International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Patil P et al. Int J Reprod Contracept Obstet Gynecol. 2019 Nov;8(11):4503-4510
www.ijrcog.org

pISSN 2320-1770 | eISSN 2320-1789

DOI: http://dx.doi.org/10.18203/2320-1770.ijrcog20194883

Original Research Article

A clinical study of preterm labour

Prachi Patil*, Richa Singh, Sriram Gopal

Department of Obstetrics and Gynecology, D. Y. Patil University, Nerul, Navi Mumbai, Maharashtra, India

Received: 28 July 2019
Revised: 12 September 2019
Accepted: 07 October 2019

***Correspondence:**
Dr. Prachi Patil,
E-mail: kpppsp@gmail.com

ABSTRACT

Background: There has been a rising incidence of preterm labour in India. Preterm labour poses greater risks of morbidity and mortality of the preterm neonates. Various factors contribute towards risk of preterm labour and its outcome. Addressing these factors appropriately improves the outcome in pregnant women.
Methods: This prospective observational study was conducted in department of obstetrics and gynaecology from the period of July 2017 to July 2018.
Results: The present study was in 98 patients admitted in our hospital with preterm labour. Clinical profile of those patients was studied. Statistically significant association was found between administration of antibiotics and tocolysis in prolongation of pregnancy (p value=0.00). There was an association found between gestational age at birth and immediate neonatal outcome (p value=0.00). Preterm labour was more common in multigravidae (62.4%) and women with cervical length less than 3 cm (85.17%).
Conclusions: Preterm labour can be expected more commonly in multigravidae, pregnant women with cervical length less than 3 cm and in presence of high-risk factors. Anticipation of preterm labour, judicious use of antibiotics, tocolytics can improve the outcome of preterm labour.

Keywords: Gestational age, High-risk pregnancy, Neonatal intensive care unit, Preterm labour, Premature neonate, Prevention of preterm labour, Pregnancy

INTRODUCTION

Preterm labour is one of the most common complications in pregnancy and leading cause of neonatal morbidity and mortality. Preterm birth is defined as birth between age of viability and 37 completed weeks of gestation.[1] It can be categorised according to the gestational age as follows:

- Extremely preterm (less than 28 weeks)
- Very preterm (28 to 32 weeks)
- Moderate to late preterm (32 to 37 weeks).[1]

Preterm labour can be a physiological process or a pathological process following an abnormal stimulus. Throughout the years various risk factors have been studied such as demographic factors like age, socio economic status, level of antenatal care, BMI which are found to be in close association with development of preterm labour. Lifestyle and social elements such as cigarette smoking, depression, domestic violence, anxiety etc. predispose adverse pregnancy outcomes.[2] Most important influencers remain to be obstetrical factors such as parity, polyhydramnios, premature rupture of membranes, threatened abortion, previous history of preterm labour etc. Intra uterine infections, urinary tract infections can act as standalone cause for preterm labour, if not addressed in time.

The molecular basis of initiation of labour is unclear. Many theories have been proposed. Of these, withdrawal

of progesterone, oxytocin stimulation and premature decidual activation are the important ones. Cytokines, prostaglandins form various structural changes in uterus, cervix initating the process of preterm labour.[3]

A better understanding of pathophysiology of preterm labour helps us to improve our ability to identify those women at increased risk. And these pregnancies can be further monitored and intervened appropriately as per the clinical status in time. At risk pregnancies can be conservatively managed by complete bed rest, nutritional interventions, antibiotics, cervical encirclage etc. Failure to prevent the progression of preterm labour warrants additional measures to atleast delay the progression to achieve favourable neonatal outcome. These modalities include tocolysis with pharmacological agents, progesterone and dexamethasone. These measures act by reducing uterine contractility, curtailing progression of labour and accelerating fetal lung maturity in turn improving neonatal outcomes.

Prematurity is the leading cause of neonatal mortality in the world as well as in India. In India, out of 27 million babies born every year, 3.5 million babies born are premature.[4] With advancement in neonatal care facilities extreme premature infants are also salvageable reducing neonatal mortality to a significantly lower level. Hence early recognition and arresting the progression of preterm labour, aiding advancement of fetal maturity can improve pregnancy outcome.

