

## The Outcomes of Very Early Preterm Births in the Republic of Sakha (Yakutia)

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### Abstract

Protection of maternal and child health is a special health care industry. It largely determines the future of the nation. Therefore, it is an important matter of the state. This article presents an analysis of cases of very early preterm births (VEPB) and their outcomes in 2012-2014 in the Republic of Sakha (Yakutia). Retrospective analysis of the cases of VEPB and of the status of health of the babies born before 28 weeks of gestation was conducted during the research. The group at risk of VEPB consisted of women with burdened obstetric and gynecological history. The main causes of VEPB were premature amniorrhexis in pregnant women with carriage of infections and life-threatening severe pre-eclampsia. In the structure of morbidity of very preterm babies the first place among the main diseases belongs to perinatal lesion of central nervous system, the second place belongs to respiratory distress syndrome, and the third place to infectious and inflammatory diseases. In the structure of death, 57.1% of fatal cases are babies with a term of gestation less than 28 weeks. The causes of mortality were respiratory distress syndrome, congenital pneumonia, and intraventricular hemorrhage. (*Int J Biomed.* 2016;6(1):56-59.)

**Keywords:** *preterm birth; very early preterm birth; very low birth weight; extremely low birth weight.*

### Introduction

In the current unfavorable demographic situation and with the health of women of childbearing age in Russia deteriorating, the problems of preservation of the life and health of each baby and reduction of infant mortality are especially relevant [1]. Preterm births (PB) are the leading cause of perinatal morbidity and mortality in the world and one of the most important problems of modern health care [2,3]. According to the WHO classification, very early preterm births (VEPBs) are deliveries which take place between 22 and 27 weeks of pregnancy; in this case the newborns have extremely low birth weight (ELBW) from 500 to 999.0 g. Deliveries in the term of 28-33 weeks are early preterm births (EPB), in

34-37 weeks are PB. Every year 20 million babies are born prematurely and 0.4%-0.5% of them have ELBW. In Russia, PBs range from 4% to 16%, and 0.3% of such newborns have ELBW [4]. With adoption of the order of the Russian Health Ministry №1687n [5], the problem of VEPB in the Republic of Sakha (Yakutia) (RS (Y)) became particularly acute.

Thus, in 2012, the perinatal mortality rate increased from 8.4 to 13.0 per 1000 born alive and dead in the region. In 2013 and 2014, this rate was respectively 10.8 and 10.0 per 1000 born alive and dead. There were 496 PBs in 2012; the proportion of VEPBs was 22.7%. In 2013, the proportion of VEPBs was 17.6%, and in 2014 it was 6.12%. Premature babies of Yakutia are being nursed on 40 beds of the Department of Pathology of Newborn and Premature Babies (DPNaPB) of the Perinatal Center (PC) at the State Budget Institution of RS(Y) "Republican Hospital №1 - National Center of Medicine (NCM)." Children from the entire region are transported there. Thus, the problem of VEPB and the

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outcome is actually not only for the health authorities but also for the social services and requires deep scanning for development of modern preventive measures.

**The aim** of this study was an assessment of the status of health of the women and their babies born before 28 weeks of gestation, and the identification of very early miscarriage risk factors. The research is based on the records of the marked PC taken in the period from 2012 to 2014.

## Materials and Methods

We conducted a retrospective analysis of occurrence of very early miscarriage and study of health of extremely preterm infants born before 28 weeks of gestation who were hospitalized in the PC in 2012-2014.

Statistical analysis was performed using the statistical software «Statistica» (v6.0, StatSoft, USA). Baseline characteristics were summarized as frequencies and percentages for categorical variables. Group comparisons with respect to categorical variables are performed using chi-square tests or, alternatively, Yates'  $\chi^2$  when expected cell counts were less than 5. A probability value of  $P < 0.05$  was considered statistically significant.

The study was conducted in accordance with ethical principles of the Declaration of Helsinki and approved by the North-Eastern Federal University Ethics Committee.

## Results and Discussion

In 2014, 16,948 childbirths were accepted in the medical institutions of RS (Y) and 1,172(6.9%) babies were born prematurely (Table 1).

