Discriminant functions of electrocutaneous conduction of a pair "mother-newborn" at acupuncture

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Discriminant functions of electrocutaneous conductivity in mother-newborn pairs at acupuncture

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SUMMARY

The presented study aimed to determine whether the electrical properties of the skin could discriminate against the mother-newborn pair before and after the course of acupuncture. Testing by the Ryodoraku method was carried out on 148 pairs of mothers and their newborns at the age of 11–28 days at the beginning and end of the late neonatal period. Multivariate statistical comparison showed that partners can be discriminated against from the control group based on the assessment of electrical conduction before and after the course of acupuncture. The data support the concept that cutaneous conductance is an independent predictor in a pair.

Keywords: discriminant analysis, cutaneous conductivity, newborn, acupuncture.

RESUME

This study sought to determine whether the electrical properties of skin could discriminate a mothernewborn pair before and after a course of acupuncture. Ryodoraku-testing carried in 148 pairs of mothers after delivery and their infants aged 11-28 days at the beginning and end of the late neonatal period. Multivariate statistical comparison revealed that partners could be discriminated from the control group on the basis of skin conductance scores before and after a course of acupuncture. The findings support the conception that skin conductance is an independent predictor factor in the pair.

Keywords: discriminant analysis, skin conductance, newborn, acupuncture.

Introduction

Despite the advances in neonatal medicine, moderate to severe acute perinatal hypoxic-ischemic encephalopathy (HIE) in newborn infants remains an important cause of death and acute neurological disorders with subsequent long-term impairment of the children's nervous system. The incidence of DIE is approximately from 1–6 ‰ live births to 31–34 ‰ [2]. The risk of disability and impaired cognitive development correlates with the severity of DIE [10]. Disorders of cerebral blood flow under conditions of hypoxia are the main cause leading to ischemic and hypoxic traumatic brain injury after childbirth [11]. At the cellular level, energy deficiency develops in two stages. In the first phase, a decrease in the flow of blood and oxygen follows with a decrease in the content of adenosine triphosphate, failure of the sodium-potassium pump,

After resuscitation and reperfusion, there is a latency period with the normalization of oxidative metabolism lasting 6-12 hours. The secondary phase of energy deficiency develops from 12–36 hours and can last from 7 to 14 days with the progression of apoptosis, mitochondrial insufficiency, cytotoxic edema, accumulation of excitatory amino acids and the release of free radicals, resulting in cell death [12] against a background of high electrical conductivity [7]. The beginning of the second phase seems to be a therapeutic window for neuroprotective intervention in the state of electrogenesis of the newborn using reflex therapy methods. It is this stage that is associated with the progression of DIE and correlates with an unfavorable outcome. A mild decrease in electrical conductivity, carried out through the acupuncture points of the skin, started within the first 8-10 days after birth, demonstrates the presence of a neuroprotective effect in newborns [8]. Subsequently, in a randomized clinical study, we showed that in children who underwent reflexotherapy treatment, the incidence and

improved psychomotor development in infancy [4]. However, it has not been clarified whether acupuncture discriminates the initial nosologically similar population of newborns into groups of "less sick children" by the electrical parameters of the representative points, whose and which coordinates of the vectors have predictive significance, which determines the effectiveness of reflexotherapy intervention in the early stages of rehabilitation treatment of the "mother-child" system. ...

The aim of the study was to determine the discriminant functions and predictor significance electrocutaneous conduction of biologically active points of the acupuncture canal system of the "mother-newborn" pair when reflexotherapy is included in rehabilitation treatment.

Materials and methods

We examined 148 pairs of newborns with perinatal pathology of the nervous system and mothers in the late neonatal period. A clinical, neurological examination [5], rheoencephalography [6], cardiointervalography [1], and a study of electrocutaneous conduction, both initially and at the end of the reflexotherapy course, were carried out. All babies and mothers were divided into 2 groups: 52 newborns of the first group (control) received only protocol treatment, in the second (main) there were 96 couples, with the additional use of reflexology. Taking into account the variant of influence, the group is divided into 3 subgroups. Against the background of standard treatment in the first subgroup, acupuncture was performed for both the mother and the child - 32 pairs; in the second subgroup, acupuncture was performed only in 32 puerperas;

