIDISM & PPH	38W 3D	LSCS	SECOND TWII	2.4	2.3	7/10 & 8/1	7/10 & 8/1	N	N			NO	NO				
1004332	R	SUNITHA KALLAPPA HUBB	29	PRIMI	SPONTANEOUS	N	DCDA	V-B	WITH 5% WT DISCO	HYPOTHYROIDISM	30W 5D	VD		1.3	1.4	7/10 & 8/1	8/10 & 9/1	Y	Y	PREMATUI	PREMATUI	NO	NO				
1007924	R	PRATIKSHA PRADEEP KAR	24	G2P1L1	SPONTANEOUS	N	MCDA	V-B	NORMAL		36W 4D	LSCS	MCDA TWIN	2.4	2.2	8/10 & 9/1	8/10 & 9/1	N	N			NO	NO				
1007547	UR	SUSHMITHA VAGESH TAR	24	G2P1L1	SPONTANEOUS	N	MCDA	B-V	NORMAL	PRE-TERM LABOR	32W 5D	LSCS	MCDA TWIN V	1.9	2.2	6/10 & 7/1	7/10 & 8/1	Y	Y	PREMATUI	PREMATUI	NO	NO				
1007120	R	RAYEENA MUSTAK SANAD	32	G4P3L3	SPONTANEOUS	N	DCDA	V-V	NORMAL	GDM & POSTPARTUM ECLAMPSIA	36W 5D	LSCS	CDMR	2.5	2.7	7/10 & 8/1	7/10 & 8/1	N	N			NO	NO				
1006020	R	AMRUTHA MANOHAR LAD	24	PRIMI	OVULATION INDUCTION	N	DCDA	B-T	NORMAL	GEST HTN37W	37W	LSCS	FIRST TWIN N	2.3	2	7/10 & 8/1	6/10 & 8/1	N	N			NO	NO				
1008838	R	MADHURI MONAPPA BEL	27	G3P2L2	SPONTANEOUS	N	DCDA	B-B	NORMAL		37W	LSCS	DCDA TWIN V	2.2	2.4	7/10 & 8/1	7/10 & 8/1	N	N			NO	NO				
1002933	UR	MEGHA AMIT KOKIKKAR	23	G2P1L1	SPONTANEOUS	N	MCMA	V-V	NORMAL		26W 6D	VBAC		839	913	5/10 & 6/1	5/10 & /10	Y	Y	PREMATUI	PREMATUI	NO	NO				
1003085	R	LAXMI SANTHOSH SANAD	21	G2P1L0	SPONTANEOUS		DCDA	V-V	NORMAL	PRE-TERM LABOR	30W 5D	VD		1.3	1.3	6/10 & 7/1	6/10 & 7/1	Y	Y	LBW	LBW	NO	NO				
1008932	UR	SHILPA DAMODAR PRABH	34	PRIMI	IVF	Y	DCDA	V-V	NORMAL	PRE-TERM LABOR	23W 4D	VD		600	550	3/10 & 7/1	3/10 & 7/1	Y	Y	PREMATUI	PREMATUI	NO	NO				
1006424	R	SIMRAN NAMID PATHAN	23	G2P1L1	SPONTANEOUS	N	DCDA	B-V	NORMAL	PRE-TERM LABOR	34W 5D	LSCS	TWIN A BREE	2.1	2.2	6/10 & 6/1	6/10 & 6/1	Y	Y	RDS WITH	RDS WITH	NO	NO				
1006542	UR	DHIVYA BHARATHI	28	G2P1L1	SPONTANEOUS	N	DCDA	B-V	NORMAL	PRE-TERM LABOR	36W	VD		2	2.1	6/10 & 7/1	6/10 & 7/1	KMC	KMC			NO	NO				
1010175	R	MANGAL HULIGAPPA SIDI	25	PRIMI	SPONTANEOUS	N	DCDA	V-B	GROWTH, LIQUOR &	GESTATIONAL HTN	36W5D	LSCS	DCDA TWIN V	2.4	1.2	7/10 & 8/1	6/10 & 7/1	NO	YES		LBW	YES (MILK /	NO				
1010152	R	POOJA JAGADISH DHANA	24	PRIMI	IUI	N	DCDA	B-B	NORMAL	PPROM	36W5D	LSCS	DCDA TWIN V	1.8	1.8	7/10 & 9/1	7/10 &9/1	KMC	KMC	LBW	LBW	NO	NO				
1009793	R	DHANASHREE ROHAN KOL	36	PRIMI	IVF	N	DCDA	B-B	A DISCORDANCY OF	ANTEPARTUM ECLAMPSIA	35W5D	LSCS	ANTEPARTUN	1.6	2.4	5/10 & 6/1	5/10 & 6/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1011781	R	VARSHA SANJAY PATIL	31	G2P1L1	OVULAION INDUCTION	N	DCDA	V-B	NORMAL	PPROM	32W5D	PTVD		1.8	1.6	6/10 & 7/1	6/10 & 7/1	KMC	KMC			NO	NO				