The study is undertaken to evaluate the risk factors associated with preterm labour and immediate neonatal outcome.

METHODS

This was prospective observational study conducted at department of obstetrics and gynecology.

Inclusion criteria

- All pregnant women admitted for preterm labour in department of obstetrics and gynaecology.

Exclusion criteria

- Patients not willing to get enrolled in the study.

The Patients fulfilling the inclusion criteria were enrolled during a period July 2017 to July 2018 (1 year). A total of 98 pregnant women were enrolled which were admitted with preterm labour. Clinical profile of these patients was then categorised on the basis of age, occupation, residential status, gestational age at delivery, associated risk factors, obstetric history, previous history of preterm labour, cervical length at the presentation, urogenital infection. Patients were then further followed up closely for monitoring progress of labour in terms of mode of delivery, use of antibiotics, tocolytics, magnesium sulphate, and corticosteroid.

Delivered neonates who require further care were managed in NICU. Neonatal outcomes were assessed in terms of survivability, duration of NICU stay.

Data collected during study was then analysed for percentages, proportions. Also, individual factors in study were studied for association with preterm labour and their association was tested for statistical significance using chi square, fisher exact test.

Associated co-morbidities like anemia, pre-eclampsia, eclampsia, heart diseases were promptly treated if identified. Mode of delivery was planned as per the clinical status of the patients. Caesarean sections were done only for obstetrical reasons.

RESULTS

Total of 98 pregnant women with preterm labour were observed during this study. Following observations were made.

Table 1: Distribution of study group as per age.

Age	Frequency	Percent
Up to 20 years	11	11.22%
21 to 25 years	37	37.76%
26 to 30 years	32	32.65%
31 to 35 years	14	14.29%
36 to 37 years	4	4.08%
Total	**98**	**100.00%**

Maximum number of patients were of the age group of 21 to 25 years i.e. 37.76% (Table 1). Minimum number of patients were found to be in age group of 36-37 years. i.e. 4.08%. 11.22% fell in the age group up to 20 years.

Table 2: Distribution of the study group as per gestational age.

Weeks of gestation	Frequency	Percent
24 to 28 weeks	9	9.18%
29 to 32 weeks	19	19.39%
Above 32 to 37 weeks	70	71.43%
Total	**98**	**100.00%**

Gestational age is one of the most important factors which determines the further course of labour and neonatal outcome. Lower gestational age is usually associated with higher neonatal complications. In this study maximum number of patients were between 32 to 37 weeks of gestation i.e. 71.43% (Table 2). Whereas 19.39% were between 29 to 32 weeks. Out of the total patients observed, 62.24% were multigravidae, whereas primigravidae were 37.76% (Table 3).

Table 3: Distribution of the study group as per obstetric history.

Obstetric history	Frequency	Percent
Primi	37	37.76%
Multigravida	61	62.24%
Total	**98**	**100.00%**

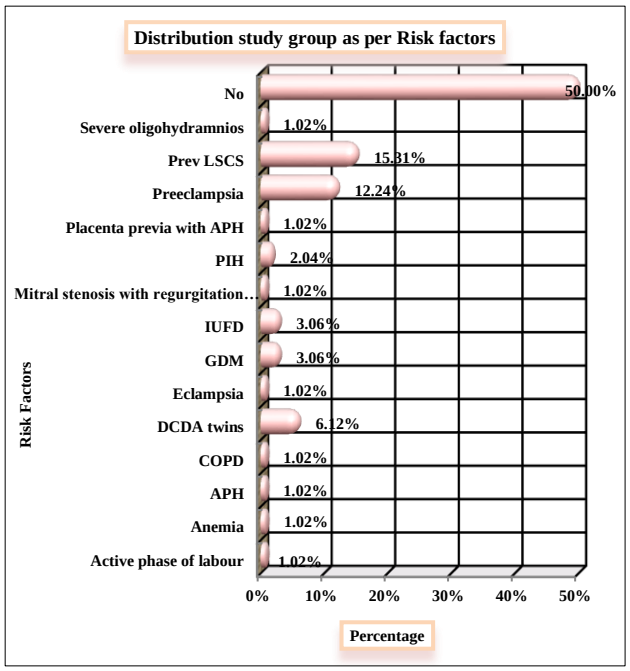


Figure 1: Distribution of the study group as per associated high risk.

