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THE VARIABLESINFLUENCING THE NEUROBEHAVIOUR OF AT-RISK TERMINFANTS

[1]Dr. N. Meena

[1]Lecturer in Physiotherapy, Department of Physical Medicine & Rehabilitation, RMMCH, Annamalai University, Annamalainagar - 608002, Tamilnadu, India., email: roshmena@gmail.com

Abstract:

Background: *The study of neurobehavioral states in infants is used to indicate functional integrity of the Central Nervous System. The objective of this study is to identify the variables influencing theneurobehaviour ofat-risk term infants. The study would be valuable in identification of infants at risk for developmental disabilities and would also provide early intervention. Method: The study included 100 neonates (54 Male and 46 Female neonates) between 37 and 40 weeks of conceptional age. The neurobehavioral status was assessed within a week after birth using Morgan neonatal neurobehavioral examination scale. The independent variables chosen were birth weight, length of the neonate, head circumference and conceptional age. The neurobehaviour of the neonates have been assessed and the results were obtained. Result: There is no significant difference between the average score of male and female neonates. The independent variables birth weight and conceptional age are significantly influencing the neurobehaviour of the neonates irrespective of the score obtained. Conclusion: This examination used to quantify the neurobehavioral abilities of at-risk term infant and identifiesthe independent variables influencing the neurobehaviour of at-risk term infants.*

Key words: *Morgan neonatal neurobehavioral examination scale, At-risk term infants.*

Corresponding author:

N. Meena,

Lecturer in Physiotherapy,
Department of Physical Medicine & Rehabilitation, RMMCH,
Annamalai University, Annamalainagar - 608002, Tamilnadu, India.,
Email: roshmena@gmail.com

QR code

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INTRODUCTION:

In the last several decades, physiotherapist's role in the special care nursery setting has expanded and become increasingly involved with infants and most recently with neonates [1, 2].The quality and intensity of neonatal neurological responses depend on the behavioral state of the infant [3,4].Developmental disabilities which may be physical, mental or both are very often identified quite late, may be at school when nothing much can be done to improve the situation. Hence infants need to be screened routinely in the neonatal period itself, so that neurobehavioral abnormality can be detected earliest. Also any possibility of a developmental abnormality later on can be ruled out [3, 5].

The purpose of examination is (a) to assess the integrity of the nervous system through the behavior and reflex responses of the newborn. (b) The influence of independent variables in neurobehaviour of infants. Earlier examination technique like dubowitz was concerned more with neurological and physical maturity of neonate [6], but neonatal neurobehavioral examination by Morgan was used to quantify the neurobehavioral abilities of infants which are concerned with both neurological and behavioral items [7].This could prove to be useful in assessing the competence of preterm and full-term neonates. It is a method used to examine individual differences in normal neonates or group difference in normal neonates. It can also be directed at recognizing and describing deviation from normal in compromised or high risk neonates [8].The objective of this study is to identify the independent variables influencing the neurobehaviour of at-risk term infantsand to detect neurodevelopmental delay in term at-riskbabies to enable early interventional therapy. It would also be valuable in identification of infants at risk for developmental disabilities.

MATERIALS AND METHODS:

Subjects

A total of 100 neonates (54 Male and 46 Female) were selected for this study from postnatal wards, Neonatal Intensive Care Unit (NICU) and Referral New born Unit (RNB) of Raja Muthiah Medical College Hospital. The subjects include term neonates of 37-40 weeks [9] of conceptional age without any obvious disease or deformity.

Morgan neonatal neurobehavioral examination scale

The neurobehavioral status was assessed within a week or prior to discharge from NICU using Morgan neonatal neurobehavioral examination scale. Assessment was done when the child is in awake state. Morgan neonatal neurobehavioral examination scale consists of 27 assessment items which are organized into 3 sections on tone and motor pattern, primitive reflex and behavioral responses [10]. Each section has 9 assessment items. Scoring method: A three point scoring system was used for each item. The score are correlated with conceptional age and or gestational age at birth, that is performance at > 32 weeks, 32-36 weeks, and <36 weeks of conceptional age. A- Scored as abnormal. The independent variables chosen for this study were birth weight, length of the neonate, head circumference and conceptional age. Neonates with the maximum score show a normal neurobehavioral state. Less scoring neonates indicate the deficiency in neurobehaviour at a given conceptional age.

DATA ANALYSES:

It was proposed to examine whether the mean score of neurobehaviour differs significantly between the male and female neonates, students 'T' test has been used [11]. Multiple regression analysis[12]was carried out to examine whether the variables chosen influence the score of neurobehaviour of the neonates, and also to compare the neonates with least score and greater score influence by the independent variables chosen on the neurobehaviour of the infantsirrespective of male and female neonates.

RESULT:

The neurobehaviour of the neonates have been assessed and measured in terms of score by a well-defined procedure as explained. To examine whether the mean score of neurobehaviour differs significantly between the male and female neonates, students 'T' test has been used. The mean score of neurobehaviour do not differ significantly between the male and female neonates. The variables chosen influence the score of neurobehaviour of the male and female neonates were examined using multiple regression analysis. The results are given in **Table 1**.