By the beginning of rehabilitation treatment in the late neonatal period, the initial age of children of the first subgroup was 10.1 ± 0.8 days, the second - 9.8 ± 0.4 days, and the third - 11.8 ± 1.3 days. The age of children in the comparison group was 9.7 ± 0.4 days. By the end of the course therapy, the age of children of the first subgroup was 30.3 ± 1.4 days, the second - 27.2 ± 0.7 days, the third - 30.4 ± 2.5 days, the comparison group - 27.2 ± 0.4 days. Both groups are identical in the main characteristics of newborns: age, sex, gestational age, weight, body length, head and breast circumference at birth, clinical syndromes, severity of the lesion, concomitant diseases and protocol therapy, as well as mothers - the course of pregnancy, age , the number of births, complications. Electrocutaneous conduction in the mother (MA) and the child (PE) was investigated by the Ryodoraku method according to Y. Nakatani representative points of the canals of the lungs (H1), pericardium (H2), heart (H3), small intestine (H4), three warmers (H5), large intestine (H6), spleen and pancreas (F1), liver (F2), kidney (F3), urinary (F4) and gall (F5) bladders, stomach (F6) on both sides. The effect of the inhibitory recipe F. Mann and the stimulation of the group Lo-point was applied. The duration of the procedure is up to 60 minutes after the morning feeding, exclusively during the child's sleep. Disposable needles "SuJok Acupuncturae Needles Sterilized by Gamaray" from Subal were used. Acupuncture course consisted of 5 sessions. stomach (F6) on both sides. The effect of the inhibitory recipe F. Mann and the stimulation of the group Lo-point was applied. The duration of the procedure is up to 60 minutes after the morning feeding, exclusively during the child's sleep. Disposable needles "SuJok Acupuncturae Needles Sterilized by Gamaray" from Subal were used. Acupuncture course consisted of 5 sessions. stomach (F6) on both sides. The effect of the inhibitory recipe F. Mann and the stimulation of the group Lo-point was applied. The duration of the procedure is up to 60 minutes after the morning feeding, exclusively during the child's sleep. Disposable needles "SuJok Acupuncturae Needles Sterilized by Gamaray" from Subal were used. Acupuncture course consisted of 5 sessions.

Statistical processing was performed 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 $\chi 2$ with Yates correction. Inclusion stepwise discriminant analysis was used to identify predictors capable of predicting the presence or absence of treatment efficacy and to resolve the issue of differences between the two groups of mother-child dyads that received standard and restorative reflexotherapy treatment. To develop an optimal classifier of differences between groups, two stages of discriminant analysis were carried out. The first analysis was performed to find the discriminant functions that maximize the distance between the control and main groups, and the second calculation was carried out to find the differences between the subgroups of the main group that received various options for restorative reflexological treatment. The software package StatSoft Statistika 5.0 was used.

Results and discussion

Previously published studies present the results of electrocutaneous conduction and its dynamics caused by the use of reflexotherapy in postpartum women and their newborns. The initial maternal skin electrical conductivity in the groups is characterized by high values with an imbalance in the representative points of the H3, F2, F4, F5, H5 and H6 channels. By the time of discharge in the control group, the electrocutaneous conductivity remains high, with a tendency to increase in most channels in relation to the initial value. The diagnostic matrix of the skin zones of the control group preserves

initial version of electrical conductivity. In the subgroups of restorative treatment, the mean value of the electrical conductivity of the representative points decreases (by 5.1–8.5%) in comparison with the conductivity of the mothers of the control group and the balancing of the representative points H3, F4 and F5. The reliability of the difference in the indices of electrocutaneous conductivity at the stages of the study from the values of the comparison group was confirmed [9].

The initial value of electrical conductivity of newborns in the main group does not differ from the severity in the comparison group at the beginning of treatment. The profile of acupuncture skin zones is represented by low values of H1, H5, H6 that differ from the autogenous norm and increased values of H3, F2, F4, F5 in the groups. Standard therapy in the control group did not prevent a significant increase in the electrocutaneous conduction of the canals by 12.8%. In the main subgroups, the value of the electrical conductivity of the representative points did not increase. In the standard treatment group, conductivity is self-harmonized only in 41.6% of the channels, and the diagnostic matrix retains the original version of electrical conductivity. In the main group, reflexological balancing of 62.5–75.0% of canals, mainly foot canals, is carried out.

The stepwise discriminant analysis of the group model included 15 predictors (Wilks' lambda 0.67215; approximation F (16.131) = 3.9936; p <0.00001) of the maternal and newborn acupuncture canal system. Of these, the most significant are three maternal (lung, triple heater and heart canals) and one child (large intestine), which determine the discrimination of groups (Table 1). The classification functions calculated for both groups are used to classify the observations. Observation belongs to the group in which the classification function is most important. The classification equation for the standard treatment group: 0.13 (H1 MA on the right) + 0.04 (H6 RE on the left) - 0.34 (H5 MA on the right) - 0.1 H3 (MA on the left) - 43.08. The equation for the group of rehabilitation treatment in the form: 0.21 (H1 MA on the right) + 0.01 (H6 RE on the left) - 0.24 (H5 MA on the right) - 0,

Table 1

Predictors of maternal and newborn electrocutaneous conductance in the control and main groups

Переменные	Лямбда Уилкса	Частная Лямбда	F-вкл. (1,131)	p-уровень	Толер.	1-Толер. (R-квад.)
H1 матери справа	0,70	0,96	0,96	0,027	0,21	0,795
H6 ребенка слева	0,70	0,95	0,95	0,014	0,38	0,624
H5 матери справа	0,73	0,92	0,92	0,001	0,22	0,782
H3 матери слева	0,70	0,96	0,96	0,016	0,29	0,707

