

Title: Assessment of selected risk factors, physical, psychomotor and emotional development disorders in infants from the Podkarpacie region improved according to the early intervention program.

Introduction: Abnormal structural development of the central nervous system (CNS) is conditioned by genetic factors and genetic and environmental pair, before birth and after birth, especially during infancy and early childhood. Brain injury determines the disorder of psychomotor functions, and children with motor deficits require early diagnosis and implementation of rehabilitation programs, called early diagnostic and therapeutic intervention

Objective of the work. The aim of the study was to characterize anamnestic risk factors in the course of pregnancy, delivery and neonatal period and infants and their synthetic evaluation, using the diagnostic function Z_{PZCPN} in abnormally growing children from birth compared to healthy children. Demonstration of the dependence of the Z_{PZCPN} function describing the risk level of pregnancy, childbirth, neonatal function, the degree of central nervous coordination disorders (CCD) and duration of pregnancy (CTC). Determination in the first and second year of life of the dynamics of physical, psychomotor and emotional development with the use of appropriate synthetic functions: Z_{PRF} measuring the level of physical development, Z_{PRPM} measuring the level of psychomotor development and Z_{PIMD} measuring the level of interaction between mother and child.

Material and methods. The study group consisted of 104 infants with developmental problems, directed by specialist doctors to early therapeutic intervention, which were called children of risk. The control group consisted of 51 healthy children who did not require improvement. Information on risk factors in the course of pregnancy, delivery and neonatal period and infancy according to the Questionnaire. The study was obtained from a maternal-perinatal interview and from medical records and health records. Physical development was diagnosed on the basis of anthropometric measurements of body mass and length, head and thorax circuits in study I and II as well as body mass and height in studies III and IV, additionally the BMI index was calculated. Dynamics of psychomotor development with tests of Munich Functional Developmental Diagnosis (MFDD) twice in the first year of life and twice in the second year of life.

Emotional development was examined according to the Spreadsheet describing the interaction between mother and child. In the control group, the tests were performed only before the therapy, in study I. In the children's risk group also in 12 month of age (study II), in 18 month of age (study III), in 26 month of age (study IV). Classification of infants according to

positioning reactions Vojta divided the study group into 4 subgroups according to ZOKN degree (lightest, light, medium heavy, heavy) and classification due to the duration of pregnancy (CTC) into 3 subgroups: children reported (38-42 weeks of pregnancy), premature babies later born (34-37 weeks of pregnancy) and prematurely born premature (below 34 weeks of pregnancy). To assess risk factors, physical, psychomotor and emotional development, the mathematical method according to A. Krefft was used and four diagnostic functions were calculated: Z_{PZCPN} , Z_{PRF} , Z_{PRPM} , Z_{PIMD} .

Results: Assessment of the sociodemographic situation showed significantly lower education of fathers and poorer conditions of risk children residence in comparison to healthy children.

A significant impact on the level of risk of development were such risk factors as: maternal illness in pregnancy, risk of miscarriage, threatening asphyxia, gestosis, fetal abnormalities, cord umbilical cord injury, duration of pregnancy, delivery termination, premature fetal withdrawal and premature contractions. In the neonatal period and infancy: intrauterine infections, respiratory complications, hyperbilirubinemia, CNS bleeding, weaker Apgar life. On average, one child in the CG group was (4.42 ± 2.56) in the CG (0.78 ± 0.92). In subgroups CCD4-3 (6.63 ± 2.81 , 5.10 ± 1.96 , respectively), in subgroups of pre-term and late-born premature babies (respectively 7.33 ± 2.35 and 4.85 ± 2.40), at a reported rate of 3.36 ± 1.9 . A significant relationship was found between the synthetic diagnostic function of Z_{PZCPN} describing the risk level of risk factors in the course of pregnancy, delivery and neonatal period, and the degree of central nervous coordination disorders (CCD) and duration of pregnancy (CTC). In the study group GB, the level of risk was ($Z_{PZCPN} = 0.5804$), in the control group CG ($Z_{PZCPN} = 0.3022$), ($p \leq 0.001$). In CTC and CCD subgroups, the highest mean values of Z_{PZCPN} were recorded in pre-term and later-born premature babies ($Z_{PZCPN} = 0.8523$ and $Z_{PZCPN} = 0.6759$ respectively) and in infants with CCD4 and CCD3 ($Z_{PZCPN} = 0.7277$ and $Z_{PZCPN} = 0.618$ respectively). It was found that the higher the degree of CCD and the shorter the duration of pregnancy (CTC), the higher the value of Z_{PZCPN} (the highest in the group of premature babies born below 34 Hbd). Because the risk factors do not affect the level of threat of pathology to the same extent, the innovative A. Krefft method was used and the selected factors were combined to determine the estimators (weights). The highest weight was set for: shortening the duration of pregnancy, anthropometric measurements, neonatal life on the Apgar scale, newborn pathology, pathology of organ structure, risk of miscarriage, placental and fetal pathology, late blood pathology, delivery pathology and pregnancy pathology. In terms of physical development, it was shown that newborns of risk had smaller body dimensions, were

