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# Compare Neonatal Complication in Group of Spontaneous Preterm versus PPROM Group

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## ABSTRACT

*A delivery before 37 weeks of gestation is classified as preterm deliveries. Preterm birth is associated with higher risk of mortality and morbidity among neonates. PPROM (preterm premature rupture of the fetal membranes) is one of the causes of preterm delivery. As preterm birth is associated with several neonatal complications, we designed this study to compare neonatal complication in group of spontaneous preterm versus PPROM group. This retrospective study conducted in Imam Hospital. Medical records of 300 preterm deliveries were reviewed and data regarding maternal age, neonatal birth weight, sex, gestational age, parity, apgaar score, and neonatal complications were extracted. According to gestational week, we groups neonates into 3 groups, 24-28 weeks (16 neonates), 28-32 weeks (42 neonates), 32-(36 weeks +6days) (242 neonates) and then compared complication in these groups according to cause of preterm birth (PROM, or spontaneous). All data were analyzed using SPSS. Frequency of IVH, Icter, respiratory distress, apnea, RDS, PPV, CRP and death were significantly different between three groups of gestational age. There was no significant difference between PROM and spontaneous group regarding gestational age between 24-28 weeks. There was no significant difference between PROM and spontaneous group regarding gestational age between 28-32 weeks. Frequency of respiratory distress and pneumonia were significantly higher in spontaneous group in cases with gestational age between 32-36 weeks. Literature showed that respiratory distress syndrome occurs higher in spontaneous group than preterm PROM neonates in gestational age between 32-36 weeks.*

**Key words:** Spontaneous Preterm, PPROM, Complication

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## INTRODUCTION

Delivery before 37 weeks of gestational age is called preterm birth which is divided to early and late pre term delivery. Deliveries between 34 to 37 weeks of gestation are classified as late pre term delivery while deliveries before 34 weeks of gestation is classified as early pre term deliveries [1]. Preterm birth is associated with higher risk of mortality and morbidity among neonates[2, 3]. It has been estimated that preterm delivery affect near 12.5% (one out of eight deliveries)[4].Every year, near 4 million newborns die and preterm birth compromise near one fourth of newborns death[5].Among preterm neonates who will survive, wide range of complications including: chronic lung disease, developmental delay, hearing impairment, respiratory distress syndrome, intraventricular haemorrhage, growth reduction, necrotisingenterocolitis ± perforation and retinopathy of prematurity have higher chance to occur[6]. The rupture of the amniotic membranes with release of the amniotic fluid before 37 weeks of gestation is considered as PPROM (preterm premature rupture of the fetal membranes) which is one of the causes of preterm delivery. It is responsible for 33% of all preterm deliveries and the remaining are spontaneous [7]. As preterm birth is associated with several neonatal complications, we designed this study to compare neonatal complication in group of spontaneous versus PPROM group.

## MATERIALS AND METHODS

This retrospective study conducted in Imam Hospital (tertiary hospital affiliated by Tehran University of Medical Sciences) between August 2012 and August 2016.

Medical records of 300 preterm deliveries were reviewed and data regarding maternal age, neonatal birth weight, sex, gestational age, parity, apgaar score, and neonatal complications were extracted.

According to gestational week, we groups neonates into 3 groups, 24-28 weeks (16 neonates), 28-32 weeks (42 neonates), 32-(36 weeks +6days)(242 neonates)and then compared complication in these groups according to cause of preterm birth (PROM, or spontaneous).

All data were analyzed using SPSS software version 20 (SPSS Inc., Chicago, IL, USA). Data were presented as Mean± SD for continuous or frequencies for categorical variables. Independent sample t-test and chi square was used to compare continuous or categorical variables. P value less than 0.05 was considered as significant.

## RESULTS

Medical records of 300 preterm births were reviewed. One hundred and seventy eight were preterm birth due to PROM and 122 were spontaneous. One hundred and fifty three cases from PROM group (85.9%) and 108 from spontaneous group (88.5%) were hospitalized in NICU.

**Table 1: shows basic characteristics of two groups**

| | PROM group | Spontaneous group | P value |
|---|---|---|---|
| Maternal age (year) | 27.4±5.9 | 27.4±6 | 0.9 |
| Neonatal birth weight (gr) | 2295±680 | 2390±739 | 0.2 |
| Sex<br>Male<br>female | 107(60.1%)<br>71(39.9%) | 71(58.1%)<br>51(41.9%) | 0.7 |
| Gestational age (week) | 33.9±2.6 | 33.7±2.8 | 0.6 |
| Maternal parity (mean) | 1.8±1.1 | 2.1±1.2 | 0.1 |
| Apgar 1th minute (median) | 9 | 9 | 0.9 |
| Apgar 5th minute (median) | 9 | 9 | 0.9 |
| Duration of NICU admission (days) | 8.7±9.9 | 6.5±8.9 | 0.07 |

Frequency of IVH, Icter, respiratory distress, apnea, RDS, PPV, CRP and death were significantly different between three groups of gestational age (table2).