In our study 50% of the patients were associated with some high-risk factor (Figure 1). 15.37% patients had undergone previous caesarean section. 12.24% patients had preeclampsia. 6.12% were twin gestations.

Table 4: Distribution of the study as per previous history of preterm labour.

Previous history	Percent
Yes	9.18%
No	90.82%
Total	**100.00%**

9.18% of the patients had previous history of preterm labour in our study whereas 90.82% had no such history (Table 4).

In 85.71% cases, cervical length was less than 3 cm (Figure 2).

In our study, 6.12% females had symptoms of urinary tract infection (Table 5). However, 17.35% were positive for pus cells in urine routine examination (Table 6). In the urine culture report, 92.86% showed no growth while 5.1% showed *E.coli*, *Candida* and *Kliebsiella* were found in 1.02% each (Table 7).

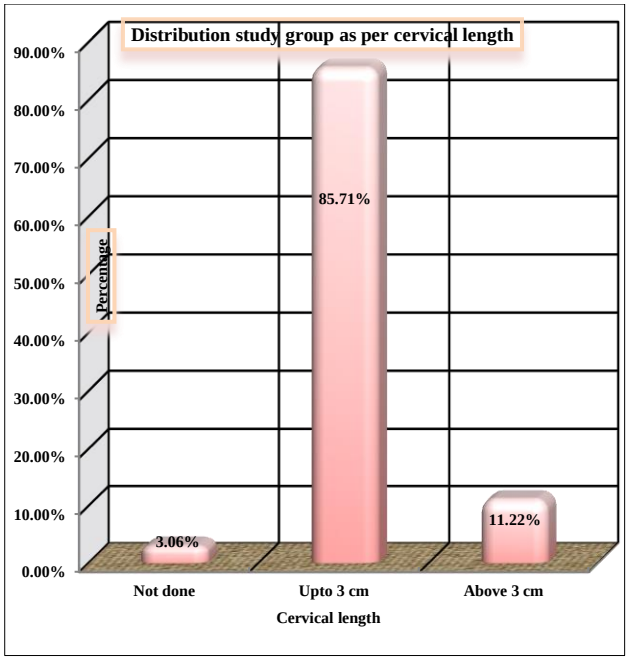


Figure 2: Distribution of the study group as per cervical length.

Table 5: Distribution of the study group as per history of urinary tract infection.

UTI	Frequency	Percent
No history	92	93.88%
Yes	6	6.12%
Total	**98**	**100.00%**

Table 6: Distribution of the study group as per urine routine investigation.

Urine routine	Frequency	Percent
Pus cells	17	17.35%
WNL	81	82.65%
Total	**98**	**100.00%**

Table 7: Distribution of the study group as per urine culture report.

Urine culture	Frequency	Percent
Candida	1	1.02%
Ecoli	5	5.10%
Kleibseilla	1	1.02%
No growth	91	92.86%
Total	**98**	**100.00%**

The 87% of the patients showed no growth in the high vaginal swab report while 4.08% showed positive results for *Candida*. *Bacterial Vaginosis* was found in 1.02% cases. *Staphylococcus*, *Streptococcus* and *Acinetobactor* were found in 1.02% cases each (Figure 3).

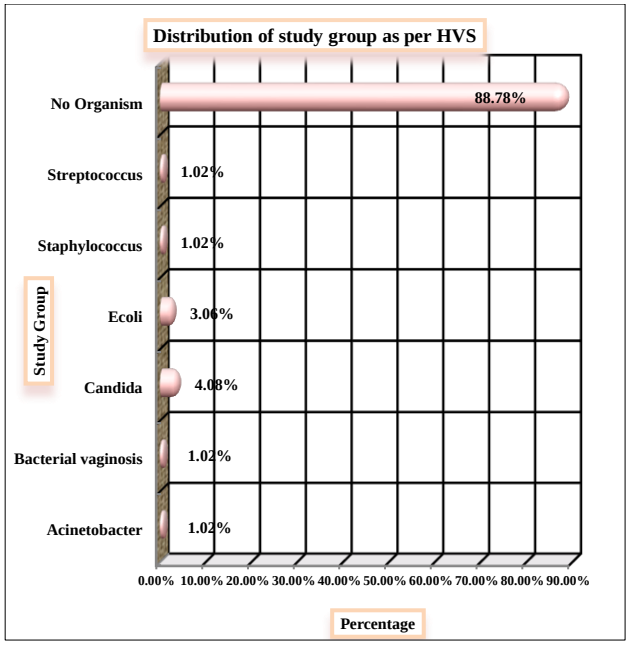


Figure 3: Distribution of the study group as per high vaginal swab report.

