## **Original Research Article**

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20181435

# Analysis of clinical profile, growth and developmental pattern of twin babies in a tertiary care hospital of central India

Pawan K. Ghanghoriya<sup>1</sup>, Avyact Agrawal<sup>1\*</sup>, Uthara Mohan<sup>1</sup>, Keerthi K.<sup>2</sup>, Shivraj Singh<sup>1</sup>

**Received:** 27 February 2018 **Accepted:** 30 March 2018

### \*Correspondence:

Dr. Avyact Agarwal,

E-mail: dravyactagrawal@gmail.com

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

#### **ABSTRACT**

**Background:** Twin birth is associated with increased risk of neonatal morbidity and mortality and disadvantages in growth and neurodevelopmental status than singletons. Objective of present study was to analyze the clinical profile, growth pattern and neurodevelopmental outcome of twin babies on follow up for 6 months corrected gestational age. **Methods:** A prospective observational study was done in a tertiary care NICU in 81 pairs of twins (162 neonates). Initial assessment in terms of morbidities and mortality was followed by growth pattern and neurodevelopmental assessment using DDSTII of survived infants upto 6 months corrected gestational age.

Results: Prematurity was present in 75% of twin gestation. 95.1% were LBW, 4.9% were normal birthweight. 38.9% were AGA babies and 61.1% were SGA babies. Moderate to severe growth discordancy, was identified in 17.2% of the twins. Mortality was inversely proportional to birth weight and gestational maturity and directly proportional to birth weight discordance. Most of the complications were attributed to prematurity and low birth weight. RDS, hypoglycemia (16%), Perinatal asphyxia (19%), NEC, shock, hyperbilirubinemia were major complications. Feeding difficulties need special attention. Group I (28-32 weeks) lagged behind group I (32-37 weeks) and group III (>37weeks) in all anthropometric parameters like weight, height and head circumference at all the ages. Growth velocity was in the order group I (28-32 weeks) >group II (32-37) >group III (>37). At 6 months of there was high incidence of abnormal neurodevelopmental outcome among twins according to gestational age. Hypoglycemia, Perinatal asphyxia, RDS, and NEC were risk factors of NDD.

**Conclusions:** There is higher incidence adverse outcomes in terms of morbidity, mortality, growth and development among twins.

Keywords: Complications, Growth pattern, Low birth weight, Neurodevelopment, Prematurity, Twins

#### INTRODUCTION

Historically twin gestations have been subject of awe, wonder and speculation.<sup>1</sup> Over the year's incidence of multiple births has increased due to late marriages and use of Assisted Reproductive techniques.<sup>2</sup> Twin birth is associated with increased risk of neonatal morbidity and mortality compared to singleton births at all gestational age<sup>3</sup>. The major complication of twinning is prematurity

and increased mortality.<sup>3</sup> Neonatal complications of twin gestations especially prematurity account for significant utilization of neonatal care.<sup>3</sup>

Twin babies impose considerable strain to mother to look after their day to day problems, physiological and nutritional needs.<sup>2</sup> There is considerable evidence that twins are disadvantaged in terms of growth and neurodevelopmental status than singletons.<sup>4</sup> Disabilities

<sup>&</sup>lt;sup>1</sup>Department of Pediatrics, NSCB Medical College, Jabalpur, India

<sup>&</sup>lt;sup>2</sup>Department of Paediatrics and Neonatology, Mitera Hospital Pvt. Ltd, Kottayam, Kerala, India

can be isolated or associated with cerebral palsy, attention deficit disorder and cognitive defect.<sup>5</sup>

#### **METHODS**

This prospective observational cohort study was conducted in a tertiary care hospital, N.S.C.B. M.C.H. Jabalpur from March 2016 to July 2017 after obtaining approval from institutional ethical committee. All twin neonates from PNC Ward and neonatal intensive care unit were enrolled after informed consent from attendants. All live twin babies of gestational age >28 weeks getting admitted in PNC ward and NICU Jabalpur were included.

Twins diagnosed to have congenital anomalies non compatible to life, Twins of birthweight <1000 g, Parents not giving consent for participation in the study were excluded. Data of all the studied 81 pair twins were analyzed and categorized on the basis of gestational age, sex, weight for gestation, age of admission, clinical profile, course during treatment, complications encountered and immediate outcome.