1010789	R	BGHYASHREE BHAVESH PA	26	PRIMI	SPONTANEOUS	N	DCDA	V-V	NORMAL	HYPOTHYROIDISM	36W5D	LSCS	DCDA TWINS	2.3	2.5	7/10 & 8/1	7/10 & 8/1	NO	NO			NO	NO				
1010443	R	VIJAYLAKSHMI VITTAL BIR	21	PRIMI	SPONTANEOUS	N	DCDA	V-V	NORMAL	SEVERE PE	32W6D	LSCS	TWINS WITH	1.6	1.6	6/10 & 7/1	6/10 & 7/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1012222	R	BANANI TARAK PAL	28	G2A1	IUI	N	DCDA	V-V	IGR & DISCORDANC	MILD PE WITH HYPOTHYROIDISM	34W6D	LSCS	DCDA TWIN V	1.5	2.5	7/10 & 9/1	7/10 & 9/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1010455	UR	MEENAZ ATTAR	35	G2P1L1	IVF	N	DCDA	V-T	MAL GROWTH & LIC	SEVERE PE &PPROM	33W2D	LSCS	IMMINENT EC	1	1.2	4/10 & 7/1	4/10 & 7/1	YES	YES	PREMATUI	PREMATUI	YES	NO				
1010565	R	KALPANA ASHOK KUMAR	35	G4A3	SPONTANEOUS	N	DCDA	V-V	MAL GROWTH & LIC	POLYHYDRAMNIOS &HYPOTHYROIDISM & PPH	30W4D	PTVD		1.1	1.1	6/10 & 7/1	6/10 & 7/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1012302	R	RENIKA RAVI HOSAMANI	28	G3P1L1A1	SPONTANEOUS	N	DCDA	V-T	ITH WT DISCORDANCY	OF 10%	36W	LSCS	DCDA TWIN V	2.4	2.2	7/10 & 8/1	7/10 & 8/1	NO	NO			NO	NO				
1012745	R	KALPANA PARASHURAM K	30	G2P1L1	SPONTANEOUS	N	DCDA	V-T	MAL GROWTH & LIQUOR		37W4D	LSCS	DCDA TWIN V	2.6	2.2	8/10 & 9/1	7/10 & 8/1	NO	NO			NO	NO				
1012831	R	RUKSANA ABDULAMAR SH	27	G2P1L1	SPONTANEOUS	N	MCDA	V-V	MAL GROWTH & LIC	MILD PE WITH HYPOTHYROIDISM	38W6D	LSCS	MCDA TWINS	2.7	2.6	7/10 & 8/1	7/10 & 8/1	NO	NO			NO	NO				
1015975	R	PREMALATA D'SOUZA SAN	30	PRIMI	SPONTANEOUS	N	MCDA	V-V	ITH WT DISCORDAN	GDM	34W1D	LSCS	MCDA TWIN	1.8	1.6	6/10 & 7/1	6/10 & 7/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1017128	R	SARVAMANGALA KAMPAL	36	G2A1	IVF	N	DCDA	V-V	WITH NORMAL GRO	GESTATIONAL HYPERTENSION	34W1D	LSCS	DCDA TWIN V	2.2	1.7	7/10 & 8/1	6/10 & 7/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1017088	R	CHAYA JOTIBA PATIL	33	G2P1L1	SPONTANEOUS	N	DCDA	V-V	ITH WT DISCORDAN	GESTATIONAL HYPERTENSION	36W4D	LSCS	PREV LSCS WI	2.5	2.1	7/10 & 8/1	7/10 & 8/1	NO	NO			NO	NO				
1016629	R	PRATIBHA VEERABADRAY	34	G4A3	IVF	N	DCDA	B-V	TANCE ON DOPPLER	PRE-TERM LABOR	34W	LSCS	DCDA TWIN II	2	2.1	6/10 & 7/1	6/10 & 7/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1016593	R	RESHMA ROHIDAS NILAKA	30	G3P2L2	SPONTANEOUS	N	MCDA	B-B	NORMAL	ANEMIA	36W1D	LSCS	MCDA TWIN	2.1	2.2	7/10 & 8/1	7/10 & 8/1	NO	NO			NO	NO				