Table 8: Distribution of the study group as per Preterm premature rupture of membranes.

PPROM	Frequency	Percent
Yes	31	31.63%
No	67	68.37%
Total	**98**	**100.00%**

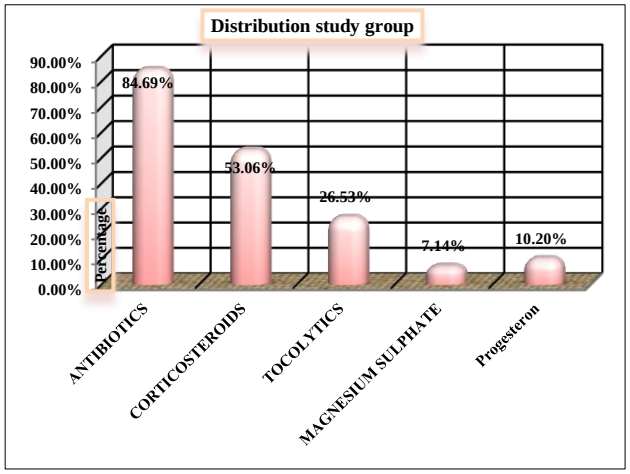


Figure 4: Distribution of the study group as per antibiotics administration, Corticosteroids administration, Tocolytics administration, Magnesium sulphate administration and Progesterone support administration.

31.63% (Table 8) of the total patients observed presented with preterm premature rupture of membranes (PPROM). In majority of the cases of PPROM cause remains unknown. Chorioamnionitis, urinary tract infection, genital tract infection, short cervix, and prior history can be associated with PPROM.

In our study, 84.69% patients were administered antibiotics (Figure 4). 53% were given corticosteroids. Tocolytics were administered to 26.53%. Magnesium sulphate was given to 7.14% for fetal neuroprotection. 10.2% were given progesterone support.

Table 9: Distribution of the study group as per mode of delivery.

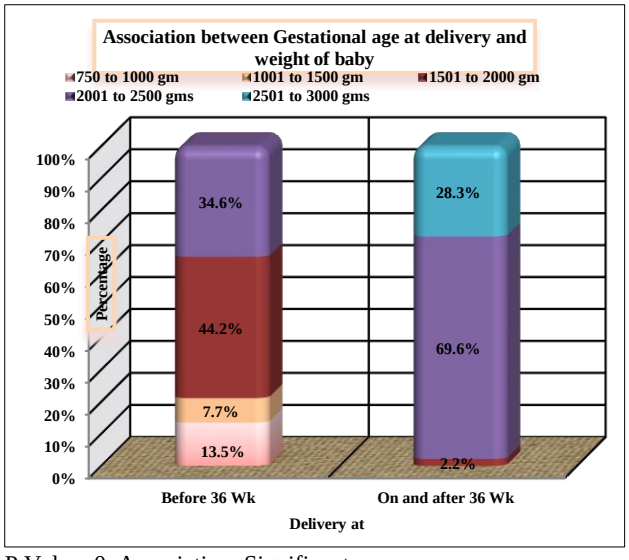
Mode of delivery	Percent
LSCS	34.69%
Vaginal	65.31%
Total	**100.00%**

In our study, 34.69% patients had to undergo caesarean section while 65.31% delivered vaginally (Table 9).

Table 10: Distribution of the study group as per Cervical encirclage.

Cervical encirclage	Percent
Yes	5.10%
No	94.90%
Total	**100.00%**

Cervical encirclage in cases with short cervical length helps to minimise chances of preterm labour. In our study, 5.1% of the patients had undergone Cervical Encirclage (Table 10), while 94.90% did not require encirclage.

