Comparison of Toddler Crown Rump Length and Leg Length in Four Low- and Middle-Income Research Sites: The Women First trial

Gabrielle Glime,[1] Ana Garces,[2] Lester Figueroa,[2] Antoinette Tshefu,[3] Adrien Lokangaka,[3] Shivaprasad Goudar,[4] Sangappa Dhaded,[4] Sarah Saleem,[5] Sumera Aziz Ali,[5] Jennifer Kemp,[1] Jamie Westcott,[1] Nancy Krebs,[1] and Michael Hambidge[1]

[1]University of Colorado School of Medicine; [2]Institute of Nutrition in Central America and Panama (INCAP); [3]Kinshasa School of Public Health; [4]Jawaharlal Nehru Medical College, KLE Academy of Higher Education and Research; and [5]Aga Khan University

Objectives: Length at 2y of age is a strong indicator of adult height and potential for other adverse effects in adulthood; leg length (LL) is suggested to be the more nutritionally responsive component of height. These analyses examine body proportions- measured as linear crown rump length (CRL), LL, and CRL: LL- among 24 mo old children from four low- and middle-income settings with high stunting rates (average across 4 sites = 65%) participating in the Women First Preconception Maternal Nutrition Trial (WF).

Methods: The WF study is a nutrition intervention trial of maternal-child pairs in four diverse research sites (Democratic Republic of the Congo [DRC], Guatemala, India, and Pakistan). At 24 mo of age, toddler length and CRL were obtained and subsequently used to calculate LL (length-CRL). ANOVAs with post hoc Tukey HSD for each parameter were performed in JMP Pro 16.0.0.

Results: No statistical differences were seen by maternal intervention arm, thus anthropometric data from 2,157 children (DRC n = 488, Guatemala n = 540, India n = 531, Pakistan n = 598) were explored by site. While mean (±SD) CRL did not significantly differ between Guatemala and India (48.9 ± 2.18, 48.9 ± 2.30cm), Pakistan and DRC (47.7 ± 2.52, 45.8 ± 2.22cm) had significantly lower mean CRL ($p < 0.001$), with DRC having the lowest value. Mean LL did not differ significantly between Guatemala and Pakistan (30.6 ± 1.74, 30.5 ± 2.21), nor between DRC and India (32.6 ± 2.28, 32.3 ± 2.01cm); however, DRC and India had significantly longer mean LL vs Guatemala and Pakistan ($p < 0.0001$). Statistically significant differences in mean CRL: LL ($p < 0.0001$) were observed among all four sites, with Guatemala exhibiting the largest mean (1.60 ± 0.09), attributable to shorter LL.

Conclusions: CRL and LL are indicative of proportionality, a measure of impaired growth. These data highlight that among the four research sites in the WF trial, Guatemala, which exhibits the highest rate of maternal stunting, has the least favorable body proportions (largest CRL: LL). The difference in body proportions between sites despite nutritional intervention warrants further examination of genomic and environmental (including nutritional) factors that may have an effect on anthropometrics such as LL, CRL, and CRL: LL.

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