1015764	R	VEENA SANTOSH WALI	34	G2A1	IVF	N	DCDA	B-B	MAL GROWTH & LIC	CHRONIC HTN & PPROM	32W2D	LSCS	DCDA TWIN V	2	1.6	8/10 & 9/1	6/10 & 8/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1015431	UR	SHRIDEVI SSHIVANNUR DA	25	PRIMI	SPONTANEOUS	N	DCDA	V-V	ITH WEIGHT DISCOI	PPROM	31W5D	PTVD		1.5	1.4	6/10 & 7/1	6/10 & 7/1	YES	YES	VLBW & PR	VLBW & PR	NO	NO				
1014326	R	SAVITA SANTOSH JIGAJIM	35	G3P1L1A1	SPONTANEOUS	N	DCDA	V-B	CORDANCY OF 26% &	GDM & GESTATIONAL HTN	34W1D	LSCS	DCDA TWIN V	2.6	1.8	6/10 & 7/1	6/10 & 7/1	YES	YES	PREMATUI	LBW & PRE	NO	NO				
1019672	R	DEEPA PRAVEEN KOPPAD	23	PRIMI	SPONTANEOUS	N	DCDA	V-T	NORMAL	ANEMIA WITH HYPOTHYROIDISM	35W4D	LSCS	DCDA TWIN V	2.3	1.7	7/10 & 8/1	7/10 & 8/1	KMC	KMC	LBW & PRE	LBW & PRE	NO	NO				
1019675	R	ALISHA MALIKARJUN KAT	20	PRIMI	SPONTANEOUS	N	DCDA	B-B	MAL GROWTH & LIC	ATONICITY	33W	PTVD		1.5	1.5	6/10 & 8/1	7/10 & 8/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1019239	UR	SONAKKA IRAPPA PUJERI	28	G4P3L2	SPONTANEOUS	N	MCDA	V-T	NORMAL	GESTATIONAL HYPERTENSION	36W6D	LSCS	MCDA TWIN	2.3	1.6	7/10 & 8/1	7/10 & 8/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1019092	R	ROOPA PRAVIN JOKALI	27	PRIMI	SPONTANEOUS	N	MCDA	B-B	NORMAL		37W2D	LSCS	MCDA TWIN	2.2	1.8	6/10 & 7/1	8/10 & 9/1	NO	NO			NO	NO				
1018544	UR	ANITA VIJAY BADIGER	29	G2P1L0	IUI	N	DCDA	V-B	MAL GROWTH & LIC	SEVERE PE	35W6D	LSCS	DCDA TWIN V	2.1	2.1	7/10 & 8/1	7/10 & 8/1	NO	NO			NO	NO				
1018315	R	ARATI BHARATH SANKANI	32	G4P1L1A2	SPONTANEOUS	N	DCDA	V-B	NORMAL	ABRUPTION	31W1D	LSCS	ABRUPTION V	1.3	1.3	3/10 & 6/1	3/10 & 6/1	YES	YES	LBW & PRE	LBW & PRE	YES	YES				
1021722	UR	SACHETA PARVEEN CHOU	29	PRIMI	SPONTANEOUS	N	MCDA	B-V	NORMAL	ANEMIA & PPROM	25W4D	PTVD		750	660	3/10 & 5/1	3/10& 5/1	YES	YES	EXTREME F	EXTREME F	YES	YES				
1020558	R	SHITAL DEEPAK KANABAR	28	PRIMI	SPONTANEOUS	N	MCDA	V-B	NORMAL	ANEMIA & GESTATIONAL HYPERTENSION	37W1D	LSCS	MCDA TWIN	2.2	2.2	7/10 & 8/1	7/10 & 8/1	NO	NO			NO	NO				
1020243	R	SUNANDA SOMESHWAR P	34	PRIMI	IVF	N	DCDA	V-B	NORMAL	T2DM ON INSULIN, HYPOTHYROIDISM & GEST	33W3D	LSCS	PRECIOUS PRI	2	1.5	6/10 & 7/1	6/10 & 7/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1021657	R	RENUKA MALLESH SANAD	23	PRIMI	SPONTANEOUS	N	DCDA	B-V	TWIN A WITH FGR	POSTPARTUM ECLAMPSIA & PROM	36W6D	LSCS	CORD PRESEN	1.9	1.4	5/10 & 7/1	6/10 & 7/1	NO	YES		LBW	NO	NO				
