

Prematurity as a Factor in Impaired Child Development

Khudoerova Dilnoza Rizoevna

A head of the Department of Internal Medicine and Endocrinology is the Bukhara State Medical Institute named after Abu Ali ibn Sina

Abstract: "...Currently, prematurity is the leading cause of disability among children, which can be illustrated by the fact that almost 2/3 of the deaf-blind children in the orphanage are premature children. The most severe consequences of prematurity are cerebral palsy of the spastic diplegia type; blindness or low vision due to retinal detachment; hearing loss associated with damage to the auditory nerve; decreased overall level of cognitive and speech development; difficulties in coordinating and planning sequential actions; psycho-emotional disorders such as autism

Characteristic features of appearance (lag in height and weight, microcephaly with deformation of the head shape) and behavior (stereotypical movements, lack of spontaneous purposeful activity) make such children recognizable, which allows us to speak about a naturally interrelated set of disorders caused by a single cause - prematurity. The article discusses the influence of premature..."

Keywords: intrauterine brain development, prematurity, multiple developmental disorders in children.

"...Modern practice of teaching and raising children with visual and hearing impairments deals with a changed composition of students. If 30 years ago the main cause of sensory impairments in children were various infections suffered in utero or at an early age, now the vast majority of children with special educational needs - children born prematurely [1]. A clear indication of this is the fact that more than 2/3 of the pupils of the Sergiev Posad orphanage for the deaf-blind are premature (Fig. 1). The characteristics of these "new deaf-blind" children dictate the need to search for new methods of teaching and upbringing. The purpose of this review is to characterize the impact of premature birth on brain development and its long-term consequences for the psychomotor and cognitive abilities of the child.

"...according to the definition of the World Health Organization [20], a child born between the 22nd and 37th full week (less than 259 days) of intrauterine development is considered premature, which corresponds to a weight at 73 Fig. 1. Proportion of premature infants among the pupils of the Sergiev Posad orphanage for the deaf-blind born in 2003-2007 (46 children). Births range from 500 to 2,500. About 15,000,000 such babies are born annually (cited from [12]). Over the past 20 years, the frequency of premature births has increased significantly [2], especially in developed countries, and, according to various sources, range from 6 to 14.5% [14] of the total number of births. Among the factors that adversely affect the course of pregnancy and increase the risk of premature birth are inactivity, poor diet, high levels of lead in the blood, smoking more than 10 cigarettes per day, daily use of transport, psycho-emotional stress, maternal age under 18 or over 35 years, small body mass index..." "...in the mother, etc. [10]

On the other hand, due to the successes of neonatology, in particular the introduction of high-tech methods of caring for low birth weight infants, the survival rate of very premature infants has increased from 50% to 85% [4]. Prematurity is a mysterious phenomenon: its exact causes have not yet been clarified: in half of the cases, premature birth occurs for no apparent reason [9]. Hereditary predisposition plays an important role: in women born prematurely or with premature sisters, the risk of preterm birth is 4-6 times higher than in the general population [18].

In 30% of cases, premature birth is associated with a reaction to intrauterine infection, in 25% with premature rupture of membranes, and in 30% with multiple pregnancies [17]. A striking feature of

premature babies is the extreme variability of mental development options [17]. Among surviving children weighing less than a kilogram at birth, 12-27% have severe neurological disorders..." "..., while the remaining 70% can develop quite successfully [9; 11]

The most common types of disability among premature babies are cerebral palsy (6.1% of children weighing less than a kilogram at birth), blindness (3.8%) and other visual impairments (amblyopia, astigmatism, strabismus - 13.4%;) , hearing impairment (2.5%) [9]. Mental disorders are even more common: attention deficit hyperactivity disorder (30%), anxiety disorders and avoidance of social interaction (14%) [35], and by adolescence, preterm girls are 6 times more likely to be diagnosed with depression [6]. Up to 30% of children born before 32 weeks of intrauterine development develop mental retardation by the age of 8, including severe retardation in 6.5% of cases..About 50% of premature children need additional classes to master the school curriculum, have difficulties in sound pronunciation, reading and writing, and attention deficit [8]. It has been shown that 39% of premature children born before 32 weeks of intrauterine development demonstrate abnormal reactions to sensory stimuli, especially auditory, tactile and vestibular signals - violations of the so-called "sensory integration" [36], as well as reduced temperature sensitivity (cited from [36]).

