



(REVIEW ARTICLE)



Babinski reflex evaluation in term neonates with hypoxic ischemic encephalopathy: Across-sectional observational study

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International Journal of Science and Research Archive, 2024, 12(01), 3074–3078

Publication history: Received on 20 May 2024; revised on 26 June 2024; accepted on 29 June 2024

Article DOI: <https://doi.org/10.30574/ijrsra.2024.12.1.1191>

Abstract

Background: Assessment of primitive reflexes is one of the earliest, easiest and most frequently used method among health care workers for newborns and young infants. Babinski reflex is one of the infantile reflexes. Our aim was to study Babinski reflex in a term neonates with hypoxic ischemic encephalopathy (HIE). The incidence of HIE in developed countries is estimated to be 1.5 per 1,000 live births. Estimates in developing countries range from 2.3-26.5 per 1,000 live births.

Methods: This study is a cross-sectional observational study. 70 consecutive neonates fulfilling criteria of HIE according to Sarnat and Sarnat classification, admitted in our neonatal intensive care unit (NICU) were included. It was elicited from 12 hours after birth to 72 hours of birth. Babinski response was assessed using thumb nail drag method.

Results: 83% babies are born to 18-35 years and 17% to elderly gravid. 55% are delivered through normal vaginal delivery and 45% to LSCS. 52% neonates belong to HIE stage I, 30% and 18% neonates belong to HIE stage II and III respectively. In HIE stage I, planter grasp was elicitable in 89%. It remains non-elicitable in 44% and 91% in HIE stages II and III respectively.

Conclusions: Absence of Babinski reflex can be correlated with the increase in severity of HIE. It is important to include the assessment of Babinski reflex along with other primitive reflexes in the newborn generally and especially in HIE.

Keywords: HIE; Sarnat and Sarnat; Babinski reflex; Neonate; NICU

1. Introduction

The advances in medical sciences and improved neonatal care have significantly increased the survival of high-risk neonates. Paediatricians are encountering smaller and sicker newborns with extremely low birth weight and serious health conditions in the neonatal intensive care unit (NICU).

High-risk newborns experience higher mortality and greater risks of various health and developmental problems.

Early health assessment is critical. Assessment of primitive reflexes is one of the earliest, easiest and most frequently used methods for newborns and young infants.

Plantar grasp reflex is very primitive in the sense that they can be elicited in all normal preterm infants at as early as 25 weeks of gestational age¹.

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During routine ultrasound examination, fetal Palmar grasp along with plantar grasp has been repeatedly observed, which first appears at 16 weeks gestation²⁻⁴. This reflex is easy to elicit but have been proved to be of distinctive clinical significance for the early detection of infant with neurodevelopmental abnormalities⁵⁻⁸.

Babinski sign, also known as the great toe sign, is the most sensitive and important indicator of an upper motor neuron lesion.

The sign consists of extension of the large toe and fanning of the other toes during and immediately after the lateral plantar surface of the foot is stroked.

Objective

To study Babinski reflex in a term neonates with hypoxic ischemic encephalopathy (HIE).

2. Material and Methods

- Type of study

The study was an observational cross sectional study on babies delivered in our hospital and requiring active resuscitation.

- Place of study

The study was conducted in the department of Paediatrics, Akash institute of medical sciences and research centre, Devanahalli, Bangalore.

- Duration of study

The study was conducted from October 2022 to March 2023.

2.1. Sample collection

- 70 consecutive asphyxiated neonates who were admitted in our neonatal unit and fulfilled the inclusion criteria were studied.
- Clinical information were collected retrospectively from maternal records such as maternal age, antenatal checkup, place of delivery, gravida, person who conducted delivery, type of delivery, presence of meconium, induced or spontaneous labour, pregnancy complications, type of resuscitation and mode of delivery were documented.
- NICU records and referral notes were considered. Both inborn and outborn babies were included.

2.2. Methodology

- Seventy consecutive neonates with birth asphyxia during that period (Apgar 0-3 at 5-minute of age) were studied.
 - Detailed antenatal and natal history of the mother was obtained.
 - HIE was assessed according to Sarnat and Sarnat staging i.e. mild (HIE stage I), moderate (HIE stage II), and severe (HIE stage III).
 - Babinski response was assessed using thumb nail drag method.
 - It was elicited from 12 hours after birth to 72 hours of birth to overcome the effect of stress due to delivery and proper manifestation of clinical signs of HIE
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3. Results

3.1. Maternal characteristics

83% of the babies are born to 18-35 years and 17% born to elderly gravid as in Table 1.

Table 1 Distribution according to maternal age

Maternal age	No of cases
18-35	58(83%)
>35	12(17%)

83% are delivered through normal vaginal delivery and 17% to LSCS (Table 2).

Table 2 Mode of delivery

Mode	No of cases
Normal vaginal delivery	39(55%)
Lower segment c section	31(45%)

3.2. Neonatal characteristics:

Majority were low birth LBW (50%) and 16% were macrosomic babies and rest 34% were in normal range (Table 3).

Table 3 Distribution of neonates according to birth weight

Birth weight in kgs	No of cases
1.5 to 2.49	35(50%)
2.5 to 4	24(34%)
>4	11(16%)

According to ACOG, HIE staging was done .37 neonates belong to HIE 1, 21 neonates belong to HIE 2 and 12 neonates belong to HIE 3 (Table 4).

Table 4 Sarnat stage of HIE distribution of neonates

Hie status	No of cases
HIE 1	37(52%)
HIE 2	21(30%)
HIE 3	12(18%)

71% neonates were AGA, 16% SGA and 9% belonged to LGA (Table 5).

Table 5 Distribution of neonates according to gestational age

Fetal growth	No of cases
AGA	50(71%)
SGA	11(16%)
LGA	9(13%)

Out of 37 neonates in HIE stage I, Babinski reflex was elicitable in 34 (89%) and in remaining 3 (11%) it could not be elicited. Similarly it remain non elicitable in 44% and 91% in HIE stages II and III respectively.(Table 6).

Table 6 Asphyxiated newborns on the basis of presence or absence of planter grasp

REFLEX	HIE 1		HIE 2		HIE 3	
	Elicited	Not elicited	Elicited	Not elicited	Elicited	Not elicited
Plantar response	34(89%)	3(11%)	12(56%)	9(44%)	1(9%)	11(91%)

4. Discussion

The incidence of HIE in developed countries is estimated to be 1.5 per 1,000 live births⁹.

Estimates in developing countries range from 2.3-26.5 per 1,000 live births^{10,11}. The localization and extent of perinatal hypoxic-ischemic cerebral injury is determined principally by the maturity of the brain at the time of insult and the severity and duration of the insult¹².

In the present study we tried to evaluate the status of Babinski reflex in different stages of HIE. In our study out of 38 neonates in HIE stage I, planter reflex was elicitable in 34 (89%) and in remaining 4 (11%) it could not be elicited.

Similarly it remain non elicitable in 44% and 91% in HIE stages II and III respectively. Many researchers have noticed that abnormality of planter reflex is of high clinical significance^{13,14}. Patients with abnormal planter reflex have significant association with many neurological conditions presenting later in life including cerebral palsy¹⁵⁻¹⁸.

Detailed neurological examination including examination of primitive reflexes can add in the diagnosis, prognosis and early intervention of high risk newborn where electroencephalography (EEG) and other neuro imaging facilities are not readily available.

Limitations

The sample size was small.

5. Conclusion

It is important to include the assessment of Babinski reflex along with other primitive reflexes in the newborn generally and especially in HIE.

Absence of Babinski reflex can be correlated with the increase in severity of HIE.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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