1023614	R	SUNITA KONERI PAWASHE	20	PRIMI	SPONTANEOUS	N	MCDA	V-V	NORMAL	PRE-TERM LABOR & MILD ANEMIA	31W1D	PTVD		1.3	1.4	5/10 & 7/1	6/10 & 7/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1024142	UR	BHEEMAVVA PIRAJI CHAL	23	PRIMI	SPONTANEOUS	N	DCDA	V-V	OWTH DISCORDAN	RHD WITH WITH GRADE II MR	37W	FT VENTOU	CARDIAC DISE	2.6	2.6	6/10 & 6/1	8/10 &7/1	NO	NO			NO	NO				
1024151	R	DUNDAVVA BASAVARAJ G	23	PRIMI	SPONTANEOUS	N	MCDA	V-B	MAL GROWTH & LIC	PPROM	34W6D	LSCS	MCDA TWIN V	2.1	1.8	6/10 & 8/1	6/10 & 8/1	YES	YES	PREMATUI	LBW & PRE	NO	NO				
1013497	UR	SALMA MAKTUSMAL SOG	20	PRIMI	SPONTANEOUS	N	DCDA	V-V	MAL GROWTH & LIC	SEVERE PE	36W3D	LSCS	DCDA TWIN V	2.3	2.5	6/10 & 7/1	5/10 & 7/1	NO	NO			NO	NO				
1013481	UR	MAHADEVI MARUTI MALA	21	G2P1L1	SPONTANEOUS	N	DCDA	V-V	MAL GROWTH & LIC	MILD PE	35W	LSCS	DCDA TWIN V	2.2	2.1	7/10 & 9/1	7/10 & 9/1	NO	NO			NO	NO				
1023316	R	SEEMA MAYOORESHWAR	33	PRIMI	OVULAION INDUCTION	N	DCDA	V-B	MAL GROWTH & LIC	HYPOTHYROIDISM	37W1D	LSCS	DCDA TWINS	2.3	2.8	6/10 & 7/1	6/10 & 7/1	NO	NO			NO	NO				
1023433	R	PREETI UMESH SANAGOU	26	PRIMI	SPONTANEOUS	Y	DCDA	B-B	NORMAL	PRE-TERM LABOR WITH HYPOTHYROIDISM	24W6D	PTVD		470	680	5/10 & 6/1	5/10 & 6/1	YES	YES	EXTREME F	EXTREME F	YES	YES	EXTREME F	EXTREME PREMATURITY & VLBW		
1027764	UR	SUPRIYA ASHISH CHAVAN	24	PRIMI	SPONTANEOUS	N	DCDA	V-B	WITH AEDF & TWIN	GESTATIONAL HYPERTENSION	36W	LSCS	DCDA TWINS	1.4	1.6	6/10 & 7/1	6/10 & 7/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1022281	R	MALAPRABHA MADIVALA	35	G2P1L1	SPONTANEOUS	N	DCDA	V-B	MAL GROWTH & LIC	PRE-TERM LABOR	36W2D	LSCS	DCDA TWIN V	2.6	2.4	7/10 & 8/1	7/10 & 8/1	NO	NO			NO	NO				
1022280	UR	ANNAPURNA RAVI PANCH	23	G2A1	SPONTANEOUS	N	MCDA	V-B	MAL GROWTH & LIC	PPROM	32W2D	LSCS	MCDA TWIN	1.6	2	6/10 & 7/1	6/10 & 7/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1025770	UR	PANDALIYOTI SHRISHAIL H	22	PRIMI	SPONTANEOUS	N	DCDA	V-B	NORMAL	PRE-TERM LABOR	36W4D	LSCS	1ST TWIN IN (	2.2	1.8	7/10 & 10/	7/10 &10/	NO	NO			NO	NO				
1025996	UR	PRIYANKA SHRAVAN JADA	27	G3P2L0	SPONTANEOUS	Y	DCDA	V-B	VERE OLIGOHYDRAM	SEVERE PE	36W6D	LSCS	PREVIOUS 2 L	2.3	2.2	7/10 & 8/1	7/10 & 8/1	NO	NO			NO	NO				
