What’s Normal? Improved Interpretation of Lung Function in a Multi-Ethnic Population of School Children

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Background

- Ethnic minorities comprise 40% of the London population
- Sickle Cell Disease is currently the most common inherited disease in London
- Asthma prevalence & morbidity vary by ethnic group, being higher among Black than White children
- Accurate diagnosis of lung disease in children of ethnic minorities is limited by lack of appropriate normative data for lung function
- The Global Lung Function Initiative (GLI) recently published the first all-age, multi-ethnic spirometry reference equations to address these issues

Aims

1. Evaluate ethnic differences in body size & lung function in a multi-ethnic population of children from London
2. Validate the GLI-2012 equations in this population

Methods

- Spirometry (Fig 1) & anthropometry were measured in 1092 healthy children (Fig 2) aged 5-11 years (Table 1)
- Children were classified broadly as White, Black, South Asian (Indian sub-continent) or "other/mixed"

Results

Table 1: Group characteristics

<table>
<thead>
<tr>
<th></th>
<th>White</th>
<th>Black</th>
<th>South Asian</th>
<th>Mixed/Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (boys%)</td>
<td>337 (48%)</td>
<td>349 (41%)</td>
<td>235 (48%)</td>
<td>171 (45%)</td>
</tr>
<tr>
<td>Age (y)</td>
<td>8.1 (1.6)</td>
<td>8.4 (1.6)</td>
<td>8.1 (1.7)</td>
<td>8.3 (1.7)</td>
</tr>
<tr>
<td>Weight z²</td>
<td>0.47 (1.26)</td>
<td>1.03 (1.12)</td>
<td>-0.01 (1.36)</td>
<td>0.48 (1.25)</td>
</tr>
<tr>
<td>Height z²</td>
<td>0.29 (1.00)</td>
<td>0.90 (1.00)</td>
<td>0.09 (1.15)</td>
<td>0.35 (1.01)</td>
</tr>
</tbody>
</table>

Data presented as Mean (SD)

- After adjustment for age and sex, Black children were significantly taller (p<0.001) and heavier (p<0.001) and South Asian children were significantly lighter (p<0.001) than White children.
- When compared with White children, after adjusting for sex, age and height, FEV₁ was significantly lower by a mean (95%CI) of 15% (13%;17%) in Black; 11% (8%;13%) in South Asian and 3% (0%;6%) in other/mixed race children.
- When expressed according to the GLI-2012 ethnic specific references, mean values for FEV₁ and FVC were approximately zero for all groups, with 95% falling within ± 2 z-scores as expected from a healthy population (Fig 3).

Conclusions

- Ethnic differences in lung function exist in primary school children.
- These differences are minimised by expressing results according to the GLI-2012 equations.
- The GLI-2012 equations are suitable for use in a multi-ethnic population of contemporary school children and will facilitate diagnosis of respiratory conditions in children from ethnic groups by improved differentiation between health and disease.


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