**Table 2: comparison of complications in different gestational age groups**

| | Group 1 N=16 | Group 2 N=42 | Group 3 N=242 | P value |
|---|---|---|---|---|
| Siezure | 0 | 3(7.1%) | 10(4.1%) | 0.4 |
| Hypotone-hyporeflexia | 3(18.8%) | 7(16.7%) | 30(12.4%) | 0.6 |
| Jitteriness | 0 | 1(2.4%) | 16(6.6%) | 0.3 |
| IVH | 4(25%) | 4(9.5%) | 3(1.2%) | <0.001 |
| Asphyxia | 0 | 1(2.4%) | 6(2.5%) | 0.8 |
| Icter | 4(25%) | 27(64.3%) | 145(59.9%) | 0.01 |
| Respiratory distress | 8(50%) | 27(64.3%) | 84(34.7%) | 0.001 |
| Apnea | 2(12.5%) | 8(19%) | 10(4.1%) | 0.001 |
| Pneumonia | 0 | 3(7.1%) | 14(5.8%) | 0.5 |
| Tachypnea | 0 | 0 | 13(5.4%) | 0.1 |
| RDS | 7(43.8%) | 12(28.6%) | 15(6.2%) | <0.001 |
| TTN | 0 | 0 | 4(1.7%) | 0.6 |
| Sepsis | 5(31.2%) | 8(19%) | 25(10.3%) | 0.07 |
| PPV | 3(18.8%) | 8(19%) | 10(4.1%) | <0.001 |
| CPR | 3(18.8%) | 8(19%) | 5(2.2%) | <0.001 |
| Death | 13(81.2%) | 12(28.6%) | 6(2.5%) | <0.001 |

There was no significant difference between PROM and spontaneous group regarding gestational age between 24-28 weeks (table 3).

**Table 3: Comparison of complications in neonates with gestational age between 24-28 weeks in two groups**

| Presence of complication | PROM group N=8 | Spontaneous group N=8 | P value |
|---|---|---|---|
| Siezure | 0 | 0 | |
| Hypotonehyporeflexia | 0 | 3(37.5%) | 0.05 |
| Jitteriness | 0 | 0 | |
| IVH | 1(12.5%) | 3(37.5%) | 0.2 |
| Asphyxia | 0 | 0 | |
| Icter | 3(37.5%) | 1(12.5%) | 0.2 |
| Respiratory distress | 4(50%) | 4(50%) | 1 |
| Apnea | 0 | 2(25%) | 0.1 |
| Pneumonia | 0 | 0 | |
| Tachypnea | 0 | 0 | |
| RDS | 3(37.5%) | 4(50%) | 0.6 |
| TTN | 0 | 0 | |
| Sepsis | 1(12.5%) | 4(50%) | 0.3 |
| PPV | 1(12.5%) | 2(25%) | 0.5 |
| CPR | 1(12.5%) | 2(25%) | 0.5 |
| Death | 5(62.5%) | 8(100%) | 0.05 |

There was no significant difference between PROM and spontaneous group regarding gestational age between 28-32 weeks (table 4).

Frequency of respiratory distress and pneumonia were significantly higher in spontaneous group in cases with gestational age between 32-36 weeks (table 5).

**Table 4: Comparison of complications in neonates with gestational age between 28-32 weeks in two groups**

| Presence of complication | PROM group N=27 | Spontaneous group N=15 | P value |
|---|---|---|---|
| Siezure | 1(3.7%) | 2(13.3%) | 0.2 |
| Hypotonehyporeflexia | 4(14.8%) | 3(20%) | 0.6 |
| Jitteriness | 0 | 1(6.7%) | 0.1 |
| IVH | 3(11.1%) | 1(6.7%) | 0.6 |
| Asphyxia | 0 | 1(6.7%) | 0.1 |
| Icter | 17(63%) | 10(66.7%) | 0.8 |
| Respiratory distress | 16(59.3%) | 11(73.3%) | 0.3 |
| Apnea | 4(14.8%) | 4(26.7%) | 0.3 |
| Pneumonia | 2(7.2%) | 1(6.7%) | 0.9 |
| Tachypnea | 0 | 0 | |
| RDS | 7(25.9%) | 5(33.3%) | 0.6 |
| TTN | 0 | 0 | |
| Sepsis | 5(15.8%) | 3(20%) | 0.1 |
| PPV | 7(25.9%) | 1(6.7%) | 0.1 |
| CPR | 6(22.2%) | 2(13.3%) | 0.1 |
| Death | 8(29.6%) | 4(26.7%) | 0.8 |

