An evaluation of spirometric reference equations for detecting obstructive airway disease in South African children

In this issue of the *African Journal of Thoracic and Critical Care Medicine*, Mkhize *et al.*[1] discuss how two reference equations, Global Lung Initiative 2012 (GLI_{2012})[2] and Poglar,[3] interpret spirometry measurements differently among children from three ethnic backgrounds in Durban, South Africa. Their article highlights the major differences in the two reference values for the interpretation and diagnosis of obstructive and restrictive airways disease in the cohort of children.

Beyond supporting the diagnosis of respiratory pathologies, pulmonary function tests such as spirometry help to stage disease, monitor its progress, and, more recently, aid pulmonologists in determining eligibility for lung transplantation, in addition to a history and physical examination.[4] In low- to middle-income countries where resources are scarce, spirometry is the primary lung function measurement tool that is becoming increasingly available in routine practice across major centres. Population-based spirometry measurements help derive forced vital capacity (FVC), forced expiratory volume in 1 second (FEV_1) and the FEV_1/FVC ratio, which are vital in supporting the diagnosis of different respiratory illnesses. In a healthy population, FVC and FEV_1 vary with gender, age and height, and are recommended to be interpreted based on *z*-scores to support the diagnosis and severity classification of different respiratory impairments.[5] Although no set of spirometric reference equations represents absolute accuracy in the diagnosis of an individual, statistically accurate and standardised reference values are crucial in research studies and routine practice. All clinicians need to understand how the choice of a particular reference value affects the interpretation of specific respiratory illnesses.

The widely used Global Lung Function GLI_{2012} reference equation was derived from data collected to develop spirometric prediction equations in adults and children from 72 centres in 43 countries. The aim was to develop one set of reference values for ages 3.5 - 95 years, male and female, from different ancestral groups, namely European, African American, Northeast Asia and Southeast Asia. A fifth category was created and termed 'other' to represent all other ancestral groups, and was based on the average of the four ancestral groups.[2]

The Polgar reference equation, on the other hand, was derived from 400 European and North American children aged 6 - 18 years, with no African children included in the dataset.[3]

Mkhize *et al.*[1] discuss the worrying variations in how the two reference equations categorise children for obstructive lung diseases across the three ethnic groups assessed. Importantly, they raise the major concern of lack of an African region-specific standardised equation and the attendant risk of disease misclassification when different reference equations are applied to the same population.

An African-specific standardised reference equation will be unique and will have many advantages; it will enhance diagnostic accuracy, while improving effectiveness in clinical care for all children regardless of their genetic, environmental and socioeconomic circumstances. It will promote confidence for participation in clinical trials for all African children.

In addition, the authors further suggest a need for African-specific studies to be conducted that track lung function across ethnic and socioeconomic groups to offer deeper insights that further enhance diagnostic accuracy.

To conclude, genetic factors and environmental and socioeconomic factors may affect specific ethnic groups and influence the interpretation of reference equations. Reference equations that are non-standardised and completely foreign may lead to misclassification of diseases. There is an urgent need for an African-specific spirometric reference equation.

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