All the surviving infants were followed up upto 6months of corrected gestational age to analyze their feeding habits, immunization status, growth pattern and developmental outcome.

Simple anthropometric measurements were taken on admission and on follow up visits (which are scheduled at 2 months, 4 months, 6 months of corrected age.) such as weight, length and head circumference of babies and developmental assessment at 3month and 6 months by DDST II (Indian infants).

A detailed Performa was filled including details of the neonate on admission and standard treatment was given and appropriately intervened in the follow up whenever required. Weight was measured using electronic weighing machine with precision of 10 gm. Length was measured using infantometer and head circumference by non- stretchable tape. Corrected age is calculated from the expected date of delivery of the neonate.

Developmental screening was done using DDST II during follow up at 2,4 and 6 months corrected gestational age. There were 125 performance-based and parent reported items on the test in the following four areas of functioning: fine motor-adaptive, gross motor, personal-social, and language skills.

Scoring per item is rated as

- P: pass-child successfully performs item or caregivers reports the child can do the item.
- F: fail-child does not successfully perform the item and/or the caregiver reports the child cannot do the item.

- No: No opportunity-the child has not had the opportunity to perform the task due to restrictions
- R: Refusal-the child refuses to attempt and the parent cannot report.

The number of scores a child received below the normal expected range classifies the child as within normal, suspect, or delayed. Scores were recorded per item through direct observation of the child and in some cases what the parent reports. The test was interpreted to place the child into two categories: normal or suspect. If the child is suspect it is recommended that rescreening occur in 1-2 weeks.

#### **RESULTS**

In present study 81 pairs of twins were initially analysed for their clinical outcome and out of them 138 infants who survived were followed up for 6 months. Of 81 pairs of twin babies 61 pairs were preterm and 20 pairs were term. Among preterm 41% were both males, 23% were both females and 36% were both male and female. In term infants, 35% were both males, 20% were both females and 45% were both male and female.

Table 1: Neonatal demographic data and mortality.

	Number of infants	Mortality (%)				
Gestational age						
28-32 wks	10	4 (40%)				
32-<37wks	112	17 (15.2%)				
>37 wks	40	3 (7.5%)				
Birth weight						
1000-1499	67	19 (28.4%)				
1500-1999	61	4 (6.5%)				
2-2499	26	1 (3.8%)				
>2.5	8	0				
Total	162	24 (14.8%)				
Weight status						
SGA	100	15 (15%)				
AGA	62	9 (14.5%)				
Total	162	24 (14.8%)				
Birth weight discordance						
Normal-mild	67 pairs (134 infants)	15 (11.2%)				
Moderate to severe	14pairs (28 infants)	9 (32.1%)				

Out of total 162 children 67 (41.4%) were VLBW, 87 (53.7%) were LBW and 8 (4.9%) were of normal birthweight. 63 (38.9%) were AGA babies and 99 (61.1%) were SGA babies. Moderate to severe growth discordancy, defined as 15-30% and >30% discrepancy of the weight of the bigger twin, respectively, was identified in 17.2% of the twins (Table 1). Mortality rate increases with decrease in birth weight and gestational maturity, also mortality rate was high when birth discordance was large.

Table 2: Neonatal morbidities.

Complications	Preterm (n=122)	Term (n=40)	Total	P value
Shock	30 (24.5%)	5 (12.5%)	35	0.6269
Perinatal asphyxia	29 (22%)	2(5%)	31	0.1435
Hyper- bilirubinemia	26 (21.3%)	11 (27.5%)	37	0.9464
RDS	25 (20.4%)	0	25	0.0459
Hypoglycemia	24 (18.8%)	2 (5%)	26	0.3070
Neonatal sepsis	22 (14.8%)	4 (10%)	26	0.8368
NEC	10 (8%)	1 (2.5%)	11	0.8187
Hypocalcemia	14 (11.5%)	0	14	0.2848
Pulmonary hemorrhage	9 (7.4%)	0	9	0.5372
IVH	6 (6%)	0	6	0.5560
Seizures	5 (4%)	0	5	0.5872
Cong anomalies	5 (4%)	0	5	0.5872
PDA	3	0	3	
CTEV	1	0	1	
ASD	1	0	1	

Morbidities were also high among these infants and prematurity contributed large to this. Respiratory distress syndrome (RDS) was present in 20.2% twins and 16.4% required surfactant therapy. Hypoglycemia was present in 16% of infants (25% pre terms and 5% terms). Perinatal asphyxia was seen in 19% infants which was also higher in pre terms (22%) (Table 2). Rescuscitation need and requirement of intensive care was high among preterm twins. Respiratory support was needed in 38.2% of cases (46.7% in preterms and 12.5% of term infants). Ionotropic support was required for 21% of infants (24.5% preterms and 5% term) (Table 3).

