

The structure of the factor load of the "mother-child" system of newborns with cerebral ischemia
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SUMMARY

We aimed to quantify the factor load of the offspring of women with postpartum depression in puerperas. The purpose of this study is to study the structure of the factor load of a newborn with cerebral ischemia in the mother-child system with standard therapy. The initial and final factorial models of the dyad in the late neonatal period are presented. The model generated indicators that determine the factorial weight by 70.2–76.1%. Functional adaptation newborn due to psychological factor characteristics of the puerpera. The role of maternal psychological factors in the formation of the state of the newborn has been studied. The leading factors are the activity of the autonomous system and cerebral blood flow of the newborn, factors of intrapersonal conflict, psychoemotional state and electrocutaneous conduction of the puerpera. The second and third factors are maternal. Maternal factors reach 43.5–56.6% of the total cumulative weight with a strong correlation in the dyad. Taking into account the identified patterns and correcting the psychoemotional state of a mother with postpartum depression should lead to an improvement in infant outcomes.

Key words: factor analysis, newborn, mother-child system, postpartum woman, reflexology.

RESUME

We aimed to quantify the factor load among the offspring of puerperae with postpartum depression. The goal of this study was to investigate the structure of the factor loadings in newborns with cerebral ischemia in the system "mother-child" by using standard therapy. The initial and final factor models of the dyad at the late neonatal period were given. In the models indicators that lead to weight factor for 70.2–76.1% are generated. Functional adaptation of the newborn is caused by psychological factorial characteristics of the puerpera. The role of maternal psychological factors in the formation of the newborn state was investigated. The leading factors are presented by the activity of

autonomic system and cerebral blood flow of the newborn, puerperal factors of interpersonal conflict, emotional state and electro skin conductivity. The second and the third factors are maternal. Maternal factors constitute 43.5–56.6% of the cumulative weight with a high correlation in the dyad. The account of the revealed laws and correction of mental and emotional state of the mother with postpartum depression must lead to improved outcomes of the baby. The statistical model allows to consider the impact of specific psycho-emotional and personality maternal factors on a newborn with cerebral ischemia and to develop the acupuncture technique that avoids unwanted consequences of postnatal depression in the "mother-child" system.

Keywords: factor analysis, newborn, "mother-child" system, puerpera, acupuncture.

INTRODUCTION

One of the most important newborn care initiatives is the co-location of the mother with the baby, providing mutual physiological and behavioral benefits in the couple. This is an increase in glucose levels, maintenance of an optimal body temperature, a decrease in the content of stress hormones, regulation of blood pressure and stabilization of respiration, an improvement in blood oxygenation and oxygenation, maturation of brain structures, neuromuscular conduction, a decrease in pain sensitivity, an improvement in sleep and a decrease in anxiety in the newborn. and maintaining breastfeeding and mother-to-child bonding. Providing sensory, vestibular and postural stimulation of the newborn [16]. The value of breastfeeding for both mother and baby is undeniable. The advantages include: a decrease in the incidence of neonatal ear and intestinal infections, obesity in older age; low risk of postpartum depression, unwanted pregnancy, hypertension, hyperlipidemia, diabetes and cardiovascular disease, ovarian and breast cancer; increased attachment between infant and mother [1]. However, up to 80% of women in childbirth and breastfeeding are in a state of mild to moderate postpartum depression, which negatively affects the condition of the newborn, the relationship between mother and child [12], causing diminution of the merits of joint stay and breastfeeding. It remains unclear what is the factor load borne by a mother who is depressed after childbirth, what is the factor structure, determining the nature of changes in the initial parameters of the functional systems of a newborn with cerebral ischemia. Does the child's altered psychoemotional state of the suffering postpartum potentiate, is it possible to influence the factors and avoid the loss of the benefits of living together and breastfeeding, creating the most favorable mother-child relationship in the dyad. A holistic analysis of the structural interpersonal relationships of the "mother-child" system is possible using mathematical methods of a multidimensional nature, which makes it possible to assess the leading factors in the personalized relationship between the parent and the newborn, to take into account the negative weight of the deviant components of the postpartum psycho-emotional state of the puerpera. Is it possible to influence the factors and avoid the loss of the benefits of living together and breastfeeding, creating the most favorable relationship "mother-child" in the dyad. A holistic analysis of the structural interpersonal relationships of the "mother-child" system is possible using mathematical methods of a multidimensional nature, which makes it possible to assess the leading factors in the personalized relationship between the parent and the newborn, to take into account the negative weight of the deviant components of the postpartum psycho-emotional state of the puerpera. Is it possible to influence the factors and avoid the loss of the benefits of living together and breastfeeding, creating the most favorable relationship "mother-child" in the dyad. A holistic analysis of the structural interpersonal relationships of the "mother-child" system is possible using mathematical methods of a multidimensional nature, which makes it possible to assess the leading factors in the personalized relationship between the parent and the newborn, to take into account the negative weight of the deviant components of the postpartum psycho-emotional state of the puerpera.