Premature children represent a risk group for the development of autism [8]. Approximately 5-8% of premature children do not pass screening tests for autism spectrum disorders (Social Communication Screening questionnaire (SCQ), Autism Quotient (AQ)), which is 5 times higher than among full-term children (cited from 2% of babies born at less than 32 weeks of gestation develop epilepsy.... It is traditionally believed that the plasticity of the brain (that is, the possibility of compensatory restructuring depending on individual experience, including under the influence of a damaging factor) decreases with the age of the child. From this it would be logical to conclude that since in premature infants the effect damaging factors accompanying premature birth occur in a very early period of development, then they should have maximum compensatory capabilities of the brain. However, in reality this is not the case, because the decrease in brain plasticity with age is not linear, but rather has an asymmetrical bell-shaped shape with peak at the age of about 3 years cited from [5]

Another suspected factor in the adverse developmental outcome of a premature infant may be ventricular enlargement (dilatation) and destruction of white matter [11]. Thus, postmortem studies have shown that in premature children with multiple developmental disorders, in contrast to neurologically healthy premature children, the ratio of the volume of the cerebral ventricles to the total volume of the brain is exceeded [27]. However, there are a number of cases where massive, but localized only in one area of the brain, destruction of white matter in children born before 32 weeks of intrauterine development did not lead to any neurological or mental abnormalities, at least by the age of 8 years.

Emotional development – teenagers and beyond.

A study of adolescents in mainstream schools who were born before 29 weeks of pregnancy found that, compared with their classmates, they had higher levels of parent- and teacher-reported emotional, attention and peer problems as early as adolescence. Despite these problems, they do not show signs of more serious conduct disorders, delinquency, drug use or depression [19]. A study of individuals aged 18 and 19 years born before 33 weeks of gestation found that their personalities differed from controls, with increased neuroticism and decreased scores on extraversion. This was more pronounced in women than in men [13].

A study of preterm children aged 19–22 years found that they were, on average, shorter than their peers, were more likely to use prescription medications, and were less likely to attend college [19].

Observation of development.

The National Institute for Health and Care Excellence (NICE) has published guidelines for monitoring premature babies. In addition to identifying the types of problems and the likelihood of them occurring, the guide also provides rationales for subsequent actions.

Interventions to reduce the morbidity and mortality of preterm birth may be primary (targeted to all women), secondary (aimed at eliminating or reducing existing risk) or tertiary (aimed at improving outcomes in preterm infants) [20]. Most efforts to date have been tertiary interventions. The success of improving the survival rate of very preterm infants has raised some serious ethical issues. Now more, smaller and earlier children can be saved. The difficult question is whether this is always in the best interests of the child, his parents and society as a whole. Decisions regarding these sensitive issues are influenced by a number of factors, not least the views of parents [4]. These children very often have both physical and behavioral problems. This may include blindness, deafness, mental retardation or ADHD. The quality of life of a surviving child is difficult to assess.

- The term “bed blockers” is usually used in a pejorative manner towards older people; however, tiny, very early babies spend very long periods of time in SCBU cribs, which are in short supply. They may deprive other children of opportunities from which they could greatly benefit. The cost of caring for SCBU is also very high and finances are not a limitless resource
- However, premature babies can become extremely productive, as evidenced by the list of famous preemies on the UK Preemies website. It includes Albert Einstein, Isaac Newton and Charles Darwin.
- Who would ever decide that the quality of life saved is not worth the effort and expense? When would it be better to let tiny children die? This is a very complex issue that will give rise to many passions and prejudices, but it is an extremely important issue that requires sober assessment.
- The high survival rates achieved by some units for very preterm infants have led to debate about the upper limit for termination of pregnancy.

When a baby is in the Central Hospital, it is a very emotional and traumatic time for any parent. They should be encouraged to visit and stay with the child as much as possible. Breastfeeding can be quite difficult, but it should be encouraged. Breast milk is the best food for any baby, especially premature babies. Mothers who produce more than their own child needs should be encouraged to donate to their local SCBU as this is always welcome.

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