



Contents lists available at ScienceDirect

Research in Developmental Disabilities

journal homepage: www.elsevier.com/locate/redevdis

Developmental assessment of preterm infants: Chronological or corrected age?



Ayelet Harel-Gadassi^a, Edwa Friedlander^b, Maya Yaari^b, Benjamin Bar-Oz^c, Smadar Eventov-Friedman^c, David Mankuta^d, Nurit Yirmiya^{b,*}

^a School of Education, The Hebrew University of Jerusalem, Mount Scopus, Jerusalem, 9190501, Israel

^b Department of Psychology, The Hebrew University of Jerusalem, Mount Scopus, Jerusalem, 9190501, Israel

^c Department of Neonatology, Hadassah University Hospital, Jerusalem, 91120, Israel

^d Department of Obstetrics & Gynecology, Hadassah University Hospital, Jerusalem, 91120, Israel

ARTICLE INFO

Number of reviews completed is 2

Keywords:

Cognitive development
Mullen scales of early learning
Corrected age
Chronological age
Preterm infants

ABSTRACT

The aim of this study is to examine the effect of age correction on the developmental assessment scores of preterm infants, using for the first time, the Mullen scales of early learning (MSEL) test. Participants included 110 preterm infants (born at a gestational age of ≤ 34 weeks) at ages 1, 4, 8, 12, 18, 24 and 36 months. The corrected age-based MSEL composite score and each of the five MSEL scale scores were significantly higher than chronological age-based scores at all ages. These corrected scores were significantly higher than the chronological scores regardless of gestational age whether weight was, or adequate or small for gestational age. Larger differences between corrected and chronological age-based scores significantly correlated with earlier gestational age and with lower birth weight between 1 and 24 months but not at 36 months. Using chronological age-based scores yielded significantly more infants identified with developmental delays than using corrected age-based scores. The findings indicate that clinicians and researchers, as well as family members, should be aware of and acknowledge the distinction between corrected and chronological ages when evaluating preterm infants in research and clinical practices.

What this paper adds?

The use of corrected or chronological age-based scores in developmental assessment of preterm children is important in both clinical and research practices. Contradicting recommendations are given regarding the age at which correction for age should no longer be used, in particular regarding ages 24 and 36 months. Most researchers addressed corrected/chronological age in assessment of preterm infants (PT) at only one or two points in time, and none administered the Mullen scales of early learning (MSEL) test. We therefore evaluated the differences between chronological and corrected scores from 1 to 36 months, using the MSEL for the first time at 1, 4, 8, 12, 18, 24, and 36 months, with a sample of 110 PT infants. We examined differences between chronological and corrected scores with respect to overall cognitive score as well as the individual scales. In addition, we examined this difference among 3 gestational age based groups, according to the conventional categories based on the level of neonatal immaturity (i.e. extremely preterm (EPT) < 28 weeks GA, very preterm (VPT) 28–31 weeks GA, moderate preterm (MPT) 32–34 weeks GA), and among PT infants with weight adequate for gestational age versus PT infants small for gestational age. Our data is clear that corrected scores should be used up to age 3 years. This is particularly important for infants born very early and/or with a very low birth weight.

* Corresponding author.

E-mail address: NuritYirmiya@huji.ac.il (N. Yirmiya).

<https://doi.org/10.1016/j.ridd.2018.06.002>

Received 13 August 2017; Received in revised form 19 February 2018; Accepted 7 June 2018

0891-4222/© 2018 Published by Elsevier Ltd.

1. Introduction

According to the World Health Organization (World Health Organization, 2012), preterm (PT) born babies are those born alive before the completion of 37 weeks of pregnancy. The incidence of PT deliveries and the survival rate of PT newborns are rising due to technological improvements in obstetrics and neonatology (Arpino et al., 2010). However, a PT infant's immature brain, lungs, gastrointestinal tract, and skin are particularly susceptible to injury and less-than-optimal development and function, which frequently leads to long-term neurological and health problems (Sutton & Darmstadt, 2013) as well as to developmental and cognitive impairments (Johnson & Marlow, 2006). While previous data indicate that PT infants perform worse on developmental tests and exhibit higher rates of intellectual disability ($IQ < 70$) than their full-term (FT) peers (Arpino et al., 2010; Baron & Rey-Casserly, 2010; Sansavini, Guarini, & Caselli, 2011; Sutton & Darmstadt, 2013), not all researchers take into account the impact of age correction when conducting developmental assessments (Van Veen, Aarnoudse-Moens, van Kaam, Oosterlaan, & van Wassenaer-Leemhuis, 2016). Thus, the lower developmental test scores of PT infants compared to FT infants may stem from an underestimation of their capacities due to the use of chronological rather than corrected age-based scores (hereafter referred to as chronological and corrected scores). The aim of this study is to examine the effect of age correction on PT infants' developmental test scores during the first 3 years of life.

