



## **Growth charts for breastfed babies**

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**G**rowth charts are essential items in the pediatric toolkit. Their value resides in helping to determine the degree to which physiological needs for growth and development are being met during the important childhood period. However, as rightly pointed out in the article by Marques and colleagues published in this issue,<sup>1</sup> the interpretation of the growth trajectory of breastfed infants, commonly used to assess lactation adequacy and to advise on when to introduce complementary foods, is highly dependent on the reference data used. The accuracy of feeding advice may be erroneous if the reference growth charts used do not adequately represent the physiological growth pattern of breastfed infants.

The growth reference currently recommended for international use – the National Center for Health Statistics/World Health Organization (NCHS/WHO) reference – was recognized as having a number of drawbacks related to the origin and type of data that makes it inappropriate for assessing the growth of breastfed infants.<sup>2</sup> One of its most important limitations is that it is based on North American, predominantly formula-fed infants whose pattern of growth has been demonstrated to deviate substantially from that of healthy breastfed infants.<sup>3</sup> The divergence between the pattern of growth of healthy breastfed infants and other national growth references that – like NCHS/WHO – are also largely based on formula-fed infants has recently been documented.<sup>4,5</sup> The inconsistency between current growth charts and infant feeding guidelines that recommend breastfeeding as the optimal source of nutrition during infancy<sup>6,7</sup> is a cause of great concern. There is a strong case for breastfed baby growth references. In countries, such as Brazil, where guidelines on infant feeding recommend exclusive breastfeeding as the optimal source of nutrition for the first six months of life, practitioners

should use anticipatory guidance to warn parents about the imperfections of the growth standards in current use. Otherwise they risk spending consultations during the first few months trying to reassure parents that their infants' apparently faltering growth is not a reason for concern (or worse, investigating possible failure to thrive and supplementing with formula), rather than congratulating parents on having exclusively nursed their infants.

Recognizing the shortcomings of the NCHS/WHO international growth reference, in 1994 WHO began planning for new standards that, unlike the current reference, will be based on an international sample of healthy breastfed

infants and will portray how children *should* grow in all countries rather than merely describing how they grew at a particular time and place.<sup>8</sup> The WHO Multicentre Growth Reference Study (MGRS), undertaken between 1997 and 2003, focused on the collection of growth and related data from approximately 8,500 children from widely differing ethnic backgrounds and cultural settings, including a sample of children from Brazil.<sup>9</sup>

In brief, the design of the MGRS combined a longitudinal study from birth to 24 months with a cross-sectional study of children aged 18–71 months. Study subpopulations had socioeconomic conditions favorable to growth, low mobility,  $\geq 20\%$  of mothers following feeding recommendations and access to breastfeeding support. Individual inclusion criteria consisted of no health or environmental constraints on growth, adherence to MGRS feeding recommendations, no maternal smoking, single term birth and absence of significant morbidity. In the longitudinal study, mothers and newborns were screened and enrolled at birth and visited at home 21 times: during weeks 1, 2, 4, and 6 and then monthly from 2–12 months and bimonthly in their second year. In addition to the data collected on anthropometry and motor development, information was gathered on socioeconomic, demographic and environmental characteristics, perinatal factors, morbidity, and feeding practices.<sup>8</sup> The Brazilian site, located in Pelotas, served as the pilot site and played an important role in the overall international study.

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Compared to other, smaller studies describing the growth of breastfed babies, the MGRS has the advantage of starting from a well-defined population basis and of having explicit inclusion and exclusion criteria, highly standardized measurements and quality control, and very high rates of follow-up (in Pelotas, for example, 96% of the newborn infants recruited into the study were followed up until they were 6 months old, 94% up to 12 months, and 91% up to 24 months of age).

Based on these new data, a number of growth standards will be constructed that will have a number of innovative characteristics when compared to existing growth charts. First, the MGRS was designed to provide data that describe "how children *should* grow", by making the study's selection criteria include specific health-related behavior that is consistent with current health promotion recommendations (e.g., breastfeeding norms, standard pediatric care, and non-smoking requirements). This new approach is fundamentally different from that taken by the traditional descriptive references. By adopting a *prescriptive* approach, the protocol's design went beyond an update of how children in presumably healthy populations grow at a specific time and place and explicitly recognizes the need for *standards* (i.e., devices that enable value judgments by incorporating norms or targets in their construction). Arguably, the current obesity epidemic in many developed countries would have been detectable earlier if a prescriptive international reference had been available 20 years ago.