#### Follow up

For anthropometric and developmental studies, we categorized them into three groups. Group I -28-<32 weeks, Group II- 32-<37weeks, Group III ->37 weeks.

Table 3: Resuscitation and intensive care requirement.

Resuscitation	Preterm (n=122)	Term (n=40)	Total				
Not required	29 (23.7%)	29 (72.5%)	58 (35.8%)				
Basic steps	62 (50.8%)	8 (20%)	70 (43.2%)				
Bag and mask	23 (18.8%)	3 (7.5%)	26 (16%)				
Intensive	8 (6.5%)	0	8 (4.9%)				
Total	122	40	162				
Mode of support							
Non invasive ventilation (CPAP)	31 (25.4%)	2 (5%)	33				
Ionotropes	30 (24.5%)	5 (5%)	35				
Invasive ventilation	26 (21%)	3 (7.5%)	29				
Surfactant	20 (20.5%)	0	20				
Total	107	10	117				

Table 4: Immunization and feeding practices.

Immunization status	No. of cases	% distribution.
Not immunized	0	0
Complete	135	97.8
Incomplete	3	2.2
Feeding practices		
Exclusive breast feeding	95	68.9
Top Feeding	9	6.5
Mixed	34	24.6

Table 5: Anthropometric parameters of study group.

	Weight (gms)			Length (cms)			Head circumference (cms)		
	Group I (n=6)	Group II (n=96)	Group III (n=36)	Group I (n=6)	Group II (n=96)	Group III (n=36)	Group I (n=6)	Group II (n=96)	Group III (n=36)
Age	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
	±SD	±SD	±SD	±SD	±SD	±SD	±SD	±SD	±SD
On	1250	1470	2180	43.16	44.56	50.12	31.8	33.36	35.28
admission	±117	±214	±324	$\pm 0.75$	±1.85	±3.01	±1.138	±0.63	±1.00
2	3170	3352	3938	49.60	50.6	55.60	34.9	36.35	38.14
2month	±350	±460	±408	$\pm 0.58$	$\pm 1.84$	$\pm 0.85$	$\pm 1.08$	$\pm 0.750$	±1.07
4 months	4664	4783	5318	55.12	56.18	60.58	37.5	38.88	40.4
4 monus	±360	±510	±540	±0.76	±1.30	$\pm 0.84$	±1.066	$\pm 1.008$	±1.07
6 months	5996	6079	6548	59.43	60.56	64.3	40.0	40.72	42.3
o months	±450	±310	$\pm 0.456$	$\pm 0.88$	±1.59	$\pm 0.93$	$\pm 1.21$	$\pm 2.56$	±1.11

At the end of 6 months corrected gestational age, immunization status of the discharged infants was satisfactory. Feeding problems existed among mothers of multiple gestation proven by the fact that 24% of them practiced mixed feeding (Table 4).

About the anthropometric parameters, the mean birth weight is less than the standards in all the three groups as well as mean length. Mean head circumference is low in group I (28-32weeks) and II (32-37weeks) but it matches with the standards in group III(>37weeks) (Table 5).

As far as the growth velocity was concerned, very preterm babies had significantly higher growth velocity in weight and head circumference from birth to 6 months (Figure 1-3).

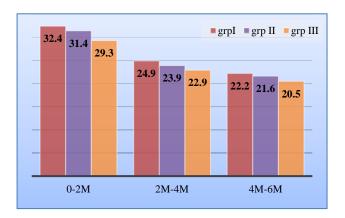


Figure 1: Comparison of weight gain velocity.

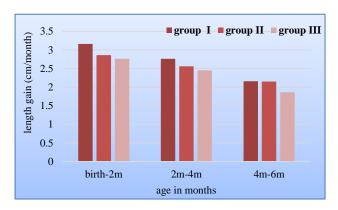


Figure 2: Comparison of length gain evelocity.

