

CASE REPORT

# Visual stimulation to improve visual fixation and tracking in a late preterm infant: A case report



Anees Ahmed Farooq Mohammed<sup>1</sup>  | Deepika Dhanachezian<sup>1</sup>  |  
Vignesh Srinivasan<sup>2</sup>  | Keren Christiana Dominic Savio<sup>1</sup> 

<sup>1</sup>Department of Paediatric and Neonatal Sciences, Saveetha College of Physiotherapy, Saveetha Institute of Medical and Technical Sciences, Chennai, India

<sup>2</sup>Department of Neurosciences, Saveetha College of Physiotherapy, Saveetha Institute of Medical and Technical Sciences, Chennai, India

## Abstract

**Background:** Late preterm babies, born between 34 and 36 weeks of gestation, are susceptible to mild visual and neurobehavioral problems because they undergo a vital phase of visual system development outside the intrauterine environment. This study aims to examine the effectiveness of visual stimulation in a late preterm infant.

**Case description and management:** A 4-month-old child was brought by the parent with complaints of reduced visual tracking and fixation. Clinical findings met ICD-10 criteria for late preterm birth, a disorder related to neurological and sensory system immaturity. The infant received four sessions per week for 4 weeks, each lasting for 5–10 minutes. The intervention included black-and-white cards, toy or rattle tracking, dim light tracking, and high-contrast geometric patterns. Baseline assessment using the Hammersmith Infant Neurological Examination (HINE) and the Visual Tracking Assessment revealed reduced neurobehavioral organisation and poor visual tracking, with scores of 23/78 on HINE and 6 on the visual tracking assessment. Following four weeks of visual stimulation intervention, the scores improved to 51/78 on the HINE and 14 on the Visual Tracking Assessment, indicating improved visual fixation, tracking, and neurobehavioral response.

**Conclusion:** This case demonstrates that visual stimulation can effectively enhance visual fixation and tracking in the late preterm infants.

### Correspondence

Anees Ahmed Farooq Mohammed  
fmanees04@gmail.com

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## Key messages

Visual impairment in infants leads to impaired visual fixation and a lack of visual tracking. Here we report that visual stimulation enhances cognitive function, focus and coordination, thereby improving visual tracking. It offers an effective, non-pharmacological approach to managing visual impairment in late preterm infants.

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## Introduction

Late preterm newborns, typically classified as babies born between 34 and 36 weeks of pregnancy, constitute a substantial and growing proportion of preterm births nationwide [1]. Although often regarded as nearly equivalent, there is increasing evidence that individuals remain vulnerable to minor neurodevelopmental immaturities, such as those affecting sensory processing, attention regulation, and visual functions. For example, low-risk late preterm newborns performed less maturely than term infants on tasks like assessing attention from a distance, distinguishing striped targets, and identifying vertical and arc patterns tracking [2, 3]. Compared to full-term newborns, late preterm infants perform less maturely in activities including vertical and arc tracking, and awareness at distance [4]. Moreover, they have problem of visual fixation and tracking [5].

## Case description and management

A 4-month-old late preterm child was brought in with the parent, complaining of reduced visual tracking and visual fixation. The study was conducted with the approval of Clinical Trial Right of India from 9 December 2025 to 12 January 2026. Written informed consent was obtained from the parent for participating in the study and publication of data. Intervention and assessment were conducted at a multispecialty hospital in Chennai, India. Clinical findings met ICD-10 criteria for a late preterm born, a disorder associated with the neurological and sensory systems' relative immaturity. The baby had difficulty following moving visual stimuli and demonstrated a limited capacity to focus on faces and other objects. There was no history of genetic problems, seizures, congenital abnormalities, or serious neonatal difficulties. The infant was deemed clinically stable after a routine pediatric and neurological assessment revealed no red flags. Caregiving was acceptable and consistent, and the psychosocial history was unremarkable.

At baseline, the Hammersmith Infant Neurological Examination (HINE) and Visual Tracking Assessment were used to assess neurobehavioral functioning and visual response. The assessments at both baseline and post-intervention were conducted by the same trained physiotherapist to ensure consistency in evaluation [6]. Reduced tracking ability, delayed visual fixation, and immature neurobehavioral responses were observed during the baseline evaluation. The HINE score was 23/78, and the Visual Tracking Assessment score was 6, indicating poor visual fixation and immature neurobehavioral organisation. Four weekly sessions, each lasting 5–10 minutes, were held. The baby's mother was trained on how to carry out the activities consistently and properly. The mother was advised to wear black lipstick, a large dark bindi, and dramatic eyeliner before each session to increase facial contrast and take advantage of the newborn's natural preference for high-contrast visual cues. This enhanced the baby's ability to focus on and respond to facial signals.

