

<http://dx.doi.org/10.35630/2199-885X/2022/12/1.7>

# CAUSES OF MORTALITY IN NEONATES WITH EXTREMELY LOW AND VERY LOW WEIGHT

Received 19 November 2021;  
Received in revised form 13 December 2021;  
Accepted 15 December 2021

Yulia Vychristuck<sup>✉</sup> , Svetlana Lebedeva 

N.I. Pirogov Russian National Research Medical University (RNRMU),  
Moscow, Russia

✉ [a.pisec@bk.ru](mailto:a.pisec@bk.ru)

**ABSTRACT** — The new methods that have been used to preserve pregnancy have reduced the frequency of premature birth. However, in this case, there is still a high mortality rate among neonates.

**AIM:** The aim of the study was to assess the main causes of mortality in neonates with extremely low and low body weight.

**RESULTS:** The largest proportion of deaths among newborn babies with extremely low and low body weight was recorded during the gestation period of 25–26 weeks — 76.9%, at the gestation period of 27–28 weeks, deaths were 36.8%. The leading cause of death of premature newborns in the neonatal period is massive intracranial hemorrhages (45.5%). Intrauterine infection of various etiologies occupies three times the place of causes of mortality of premature newborns and occurs in 24.2%.

**CONCLUSION:** Among newborns with extremely low and low body weight, mortality is present in every fifth case, the causes of which were: intracranial hemorrhages, intrauterine infection, respiratory distress syndrome.

**KEYWORDS** — premature birth, extremely premature baby, perinatal mortality, intracranial hemorrhage, intrauterine infection, singleton births.

## INTRODUCTION

Premature birth is an acute medical problem, as it causes high perinatal mortality [1, 2]. Preterm birth accounts for approximately 11% of births worldwide [3]. About 85% of infants born before 37 weeks are moderate or late premature (32–36 weeks), 10% are very premature (28–31 weeks) and 5% are considered as extremely premature (<28 weeks) [4].

Despite the high level of development of obstetric and gynecological care worldwide, the frequency of premature births over the past 10 years hasn't decline. And, among premature newborns, there is still a mortality rate for about 60–70% [5]. Moreover, in premature infants with extremely low and low body weight, the incidence much higher. Therefore, the analysis of the causes of mortality in newborn babies

with extremely low and low body weight is an urgent task of modern medicine.

## Aim

This paper aims to assess the leading causes of mortality in neonates with extremely low and low body weight.

## METHODS

The study included 152 women with a singleton pregnancy and with premature birth at 25–32 weeks gestation. The criteria for exclusion from the study are extremely premature newborns with a gestation period of 22–24 weeks.

In each case of observation, we assessed the gestation period at birth, the weight of newborns, and the cause of mortality.

Gestation periods at birth (n=152) were: in 13 (8.5%) — 25–26 weeks, in 19 (12.5%) — 27–28 weeks, in 43 (28.3%) — 29–30 weeks and in 77 (50.7%) — 31–32 weeks. The birth weight of newborns was as follows: with extremely low birth weight (up to 1000 g) — 28 (18.4%) children, with very low birth weight (1000–1499 g) — 57 (37.5%), more than 1500 g — 67 (44.1%) children.

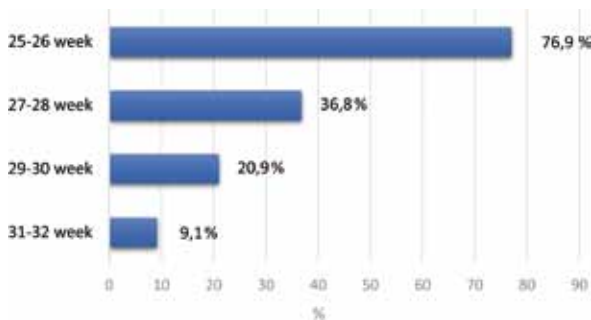
All children (n=152) in the early neonatal period were in the neonatal intensive care unit, where they underwent supportive and forced ventilation of the lungs, as well as therapy aimed at treating the underlying disease, cardiovascular and respiratory system, metabolism.

We observed early neonatal death in the pediatric intensive care unit in 13 (8.5%) premature newborns born with extremely low and low body weight. The remaining children (n=139) were transferred to the second stage of nursing in clinical hospitals. At the second stage of nursing, 21 (13.8%) children died. In total, mortality among newborns with extremely low and low body weight was 21.9% (n=34). The maximum mortality (61.7%) in low birthweight newborns was noted during the second week of life.

The statistical analysis was performed using spreadsheets “EXCEL” and “STATISTICA 8.0”. The significance of differences between quantitative indicators was assessed using the Mann–Whitney test. Differences were considered significant at  $p < 0.05$ .

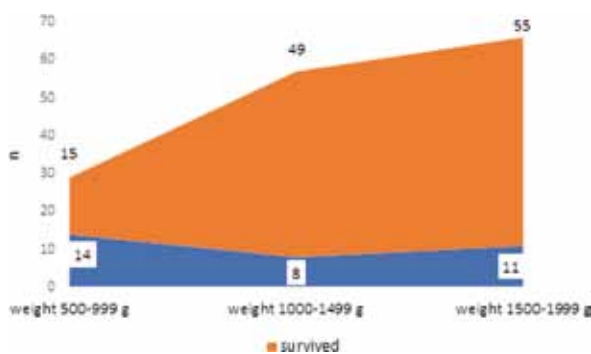
## RESULTS

The mortality rate of premature newborns with extremely low and low body weight at various gestation periods is shown in Fig. 1. A large proportion of deaths among this category of children was at 25–26 weeks of gestation — 76.9%, every third child who died was at 27–28 weeks of gestation.