lighter 655 grams, shorter by 4 cm, with smaller head circumferences by 1.7 cm and chest diameter by 2.6 cm compared to healthy children from the CG. Somatometric measurements significantly more often (10%), are below 10 percentile, less than 90 percentile ($p \leq 0.001$). Observation of the physical development of girls and boys in the next four studies was within the broad range, with boys being significantly heavier and taller than girls in all studies. Observation of psychomotor development in children with pre-therapy risk showed a significantly lower level in all skills, higher delays were noted in the motoric rather than cognitive spheres. After six months of therapy, children reached levels above 93-95% of the norm, except for the age of walking. Slight delays in development (up to 10%) were demonstrated in the III and IV trials in children with severe disorders and in premature babies born below 34 weeks of pregnancy in the age of walking, speaking and independence. Thanks to the Kreft method it was possible to determine the estimators (weights) of individual diagnostic features describing the level of psychomotor development of Z_{PRPM} in risk children. And such features as age of capture, sitting, walking had the greatest impact on the level of psychomotor development in the first year of life (Z_{PRPM1}), and in the second year in the model Z_{PRPM2} - social and range of independence.

Conclusions:

1. Occurrence of risk factors determines the risk of improper development. In total, there are five times more pathological factors per child risk than in the control group.

2. The level of risk measured with the synthetic diagnostic function of Z_{PZCPN} is significantly higher in children than in healthy children, what is more dependent on the degree of central nervous coordination disorder and pregnancy duration, because the higher the Z_{PZCPN} value, the higher the CCD rate and the shorter duration Pregnancy (CTC).

3. Newborns of risk had smaller body dimensions, were lighter and shorter, with smaller head and chest circumferences compared to healthy children.

4. Somatometric measurements of mass, body length, head and chest circumferences significantly more frequently (10%), are below the 10th percentile, and less frequently than the 90th percentile.

5. The dynamics of physical development monitored in four studies showed significant differences related to sexual dimorphism. Observation of the physical development of girls and boys was between the 5th and 95th centiles, for mass, body length, with boys being significantly heavier, higher than girls in all studies. The average anthropometric measurements of mass and body length in 1 year are closer to the 95th percentile, and in the 2nd year they decrease to the 5th percentile.

6. The dynamics of physical development measured by the synthetic diagnostic function of Z_{PRF} between the subgroups of CCD was similar, and the differences were not statistically significant. Diversification of physical development was demonstrated in full-term and premature infants in study III and IV.

7. Evaluation of psychomotor development using the synthetic diagnostic function Z_{PRPM1} in the first year of life and Z_{PRPM2} in the second year of life showed a differentiation in the subgroups CCD and CTC. Children with moderate and severe CCD significantly differed from the norm before and after the age of 2 years. Premature babies and children reported significantly differed from each other before therapy, in study II premature babies born later "caught up" with infants reported, but worse results were obtained in studies III and IV, without age correction.

8. Psychoemotional development measured by the synthetic diagnostic function of Z_{PIMD} is significantly lower in children of risk than in the group of healthy children. In CCD subgroups and CTC subgroups, the differences are not statistically significant. Higher dynamics of the level of interaction between mother and child is observed in study I, II, III than in study IV.

Key words: children at risk, level of danger, physical development, psychomotor development, emotional development