Objective of the study: factor modeling of a “mother-child” pair - a postpartum woman with postpartum depression and a newborn with cerebral ischemia - and the dynamics of factor loads in the neonatal period with standard treatment.

MATERIAL AND METHODS

The study involved 200 infants with perinatal encephalopathy and mothers at the beginning of the late neonatal period and 63 dyads at the end of the course of standard therapy at the end of the period. The initial age of children was 10.3 ± 1.0 days, boys - 106, girls - 94, body weight - 3358–3568 g. At the end of the course therapy, the age of children was 27.2 ± 0.4 days, boys - 37, girls - 36, body weight - 3678-3795 g. All newborns are identical in basic characteristics: inclusion criteria, age, sex, gestational age, weight, body length, head and breast circumference at birth, clinical syndromes, severity of injury, concomitant diseases and protocol therapy, as well as mothers - during pregnancy, age - 26.2 ± 0.7 years, the number of births, complications.

An assessment of physical development was carried out, a survey with an assessment of unconditional cardiointervalography, immunological reactivity of newborns; psychological testing of puerperas with the determination of the levels of neurotization and accentuation, anxiety according to the Spielberger-Hanin test, the Pishaud depression scale, Luscher's color choice; electrocutaneous conductivity in a pair. The electrocutaneous conductivity of the mother and child was investigated by Ryodoraku Y. Nakatani representative points on both sides. clinical, neurological reflexes, rheoencephalography, psychological testing of puerperas with the determination of the levels of neurotization and accentuation, anxiety according to the Spielberger-Hanin test, the Pishaud depression scale, Luscher's color choice; electrocutaneous conductivity in a pair. The electrocutaneous conductivity of the mother and child was investigated by Ryodoraku Y. Nakatani representative points on both sides.

Statistical analysis was carried out by parametric methods with the calculation of the mean, standard error of the mean. The significance of differences for absolute and relative values was assessed by Student's t-test and Pearson χ^2 with Yates correction. To reduce the dimension and identify in the entire set of signs that affect the change in dependent variables, we used factor analysis of the principal components with quadrimax rotation and a significance level of $p < 0.01$. The software package StatSoft Statistika 5.0 was used.

RESULTS AND DISCUSSION

In previous publications, we analyzed the dynamics of indicators of the postpartum psychoemotional state of the postpartum woman [11] and the clinical manifestations of the newborn [8] during treatment, supplemented by acupuncture [4].

With standard therapy, the factor analysis program transformed 74 initial parameters under study into 8 factors that account for 70.2% of the variance of the single mother-child system, having overcome the critical seventy percent threshold. The first factor with an eigenvalue of 4.1 is marked by the highest loads on the variables associated with indicators of the activity of the functioning of the autonomous system of the newborn, and explains 17.0% of the total variance. The second factor is related to indicators reflecting

the state of central conflicts of the intrapersonal plan of the parturient woman (eigenvalue - 3.0) - behavior that, causing a transient weakening, does not lead to real compensation for an unmet need. The third factor load (eigenvalue - 2.6) is represented by indicators of a woman's psychoemotional state - neurotic manifestations, depression, reactive and personal anxiety. The fourth (eigenvalue - 2.1) - the state of cerebral hemodynamics of the newborn. The fifth and sixth - by electrocutaneous conductivity (eigenvalue - 1.5) and accentuation of the mother's character (eigenvalue - 1.4). Seventh - an indicator of the nervous regulation of autonomic homeostasis of the newborn (eigenvalue - 1.1). Eighth - with maternal anxiety, contributing to the development of compensation (eigenvalue - 1.1). Factor load and its contribution to the total variance are reflected in table. one.