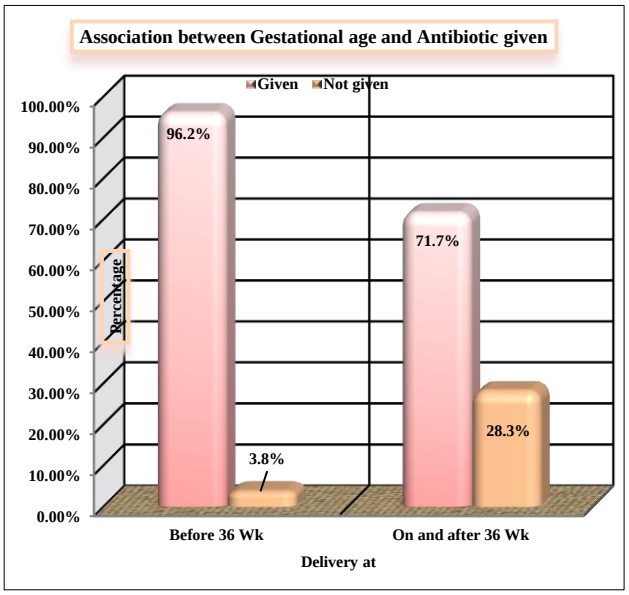


P Value: 0, Association: Significant.

Figure 5: Association between gestational age at birth and neonatal weight.

In our study, we found that, out of the patients who delivered before 36 weeks, 44.2% had birth weight between 1.5 kg to 2 kg (Figure 5). Association of

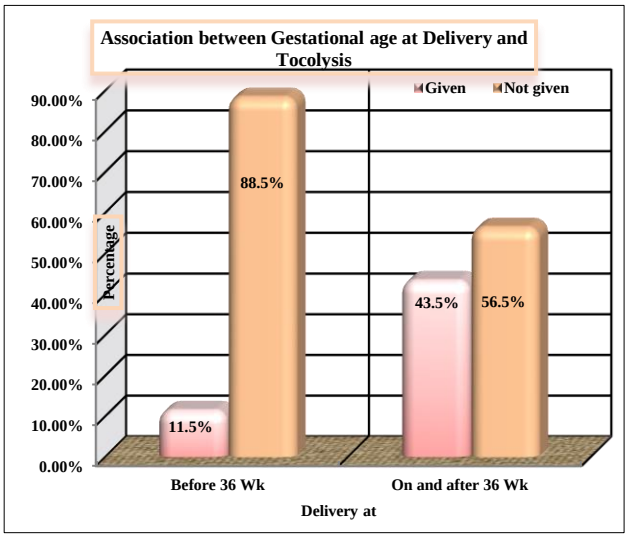
gestational age at delivery and birth weight was found to be significant (P value 0).



P value: 0.001, Association: Significant.

Figure 6: Association between gestational age at delivery and antibiotics administered.

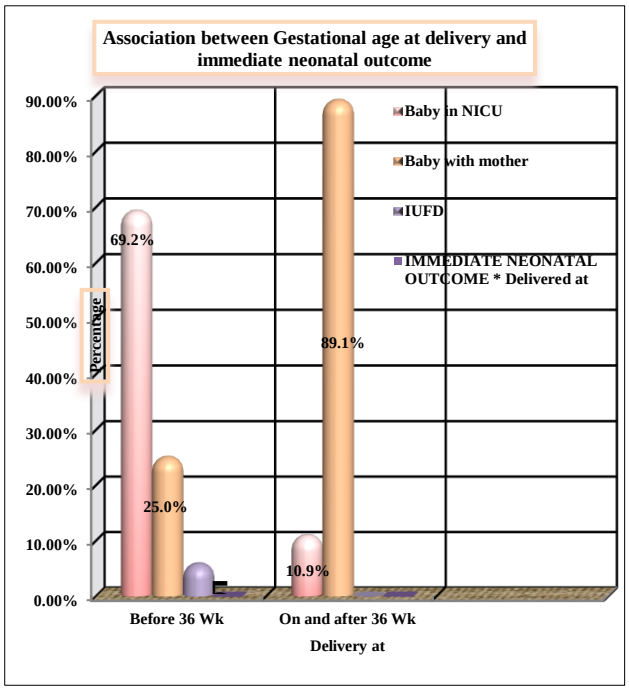
In the study it was found that, out of patients who delivered before 36 weeks 96.2% were given antibiotics and 3.8% were not given antibiotics (Figure 6). Whereas out of the patients who delivered at and beyond 36 weeks 71.7% were given antibiotics and 28.3% were not given. Association of antibiotics and prolongation of pregnancy was found to be significant (P value 0.001).



