

COMPARISON OF NEONATAL LENGTH MEASUREMENTS USING TAPE MEASURE VERSUS LENGTH BOARD

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PROCESS TO BE IMPROVED

For neonates requiring intensive care, growth is an expression of overall health, nutritional status and well-being. Neonatal length is a primary gauge of neonatal nutrition and forms the basis for treatment decisions. Existing evidence demonstrates inaccuracies in neonate length measurements between tape measure and length board.

BACKGROUND & SIGNIFICANCE

- Infants admitted to a neonatal intensive care unit (NICU) are often at a higher risk of dysfunctional growth, especially those born prematurely.
- Anthropometric measurements such as weight, head circumference and length are used to help determine an infant's nutritional status.
- Nurses do not receive any specialized training to ensure reliability.
- Length is reported as the most inaccurate of these anthropometric measurements
- Length is an increasingly important index for nutrition and associated disease.
- Weight alone cannot determine if the child's growth is stunted or wasted.
- Dysfunctional linear growth is associated with an increased risk of pathophysiology poor cognitive development and overall poor productivity in adulthood

*References available on request

METHODS

This single-group, quasi-experimental, repeated measures design was conducted in a NICU at a public academic medical center in a metropolitan area between March 2019 and January 2020.

- **Standard of care:** Weekly length using a tape measure. Raters were blinded to the weekly tape measure values.
- **Exclusion criteria:** Therapeutic hypothermia, were less than 600 grams, on high frequency oscillator ventilator, and/or critical, acute persistent pulmonary hypertension.
- Two-person research teams who were nurses trained on the procedure to use and clean the length boards (Ellard Instrumentation, Monroe, WA).
- Preemie and Newborn length boards used, depending on infant's size.
- **Length Board Training:** Return demonstration was performed by each research team member who served as rater. A rater was deemed 1) 'accurate' if the test measurement obtained was within 0.5 cm of the trainer's measurement and 2) 'precise' if a repeated measurement of the same neonate was within 0.5 cm of each other.
- The tape measure served as the standard comparison in this study.



DATA ANALYSIS

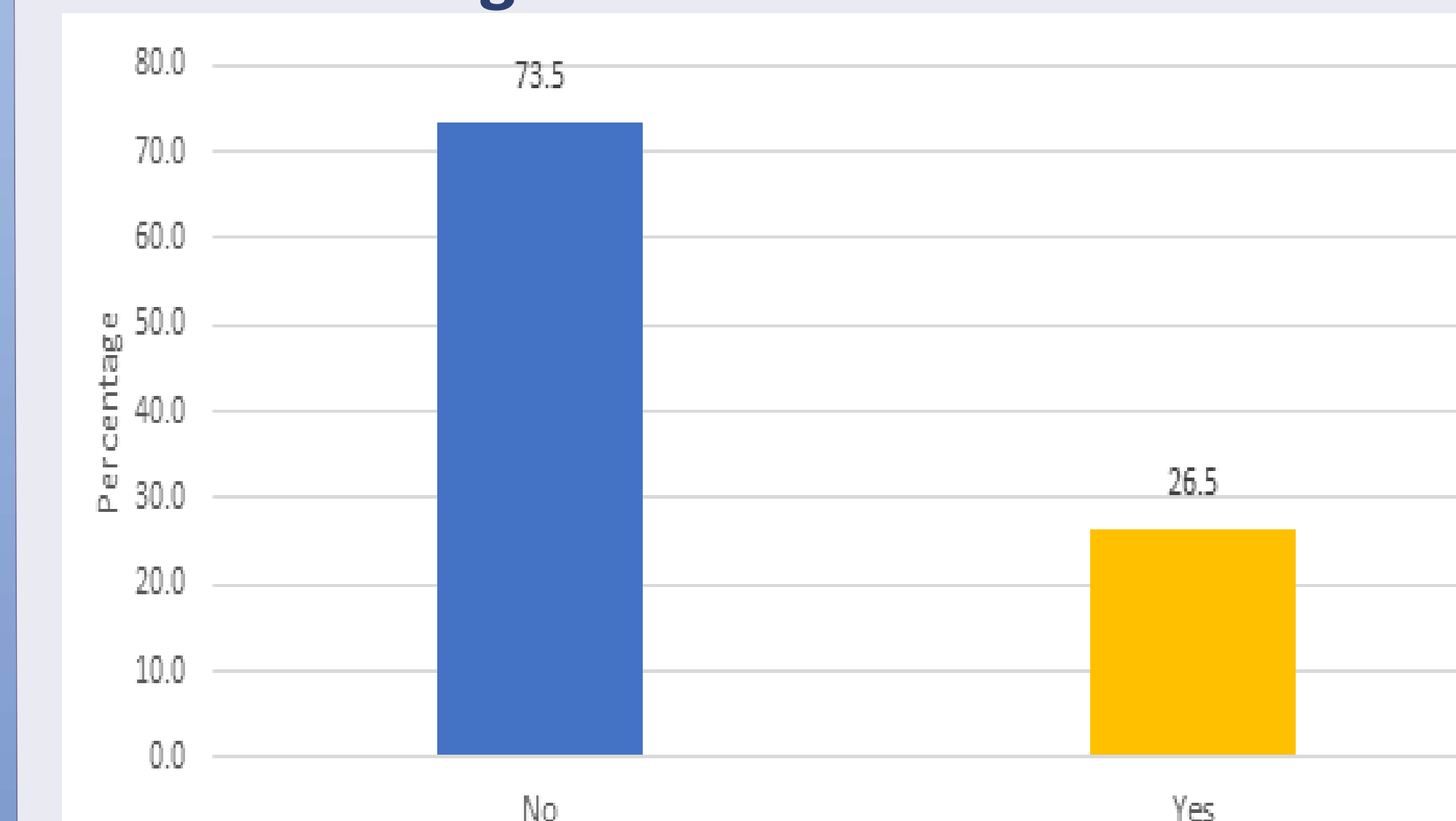
- Descriptive statistics were used to summarize the sample data.
- Continuous variables were presented as means and standard deviations, categorical variables were presented as frequencies and percentages. Significance level was set at $\alpha < 0.05$. Data were analyzed using Stata 16 (StataCorp, College Station, Texas).
- The main effect of measurement conditions and time were significant.
- Predicted length was 0.38 cm lower for lengthboard when compared to tape measure over time.
- Weighted kappa coefficient and intra-class correlation coefficient indicated good to excellent agreement.

RESULTS

Demographics	Sample (n = 108)
Maternal Age (years) †	34.75 ± 5.00
Gestational Age (weeks) †	35.58 ± 3.68
Gender ‡	
Male	64 (59.3%)
Female	44 (40.7%)
Birth Weight (g) †	2124.83 ± 881.69
Head Circumference (cm) †	31.13 ± 3.00

†Mean±SD for continuous measures; ‡N (%) for categorical measures
cm, centimeters; g, grams

Change in growth chart percentile category based on length board measurements



DISCUSSION

- To our knowledge, this is the first study to compare longitudinally agreement between length board and tape measure.
- There was a significant difference in the level of agreement between length board and tape measure over time.

IMPLICATIONS FOR RESEARCH

- Accuracy of an infant's length is a critical data point for evaluating growth and nutrition status.
- Physiologic and developmental outcomes are impacted by postnatal growth.