Interpreting spirometry data from South Asian children using the GLI-2012 equations: The SLIC study

1Bonner R, 1Stocks J, 2Quanjer P, 1Lee S, 1Raywood E, 1Legg S, 1Sears D, 1,3Kirkby J, 1,3Sonnappa S, 1Lum S
1Portex Respiratory Unit, UCL Institute of Child Health, London, United Kingdom; 2Department of Paediatrics, Erasmus Medical Centre, Rotterdam, Netherlands and 3Lung Function Unit, Great Ormond Street Hospital for Children NHS Foundation Trust, London, United Kingdom

Background

- The Global Lung Function Initiative (GLI) recently published the first all-age, multi-ethnic spirometry reference equations.1
- However, specific reference equations for the South-Asian (Indian sub-continent) population have yet to be developed.

Aims

2. Determine the extent to which this is appropriate for use in children from different parts of the Indian sub-continent.

Methods

- Spirometry (Fig 1) & anthropometry were measured at school in healthy South Asian children aged 5-11 years.
- Coefficients for the new South Asian ethnic group were calculated using GLI software (www.lungfunction.org).
- Spirometry results for the various South Asian subgroups were expressed as ethnic-specific z-scores using these "new" coefficients.
- Data were compared across the subgroups using One-way Anova.

Results

Table 1: Group characteristics of South Asian children

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Indian</th>
<th>Bangladeshi</th>
<th>Pakistani</th>
<th>Sri Lankan</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>n (boys%)</td>
<td>495 (45%)</td>
<td>337 (46%)</td>
<td>43 (47%)</td>
<td>45 (49%)</td>
<td>55 (31%)</td>
<td>14 (57%)</td>
</tr>
<tr>
<td>Age (y)</td>
<td>8.4 (1.7)</td>
<td>8.3 (1.7)</td>
<td>8.9 (1.5)</td>
<td>8.9 (1.7)</td>
<td>8.6 (1.6)</td>
<td>8.2 (1.9)</td>
</tr>
<tr>
<td>Weight z²</td>
<td>0.04 (1.3)</td>
<td>-0.09 (1.3)</td>
<td>0.31 (1.2)</td>
<td>0.56 (1.2)</td>
<td>0.24 (1.2)</td>
<td>-0.11 (1.1)</td>
</tr>
<tr>
<td>Height z²</td>
<td>0.15 (1.1)</td>
<td>0.08 (1.1)</td>
<td>0.12 (1.0)</td>
<td>0.66 (0.9)</td>
<td>0.14 (0.9)</td>
<td>0.27 (0.6)</td>
</tr>
</tbody>
</table>

Data presented as n (%) or Mean (SD); 4According to British 1990 reference data

- Spirometry data were available from 306 (47% boys) subjects on 495 occasions. Repeat measures were at least 9 months apart.
- Although Pakistani children were somewhat taller and heavier than other groups, these differences did not reach statistical significance.
- When compared with White children, after adjusting for sex, age and height, FEV₁ was significantly lower by a mean (95%CI) of 0.86 (0.75;0.98) z-scores in South Asian children, which equates to a reduction of 10.4 (8.9;11.9)% predicted.
- A proportional reduction in FVC was observed such that the FEV₁/FVC ratio was constant between groups.
- The new coefficient for South Asians appeared to fit data from all subgroups, except those from Pakistan (Fig 2), which were significantly (p<0.05) higher by a mean (95%CI) of 0.43 (0.20; 0.66) z-scores (~ 5% predicted).
- Since at least 300 subjects are required to verify reference equations these results will need to be confirmed in a larger population.
- The new South Asian coefficient also appear to be applicable to Indian children living in Bangalore.

Conclusions

- GLI-coefficients can be derived for ‘new’ populations, aiding interpretation of spirometry in a multi-ethnic society.
- Confirmation of the current results is needed in larger South Asian populations living in different regions and spanning the entire age range.

References:

This research was funded by the Wellcome Trust and Asthma UK

r.bonner@ucl.ac.uk