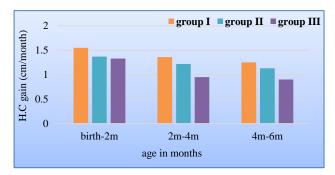


Figure 3: Comparison of H.C gain velocity.

At 6 months of age we observed 50% of abnormal ND screening score in group I, 33.3% in group II and 5.6% in group III (Figure 4).

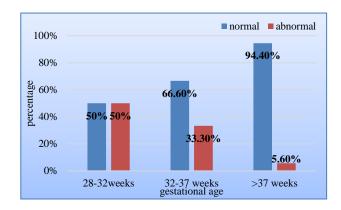


Figure 4: Neurodevelopmental outcome at 6 months.

There is high incidence of abnormal neurodevelopmental outcome among twins that too higher among low gestational age at birth infants.

Hypoglycemia, Perinatal asphyxia, RDS, and NEC were associated with high risk of neurodevelopmental delay (Table 6).

Table 6: NDD correlation with risk factors.

Disease	Developmental delay at 6months			
	Present	Absent		
Hmd (n=15)	10 (66.6%)	5 (33.3%)		
Hypoglycemia (n=8)	5 (62.5%)	3 (37.5%)		
Perinatal asphyxia (n=8)	5 (62.5%)	4 (40%)		
Nec (n=10)	6 (60%)	3 (37.5%)		
Sepsis (n=15)	8 (53.3%)	7 (46.6%)		
Shock (n=14)	5 (35.7%)	9 (64.3%)		
Jaundice (n=37)	6 (16.26%)	31 (83.7%)		
X <sup>2</sup> = 23.724, P=0.0001				

High incidence of NDD (51%) was seen in VLBW group and 21% seen in 1500-1999 group.

#### DISCUSSION

Twins form a high risk group of newborns because of their tendency for premature birth and intrauterine growth retardation. Numerous studies from developed and developing countries have shown increasing adverse long term outcome in these high risk neonates, despite substantial improvements in neonatal care and mortality. 1,2 This study is an attempt to delineate neonatal morbidities, outcome and the pattern of growth and development in follow up on the basis of gestational age of twin babies.

A total of 81 (56 inborn and 25 outborn) pairs were enrolled in present study out of which 138 survived and

followed up for 6 months. Incidence of inborn twins in our present study was 15/1000 live birth. This incidence is less than that reported by Chauhan et al in the United States (32 per 1000) and Akinboro et al in Nigeria (46.5 per 1000).<sup>3,4</sup> High incidence in developed nations like US can be due to higher rates of artificial reproductive techniques and high hospital visits.

As per present study 75% of the twins were premature, among them 8% were moderate preterm and 91% were late preterm. Chaudhari et al also reports a similar observation of 73% preterm births in their study conducted at Pune.<sup>5</sup> This is higher than the study conducted by Refuerzo JS et al in which 65.7% of twins were preterm (14.5% were moderate pretem, 49.8% were late preterm) and 34.3% were term.<sup>6</sup> Patil et al in a study conducted in Mumbai observed a 60% incidence of prematurity among twin gestations.<sup>7</sup> Chauhan et al also reports a 60% prevalence of preterm birth among twins as compared to 11% among singletons.<sup>3</sup>

Out of the 162 infants 67 (41.4%) were VLBW, 87 (53.7%) were LBW and 8 (4.9%) were of normal birthweight. Chaudhary et al reports 85% LBW 11.9% VLBW, 2.4% ELBW infants and none were of normal birth weight.<sup>5</sup> Better results in this study can be explained by better perinatal care.

The mean birth weight of the study cohort was 1633 gms. This is less than observed by Assunção RA et al in the state of Sao Paulo in which the mean birth weight was 2026g.8

In present study 27.5% of the term babies required resuscitation procedures either in the form of basic steps or bag and mask ventilation or intensive steps, whereas 76.2% of preterms required the same. Advanced resuscitation was required in 21% of infants in present study as against 8% in study conducted by Patil et al.<sup>7</sup> This difference is explained by more referred high risk pregnancies in our centre.