P value: 0, Association: Significant.

Figure 7: Association between gestational age at delivery and tocolysis.

Out of the patients who delivered before 36 weeks, 11.5 % were given tocolysis while 88.5% were not given tocolysis (Figure 7). 43.5% of the patients who delivered at or beyond 36 weeks were given tocolysis while 56.5% were not subjected to tocolysis. Association of tocolysis and prolongation of pregnancy was found to be significant (P value 0).



P value: 0, Association: Significant.

Figure 8: Association between gestational age at delivery and immediate neonatal outcome.

Association of gestational age at delivery and immediate neonatal outcome was studied. It was found that out of the patients who delivered before 36 weeks, 69.2% babies required NICU, while 25% did not require NICU.

Only 10.9% of the patients who delivered beyond 36 weeks required NICU care whereas 89.1% did not require. Thus, Association was statistically significant (P value 0).

DISCUSSION

This was a prospective observational study of clinical profile of the patients coming to our hospital with preterm labour from July 2017 to July 2018.

Maternal age is one of the important factors which determines the outcome pregnancy. A study conducted by Goffinet found that women younger than 17 years and older than 35 years are at increased risk of preterm labour.[5] While in our study maximum number of patients were of the age group of 21 to 25 years i.e. 37.76% (Table 1), 4.08% women were in age group of 36 -37 yrs. and 11.22% fell in the age group up to 20 years. Hence our study contradicts the findings of Goffinet.[5]

Premature labour and the complications associated with it show predilection to gestational age. In this study it was

found that preterm labour was more common in women with gestational age between 32 to 37 weeks i.e. 71.43% and 19.39% women of gestational age between 29 to 32 weeks experienced preterm labour (Table 2).

Past history of abortion or a preterm delivery is strongly associated with preterm labour. Etiopathogenesis in primigravidae can be explained on the basis of genetic polymorphism, congenital cervical incompetence due to connective tissue disorders like Marfan's syndrome, Ehler - Danlos syndrome.[6] Out of the total patients observed, 62.24% were multigravidae, whereas primigravidae were 37.76% (Table 3).

According to Martin and co-workers (2006)7, there were 5,08,356 preterm births in United States out of which 86,116 i.e. 17% were from multifetal pregnancies. authors studied association various high risk factors and found that 50% of the patients were associated with some high risk factor (Figure1). 15.37% patients had undergone previous caesarean section. 12.24% patients had preeclampsia. 6.12% were twin gestations. 9.18% of the patients had previous history of preterm labour in our study whereas 90.82% had no such history (Table 4). Bloom and associates in 2001 conducted a study of 16000 women with preterm labour where 62% of the patients had previous history of preterm labour.[8]

In women with previous birth before 32 weeks, Owen et al, reported a significant correlation of cervical length at 16 to 24 weeks and subsequent preterm birth before 35 weeks.[9] In their review later, Owen et al, concluded that value of cervical length to predict birth before 35 weeks is apparent only in women at high risk for preterm birth.[9] De Carvalho et al, reported an interesting study of sonographic examination of cervix in 1958 in women attending routine prenatal clinic at the University of Sao Paulo.[10] These investigators correlated sonographic cervical length and prior history of preterm birth with delivery before 35 weeks. They concluded that a short cervix itself was a poor predictor of preterm birth, whereas funnelling plus a history of prior preterm birth was highly predictive of preterm birth. In this study 85.71% cases, cervical length was less than 3 cm (Figure 2).

In our study, 6.12% females had symptoms of urinary tract infection (Table 5). However, 17.35% were positive for pus cells in urine routine examination (Table 6). In the urine culture report, 92.86% showed no growth while 5.1% showed *E.coli*, *Candida* and *Kliebsiella* were found in 1.02% each (Table 7).

Bajwa et al, carried out a retrospective study that showed 230 (79.31%) out of 290 patients with positive culture of either urine or vaginal discharge delivered preterm, while 60 patients who delivered preterm had neither infection of urine nor of vagina.[11] On statistical analysis the difference was highly significant ($p < 0.001$).

