

## Early marker of motor developmental delay in preterm infants

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### Abstract

Early markers of motor delay which have been studied include antenatal characteristics of mother and perinatal variables like heart rate variability, responsiveness to stimulation, motor function, behavioral state and infant size.

**Keywords:** Developmental delay, General movements, Preterm infants.

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Nearly 10% of preterm babies develop severe motor impairments [1]. About 50% of very low birth weight preterm babies ( $\leq 1,500$  g) and extremely low birth weight preterm babies ( $\leq 1,000$  g) develop neuromotor disorders [2]. Mild motor delay occurs 3-4 times more in preterm babies as compared to term babies. Nearly 47% of very preterm have mildly delayed scores on Gross Motor Subscale of the Bayley III at 8-12 months corrected age and 29% score 1SD below mean on gross motor and 34% on fine motor scale of Bayley III at 2.5 years corrected age [3].

There are various screening tests for early diagnosis of motor abnormalities like DENVER II, Alberta Infant Motor Scale, Movement Assessment of Infants, Test of Infant Motor Performance, General Movements & Bayley II and III Scale. However symptoms of motor impairment like abnormalities of muscle tone, control, primitive reflexes, postural reactions and lack of inhibition of involuntary movement become evident only as the preterm baby matures to about 18- 24 months of corrected gestational age [4]. Early markers of motor delay which have been studied include antenatal characteristics of mother and perinatal variables like heart rate variability, responsiveness to stimulation, motor function, behavioral state and infant size. With the recent four-dimensional ultrasonography analysis of in utero fetal behaviour is possible as early as first trimester. Cranial ultrasound can detect germinal matrix and intraventricular hemorrhage, ventricular dilation and periventricular leukomalacia which are associated with motor impairment. MRI is useful to

differentiate white and gray matter injuries with greater sensitivity whereas Diffusion tensor magnetic resonance imaging can map white matter pathways. There is a high incidence of abnormal muscle tone observed among premature infants upto 18 months of age. Early truncal tone abnormalities are associated with a worse developmental outcome. Infants with Truncal hypertonicity and truncal or lower extremity hypotonicity at 3 months was associated with significantly poor Bayley motor and mental scores at 18 months [5]. Atypical early head, arm, leg, or trunk movements are red flag signs for motor developmental disorders.

Irritability, abnormal finger posture, spontaneous Babinski reflex, weakness of lower limbs, transient tone abnormalities and delay in achieving motor milestones are some of the neurological signs among high-risk preterm infants later associated with neuromotor delay. Without any sensory input, fetal and neonatal nervous system generates motor patterns like startles, twitches, stretching, yawning known as general movements. Prechtl et al., introduced a new approach to neurological evaluation based on spontaneous motor activity, rather than reflexes and evoked responses [6]. Abnormal General movements include hypokinesia, poor repertoire, abnormal or absent fidgety movements, chaotic and cramped synchronized General movements. Predominant cramped movements has 100% sensitivity and around 93% specificity for predicting motor delay [7]. Spontaneous activity has been found to be more sensitive of brain dysfunction than reactivity to sensory stimuli. Visual gestalt perception is a new

technology to detect alterations in the movements and absent fidgety movements are associated with severe motor deficits. Background electroencephalograms and monitoring maturation of certain rhythmic theta activity termed “temporal sawtooth” has been shown to identify neuromotor abnormalities in preterm infants. A novel method of neonatal motor assessment has been developed by analysis of intraoral sucking pressures and infant’s control while feeding and preterm infants who sucked irregularly had delayed motor development [8]. A recent study has shown that babies who were more fussy in prone position had significantly higher rate of motor delays than infants who spent longer in prone which could be used as a marker for the early identification of motor delays [9]. Studies have shown that poor ability to lift head in prone and align head with body during pull-to-sit at term and 12 weeks CGA were associated with motor delays at one year [10] and Kinematic measurements of head control in early infancy help as an objective quantitative marker of future motor impairment. In this issue Diwanmal SB studied to determine the effectiveness of Test of Infant Motor Performance (TIMP) in detecting motor developmental delay in preterm infants. TIMP and Alberta Infant Motor Scale (AIMS) are equally useful in the assessment of infant motor performance at 4 months of corrected age [11].

**Funding:** Nil, **Conflict of interest:** None initiated,  
**Perission from IRB:** Yes

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How to cite this article?

Rabindran, Gedam D. S. Early marker of motor developmental delay in preterm infants. *J Pediatr Res*. 2017; 4(09):544-545. doi:10. 17511/ijpr.2017.i09.01.

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