Original Article

The Prevalence of Complications of Prematurity among 1000 Newborns in Isfahan, Iran

Abstract

Background: Different morbidity conditions are globally reported from different nations for premature infants. The aim of this study was to identify the relative frequency of some of the most important complications of prematurity in a population of about 1000 of very low birth weight (VLBW; i.e., infants with weight of <1500 g) premature infants in our city and publish the results of the project at the level of the urban community of Isfahan in order to use it for further decisions. **Materials and Methods:** Demographic characteristics and information of prematurity complications of 1000-registered VLBW premature infants were collected and analyzed. **Results:** The mean gestational age and birth weight were 30.19 ± 2.26 weeks and 1223.96 ± 227.77 g, respectively. Seven hundred and ninety-eight individuals (79.69%) had respiratory distress syndrome (RDS) which also had the most prevalence frequency, whereas the number of newborns who had chronic lung disease was 80, with the lowest prevalence of 8.01%. The prevalence of infantile mortality was 3.10%. **Conclusion:** Regarding advances in medical technologies and caring system, the mortality rate for premature neonates, even VLBW infants, has decreased significantly and survival rates are grown. Alongside the low death rates, managing complications related to prematurity period should be considered more, especially caring for respiratory management should be considered remarkably since RDS stands as the most prevalent disease among them. Efforts also should be made to reduce the number of diseases that worsen the prognosis, such as intraventricular hemorrhage.

Keywords: *Frequency, infants, prematurity, very low birth weight*

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Introduction

There are many premature infants born in different countries every year, with around 15 million premature infants born every year, and this number is rising.[1] Despite advances in the field of medical sciences and related technologies, the topic of the birth of premature infants is one of the serious issues encountered by humanity.[2] Today, according to the progress made, we can help premature infants to stay alive more effectively,[3] and consequently, it would result in encountering prematurity-based problems of the premature infants for more.[4] On the other hand, by improving care functions in very premature infants, we can manage the complications due to the prematurity of these infants and their final evolutionary prognosis more effectively.[5] Premature infants are faced with several complications such as respiratory distress syndrome (RDS), chronic lung disease (CLD), necrotizing enterocolitis (NEC), patent ductus

arteriosus (PDA), and intraventricular hemorrhage (IVH). These problems can even be severe and deadly and also lead to the death of these infants.[6] In previous studies, prematurity has been identified as the main factor to make neonates susceptible to diseases such as RDS, chronic pulmonary disease, and intestinal NEC, and an increase in the prevalence of these problems would be inspected when prematurity rates grow.[7,8] With the onset of the new century, there was a gradual improvement in the morbidity and mortality states of premature infants.[9] However, conflicting reports from different communities were gradually published; progression and improvement in neonatal outcomes were reported by some of them, and others published results indicating a downtrend.[10-15] Therefore, it seems that each society should investigate and evaluate the state of premature complications' incidence and the prevalence of common problems in this category of infants – at the community level in their area – in order to

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improve the conditions of preservation of premature infants and even eliminate the solvable causes of the complications of the prematurity period. For this purpose, like other communities, we decided to identify the relative frequency of some of the most important complications of prematurity and common problems of these infants, such as PDA, CLD, NEC, RDS, and mortality in a population of about 1000 of premature infants <1500 g in our city and publish the results of the project at the level of the urban community of Isfahan in order to use it for further decisions.

Materials and Methods

This descriptive cross-sectional study was carried out between 2012 and 2017 in Al-Zahra Hospital and Shahid Beheshti Hospital in Isfahan. The study population included 1000 newborn infants born in or referred to the hospital who weighed <1500 g. The inclusion criteria for the study included premature newborns, weight <1500 g, and the availability of the patient's registered official file, as well as the possibility of contacting the family to resolve the errors. Furthermore, the presence of major and congenital anomalies and asphyxia was considered as exclusion criteria. The sampling method was convenience sampling, and samples were collected from both hospitals continuously until fulfilling the required number of samples.

In this study, after coordinating with the relevant authorities, the registered files of about 1000 premature infants and the ones weighing <1500 g admitted to Al-Zahra and Shahid Beheshti Hospitals were evaluated. After completing the conditions for entering the study, demographic variables such as gestational age (GA) at birth, birth weight, and infant's gender, as well as prematurity complications such as RDS, IVH, NEC, PDA, CLD, and neonatal sepsis were investigated first. After collecting information, all were entered into the IBM SPSS version 24.0 (SPSS, Chicago, IL, USA), and results which contained the frequency of each of the studied variables were presented throughout statistical indices such as percentage, mean, and standard deviation.

Results

A total of 1300 neonates were investigated for inclusion in the study, and after considering the inclusion and exclusion criteria, a total of 1000 newborn infants, <1500 g in weight, could stay involved in the study until the end. The mean GA was 30.19 ± 2.26 weeks. The mean birth weight in the study population was 1223.96 ± 227.77 g. The frequency distribution of genders in this study was equal to 506 female neonates (50.60%) and 494 male individuals (49.40%) [Table 1].

Out of 1000 infants, 798 individuals (79.69%) had RDS which also had the most prevalence frequency. Furthermore, the number of newborns who had CLD was

80, with the lowest prevalence of 8.01%. In the meantime, 206 individuals (20.6%) had sepsis (early and late), 141 patients (14.10%) had PDA, 126 people (12.60%) had IVH, and 86 patients (8.58%) had NEC. The prevalence of infantile mortality was 31 out of 1000 people (3.10%) [Figure 1].

Discussion

The purpose of this study was to investigate and determine the prevalence of complications and prematurity-related conditions in preterm infants who weighed <1500 g. The main finding of the study was the presence of RDS as the most common disease and chronic pulmonary disease as the least common disease among premature infants.