*Fig. 1. Mortality of premature newborns with extremely low and low body weight at different gestation periods*

vere Neonates' respiratory distress syndrome (NRDS), which subsequently led to a fatal outcome. We believe that an insignificant percentage of NRDS in the mor-



*Fig. 2. The dependence of deaths on body weight at birth in the gestation period of 25–32 weeks*

The dependence of deaths on the body weight of newborns is shown in Fig. 2. The average weight of dead children during single pregnancy was  $1247 \pm 17$  g.

We have recorded the inverse dependence of deaths on the weight of a premature newborn. The leading cause of death of children in the neonatal period is massive intracranial hemorrhages. A total of 45.5% of premature newborns died from this pathology. In the second place in the structure of the causes of mortality of premature newborns is intrauterine infection of various etiologies — 24.2%. 9.1% developed se-

tal structure of premature newborns is associated with the presence of special respiratory equipment, the introduction of surfactant, wait-and-see tactics for preterm labor, the appointment of glucocorticoids. Severe hemolytic disease of the newborn, multiple fetal malformations, asphyxia, necrotic enterocolitis were the cause of death in low-weight newborns with approximately the same frequency: 6%, 6.1%, 6.1%, 3% accordingly.

## DISCUSSION

Newborns with low and extremely low body weight account for the majority of perinatal losses. Childbirth with a premature fetus is 10 times more likely to end in the death of a newborn compared to timely delivery [5]. The lethality of newborns is influenced by many factors: the quality of prenatal care, the method of delivery, fetal weight, intrauterine infections, gestational age, birth defects, etc.

According to Barfield WD, the death of infants born <32 weeks of pregnancy was 52% due to disorders of the nervous system [6].

In a recent retrospective study, it was shown that 75% of deaths occurred in all premature infants (n=72) with a gestational age of 23–25–31 weeks [1]. The most common causes of mortality in this category of children were: NRDS (95.4%), patent ductus arteriosus (81.3%), sepsis (55.7%), intraventricular hemorrhage (34.4%), retinopathy of prematurity (21.9%) and necrotic enterocolitis (10.9%) [1].

Fetal weight at birth is a predictor of perinatal mortality. Thus, the probability of perinatal death among children with low birth weight was approximately 9.6 times higher than in children with normal birth weight (OR = 9.6; 95% CI, 6.12–15.02) [7].

Due to this study the leading cause of death in neonates with extremely low and low body weight have been considered massive intracranial hemorrhages caused by the peculiarities of the development of brain vessels characteristic in premature newborns. The frequency of massive intracranial hemorrhages is inversely proportional to the gestation period and the birth weight of the fetus, while the frequency of other causes of death in neonates (intrauterine infection, respiratory distress syndrome) does not depend on these indicators.

## CONCLUSION

Mortality among newborns with extremely low and low body weight is present in every fifth case. To date, the leading causes of mortality in premature babies born before 32 weeks of gestation are intracranial hemorrhages, intrauterine infection, NRDS. Consequently, neonates who have suffered from intrauterine

hypoxia, severe asphyxia, with massive intracranial hemorrhages can be attributed to a high-risk group, due to the increased possibility of death.

Thus, the analysis of mortality in newborns with extremely low and low body weight will effectively direct the efforts of intensive therapy to improve the results of nursing newborn babies of this category.

## REFERENCES

1. **DA CUNHA DURAES MI, FLOR-DE-LIMA F, ROCHA G, SOARES H, GUIMARAES H.** Morbidity and mortality of preterm infants less than 26 weeks of gestational age. *Minerva pediatrica*. 2019; 71(1):12–20. DOI10.23736/S0026-4946.16.04609-0
2. **MAKUKHINA T. B., KRIVONOSOVA N. V., PENZHAYAN G. A., SIKALCHUK O. I., PENZHAYAN M. A., MAKUKHINA V. V.** Intrauterine infection verification by gray-scale echography for patients with preterm labor. *Medical News of North Caucasus*. 2019;14(4):620–624. DOI – <https://doi.org/10.14300/mnnc.2019.14154> (In Russ.)
3. **VOGEL JP, CHAWANPAIBOON S, MOLLER AB, WATANANIRUN K, BONET M, LUMBIGANON P.** The global epidemiology of preterm birth. *Best Pract Res ClinObstetGynaecol*. 2018;52:3–12. doi: 10.1016/j.bpobgyn.2018.04.003.
4. **TORCHIN H, ANCEL PY.** Epidemiology and risk factors of preterm birth. *J GynecolObstetBiolReprod (Paris)*. 2016;45(10):1213–1230. doi: 10.1016/j.jgyn.2016.09.013.
5. **VARTANYAN E.A., GRIDNEV O.V., BELOSTOTSKIY A.V., PESENNIKOVA E.V.** Problems of the organization of pregravid preparation and management of pregnancy in women with recurrent miscarriage in the structure of primary health care. *Research and Practical Medicine Journal*. 2016;3(4):27–32. (In Russ.) <https://doi.org/10.17709/2409-2231-2016-3-4-3>
6. **BARFIELD WD.** Public Health Implications of Very Preterm Birth. *ClinPerinatol*. 2018;45(3):565–577. doi: 10.1016/j.clp.2018.05.007.
7. **BERHAN Y, BERHAN A.** A meta-analysis of selected maternal and fetal factors for perinatal mortality. *Ethiop J Health Sci*. 2014;24 :55–68. doi: 10.4314/ejhs.v24i0.6s.