BACKGROUND

Genetic and environmental factors predominantly contribute to human stature (Batty et al., 2009) and the growth of its components: legs and trunk (Brenchley & Tanner, 1976; Azcorra et al., 2013). Disadvantageous circumstances, particularly early in life, affect leg growth more than trunk growth (Bogin et al., 2002), which is especially reflected in children suffering chronic malnutrition, through the manifestation of impaired leg growth (Azcorra et al., 2013). Photographic imaging may be used to assess height and its components (legs and trunk) in an accurate way. Nonetheless, inter- and intra-rater variations represent a potential source of error in this novel method.

OBJECTIVE

To determine the inter- and intra-rater reliability when using photographic imaging for the estimation of height (H), total length (TL), leg length (LL), and the trunk-to-leg ratio (TLR) in preschool children from the Western Highlands of Guatemala.

METHODS

1. Subjects: Photographs from 50 (height estimation exercise) and 60 (body segment estimation exercise) schoolchildren aged 4-7 years old were selected from a larger sample of 241 children recruited at private and public elementary schools located in the Departments of Sololá and Quetzaltenango, Guatemala. The study was approved by CeSSIAM Human Subjects Committee and parental informed consent was obtained.

2. Photographic images: Images were taken with a Nikon Coolpix L830 camera from a 3-m distance with the child standing sideways in front of a color-coded metric ruler and looking forward with a Frankfort plane gaze (Figure 1).

3. Height estimation from photographs: Height was estimated from paper print-out computer screen and compared to the gold standard stadiometer. A square ruler was made to use an angle on the photo print-out (Figure 2). The height value was read at the nearest 0.5 cm.

4. Total- and leg length estimation from photographs: Measurements were made with a plastic ruler by marking the crown of the head, the sole of the foot and a colored sticker on the photograph, which identified the iliac crest as the landmark of diapason of trunk and legs. Relative total length was determined by measuring the distance, in millimeters (mm), between the crown of the head and the sole of the foot. Relative trunk length was determined by the difference, subtracting leg length from total length.

5. Inter- and intra-rater reliability assessment: Image-derived H, TL, and LL were measured on 3 different occasions (rounds I, II, and III) by the same investigator (R1) for intra-rater correspondence and once by 2 other investigators (R2 & R3) for inter-rater reliability assessment.

RESULTS

The results from this study highlight strong inter- and intra-rater concordances for estimates of standing height and of body components derived from photographic Imaging. Thus, we are presenting an innovative method a promising tool for growth studies in humans.

REFERENCES

We would like to thank the staff and students from the Xolbé Elementary School in Sololá and El Clearmont, Villa Educativa, Pascual Bilingüe, Centro TeTe and Eco School Qanill in Quetzaltenango for supporting and participating in this study.

We are grateful to CeSSIAM’s staff in Quetzaltenango, especially with Elena Diaz, Deborah Fuentes and Rosario Saqui from UGV-Altiplano for their valuable contributions in the fieldwork at the Xolbé Elementary School in Sololá.

ACKNOWLEDGEMENTS

CONTACT INFORMATION:
Dr. Mónica Orozco
Center for Studies of Sensory Impairment Aging and Metabolism —CeSSIAM—Guatemala City, Guatemala
mmorozco@uvg.edu.gt

Table 1. Anthropometric description of the populations used to assess inter- and intra-rater reliability within the height and body component estimation exercises. Data shown as Mean±SD and (median).

Table 2. Reproducibility within- and between raters for body segment estimation (n= 60 selected images).

Table 3. Reproducibility within- and between raters for reproducibility for image derived height measurements: photo print-out, camera screen and computer screen (n= 50 selected images).

Table 4. Concordance for height and body components derived from photographic imaging. No. 890.4 [D7]

CONTACT INFORMATION:
Dr. Mónica Orozco
Center for Studies of Sensory Impairment Aging and Metabolism —CeSSIAM—Guatemala City, Guatemala
mmorozco@uvg.edu.gt

REFERENCES


CONCLUSION

The results from this study highlight strong inter- and intra-rater concordances for estimates of standing height and of body components derived from photographic Imaging. Thus, we are presenting an innovative method a promising tool for growth studies in humans.