Overall mortality was 14.8% in present study which is comparable to the study conducted by Patil et al of 13.9% among twins born in Mumbai in 2015.<sup>7</sup> Mortality was high among SGA (23%) infants as compared to AGA infants (11%) which is also similar to the findings in the Mumbai study even though in that study mortality rate of SGA infants was 40%.

In present study, mortality rate was 40% in twins 28-32 weeks and 18% in twins 32-37 weeks, which was related to the complications of prematurity. This compares well with some studies which have reports for 60-80% of the deaths in premature twin infants.<sup>8-10</sup>

Moderate to severe birth weight discordance was seen in 14 pairs of twins (17.2%) as against 34% observed by Patil et al.<sup>7</sup> Mortality was also high (32.1%) among

moderate to severe growth discordant twins similar to Patil et al.<sup>7</sup>

Out of total 24 neonatal deaths 9 were among discordant birth weight twins. We did not study the maternal and placental details, which may be one of the contributing factors for high incidence of growth discordance noted.

Common morbidities in twins were RDS, Perinatal Asphyxia, hypoglycemia and NEC in decreasing order. A high incidence RDS (20.4%) which further necessitated surfactant therapy and respiratory support. Patil et al also observed the same finding in a study conducted at Mumbai. Incidence of malformation noted in present study was 5%. Kyriakidou M et al also observed a high rate of morbidities among preterm twins. 11

Due to good follow up rate and counselling provided 98.7% of our infants were completely immunized at 6 months of age, rest were partially immunized due to some acute illnesses which prolonged the due date of vaccination. All of them were counselled further for completing the schedule as early as possible.

At the end of 6months 68.9% of infants were on exclusive breast feeding. 24.6% infants were on mixed feeding, 6.5% on top feeding. Even though the percentage of exclusive breast feeding is much high in present study than Patil et al (26.7%), it should be increased further by good feeding advices. We need to focus on ensuring that mothers with twins get adequate support for lactation.

We observed that all the anthropometric parameters at birth were less among twins as compared to the singleton standards. The mean birth weight, length of the study group were less than the standards and 92% of the them were of low birth weight. Below standards in anthropometric parameters were seen both in terms as well as preterms.

The growth velocity was high among preterm groups although they lagged behind the term infants in all parameters at 6 months of age. Group I (28-32 weeks) had significant lag in growth of all physical parameters at 6 months of age.

When comparing the growth pattern of twins in present study with that of growth patterns of singletons by Gp Capt D Singh et al, pattern of weight gain was similar but rate of growth of both length and head circumference was less among twins when compared to singletons.<sup>12</sup>

This comparison supports the observation In the American study by Wilson RS et al that twins were found to lag at birth, both in terms of height and weight.<sup>13</sup> They rapidly caught up in weight during the first 3 months, whereas height took much longer. The lower values in twin infants can be attributed to IUGR and perinatal

morbidities. Feeding problems and maternal malnutrition and stress can also have an add on effect.

According to our simple neurodevelopmental screening test done by DDST II at 2,4 and 6 months there is high percentage of abnormal screening score among group I (28-32wks) (P<0.005). Group II (32-34 weeks) were also found to have high abnormal screening scores. By early interventions initiated due to screening of these infants we were able to reduce the abnormal screening scores from 31.2% at 4 months to 26% at 6 months. Further improvement is expected by continued screening and interventions during their follow up in the well-baby clinic. Further evaluated correlation of NDD with neonatal complications and strong correlations were obtained with RDS, hypoglycemia, shock and perinatal asphyxia (P <0.005). Since preterm infants are more prone for neonatal complications higher incidence of NDD among them can be substantiated.

Multiple gestation itself is a risk factor for prematurity and low birth weight, higher prevalences of NDD among them is observed in many studies like Thorpe et al, Wadahawan et al, which correlates well with present study. 14,15

Long term follow up study conducted upto 4 years by Chaudhary et al observed that twinning per se is not an additionl risk factor for adverse neurodevelopment.<sup>5</sup>

Kyarikodou M et al also concludes that at 24 months neurodevelopmental outcome there is no difference between twins and age matched singletons.<sup>11</sup>

Higher abnormal screens in present study have been due to various reasons, ours being the tertiary referral center, infants with higher neonatal morbidities are included and less competent neuro-rehabilitation services as compared to developed countries.

Limitations of present study were fistky, twins were not compared against gestational age-matched singleton infants as control. Further extensive regional multicentric studies with larger sample sizes are thus warranted.

