



Infants with Down syndrome: Percentage and age for acquisition of gross motor skills

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ABSTRACT

The literature is bereft of information about the age at which infants with Down syndrome (DS) acquire motor skills and the percentage of infants that do so by the age of 12 months. Therefore, it is necessary to identify the difference in age, in relation to typical infants, at which motor skills were acquired and the percentage of infants with DS that acquire them in the first year of life. Infants with DS ($N = 20$) and typical infants ($N = 25$), both aged between 3 and 12 months, were evaluated monthly using the AIMS. In the prone position, a difference of up to 3 months was found for the acquisition of the 3rd to 16th skill. There was a difference in the percentage of infants with DS who acquired the 10th to 21st skill (from 71% to 7%). In the supine position, a difference of up to one month was found from the 3rd to 7th skill; however, 100% were able to perform these skills. In the sitting position, a difference of 1–4 months was found from the 1st to 12th skill, ranging from 69% to 29% from the 9th to 12th. In the upright position, the difference was 2–3 months from the 3rd to 8th skill. Only 13% acquired the 8th skill and no other skill was acquired up to the age of 12 months. The more complex the skills the greater the difference in age between typical infants and those with DS and the lower the percentage of DS individuals who performed the skills in the prone, sitting and upright positions. None of the DS infants were able to stand without support.

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1. Introduction

Down syndrome is a genetic change responsible for causing delay in motor development. For this reason, in the last 20 years, researchers have attempted to characterize the development of children with this syndrome, describing the acquisition of various motor skills such as manual reaching (Campos, Francisco, Savelsbergh, & Rocha, 2011; Campos, Rocha, & Savelsbergh, 2010; Charlton, Ihsen, & Oxley, 1996); kicks (McKay & Angulo-Barroso, 2006; Ulrich & Ulrich, 1995), postural control (Haley, 1986, 1987; Nishizawa, Fujita, Matsuoka, & Nakagawa, 2006; Polastri & Barela, 2002, 2005; Shumway-Cook & Woollacott, 1985; Tudella, Pereira, Basso, & Savelsbergh, 2011); and gait (Agiouvasitis et al., 2011; Angulo-Barroso, Wu, & Ulrich, 2008; Hampton, Stasko, Kale, Amende, & Costa, 2004; Mauerberg-Castro & Angulo-Klinzler, 2000).

Infants with Down syndrome have delayed acquisition of fundamental motor patterns such as rolling, sitting and crawling. Few studies have reported the diversity and details of the acquisition of motor skills performed in prone and supine

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(horizontal), sitting and standing (vertical) positions during the first year of life (Dyer, Gunn, Rauh, & Berry, 1990; Palisano et al., 2001; Tudella et al., 2011). An earlier study conducted by Tudella et al. (2011) concluded that during the first year, subscale and total AIMS scores were lower in infants with Down syndrome than in typical infants, demonstrating that the former had a slower development rate. However, to date, there are no literature studies that describe the minimum and maximum ages required for infants with Down syndrome to acquire each motor skill at the different positions, in accordance with the AIMS, or the percentage of infants that were able to perform these skills by the age of 12 months.

The AIMS is a widely used scale to assess gross motor development in infants, identifying motor delays or deviations from birth to the development of independent gait. This scale describes not only simple motor skills such as those observed in prone and supine positions, but also more complex ones performed when standing (Piper & Darrah, 1994). Furthermore, it identifies the moment at which motor skills begin and when they are incorporated into the infant's motor repertoire.

In this respect, the present study aimed to identify the difference in age, compared to typical infants, at which those with Down syndrome acquire gross motor skills and the percentage who have acquired these skills in prone and supine (horizontal) and sitting and standing (vertical) positions from 3 to 12 months of age.

Importantly, in clinical practice, therapists have stimulated infants and children with Down syndrome in order to minimize motor delay. Knowing the age for acquisition of motor skills in these infants could provide important contributions to scheduling therapy according to capacities and deficiencies expected at each position and age, resulting in evidence-based interventions.

The hypothesis of this study is that, when compared to typical infants, those with Down syndrome take longer to acquire the skills in the prone and supine positions and are not able to perform all motor skills for the sitting and standing positions described in AIMS by the age of 12 months.

2. Materials and methods

This is a longitudinal study with a non-probabilistic convenience sample. Infants were divided into two groups: (1) experimental group: infants with Down syndrome and (2) control group: typical infants. Infants in the experimental group were recruited from rehabilitation institutions in three different cities in the state of Sao Paulo and typical infants from Basic Health Units. Study sample composition is shown in Fig. 1.

As inclusion criteria, it was established that both groups should be healthy and have no neurological, sensory or orthopedic alterations unrelated to Down syndrome in the case of the experimental group.

The Down syndrome group consisted of 20 infants (11 girls), with Apgar score of 7 or 8 in the first minute and 7 or 9 in the 5th minute. The average weight and length at birth was 2.832 g (± 0.682) and 45.92 cm (± 4.60), respectively. All infants in this group underwent physiotherapy during data collection, based on both the Bobath concept and the Sensory Integration method.

The group of typical infants was composed of 25 babies (10 girls), with Apgar score of 8 or 9 in the 1st minute and 9 or 10 in the 5th minute. The average weight and length at birth were 3266 g (± 431) and 48.68 cm (± 2.49), respectively.

Infants who missed more than three consecutive evaluations were excluded.

The study was approved by the Research Ethics Committee of the University and all parents/guardians gave their informed consent.

2.1. Materials

Babies were evaluated using the Alberta Infant Motor Scale, a validated scale to assess infants from birth to achieving independent gait and identify risks of developmental delay. It is an observational instrument that assesses the infant's motor behavior in supine (9 skills), prone (21 skills), sitting (12 skills) and standing (16 skills) subscales. Each subscale contains a

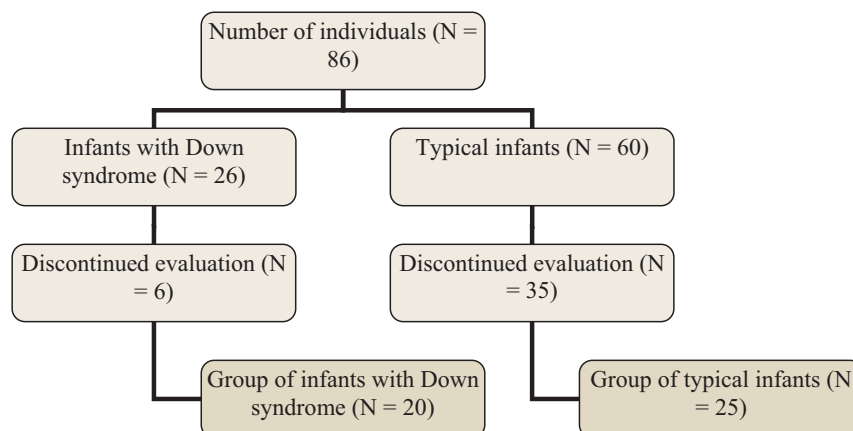


Fig. 1. Study sample composition.

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