

A pediatric echocardiographic Z-score nomogram for a developing country: Indian pediatric echocardiography Study – The Z-score

Sir,

I read with interest the study by Gokhroo *et al.* on the constructing pediatric echocardiographic Z-score nomogram in India.^[1] Apart from a few limitations addressed by the authors, I presume that the following four limitations might additionally cast some suspicions on the study results and possibly introduce bias in the clinical decision-making process.

First, in the methodology, the authors stated that various echocardiographic measurements were expressed in relation to body surface area (BSA) calculated by Haycock's formula ($BSA = \text{weight} \times 0.5378 \times \text{height} \times 0.3964 \times 0.024265$).^[1] It is worthy to mention that various formula are present in the clinical settings to calculate BSA, namely, Boyd, Mosteller, Gehan and George, Haycock, and Dubois-DuBois. Clinical evaluation revealed the different performance of each BSA estimation method in certain pediatric population.^[2] The lack of a similar evaluation among pediatric population in India renders the suitability of using Haycock's formula to estimate BSA in the Gokhroo *et al.*'s study questionable.

Second, the studied cohort included 71% of boys and 29% of girls. Determination of gender-specific echocardiographic Z-score nomogram for the studied population was regrettably not addressed. This point is important to be considered as gender-specific differences in certain echocardiographic dimensions have been reported. For instance, boys have been found to have larger heart valve dimensions at all ages. These valve dimension differences were statistically significant for the three of four heart valves even after adjustment for the differences in body sizes. The difference might be due to higher circulating blood volume in boys compared to that in girls.^[3]

Third, in the methodology, the authors mentioned that echocardiographic evaluation was performed using a Philips iE33 system (Philips Medical Systems, Bothell, WA, USA). The two-dimensional echocardiography and M-mode measurements of various cardiovascular structures were obtained for each participant.^[1] It is noteworthy that the recent developments in three-dimensional echocardiography (3DE) have resulted in smaller probes, faster data acquisition, and wider applicability. A systematic literature search has

pointed that in patients with a regular heart rhythm and for whom it was possible to obtain good quality images, the introduction of 3DE has improved the accuracy and reproducibility of the left ventricular volume and ejection fraction measurements. In valvular heart disease, the superiority of 3DE was also apparent but was less convincing.^[4] I presume that if the authors employed 3DE in the methodology, the study results might be altered.

Fourth, it is obvious that Indian population is a unique amalgamation of different ethnic groups. It was not obvious in the study methodology the exact ethnicities of the studied population. This point is important to be considered as many echocardiographic parameters truly vary among different ethnic groups.^[5]

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Conflicts of interest

There are no conflicts of interest.

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