**Table 5: Comparison of complications in neonates with gestational age between 32-36 weeks in two groups**

| Presence of complication | PROM group N=143 | Spontaneous group N=99 | P value |
|---|---|---|---|
| Siezure | 7(4.9%) | 3(3%) | 0.4 |
| Hypotonehyporeflexia | 20(14%) | 10(10%) | 0.3 |
| Jitteriness | 10(7%) | 6(6%) | 0.7 |
| IVH | 3(2.1%) | 0 | 0.1 |
| Asphyxia | 4(2.8%) | 2(2%) | 0.7 |
| Icter | 83(58%) | 62(62.6%) | 0.4 |
| Respiratory distress | 38(26.6%) | 46(46.5%) | 0.001 |
| Apnea | 5(3.5%) | 5(5.1%) | 0.5 |
| Pneumonia | 4(2.8%) | 10(10.1%) | 0.01 |
| Tachypnea | 9(6.3%) | 4(4%) | 0.4 |
| RDS | 8(5.6%) | 7(7.1%) | 0.6 |
| TTN | 3(2.1%) | 1(1%) | 0.5 |
| Sepsis | 17(11.9%) | 8(8.1%) | 0.6 |
| PPV | 6(4.2%) | 4(4%) | 0.9 |
| CPR | 1(0.7%) | 4(4%) | 0.2 |
| Death | 2(1.4%) | 4(4%) | 0.1 |

## DISCUSSION

The result of current study showed that frequency of neonatal complications do not differ significantly in preterm births either due to PROM or spontaneous causes in neonates with gestational age less than 32 weeks of gestational age. On the other hand, frequency of respiratory distress and pneumonia were significantly higher in spontaneous group in neonates with gestational age between 32-36 weeks. We also found that frequency of complications such as IVH, icter, respiratory distress, apnea, RDS, PPV, CRP and death were significantly lower in the third gestational age group. This could show that by decreasing gestational age frequency of complications become higher notwithstanding the reason of preterm birth either PROM or spontaneous.

In a previous study, Tanir et al compared neonatal complications in two groups of preterm neonates: group 1: PROM and group 2 non PROM preterm neonates. They reported no significant difference of RDS, death, sepsis, duration of NICU admission and death between two groups[8].Like our findings, in their study maternal age, neonatal birth weight, apgar score, and gestational age were not significantly differentbetween PROM and non PROM group.

Furman et al compared neonatal morbidity (respiratory distress syndrome, intraventricular hemorrhage (grade III-IV), necrotizing enterocolitis, periventricular leukomalacia, bronchopulmonary dysplasia, neonatal pneumonia and sepsis) and mortality between PROM and non PROM preterm births. They found that there was no statistically significant difference in neonatal morbidity rates between the PPROM group and the other group in any of the gestational-ages. There was no statistically significant difference in neonatal morbidity between patients with PPROM and the other group [9] . Our findings are not compatible with their findings as we found that frequency of respiratory distress and pneumonia were significantly higher in spontaneous group in cases with gestational age between 32-36 weeks. In another study which conducted by Furman et al, again PROM group compared with non PROM group. Their finding in that study was against our findings and their other study. Gestational age and birth weight were significantly lower in PROM group. Perinatal mortality rate were significantly higher in the group without PPROM than PROM group [10].

Sims et al performed a retrospective study to compare neonatal complications of neonates with gestational age between 24 and 34 with and without PROM. They noticed that RDS was significantly higher in non PROM group than PROM group[11] which is not similar to current findings. Newman et al compared neonatal morbidity and mortality rates in preterm deliveries (between 23 and 27 weeks' gestation) with and without PPROM.

They investigated that only in the group born at 23-24 weeks, and at 25-27 weeks, there were

fewer antepartum deaths in the PPROM group as compared to the non PROM group[12]. This finding is against our finding. There was no significant difference between PROM and spontaneous group regarding gestational age between 24-28 weeks.

Hanke et al compared neonatal complications in very low birth weight neonates (<1500 gram with gestational age between 22 and 32 weeks) in PROM and non PROM groups. They found that gestational age was significantly higher in non PROM group while birth weight was significantly higher in PROM group. Their results showed no significant difference between neonatal complications including sepsis, IVH, pneumonia, pneumothorax, bronchopulmonary dysplasia (BPD) and death between two groups. They reported that PROM is not independent risk factor for neonatal complications except BPD[13].

These differences between results of multiple studies could be due to enrollment of neonates with different gestational ages and study designs (either retrospective or prospective). Every year near 4 million newborns die all over the world[12]. Half of these deaths are due to complications related to preterm birth [14]. One third of preterm deliveries in high income countries is due to PROM which is associated with neonatal and maternal complications including 1-2 percent risk of fetal death[14-17]. Literature showed that respiratory distress syndrome occurs in 35% of preterm PROM neonates and Cord compression, Chorio-amnionitis, Abruptio placentae could be consequences of PROM preterm delivery[17]. Considering complications of preterm birth will help physicians to pay attention to this issue and manage properly the upcoming complications.

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