VALIDATION ON THE USE OF ARM SPAN AND KNEE HEIGHT AS PROXY INDICATORS OF HEIGHT AMONG NORMAL AND MOBILITY-IMPAIRED CHILDREN

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Background: An important component of health care is nutritional anthropometry which includes the accurate measurement of growth indexes such as weight and height. Values for stature are important to help assess the growth of handicapped or mobility-impaired children, particularly those with cerebral palsy where growth retardation is the norm. Stature values are basis for estimating basal energy expenditure and consequent nutrient needs and calculating for indices of nutrient status. Common methods of nutritional anthropometric measurement however, are not entirely satisfactory/appropriate for all children. Certain measurements such as stature may be difficult to obtain, like in persons with physical impairment or mobility problems. In such cases, estimation of height from knee height and/or arm span can be important surrogate measures of growth. No adequate methods for predicting stature in our local setting exist to help assess the growth of mobility-impaired children. With this assessment tool, the mobility-impaired or handicapped children can be afforded appropriate medical/dietary management that would provide them with a better quality of life. Objectives: To develop an equation from arm span and knee height measurements to estimate vertebral height among normal children and mobility-impaired children; to determine the correlation and variation between arm span and actual height measurements as well as between knee height and actual height measurements and to formulate an ethno-specific equation for actual height estimation using knee height and arm span among normal and mobility-impaired children.

Methods: The study was conducted in two elementary schools in Metro Manila and the subjects were 4,212 male and female school children, out of whom, 158 were with partial mobility-impairment whose vertebral height can be assessed. Following standard procedures, height was measured using a microtoise, knee height was measured using a sliding broad blade caliper (Ross) and arm span was measured using a metal steel tape. The subjects were categorized according to age group, <10 years old and 10 years old and over for the female group whose growth spurt accelerate about the age of just under 12 years. The male group was categorized into <12 years old and 12 years old and over because the growth spurt in males begins at 12 years and peaks about the age of 14 years. Using the arm span and knee height measurements, regression equations were developed, and used to estimate height of normal and mobility impaired children. Results: Findings showed that the estimated heights from knee height for both age groups of the female subjects and the male 12 years old and over were not significantly different from the actual heights. There is no significant difference between the actual height and the estimated height from arm span of the male <12 years old and over for both the normal and mobility-impaired children. Arm span and knee height were shown to be positively correlated with height for both age group and sex, with r = 0.94 and 0.91 for height and arm span, r = 0.93 and 0.89 for
height and knee height (female) and \( r = 0.97 \) and \( 0.93 \) for height and arm span, \( r = 0.96 \) and \( 0.91 \) for height and knee height (male).  

**Conclusion and Recommendations:** The specific equations developed indicate good relationship using correlation coefficients between height and knee height and between height and arm span. The equations can be used to estimate the vertebral height of Filipino children when it is difficult or not possible to measure height directly. The formulated equations may not be appropriate for other age groups and therefore it is recommended that further studies be undertaken to derive population-specific equations taking into account the ethnicity, age, and gender.