Of the 1000 premature infants weighing <1500 g, who were investigated in this study, approximately 80% of patients suffered RDS which was the most common illness in the premature infants. The result of this study is in agreement with the previous study by Armanian *et al*.[16,17] in 2015. In their study, from 495 premature infants, 375 individuals (nearly 75.5%) had RDS. The result of this study is also repeated in a study by Beigi *et al*.[18] Their study was conducted in Tehran in 2014 with the aim of investigating the prevalence of preterm labor and neonatal consequences. In this study, 93.67% of premature infants suffered from RDS, demonstrating a higher prevalence than the current study. The reason for this difference could be related to the low sample size and the higher statistical

Table 1: Demographic characteristics including frequency distribution of genders, gestational age at birth, and birth weight

Variable	Number
Gender, *n* (%)	
Female	506 (50.60)
Male	494 (49.40)
GA (weeks), mean±SD	30.19±2.26
Birth weight (g), mean±SD	1223.96±227.77

GA: Gestational age, SD: Standard deviation
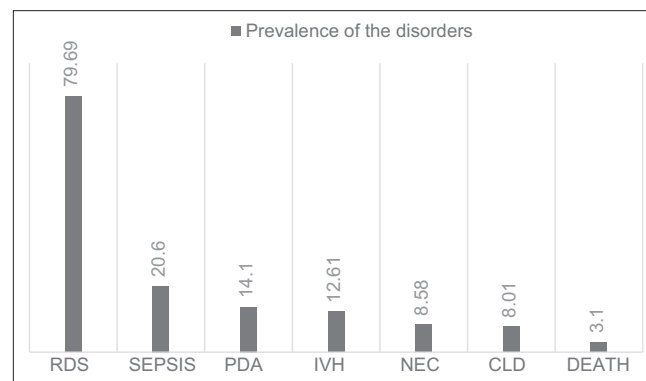
Figure 1: Prevalence of RDS, Sepsis, PDA, IVH, NEC, CLD and infantile mortality. NEC: Necrotizing enterocolitis, PDA: Patent ductus arteriosus, CLD: Chronic lung disease, RDS: Respiratory distress syndrome, IVH: Intraventricular hemorrhage

population of the study since only 50% of the neonates weighed between 1000 and 1500 g in Beigi's study.

After RDS, in the current study, neonatal sepsis had the highest prevalence among infants (20.60%). The prevalence of sepsis has been reported differently in various societies.[16,19] Stoll *et al.*[19] stated that the prevalence of late-onset sepsis in premature infants is 21%. Sobaih and Al-Mandeel[20] conducted a study in Saudi Arabia in 2013 and showed that the prevalence of early-onset sepsis in infants weighing between 500 and 1500 g is 10.9% and the late-onset sepsis is 37.1%. The cause of the higher prevalence of this disease in Saudi Arabia can be related to differences in the health status levels of the two countries, although the disease has a relatively high prevalence in both countries.

The prevalence of PDA in the current study was 14.10%. In the study by Armanian *et al.*,[16] it was reported to be 6.8%. The prevalence of PDA is inversely related to birth weight and GA, so that is about 30% in newborn babies weighing <1500 g and 40% in infants born with a weight between 750 and 1000 g. It is increased to over 50% when birth weight is <750 g. The prevalence of PDA in premature infants was reported 14.9%[21] and 31%[22] for infants weighing 1500–500 g in previous studies.

The prevalence of IVH was 12.61% in this study. The prevalence of this disorder was 6.1% in the Armanian's study,[16] although in the study of Ahn *et al.*[23] in 2015, the prevalence of IVH in Korea was very high and was reported to be 42.2%, much higher than the results of the current study. On the other hand, in a study conducted by Samaei[24] in Ali Asghar Hospital in Tehran in 1999, the incidence of IVH was reported 41% in neonates weighing <1500 g and 22% in infants weighing >1500 g. From the comparison of the above results, it can be concluded that either the difference in diagnostic criteria or even the accuracy of the diagnosis can cause this difference, or maybe, the prevalence of the disease in Iran over the past years has been declining with the improvements in the quality of health services.

The prevalence of necrotizing enterocolitis and chronic pulmonary disease was lowest among the population of the study, which was 8.58% and 8.01%, respectively. The prevalence of these two diseases was reported to be 7% and 3.4%, respectively, in the study conducted by Armanian *et al.*,[16] which is close to the result of the present study. In other studies, the prevalence of this disease has been reported to be approximately 5% in infants weighing <1500 g and 10% in infants weighing <1000 g.[25] Like other previously mentioned disorders, the prevalence of these diseases is inversely related to the age and birth weight of the infant, which is almost not seen in mature infants.[26]

Eventually, the mortality rate in this study was 3.1%, which is in line with the results of a study conducted by Afjeh *et al.* in Tehran in 2013 that reported being 7.2%. Although the prevalence of mortality in the study of Afjeh *et al.*[27] is more than the current study, this difference can be interpreted as patients were followed up for 3 years in the mentioned study, while in the current study, patients were only investigated for a short period of time, and the number is expected to increase if the follow-up period lasts longer.

Conclusion

With significant advances in the field of neonatal science, the majority of preterm infants survive and the death rate of these infants are very low, even if they weigh <1500 g (about 3% in the present study), and therefore, all efforts are made to manage the disorders related to the prematurity period, especially their respiratory management (due to the high prevalence of RDS disease). Furthermore, all efforts should be made to reduce the number of diseases that worsen future prognosis (such as IVH).

Conflicts of interest

There are no conflicts of interest.

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