In our study, 87% of the patients showed no growth in the high vaginal swab report while 4.08% showed positive results for *Candida*. *Bacterial Vaginosis* was found in 1.02% cases. *Staphylococcus, Streptococcus* and *Acinetobactor* were found in 1.02% cases each (Figure 3). In the study by Robert et al, 19.6% had asymptomatic vaginal candidiasis and were randomized to cotrimazole or usual care.[12] There was a tendency towards a reduction in spontaneous preterm birth among women with asymptomatic candidiasis who were treated with clotrimazole.

31.63% (Table 8) of the total patients observed presented with preterm premature rupture of membranes (PPROM). In majority of the cases of PPROM cause remains unknown. Chorioamnionitis, urinary tract infection, genital tract infection, short cervix, and prior history can be associated with PPROM. Leitich et al, conducted study in 2003 showed association between bacterial vaginosis and preterm birth/premature rupture of membranes.[13] From all of these studies, there seems no doubt that adverse vaginal flora is associated in some way with spontaneous preterm birth. Goldenberg and associates showed that 30-35% follow preterm premature rupture of membranes.[14]

In our study, 84.69% patients were administered antibiotics. 52% were given corticosteroids (Figure 4). Tocolytics were administered to 26.53%. Magnesium sulphate was given to 7.14% for fetal neuroprotection. 10.2% were given progesterone support. Meis et al, did a trial in which 310 women with prior preterm births were randomized to receive 17 - hydroxyprogesterone caproate, while another 153 received placebo.[15] It was found that rates of delivery before 37, 35, and 32 weeks were all significantly reduced by progestine therapy.[15]

In our study, 34.69% patients had to undergo caesarean section while 65.31% delivered vaginally (Table 9).

5.1% of the patients required Cervical Encirclage (Table 10). In a study conducted by Berghella V, showed that in women with a singleton gestation, previous spontaneous preterm birth and cervical length less than 25 mm before 24 weeks of gestation, preterm birth before 35 weeks of gestation was 28.4% in the circlage compared with 41.3% in the no circlage groups.[16] Circlage also significantly reduced preterm birth before 37 weeks of gestation. Composite perinatal mortality and morbidity were significantly reduced.[15]

In our study, authors found that, out of the patients who delivered before 36 weeks, 44.2% had birth weight between 1.5 kg to 2 kg (Figure 5). Association of gestational age at delivery and birth weight was found to be significant (P value 0).

In the study it was found that, out of patients who delivered before 36 weeks 96.2% were given antibiotics and 3.8% were not given antibiotics (Figure 6). Whereas

out of the patients who delivered at and beyond 36 weeks 71.7% were given antibiotics and 28.3 % were not given. Association of antibiotics and prolongation of pregnancy was found to be significant (P value 0.001). Study by Morency et al, also concludes favorable effect of antibiotic therapy on the rate of preterm birth.[17]

Out of the patients who delivered before 36 weeks, 11.5% were given tocolysis while 88.5% were not given tocolysis (Figure 7). 43.5% of the patients who delivered at or beyond 36 weeks were given tocolysis while 56.5% were not subjected to tocolysis. Association of tocolysis and prolongation of pregnancy was found to be significant (P value 0).

Association of gestational age at delivery and immediate neonatal outcome was studied. It was found that out of the patients who delivered before 36 weeks, 69.2% babies required NICU, while 25% did not require NICU (Figure 8).

Only 10.9% of the patients who delivered beyond 36 weeks required NICU care whereas 89.1% did not require. Thus, association was statistically significant (P value 0).

Preventive measures practiced in our country include improvement of nutrition, correction of anemia, elimination of infection, limiting substance abuse, avoiding strenuous exercise, adequate rest, regular antenatal visits. The practice of prophylactic administration of oral tocolytics has been of debatable value. Tocolysis may prevent threatened preterm labour but these patients need hospitalization and close monitoring.

CONCLUSION

The present study involved 98 patients admitted in our hospital with preterm labour. Clinical profile of those patients was studied. It was found that preterm labour was more common in multigravida and women with cervical length less than 3 cm. Hence in such females anticipation of preterm labour can be made and specific issues can be addressed to improve the clinical status of the patient.