Another key characteristic of the new reference is that it makes breastfeeding the biological "norm" and establishes the breastfed infant as the normative growth model. Health policies and public support for breastfeeding will be strengthened when breastfed infants become the reference for normal growth and development.

Third, the pooled sample from the six participating countries (Brazil, Ghana, India, Norway, Oman and the USA) will allow the development of a truly international reference (in contrast to the present international reference that is based on children from a single country) and reiterate the fact that child populations grow similarly across the world's major regions when their health and care needs are met.

Fourth, the wealth of data collected will allow the replacement of the current international references on attained growth (weight-for-age, length/height-for-age, and weight-for-length/height) and the development of new references for triceps and subscapular skinfolds, head and arm circumferences, and body mass index. These innovative references are particularly useful for monitoring the increasing epidemic of childhood obesity, which seems to be particularly severe in Latin America.

Fifth, the study's longitudinal nature will also allow the development of growth velocity standards. Pediatricians will not have to wait until children cross an attained growth threshold to make the diagnosis of under- or over-nutrition since velocity references will

enable the early identification of children in the process of becoming under- or over-nourished.

Lastly, the development of accompanying motor development reference data will provide a unique link between physical growth and motor development. The main drawback of the new growth curves, however, is that they will cover children only up to 5 years of age. The need to expand this effort to older children is evident.

The completion of weight, length, and head circumference references are anticipated before the end of 2005. The remainder of the references should be ready by 2006.<sup>8</sup> Of particular concern is a smooth global transition to the new references by countries that currently use the NCHS/WHO growth references. A recent worldwide survey of national practices in the use and interpretation of growth charts indicate that the process of replacing existing growth charts must go beyond simply changing charts, revisiting growth monitoring practices as a whole.<sup>10</sup> Intensive training efforts at all levels will be required to overcome the difficulties health professionals experience with the use and interpretation of growth curves and to disseminate knowledge about effective interventions to prevent or treat either excessive or inadequate growth at both individual and population levels.

The low rates of exclusive breastfeeding worldwide have raised doubts about the practicality of recommending a child diet that is practiced so infrequently. However, recent evidence demonstrates that breastfeeding counseling given in hospitals and in the community is a cost-effective way of increasing exclusive breastfeeding rates.<sup>11-16</sup> Experience from the WHO Multicentre Growth Reference Study confirms this observation in a Brazilian setting.<sup>17</sup> The greater effectiveness observed in trials of support in communities with high levels of breastfeeding take up may indicate that an early culture of breastfeeding acts synergistically with the provision of extra support.<sup>15</sup> It would appear that strategies that depend mainly on face-to-face support appear more effective than those that rely primarily on telephone contact.<sup>15</sup> Clearly, support to mothers must continue after hospital discharge and must include guidance on breastfeeding techniques and ways to resolve problems that occur.<sup>16</sup>

Virtually all mothers can breastfeed provided they have accurate information, and support within their families and communities and from the health care system. The greatest challenge - and the only way we can achieve successful breastfeeding counseling programs - is how to understand the many factors that determine exclusive breastfeeding in different settings. These include: 1) national breastfeeding policies; 2) socioeconomic and cultural factors (medical attitudes, commercial advertising, family pressures, maternal work demands, women's employment legislation, and maternal beliefs); 3) biological factors (infant size and sex, growth rate and development, interest/desire, appetite, and maternal lactation capacity); and 4) local epidemiology of HIV/AIDS. The implementation of large-

scale breastfeeding counseling programs will demand substantial resources and political commitment. Ideally, breastfeeding support should be provided as part of routine health service provision. This implies the need to train skilled health workers, lay and peer counselors, and certified lactation consultants, who can help to build mothers' confidence, improve feeding technique, and prevent or resolve breastfeeding problems. Similarly, women in paid employment will require minimum enabling conditions to prolong the duration of exclusive breastfeeding, such as paid maternity leave, part-time work arrangements, on-site nurseries, facilities for expressing and storing breast milk, and breastfeeding breaks.

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