1025593	R	KALPANA SAGAR KESARG	22	G2A1	SPONTANEOUS	N	DCDA	B-V	NORMAL	PPROM	34W4D	LSCS	DCDA TWIN V	2.2	2.6	7/10& 8/1	6/10& 7/1	NO	NO			NO	NO				
1025653	UR	RAJASHRI NAGESH PATIL	28	G2A1	OVULAION INDUCTION	N	DCDA	B-B	METRICAL IUGR IN TV	SVERE PE WITH PLACENTA PREVIA	36W	LSCS	SEVERE PE WI	1.4	2.1	7/10& 8/1	8/10& 9/1	YES	YES	LBW	LBW	NO	NO				
1025421	UR	VEENA PRAVIN DUBAL	25	PRIMI	IUI	N	DCDA	V-B	A IS DISCORDANT T	SEVERE PE WITH HELLP	33W4D	LSCS	SEVERE PE WI	1.2	1.4	6/10 &7/1	6/10 &7/1	YES	YES	LBW & PRE	LBW & PRE	NO	NO				
1024755	R	LAXMI MARUTI BHATE	29	G2P1L1	SPONTANEOUS	N	DCDA	V-V	NORMAL	PRE-TERM LABOR	36W4D	PTVD		2	1.9	6/10& 7/1	6/10 &7/1	KMC	YES	LBW		NO	NO				
1024617	R	KRANTI GAJANAN PATIL	27	PRIMI	SPONTANEOUS	N	DCDA	V-V	NORMAL	GESTATIONAL HYPERTENSION &MILD ANEMIA	37W2D	FTVD		1.9	2.1	8/10 & 9/1	7/10& 8/1	YES	KMC	LBW		NO	NO				
1024608	UR	PAVITRA MAHANTESH PA	20	PRIMI	SPONTANEOUS	N	DCDA	B-T	NORMAL	PRE-TERM LABOR & COVID POSITIVE	30W1D	PTVD		1	1	6/10&7/10	4/10& 7/1	NO (AMA)	NO (AMA)			NO	NO				
1028953	UR	JYOTHI BHIMARAYAPPAM	32	PRIMI	OVULAION INDUCTION	N	DCDA	V-V	TWIN B - POLYHYDR	PPROM	25W2D	PTVD		635	530	FSB	FSB					YES	YES				
1027917	UR	FATIMA RAFIQ MULLA	22	PRIMI	SPONTANEOUS	N	MCDA	B-V	B IS DISCORDANT O	ECLAMPSIA & PARTIAL HELLP	36W4D	LSCS	ANTEPARTUN	1.5	1.2	6/10&6/10	7/10&7/10	KMC	KMC			NO	NO				
1027619	UR	ANITA KARTIK SHAH	34	G4P1L1A2	SPONTANEOUS	N	DCDA	B-V		GDM & GESTATIONAL HTN	36W2D	LSCS	PREV LSCS WI	3.1	3.1	6/10 & 7/1	7/10&7/10	NO	YES		RESPIRATO	NO	NO				
1027152	UR	LAXMI SIDRAM NAIK	28	G3P2L2	SPONTANEOUS	N	MCDA	V-V	IS DISCORDANT OF	MODERATE ANEMIA, SEVERE PE & HELLP	36W2D	LSCS	PREVIOUS 2 L	2	1.4	6/10&7/10	5/10&7/10	NO	YES		LBW	NO	NO				
1030647	UR	PARVATI MANJUNATH BA	23	PRIMI	SPONTANEOUS	N	MCDA	T-C	NORMAL	SEVERE PE & ATONIC PPH	30W2D	LSCS	MCDA TWIN V	1.4	1.4	5/10 &7/1	6/10 &7/1	YES	YES	SEPSIS	RESPIRATO	NO	NO				
1030484	R	RENUKA SHANKAR HUKKE	30	G2P1L1	SPONTANEOUS	N	DCDA	B-B	NORMAL	GDM	37W2D	LSCS	PREVIOUS LSC	2.2	1.9	1	7/10 & 8/1	NO	NO			NO	NO				
1001348	R	SHANTHA SANDEEP	24	PRIMI	SPONTANEOUS	N	MCMA		TRAP	TRAP	32W5D	LSCS	TRAP WITH PI	2	600GM	7/10&8/10		YES		PREMATURITY		NO					
1030511	R	GOURI MAHADEV	26	G2P1L1	SPONTANEOUS	N	DCDA	V-V	NORMAL	PRE-TERM LABOR	36W	PTVD		2.2	2.3	6/10 & 7/1	7/10 & 8/1	NO	NO			NO	NO				