Table 1

Factorial model of the mother-child dyad at the beginning of the late neonatal period, $p < 0.01$

Фактор и его признак	Факторная нагрузка	Вклад в общую дисперсию, %	Кумулят., %
1. Активность автономной системы новорожденного:		17,0	17,0
индекс вегетативной реактивности	0,94		
активность процессов регуляции	0,88		
показатель ритма	0,88		
амплитуда моды	0,81		
2. Внутриличностный конфликт матери:		12,5	29,5
вегетативный баланс	0,96		
компенсация	0,85		
3. Психоэмоциональное состояние матери:		10,8	40,3
стрессоустойчивость (невроз)	-0,84		
депрессия	0,81		
реактивная тревожность	0,73		
личностная тревожность	0,76		
4. Мозговой кровоток новорожденного:		8,7	49,0
внутренняя сонная артерия слева	0,79		
позвоночная артерия слева	0,77		
позвоночная артерия справа	0,73		
5. Состояние системы акупунктурных каналов матери:		6,1	55,2
электрокожная проводимость	0,85		
6. Характерологические черты матери:		5,7	60,8
акцентуация характера (психопатия)	0,73		
7. Регуляция автономной нервной системы новорожденного:		4,7	65,6
индекс напряжения	-0,72		
8. Материнская тревога	0,77	4,6	70,2

The signs are presented according to the decrease in the factor load, which

is the correlation coefficient of the variable with the factor. Most positive (or the smallest negative) magnitude factor a testifies about the prevailing manifestation of the variable included in the factor. V particular, the index of autonomic reactivity by a strong bond correlates with the first factor (0.91), the vegetative balance of the mother - with the second factor (0.96), stress resistance, or rather, its absence (minus 0.84) - with the third. The analysis made it possible to identify a change in stability in the child-mother relationship of the "mother-child" system and the need to take measures to stabilize them by methods of restorative therapy at the stage. The maternal part is 56.6% of the total cumulative factorial weight of the loads, taken as 100%. The introduction of other variables did not affect the change in the structure of the factor model.

At the end of the standard treatment, 8 factors account for 76.1% of the variance in the indicators of the mother-child dyad. Factors and their signs are presented in table. 2.

This is the regulation of the autonomous system of the newborn (eigenvalue - 4.2), maternal anxiety (eigenvalue - 3.4), the state of the system of acupuncture channels in a pair (eigenvalue - 2.7), cerebral blood flow of the newborn (eigenvalue - 2.0), intrapersonal conflict of the mother (eigenvalue - 1.8), the activity of the autonomous system of the newborn (eigenvalue - 1.6), psychoemotional state of the mother (eigenvalue - 1.4) and characteristic (eigenvalue - 1.2) features of the mother. At the same time, the share of maternal participation is slightly less than half (43.5%) of the cumulative weight.

A number of authors have assessed the restructuring of the functional systems of healthy infants. The main system-forming parameters of the functional state are presented indicators of vegetative system [2]. Us found that the most significant factor loading in the neonatal period accounts for the indicators of the functioning of the autonomous system and in With children with cerebral lesion, which is realized by the hypersympathicotonic variant of reactivity, high pain sensitivity, sleep disturbances, pronounced anxiety [3]. Violation of the formation of autonomic regulation of a newborn with the assignment of the stress index to the seventh factor, indicates a delay in the formation of the system and the need to take into account its parameters when drawing up a program of rehabilitation treatment.

table 2

Factorial model of the mother-child dyad at the end of the late neonatal period, $p < 0.01$

Фактор и его признак	Факторная нагрузка	Вклад в общую дисперсию, %	Кумулят., %
1. Регуляция автономной системы новорожденного:		17,5	17,5
вариационный размах	0,73		
показатель ритма	-0,93		
индекс напряжения	-0,92		
2. Материнская тревога	-0,87	14,1	31,6
3. Состояние системы акупунктурных каналов в паре:		11,3	42,8
электрокожная проводимость матери	0,85		
электрокожная проводимость ребенка	0,76		
4. Мозговой кровоток новорожденного:		8,4	51,2
внутренняя сонная артерия слева	0,78		
позвоночная артерия слева	0,74		
5. Внутриличностный конфликт матери:		7,4	58,6
вегетативный баланс	0,74		
компенсация	-0,74		
6. Активность автономной системы новорожденного:		6,5	65,1
активность процессов регуляции	-0,84		
7. Психоэмоциональное состояние матери:		5,8	70,9
депрессия	0,88		
8. Характерологические черты матери:		5,2	76,1
акцентуация характера (психопатия)	-0,76		