#### **CONCLUSION**

High incidence of neonatal morbidities and mortality seen among twins that multiple gestations are associated with worse outcome than singleton pregnancies even though they account for only a small percentage of live births.

Prematurity and low birth weight, weight discordance account for the majority of the morbidities and mortalities in them. Since the very preterm babies (28-32 weeks) showed catch up growth around the initial period, efforts to improve the longer follow up of these babies, nutritional status and adequately stimulating environment

will help in optimizing the growth outcome of these babies.

Incidence of neurodevelopmental delay was significantly high with lower gestational ages, lower birth weight and associated risk factors. High index of suspiscion is required for developmental delay among twins. Improving perinatal care, early detection by screening tests, emphasizing the parent's involvement and early interventions will help in reducing the developmental challenges. The caregivers must impart adequate knowledge regarding growth and development of the babies to their parents so that any deviation from the normal is dealt at the earliest.

#### **ACKNOWLEDGEMENTS**

Authors would like to thank teachers Dr. Pawan Ghanghoriya, Dr. Avyact, Dr. M. Lazarus, Dr. M. L. Barman for their support and guidances and Dr. Vivek for technical and statistical support.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

#### **REFERENCES**

- 1. Meherbansingh. Care of the new born-eighth edition. P:548-550.
- Cloherty JP, Eichenwald EC, Hansen AR, Stark AR. Manual of neonatal care. 7th ed. SEA edition. 2015;129-133.
- 3. Chauhan SP, Scardo JA, Hayes E, Abuhamad AZ, Berghella V. Twins: prevalence, problems, and preterm births. Am J Obstet Gynecol. 2010;203(4):305-15.
- 4. Akinboro A, Azeez MA, Bakare AA. Frequency of twinning in Southwest Nigeria. Indian J Hum Genet. 2008;14(2):41-7.
- 5. Chaudhari S, Bhalerao MR, Vaidya U, Pandit A, Nene U.. Growth and development of twins compared with singletons at ages one and four years. Indian Pediatr. 1997;34:1081-5.
- Refuerzo JS, Momirova V, Peaceman AM, Sciscione A, Rouse DJ, Caritis SN et al. Neonatal outcomes in twin pregnancies delivered moderately preterm, late preterm and term. Am J Perinatol. 2010 Aug;27(7):537.
- 7. Patil S, Utture A, Mondkar J, Goel S. Outcome in twin gestations: A prospective observational study. Indian J Child Health. 2017 Nov;4(2):239-42.
- 8. Assunção RA, Liao AW, Brizot MD, Krebs VL, Zugaib M. Perinatal outcome of twin pregnancies delivered in a teaching hospital. Rev Assoc Med Bras. 2010;56(4):447-51.
- 9. Morrison J. Twin gestation and premature birth. J Perinatol. 2005;25(1):13.

- 10. Manlan G, Scott KE. Contribution of twin pregnancy to perinatal mortality and fetal growth retardation; Reversal of growth retardation after birth. Can Med Assoc J. 1978;118(4):365-8.
- 11. Kyriakidou M, Karagianni P, Iliodromiti Z, Chatziioannidis I, Papaioannou E, Exadaktilou S et al. Comparison of 24 months neurodevelopmental outcome in twins and singletons ≤34 weeks gestation at birth. JPNIM. 2013 Jan 15;2(1):48-54.
- 12. Singh D, Devi N, Raman TR. Exclusive breast feeding in low birth weight babies. Med J Armed Forces India. 2009 Jul 1;65(3):208-12.
- 13. Wilson RS. Twin growth: initial deficit, recovery, and trends inconcordance from birth till nine years. Ann Hum Biol. 1979;6:205-20.

- 14. Thorpe K. Twin children's language development. Early Hum Dev. 2006;82(6):387-95.
- Wadhawan R, Oh W, Perritt RL, McDonald SA, Das A, Poole WK et al. Twin gestation and neurodevelopmental outcome in extremely low birth weight infants. Pediatrics. 2009 Feb 1;123(2):e220-7.

Cite this article as: Ghanghoriya PK, Agrawal A, Mohan U, Keerthi K, Singh S. Analysis of clinical profile, growth and developmental pattern of twin babies in a tertiary care hospital of central India. Int J Contemp Pediatr 2018;5:754-60.