

Risk of arterial hypertension in Children and Adolescents who had Prematurity in Anamnesis

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Abstract

The aim was to analyze the available literature data to identify the relationship between a preterm birth in anamnesis and hypertension in children and adolescents. We looked for 15 studies carried out between 1998 and 2011, in which the blood pressure was measured in preterm infants. The comparison is based on a number of issues - the method of measurement, age ranges, the length and weight at birth. Based on the age of the patients, the study can be divided into groups: evaluation of school-age children (6-12 years old), adolescents (13-18 years old), and adults (18-30 years old). The prevalence of hypertension in all studies ranged from 6 to 25%. It was found that the main problem is the premature systolic hypertension. Using two methods of blood pressure measurement (ABPM and casual) reduces the percentage range of hypertension in the study. All of the above studies have focused on different aspects of the risk of hypertension in former preterm infants. The results in the literature that we have studied are largely contradictory, so it confirms that it is necessary to make national and multi-center studies on large populations. Conduct follow-up in the same groups at intervals of every few years of life can help to understand better the problem of hypertension in premature infants.

Keywords: Arterial hypertension, Infants, Preterm

Introduction:

Preterm birth is a major problem in perinatal care. Most perinatal deaths occur in preterm infants, in addition, premature birth is an important risk factor for neurological disorders and disabilities. Over the last 20-30 years there has been significant progress in perinatal care to premature babies. This has led to a shift in the boundaries that require registration as a human fetus from 20 to 24 weeks.¹ In Russia preterm birth ranges from 4 to 16%, with low birth weight - 0.2-0.3%, with very low - 0.13-0.48%, weighing less than 1000 grams - 0.3%. The seemingly small percentage of premature infants with birth weight less than 1500g forms a major part of the structure of perinatal mortality - 50-70%. Early complications are respiratory distress syndrome (RDS),

intraventricular hemorrhage, patent ductus arteriosus (PDA), necrotizing enterocolitis and sepsis. Most complications occur during the first few weeks. But prematurity also affects the long-term effects. Late complications include mainly bronchopulmonary dysplasia (BPD) and retinopathy of prematurity.²⁻⁴ Recently, there have been several multi-center studies analyzing the impact of prematurity and low weight on the health problems of children and adolescents. Many of these studies, the problems associated with hypertension. Could this mean that an increase in survival rates will rise and long-term complications? If this is the case, given that hypertension is the most common disease of the cardiovascular system - the leading cause of morbidity and mortality in most

countries - it can be a serious health problem in the coming years.

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Based on the age of the patients, the study can be divided into groups: evaluation of school-age children (6-12 years old)^{6-8,12,19}, adolescents (13-18 years old)^{11,13,18}, and adults (18-30).^{5,9,10,14-17} The prevalence of hypertension in all studies ranged from 6 to 25%. In patients 6-12 years - 10-25%.^{6-8,12} in the teenage group, 16%¹¹, and in the adult group, 10.6%.^{5,9,10} According to these data, it seems that the prevalence of hypertension decreases with age. However, it should be noted that the studies include the past 30 years, during which advances in neonatal intensive care have increased the survival of preterm infants former exponentially. Until the 1970s, only 10% of extremely low weight (ELBW) infants or preterm birth less than 28 weeks' gestation had a chance to survive.²⁰ However, in the late 1990s, the survival rate has increased by almost a factor of 3-4.²¹ Therefore, it is possible that in the adult group the proportion of children with ELBW or extremely preterm infants was lower in comparison with a group of children and adolescents.

Taking into account the method of measuring blood pressure in 8 studies, the authors used only casual blood pressure measurement.^{5-7,11,13,16,17,19} In this group, the prevalence of hypertension ranged from 10 to 24%. Ambulatory blood pressure monitoring (ABPM) was used in two studies.^{8,12} Hypertension is diagnosed in these cases, 10.3%,¹² and 25% of children.⁸ Both methods were used in 5 studies, hypertension was recorded from 6 to

9.3%.^{9,10,14,15,18} When used only one method of measuring blood pressure, hypertension percent range was higher than when they used both methods. Using BPM reduces the risk of bias due to random variation. ABPM is the best diagnostic method, but in some situations it may not be properly performed in children. Therefore, two methods are complementary to each other in the evaluation of hypertension.

Another important aspect in the study was the effect of intrauterine growth restriction (IUGR) on the presence of hypertension in later life. In studies Keijzer-Veen MG et al. significant difference in blood pressure between the available IUGR and without IUGR was observed (5.9). In a Swedish study noted that a full-term IUGR had significantly lower blood pressure values than the corresponding term of preterm.¹⁴ However, Shankaran S. et al. have shown that the incidence of hypertension with IUGR term was higher than the control group.⁷ In contrast, a study in Israel showed that children with IUGR had lower blood pressure than their peers who were born without IUGR.¹⁹ Because of the differences between these results, it is difficult to clearly assess the impact of preterm IUGR on the value of blood pressure in the adulthood.

Another approach to the separation of research is based on the classification of birth weight. Very low body weight (VLBW) - 5 studies^{10,13,15-17} and ELBW in two studies.^{6,12} All results were assessed compared to full-term children. Children with VLBW were estimated at 15-17 years. In all studies^{10,13,15-17} higher systolic and/or diastolic blood pressure was found in infants with VLBW. Differences in systolic blood pressure (SBP) ranged from 3.0 to 8.6 mm Hg, significant differences were observed in diastolic blood pressure (DBP) (3.5-5.3 mm Hg). As for the studies of children with ELBW, later they were examined at school age (6-8 and 6-12 years). In both studies, the prevalence of hypertension was approximately 10%. There were no statistically significant differences between preterm and full-term with ELBW and for SBP, DBP, and mean arterial pressure. Only one study found a significant difference between the study groups for systolic and diastolic blood pressure load.^{6,12} Comparing studies of children with VLBW and ELBW, the main difference

- the number of patients. This may explain the lack of significance of the results obtained in groups with ELBW. In 10 of the 15 analyzed studies was significantly higher SBP preterm compared with the control.^{8-16,18} Five Studies have shown elevated levels of DBP.^{10,12,15,17,18} Mean arterial pressure was significantly elevated in children in three studies.^{14,15,18} Moreover, all the studies which used ABPM, SBP was significantly increased, but only 2 of them showed a significantly higher DBP.^{12,18} These data show that the main problem is premature systolic hypertension.

In the diagnosis of hypertension is also important to distinguish between the values of blood pressure during the day and night, which are included in the ABPM. In 4 of the studies reviewed, major differences in blood pressure during the daytime and night-time were observed between the control groups for SBP and premature. In one study daytime SBP was significantly higher.⁹ In another study, only nighttime SBP was increased.⁸ Daytime and nighttime SBP were increased in two studies.^{15,18} For DBP had no such correlation in any of the aforementioned studies.

Conclusion:

Present review conclude that

1. The prevalence of hypertension among former preterm infants in all studies ranged from 6 to 25%.
2. The main problem is the premature systolic hypertension.
3. Using two methods of blood pressure measurement (ABPM and casual) reduces the percentage range of hypertension in the study.
4. All of the above studies have focused on different aspects of the risk of hypertension in former preterm infants.

The results in the literature that we have studied are largely contradictory, so it confirm that it is necessary to make national and multi-center studies on large populations. Conduct follow-up in the same groups at intervals of every few years of life can help to understand better the problem of hypertension in premature infants.

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