Week 1 focused on exposing the baby to simple visual stimuli and promoting visual fixation. Black-and-white cards, toy or rattle tracking, dim flashlight tracking, and exposure to high-contrast geometric patterns were among the activities. To encourage persistent concentration, the geometric patterns and cards were displayed at eye level from 10 to 16 inches. To start visual tracking, the toy and the dim flashlight were moved slowly in both horizontal and vertical directions. The objectives of this stage were to increase the infant's capacity for fixation, promote early visual attention, and familiarise them with controlled visual stimuli.

Week 2 concentrated on improving visual tracking and boosting attention span. To encourage coordinated eye movements, the same exercises were repeated with slightly longer and more effective tracking motions. Contrast sensitivity was enhanced using high-contrast patterns and black-and-white cards, while smooth pursuit was developed through flashlight and toy tracking activities.

Week 3 concentrated on improving tracking over more complex visual surfaces and maintaining visual engagement. While dim flashlight and toy tracking involved both horizontal and vertical movements with slow shifts across the midline, high-contrast geometric patterns were displayed with brief pauses to encourage sustained focus. To enhance visual discrimination and attention, black-and-white cards were used. This stage aimed to improve visual responses, midline crossing, and more fluid visual pursuit.

Week 4 focused on consolidating and integrating the visual skills learned in prior weeks. To promote sustained attention, improved fixation, and coordinated tracking, all visual stimulation exercises were carried out in a structured sequence. During face-to-face interactions with the mother, the newborn demonstrated increased visual engagement and attention. The aims of this final stage were to optimise visual responses, enhance visual-social interaction, and support early visuomotor development [7, 8].

Throughout the four-week programme, the infant was attentively observed for signs of stress, including yawning, finger splaying, gaze aversion, or colour changes. The intervention was well tolerated, with no adverse reactions observed. At the end of the four-week intervention, reassessment demonstrated improvement in both neurobehavioral organisation and visual function. The HINE score improved from 23/78 at baseline to 51/78, while the Visual Tracking Assessment score increased from 6 to 14, indicating enhanced visual fixation, improved attention to visual stimuli, and smoother horizontal and vertical tracking.

The mother expressed satisfaction with the visual stimulation programme, noting enhanced awareness, improved object tracking, and improved visual fixation. The activities improved the mother-infant relationship, were simple to carry out, and the baby tolerated them well.

## Discussion

In the present case, visual stimulation resulted in notable improvements in neurobehavioral and visual function, as evidenced by increases in the HINE score from 23/78 to 51/78 and the Visual Tracking Assessment score from 6 to 14 following four weeks of intervention. These findings are consistent with previous studies that reported improvements in visual attention and tracking abilities in preterm infants following early sensory stimulation programmes [9]. However, most previous studies involved larger sample sizes or randomised designs, whereas the present report highlights the clinical response observed in a single late preterm infant. Early intervention increased the likelihood that infants would perform well on a variety of tests testing visual attention, contrast discrimination, tracking arcs, and ocular movement [10].

These results demonstrate the potential of specialised therapies to accelerate visual function components essential for neurological development. High-contrast geometric patterns, stationary and dynamic stimuli (such as black-and-white cards, dim light tracking, and toy tracking), and the current visual stimulation programme for a late preterm infant are all in line with research that has demonstrated that contrast stimuli and interaction with moving targets can strengthen pathways involved in fixation and pursuit. However, further research is necessary to corroborate it [5, 9]. Although our study had a limitation of short-term follow-up, we suggest that visual stimulation improves neurobehavioural and visual functions in late preterm babies.

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## Author contributions

*Manuscript drafting and revising it critically:* DD, AAFM, VS, KCDS. *Approval of the final version of the manuscript:* AAFM, VS. *Guarantor accuracy and integrity of the work:* AAFM, VS.

## Conflict of interest

We do not have any conflict of interest.

## Data availability statement

We confirm that the data supporting the findings of the study will be shared upon reasonable request.

## Supplementary file

None

## AI disclosure

The visual abstract was designed and generated using Gemini 3 Flash to synthesize study data into a graphical format. The final output was reviewed and verified for clinical accuracy by the authors.

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