There is an association found between gestational age at birth and immediate neonatal outcome. Prolonging gestational age with therapeutic measures in cases of preterm labour significantly improves neonatal outcome in terms of mortality and morbidity. Statistically, significant association was found between administration of antibiotics and tocolysis in prolongation of pregnancy. With use of these measures progression of preterm labour could be sufficiently halted so as to help in advancement of gestational age and favourable neonatal outcome. Therefore, anticipation of preterm labour, treatment of specific risk factors can improve the overall neonatal outcome.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. American College of Obstetricians and Gynecologists. ACOG Practice Bulletin. Assessment of risk factors for preterm birth. Clinical management guidelines for obstetrician-gynecologists. Obstet Gynecol. 2001;98(4):709.
2. Stillerman KP, Mattison DR, Giudice LC, Woodruff TJ. Environmental exposures and adverse pregnancy outcomes: a review of the science. Reproductive sciences. 2008;15(7):631-50.
3. Oliver R, Lamont RF. Role of cytokines in spontaneous preterm labor and preterm birth. Progress Obstet Gynaecol. 2004;16:83-106.
4. Preterm birth, National Health Portal of India. 2019. Available at: https://www.nhp.gov.in/disease/reproductive-system/female-gynaecological-diseases-/preterm-birth.
5. Goffinet F. Primary predictors of preterm labour. BJOG. Int J Obstet Gynaecol. 2005;112:38-47.
6. Anum EA, Hill LD. Connective tissue and related disorders and preterm birth: clues to genes contributing to prematurity. Placenta. 2009;30(3):207-15.
7. Martin JA, Hamilton BE, Sutton PD, Ventura SJ, Menacker F, Munson ML. Births: final data for 2004. National vital statistics reports, vol. 55, no. 1. National Center for Health Statistics: Hyattsville, MD, USA. 2006.
8. Bloom SL, Yost NP, McIntire DD, Leveno KJ. Recurrence of preterm birth in singleton and twin pregnancies. Obstet Gynecol. 2001;98(3):379-85.
9. Owen J, Iams JD, Hauth JC. Vaginal sonography and cervical incompetence. Am J Obstet Gynecol. 2003;188(2):586-96.
10. deCarvalho MH, Bittar RE, de Lourdes Brizot M, Bicudo C, Zugaib M. Prediction of preterm delivery in the second trimester. Obstet Gynecol. 2005;105(3):532-6.
11. Bajwa S, Bajwa S, Singh K, Kaur A, Goel S, Goel S. Genitourinary infection and preterm labour: a retrospective study. Sri Lanka J Obstet Gynaecol. 2012;32(3).
12. Roberts CL, Rickard K, Kotsiou G, Morris JM. Treatment of asymptomatic vaginal candidiasis in pregnancy to prevent preterm birth: an open-label pilot randomized controlled trial. BMC Preg Childbirth. 2011;11(1):18.
13. Leitich H, Brunbauer M, Bodner-Adler B, Kaider A, Egarter C, Husslein P. Antibiotic treatment of bacterial vaginosis in pregnancy: a meta-analysis. Am J Obstet Gynecol. 2003;188(3):752-8.
14. Goldenberg RL, Culhane JF, Iams JD, Romero R. Preterm birth 1: epidemiology and causes of preterm birth. Obstet Anesth Digest. 2009;29(1):6-7.

15. Meis PJ, Klebanoff M, Thom E, Dombrowski MP, Sibai B, Moawad AH, et al. Prevention of recurrent preterm delivery by 17 alpha-hydroxyprogesterone caproate. New Eng J Med. 2003;348(24):2379-85.
16. Berghella V, Odibo AO, To MS, Rust OA, Althuisius SM. Cerclage for short cervix on ultrasonography: meta-analysis of trials using individual patient-level data. Obstet Gynecol. 2005;106(1):181-9.
17. Morency AM, Bujold E. The effect of second-trimester antibiotic therapy on the rate of preterm birth. J Obstet Gynaecol Canada. 2007;29(1):35-44.

Cite this article as: Patil P, Singh R, Gopal S. A clinical study of preterm labour. Int J Reprod Contracept Obstet Gynecol 2019;8:4503-10.