CORRESPONDENCE

To the Editor:

Although the European Respiratory Society (ERS) proposes using percentiles or standardized residuals for reporting results of lung volume measurements [1], this approach has not been widely accepted, and percentages are still being used, mainly because calculations and interpretation are easier to perform.

Our group has reported that both for spirometry [2] and total lung capacity (TLC) measurement [3] it is possible to find values of percentage of predicted that adequately meet the ERS standard, so that these values can be used in daily practice.

The aim of the present study was to find values of residual volume (RV)/TLC% that could be used instead of percentiles and standardized residuals in clinical practice. We have analysed lung volume measurements performed in 212 consecutive patients (151 males and 61 females) aged 53±12 yrs (18–70 yrs) in 1993. For each patient, spirometry, body plethysmography and single-breath helium dilution were performed in turn in a Masterlab system (Jaeger) under basal conditions. We have considered the standard upper limit of normality (ULN) of RV/TLC% to be the 95th percentile, as stated by the ERS, and we have calculated it as mean+1.6449-standard error, using the ERS prediction equations [1]. Alternative methods to be tested are two previously published ones cut-off point between normal and abnormality at an actual value of RV/TLC% of 40%, or 120% of predicted [4], and the ones we propose, based on cut-off points found by trial. Agreement analysis has been made according to the guidelines of BRENNAN and SILMAN [5], both for plethysmographic measurements and for helium-dilution. Our main results are presented in table 1.

Table 1. – Cut-off points between normal and abnormal RV/TLC%. Agreement and bias

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>Abnormal</th>
<th>kappa</th>
<th>Bias</th>
<th>p-value</th>
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<td></td>
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<tr>
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RV: residual volume; TLC: total lung capacity; % pred: percentage of predicted value.

Plenoomography: mean value of RV/TLC% is 39.7±11.6% (mean±sd), which is 112±28% of predicted (standardized residual: 0.79±1.8008). Kappa index, when ULN is set at 120% of predicted, is 79.5% (good agreement), and bias is present. Setting the ULN at 40% yields a moderate agreement (kappa is 49.7%), with significant bias. The proposed methods for plethysmographic measurements are 126% for percentage of predicted (κ=94.8%, no bias) and 48% for the actual value (κ=85.7%, no bias). Since it has been proposed not to use fixed values for indices that, like forced expiratory volume in one second (FEV1)/VC%, change with age [6], I prefer using percentage of predicted (which varies with age), which in addition has the highest value of kappa.

Helium dilution: mean RV/TLC% is 35.5±9.1% (100±20% of predicted), or, in standardized residuals, 0.027±1.310. Kappa, when ULN is set at 120% of predicted, is 90.6% (very good agreement) and no bias is present; for an actual value of 40%, kappa is 47.5% (moderate agreement), and bias is present. Values of kappa for the proposed methods (ULN at 128% of predicted, and 47% as the actual value) are, respectively, 97.4% and 89.9% (very good agreement in both cases), with no bias. In this case I also prefer using percentage of predicted, for reasons already explained.

It has been shown that percentage-based methods are available that can be used in clinical practice instead of percentile-based ones: air-trapping if RV/TLC% is higher than 126% of predicted by the plethysmographic method or 128% of predicted by the helium dilution method, and no air-trapping if RV/TLC% is equal to or under those values; however, standardized residuals should be used for investigative purposes. I have not found any satisfactory explanation for the small difference between the cut-off points set for both methods of lung volume measurement, but I think this difference has no practical meaning.

References


REFERENCES


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