Table 1: Results of variables chosen influence the score of neurobehavioral of the male and female neonates

Neonates	R square	F	'p' sig
Male neonates	0.543	14.545	0.000
Female neonates	0.591	14.831	0.000

Independent Variables	'p' sig.	
	Male neonates	Female neonates
Birth weight (X2)	0.000*	0.000*
Length of the neonate (X3)	0.301	0.612
Head circumference (X4)	0.229	0.353
Conceptional age (X5)	0.000*	0.001*

From the table it is observed that the value of the co-efficient of multiple determinations R^2 is 0.543 and 0.591 respectively in male and female neonates, means 54% in male neonates and 59% in female neonates, the change in the neurobehaviour are due to the independent variables chosen. It is also seen that the F ratio is significant, since the corresponding p value is 0. Hence the model is a good fit for the data. It is also seen in the table that the variables birth weight (X2) and conceptional age(X5) have significant values. But the variables length of the neonate (X3) and head circumference (X4) do not have significant values.

To examine and compare the neonates with least score and greater score influence by the independent variables chosen on the neurobehaviour of the babies irrespective of male and female neonates, multiple regression analysis was carried out. The results are given in **Table 2.**

Table 2: Neonates with least and greater score influence by the independent variables chosen on the neurobehaviour of the infants

Score	R square	F	'p' sig	Independent Variables 'p' sig.			
				Birth weight (X2)	Length of the neonate (X3)	Head circumference (X4)	Conceptional age (X5)
Greater score	0.4853	19.33	0.000	0.0003*	0.0422*	0.5539	0.000*
Least score	0.5497	2.442	0.1256	0.4311	0.0470*	0.2250	0.8991

From the table it is observed that the value of R^2 is 0.4853and 0.5497 respectively for the neonates with least score and greater score, means 49% in least score neonates and 55% in greater score neonates influence the change in the neurobehaviour of the babies. It is also seen that the F value is significant with the corresponding p value 0 in least score babies and not significant in greater score babies. It is also seen that the variables birth weight (X2), length of the neonate (X3)and conceptional age(X5) have significant values; but the variable head circumference (X4) is not significant, in greater score babies. The variables birth weight (X2), head circumference (X4) and conceptional age(X5) have no significant values; but the variable length of the neonate (X3) has a significant value in least score babies.

DISCUSSION:

The neurobehaviour of the new born is a very important aspect of study because the physical and mental growth of the babies very much depends on the present status [12-13]. It is a method valuable in various ways (a) to characterize the neurobehavioral fitness of the neonate at a given conceptional ages by the three point scoring system. (b) Second, this technique high lights the maturational difference between preterm and term infants. (c) Third, differentiating the behavioral characteristics of normal neonates. (d) Fourth, any deviation from normal or high risk neonates. The need for the study

may be attributed to the reason that, in the present study undertaken in a sample of 100 neonates, 13 were identified to be in the risk group which is relatively higher. Hence, immediate intervention can be instituted to have better outcome by reducing the occurrence of developmental abnormalities.

The neurobehaviour states of the neonate were examined by 27 assessment items. The individual scores of the neonates obtained were based on 27 items. For all the 100 babies the overall average score has been computed and was found to be nearly 1.98 i.e., the average score was close to 2. It is inferred that the neurobehaviour status of the neonates in the present study corresponds to 32- 36 weeks of conceptional age. From the study it was found that there is no significant difference between the average scores of the male and female neonates. In this study 54% and 59% of the changes in the neurobehaviour in the male and female neonates are due to the independent variables chosen. From the statistical analysis the independent variables namely birth weight and conceptional age are influencing the neurobehaviour of the neonates irrespective of the scores obtained.

In neonates with high scores the independent variables namely birth weight; conceptional age and length of the neonate are influencing the neurobehaviour of neonates. It is quite interesting to note that for neonates with least score the variable which made significant contribution to neurobehaviour in term babies are not at all making any influence except the length of the baby. This test relies on objective observation. Inner tester reliability is reported as 88% agreement by items and 95% agreement by total score [14]. Lee et al reported the predictive validity of the neonatal neurobehavioral examination for performance on the Peabody Developmental Motor Scale (PDMS). The NNE was given to a sample of infants at 37 to 41 weeks of conceptional age. The infants were examined with the PDMS at 6 and 18 months corrected age. Low correlation was noted between NNE subtest scores and PDMS scores and higher correlations when subtest scores were combined [15]. Systemic and conscientious screening should be included in all infants not just those who are statistically at higher risk for developmental disabilities because of identifiable factors at birth. Identification of risk status makes it possible to provide early intervention.

CONCLUSION:

This examination used to quantify the neurobehavioral abilities of term at-risk infant. This examination identifies the variables influencingthe neurobehaviour of at-risk term infantsand also an effective predictor of neurologic problems in at-risk infants.

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