**Table 1.**

*The number of births in RS (Y) in 2013-2014*

Variable	2012 (n/%)	2013 (n/%)	2014 (n/%)
Number of preterm births	1160/6.85	1078/6.5	1172/6.92
Number of other births	15762/93.14	15500/93.5	15776/93.1
Total number of births	16922/100	16578/100	16948/100

In the period from 2012 to 2014, 82 women had VEPB in the PC. Overall, 54.66% of the women were from the rural area and 46.34% were from the city. VEPB was common in the age group of 19-28 years (42.46%). The early turnout at the dispensary registration (before 12 weeks of the pregnancy period) was 60.97%. Overall, 68.3% of the women had chronic diseases of the female genital organs, 37.75% had medical abortions in the anamnesis, 28.1% – miscarriages, 4.87% – experienced fetal death, and 15.85% – PB. Extragenital diseases were found in all of the cases in the studied group: 75.6% of the women had urinary tract diseases, 54.87% – cardiovascular diseases, 36.58% – gastrointestinal diseases, 19.51% – anemia, 8.53% – respiratory system diseases, and 2.43% – endocrinopathies. Sexually transmitted infections were found in almost all the studied cases.

On average, 55.06% of the women entering an obstetric

hospital had a severe condition; 87.33% had such a condition due to the severe pre-eclampsia. The causes of VEPB were premature amniorrhexis (42.6%), premature abruption of a normally located placenta (14.23%), threat of fetal asphyxia (9.13%), and isthmic-cervical incompetence (6.06%). On average, 18.74% of the women had independent childbirth, 81.26% – surgical delivery (cesarean section), and 13.41% – emergency childbirth. The main reasons for early deliveries (in 22-27 weeks) were severe pre-eclampsia (38.63%), premature abruption of a normally located placenta (9.1%), and premature amniorrhexis (16.23%).

The majority of mothers (42.2%) had a secondary education, 55.06% of the women were married, and 31 women (37.8%) smoked tobacco.

Due to the effective implementation of routing of the women in labor who have severe extragenital pathology and routing of women with a threat of PB in the RS (Y), there was an increase in preterm infants with ELBW born at the PC (Table 2).

**Table 2.**

*The number of premature infants hospitalized to the DPNaPB (PC-NCM) from maternity wards of RS (Y)*

Variable	2012 (n/%)	2013 (n/%)	2014 (n/%)
Maternity ward of PC NCM	89/41.8	141/62.7	145/84.3
Maternity ward of Yakutsk	86/40.4	59/26.2	4/2.3
Central hospital of Ulus (CHU)	31/14.6	22/9.8	23/13.3
Other departments	6/2.8	3/1.3	-
Self-appeal	1/0.47	-	-
Total	213/100	225/100	172/100

The analysis of the health of newborns who had been admitted revealed that every year the number of babies in a very severe condition increased. In 2012, it was 39(18.3%) newborns, in 2013 – 68(30.2%) newborns, in 2014 – 67(38.9%) newborns. In 2012, a severe condition was diagnosed for 130(61.03%) newborns, in 2013 for 136 (60.4 %), in 2014 for 102(59.3%) newborns (Table 3).

**Table 3.**

*The health of newborns at admission to DPNaPB of PC-NCM*

Variable	2012 (n/%)	2013 (n/%)	2014 (n/%)	<i>P</i>
Very severe condition	39/18.3	68/30.2	67/38.9	0.0000
Severe condition	130/61.0	136/60.4	102/59.3	0.9413
Moderate condition	43/20.2	19/8.4	3/1.7	0.0000
Satisfactory condition	1/0.47	2/0.89	-	0.7870
Total	213/100	225/100	172/100	

Dynamics starting from 2012 revealed an increase in the number of extremely serious conditions of newborns. This tendency is associated with an increase of the number of babies with gestation less than 28 weeks: in 2012 – 37 (17.3%), in 2013 – 43 (19.1%) and in 2014 – 38 (22.1%) (Table 4). The huge growth of the number of hospitalized babies with ELBW

and very low birth weight (VLBW) is revealed in annual dynamics. Thus, in 2012 the share of babies with ELBW was 31 (15% of all the cases of hospitalization), in 2013 – 30 (13.3 %), in 2014 – 41 (23.8%) (Table 5).

**Table 4.**

**Distribution of hospitalized babies by gestation term**

Weeks of gestation	2010 (n%)	2011 (n%)	2012 (n%)	2013 (n%)	2014 (n%)	P
<28	20/8.2	16/7.0	37/17.4	43/19.1	38/22.1	0.0000
28-30	41/16.4	39/17.2	55/25.8	59/26.2	69/40.1	0.0000
31-33	107/43.7	102/44.9	85/39.9	93/41.3	55/32.0	0.0887
34-36	67/27.3	60/26.4	31/14.6	24/11	10/5.8	0.0000
> 36	10/4.1	10/4.4	5/2.3	6/2.6	-	0.0734
Total	245/100	227/100	213/100	225/100	172/100	