Step by step, 27 factors (Wilks' lambda 0.28944; approximation F (81.353) = 2.2436; p <0.00001) of the acupuncture canal system of the mother and the newborn were introduced into the subgroup model. Of these, four maternal (channels of the triple heater on the left, heart on both sides, spleen and pancreas on the left) and one child (lungs on the left) are the most significant and determine the discrimination of subgroups (Table 2).

table 2

Predictors of maternal and newborn electrocutaneous conductance in a control group model and main subgroups

Переменные	Лямбда Уилкса	Частная Лямбда	F-вкл. (1,131)	p-уровень	Толер.	1-Толер. (R-квад.)
H5 матери справа	0,36	0,80	9,87	0,000	0,154	0,846
H1 ребенка слева	0,32	0,90	4,35	0,006	0,361	0,639
H3 матери слева	0,31	0,93	3,14	0,028	0,237	0,763
F1 матери слева	0,32	0,91	4,05	0,009	0,213	0,787
H3 матери справа	0,31	0,93	3,17	0,027	0,166	0,834

On their basis, classification functions were determined for each of the subgroups, for example, for the first subgroup: 0.1 (H5 MA on the right) + 0.18 (H1 PE on the left) - 0.1 (H3 MA on the left) + 0.17 (F1 MA on the left) + 0.22 (H3 MA on the right) - 51.42. For the second subgroup: 0.03 (H5 MA on the right) + 0.1 (H1 PE on the left) + 0.01 (H3 MA on the left) + 0.12 (F1 MA on the left) + 0.04 (H3 MA on the right) - 50.17. For the third subgroup: - 0.13 (H5 MA on the right) + 0.1

(H1 PE on the left) + 0.03 (H3 MA on the left) - 0.03 (F1 MA on the left) + 0.16 (H3 MA on the right) - 49.46. The correctness of the classification in the control group reaches 61.5% and 86.5% in the main group. In subgroups, the classification accuracy is 71.9–46.9–81.3% (for the first, second and third, respectively) and 73.1% in the control group (Table 3).

Table 3

Predictive classification matrix in the model of the control and subgroups of the main groups

Группы	Процент правильный	Контрольная группа p = 0,35135	1-я подгруппа p = 0,21622	2-я подгруппа p = 0,21622	3-я подгруппа p = 0,21622
Контрольная группа	73,1	38	3	5	6
1-я подгруппа	71,9	5	23	3	1
2-я подгруппа	46,9	5	5	15	7
3-я подгруппа	81,3	5	0	1	26
Всего	68,9	53	31	24	40

A significant part of the vectors of the second subgroup (37.5%) was integrated into the coordinates of the centroids of the first and third subgroups (15.6% and 21.9%, respectively), which indicates the effectiveness of reflexotherapy, carried out only by the mother, and its effect on the newborn as a result similarity with the first and third treatment options, but still having specificity (46.9%), confirmed by the reliability of the p-level value presented below.

In the coordinate system, the centroids of the groups were clearly discriminated with a reliability of p <0.00000417. The correct classification was also determined in subgroups, since the Mahalanobis distances are large and the centroids are distant from each other. The significance is quite high and is presented in table. 4.

Table 4

Reliability of Mahalanobis distances between subgroups (p-level)

Группы	Контрольная группа	1-я подгруппа	2-я подгруппа	3-я подгруппа
Контрольная группа	–	0,000011	0,03682	0,00186
1-я подгруппа	0,00001	–	0,00657	0,000007
2-я подгруппа	0,03681	0,006575	–	0,004966
3-я подгруппа	0,00186	0,000007	0,00496	–

The final analysis did not include variables whose differences between groups were statistically significant. In the discriminant functions, the program singled out factors, the differences between which in parametric analysis are statistically insignificant, however, as it turned out, they make an exceptional contribution to the overall result. The classification functions are able to distinguish between the groups of rehabilitation and restorative treatment according to the electrical parameters of the skin. Attention is drawn to the prevailing presence of maternal predictors of electrocutaneous conduction participating in discrimination of groups and subgroups of newborns, which dictates the indispensable participation of the mother in the rehabilitation of the newborn and confirms the correctness of the proposed concept of mutual rehabilitation. Using the variables of the electrocutaneous conductivity of the acupuncture canal system and discriminant functions, we were able to determine the prognostic possibility of choosing a variant of reflexotherapy in pairs. Fluctuations in the Wilks lambda value (0.31-0.70) of the controlled parameters of electrical conductivity suggest that the remaining 69-30% of its value is accounted for by factors not related to the electrical parameters of the skin, opening up prospects for further scientific research.

conclusions

Thus, the electrocutaneous conduction, investigated by the Nakatani method, has a predictor value and discriminatory ability in newborns and their mothers, and allows a personified approach to the choice of a reflexological aid option. Both pediatric and maternal predictors of electrical parameters of the skin determine the effectiveness of reflexotherapy interventions in the early stages of rehabilitation treatment of the "mother-child" system.

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