Vegetative-visceral disorders and a decrease in cerebral blood flow are among the leading links in the pathogenesis of cerebral ischemia in a child. Hypoxic ischemic encephalopathy is a serious disease that in 40-60% of newborns, cases leads to the death of an infant under one year old, or complicated by severe disabilities. Most of the main pathological events are associated with impaired cerebral blood flow, oxygen delivery to the brain, primary and secondary energy deficiency with low levels of adenosine triphosphate and lactate accumulation [15]. Hypoperfusion, mainly of cervical blood flow, caused by hypoxia, sympathicotonic vegetative orientation, forms manifestations of prolapse

reflexes of spinal automatism with a decrease in the conductivity of this segmental level. General cerebral symptoms, low oxygen tension, inhibition of the formation of brain structures by impaired blood circulation in the basin of the internal carotid artery. Decreased regional cerebral blood flow is the dominant factor in determining the level of tissue damage in the immature brain. Nevertheless, in both models of the dyad, the state of cerebral hemodynamics of the newborn is ranked fourth with a contribution to the total variance of 8.4–8.7%.

It turns out that in the mother-child dyad there are at least significant are maternal parameters that form the second and third factors, the total weight of which exceeds the first factor by 5.5%. They give rise to a statistical process of “scattering” of the remaining indicators. Consequence of violations

prefrontal dorsomedial cortical activity, the function of the hypothalamic-pituitary-adrenocortical axis, cytokines and neurotrophins is an altered hormonal composition of plasma and breast milk [17]. High levels of manifestations of internal personal conflict in a woman with altered compensation, autonomic imbalance of adrenergic orientation, lack of stress resistance, pronounced postpartum depression, reactive and personal anxiety are factors that determine the lag in physical development, a deficit of the unconditional reflex sphere of oral automatism [7], suppression of immunological reactivity [14], low health index and increased morbidity in infancy [9]. Correction of the fifth factor - the electrical conduction of the mother, having a discriminant ability in a pair and being in close correlation with a similar system of a newborn, entails a positive dynamics of the child's transmembrane potential, his neuromuscular conduction with the possibility of a personalized approach to therapy using acupuncture [10]. Dryness, callousness, characteristic of the characterological accentuation of the mother in the relationship with the child, gives rise to detachment of interpersonal relationships, poverty of emotional perception in a couple, delay in the development of the "revival" syndrome, delay in the neuropsychic development of the child. Maternal anxiety, as an emotional source of stress, provokes an increase in compensation and is accompanied by an aggravation of the personal conflict of the postpartum woman. A "vicious circle" develops, which closes in on the child [6].

The model is not static. At the end of the neonatal period, the dynamics of the factor load and the weight of each is recorded. In the first place is the regulation of the functioning of the autonomous system of the newborn. However, maternal participation in the formation of the functional systems of the newborn remains. The second factor is still maternal - this is anxiety, which has shifted from the eighth position to the second. It is an indicator of a woman's intrapersonal conflict, reflecting the significance of deviations in higher nervous activity, and not emotions, for which the subcortical structures, placed in the seventh position, are responsible [13]. The weight and importance of the second factor underlie interpersonal therapy for depression [5]. The assignment of the state of the system of acupuncture channels, which characterizes the potential of electrocutaneous conduction, to the third most important factor,

CONCLUSIONS

1. The assumption that maternal postpartum depression causes the severity of the condition of the newborn and is a factor that forms the state of the functional systems of the child, is confirmed. The feasibility of maternal participation in the rehabilitation of the condition of the newborn has been statistically proven.
2. Found a significant weight of factorial loads of the mother

postpartum depression in a newborn with cerebral ischemia and their dynamics in the course of standard treatment. The factorial weight of the maternal component exceeds the share of factorial loads of the newborn and persists throughout the neonatal period. Independent overcoming of intrapersonal conflict by mother and normalization of the psychoemotional sphere seems to be very difficult.

3. Factor modeling made it possible to consider the impact of personal psychoemotional and personal maternal factors on a newborn with cerebral ischemia and to offer reflexological prevention of adverse consequences in the mother-child dyad.

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