**Table 5.**

**Distribution of hospitalized babies by weight at birth**

Weight (g)	2010 (n%)	2011 (n%)	2012 (n%)	2013 (n%)	2014 (n%)	P
>1000	10/4.1	22/9.7	31/14.6	30/13.3	41/23.8	0.0000
1000-1250	15/6.1	27/11.9	35/16.4	34/15.1	23/13.4	0.0000
1250-1500	33/13.5	36/15.8	37/17.4	45/20.0	51/29.6	0.0006
1500-2000	106/43.3	90/39.6	71/34.7	84/37.3	52/30.2	0.0524
2000-2500	56/22.8	46/20.3	27/12.7	18/8.0	5/2.9	0.0000
>2500	25/10.2	6/2.6	12/5.6	14/6.2	-	0.0000
Total	245/100	227/100	213/100	225/100	172/100	

In 2012, the majority of newborns (55.39%) in the Department of Pathology of Newborn and Premature Babies received artificial feeding, 28.63% received breastfeeding and 34 (15.96%) received mixed feeding. In 2013, 108 (50%) of newborns received artificial feeding, 64 (30%) received breastfeeding and 44 (20.3%) babies received mixed feeding. In 2014, 105 (61%) babies received artificial feeding, 42 (24.4%) received mixed feeding and only 25 (14.4%) babies received breast milk. Such a tendency is due to severe and very severe conditions of the health of very preterm babies and hypo- and agalactia of mothers (Table 6).

**Table 6.**

**Distribution of hospitalized babies according to feeding type**

Feeding type	2012 (n%)	2013 (n%)	2014 (n%)	P
Breastfeeding	61/28.6	64/28.4	25/14.5	0.0014
Mixed feeding	34/16.0	44/19.6	42/24.4	0.1160
Artificial feeding	118/55.4	117/52.0	105/61.0	0.1970
Total	213/100	225/100	172/100	

In 2014, the most common disease in the structure of morbidity of hospitalized very preterm babies was perinatal lesion of central nervous system (95.9% of cases, 5.8% of them were intraventricular hemorrhage of the third

degree); respiratory distress syndrome was in 80.8% of the cases of morbidity, infectious and inflammatory diseases in 14.5% of the cases. The following complications were observed: necrotizing enterocolitis (11.0%), conjugation hyperbilirubinemia (16.8%), and anemia of prematurity (39.5%).

According to the data obtained (Table 7), 57.1% of fatal outcomes belong to the babies with a term of gestation less than 28 weeks. On average, 75% of babies were born with ELBW.

**Table 7.**

**The structure of hospital mortality among the premature infants**

Variable	Fatal outcomes	2013 n=8 (n%)	2014 n=14 (n%)	P
Age	0-6 days	-	-	0.9643
	6-28 days	6/75	9/64.28	
	>28 days	2/25	5/35.71	
Gender	Boys	6/75	6/42.86	0.3118
	Girls	2/25	8/57.14	
Ethnicity	Ethnic Russians	--	2/14.28	0.9650
	Yakuts	7/87.5	11/78.57	
	Minority ethnicities	1/12.5	-	
	Others	-	1/7.14	
Residence	Rural	5/62.5	7/50.0	0.9025
	Urban	3/37.5	7/50.0	
Route of admission	Maternity ward of PC- NCM	7/87.5	13/92.85	0.9175
	City maternity ward	1/12.5	-	
	CHU	-	1/7.14	
Term of gestation	< 28 weeks	5/62.5	8/57.14	0.8376
	28-30 weeks	3/37.5	6/42.85	
	31-33 weeks	-	-	
	34-37 weeks	-	-	
Weight at birth (g)	<1000	4/50.0	12/85.71	0.1678
	1000-1250	1/12.5	2/14.28	
	1250-1500	3/37.5	-	
	1500-2500	-	-	

According to autopsies, the causes of mortality were the following: respiratory distress syndrome (37.5%), congenital pneumonia (12.5%), intraventricular hemorrhage of the third degree/noncommunicating hydrocephaly/coma (12.5%), respiratory syncytial virus infection (12.5%), a congenital heart defect (complete transposition of the great vessels) (12.5%), and neonatal necrotizing enterocolitis (12.5%).

## Conclusion

The group at risk of VEPB consisted of women with burdened obstetric and gynecological history. The main causes of VEPB were premature amniorrhexis in pregnant women with carriage of infections and life-threatening severe pre-

eclampsia. In the structure of morbidity of very preterm babies the first place among the main diseases belongs to perinatal lesion of central nervous system, the second place belongs to respiratory distress syndrome, and the third place to infectious and inflammatory diseases. In the structure of death, 57.1 % of fatal cases are babies with a term of gestation less than 28 weeks.

Thus, implementation of routing of pregnant women with severe extragenital pathology who have a risk of PB has an opportunity to significantly reduce the medical and social effects of VEPB.

## Competing interests

The authors declare that they have no competing interests.

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