Beginning in the 1930s, there has been an increasingly common clinical practice of using corrected age for PT infants and children to account for their prematurity (Lems, Hopkins, & Samson, 1993; Miller, Dubowitz, & Palmer, 1984; Wilson & Cradock, 2004). Full-term pregnancy is defined as 40 weeks of gestation (Engle, 2004); therefore, corrected age is calculated by subtracting the number of weeks a child was born prematurely to her/his chronological age. For example, the corrected age of a chronologically aged 18-month-old PT infant born 2 months early, is 16 months because the 2 months that the infant was born prematurely are included in the chronological age (duration of time from birth). However, there are contradicting recommendations regarding the age at which correction for age should no longer be used, in particular regarding ages 24 and 36 months (Bernbaum, Campbell, Imaizumi, & McInerney, 2008; Engle, 2004). Furthermore, it is not specified under which circumstances this should be done, or whether it is recommended only for particular gestational ages (GAs).

The theoretical basis underpinning this practice is the biological and maturational perspective, which suggests that early development continues after conception (contra birth), either intra- or extra uterine (Roberts et al., 2013; Sansavini et al., 2011). Therefore, correction for the degree of prematurity was devised to decrease the transient developmental gap that PT infants experience until they catch up with their FT peers. Conversely, the environmental perspective, which places more emphasis on the role of external, post-delivery factors in PT infants' development, favors the use of chronological age (Restiffe & Gherpelli, 2006; Wilson & Cradock, 2004) arguing that children compensate for their preterm birth by environmental factors and thus what matters is mostly the postnatal (chronological) age.

The use of chronological scores in assessing infants may disadvantage PT infants, as their greater immaturity in relation to their postmenstrual age may lead to underestimating their true developmental status. This can have clinical implications, as PT infants are more likely to be suspected of functioning at a lower-than-average developmental level when they are, in fact, conforming to what is expected of their age bracket or their delay may be smaller than reported. Thus, they might be referred for unnecessary specialist prevention and intervention services, thereby placing additional strains on already overstressed families and limited services. Diagnoses which rely on incorrect evaluation of age may also cause parents unnecessary anxiety and stress and lower the child's self-esteem. Conversely, correcting for prematurity may lead to an overestimation of PT infants' developmental progress, with more PT infants being classified in the normal or relatively high average range, which may potentially mask possible developmental delays and lead to appropriate interventions being deferred (D'Agostino et al., 2013; Restiffe & Gherpelli, 2006; Van Veen et al., 2016; Wilson-Ching, Pascoe, Doyle, & Anderson, 2014).

Recently, researchers who examined the use of corrected versus chronological age reported that corrected IQ scores were significantly higher than chronological IQ scores among extremely PT infants at the ages of 5 and 8 years, using the Wechsler Preschool and Primary Scale of Intelligence, third Edition, and the Wechsler Intelligence Scale for Children- Fourth Edition. The same pattern of results emerged among late PT infants at the age of 2 years, who were examined using the Bayley Scales of Infant and Toddler Development, Third Edition (BSID-III), with the difference between corrected and chronological scores significantly larger at lower GAs (Parekh et al., 2016; Roberts et al., 2013; Van Veen et al., 2016). Using the BSID-III, Ionio et al. (2016) found a significant difference between corrected and chronological scores, with this difference negatively correlated with GA at 2 years, but not at 3 years, among PT infants. With respect to the diagnosis of developmental delays, controversial findings were reported: Roberts et al. (2013), applying both corrected and chronological ages, reported that none of the extremely PT children in their study fell within the intellectual disability range ($IQ < 70$) at 5 years. Furthermore, at the age of 8 years, the difference between the percentages of children identified as having intellectual disabilities when using corrected compared with chronological scores was not statistically significant. In contrast, Parekh et al. (2016) reported that a significantly greater number of the late PT infants the authors studied were classified as having developmental delays ($IQ < 80$) when assessed on the basis of chronological rather than corrected age at 2 years.

In the aforementioned studies, developmental assessments were conducted at only one or two points in time. Thus, rather than using collected data from actual participants, Wilson-Ching et al. (2014) examined simulated developmental assessment scores between the ages of 6 months and 16 years. Their findings indicate that the absolute decrease in scores based on chronological as compared to corrected age was greater with increased degree of prematurity, younger ages at assessment, and higher baseline scores, this difference in performance remained significant beyond the age of 3 years.

Download English Version:

<https://daneshyari.com/en/article/6848093>

Download Persian Version:

<https://daneshyari.com/article/6848093>

[Daneshyari.com](https://daneshyari.com)