INTRODUCTION AND OBJECTIVE

Urea kinetic modelling is one of the methods by which urea distribution volume can be estimated. However, it is unclear which urea kinetic model (UKM), single pool or double pool, is more accurate in estimating (V), i.e. total body water, in children. It is known that in adults single pool UKM underestimates, while double pool UKM overestimates kinetic V. Our objective was to investigate how well single pool and double pool UKM estimate total body water and by which UKM is this estimation better. This was done by comparing the results of both methods with anthropometric values (Mellits & Cheek) which have previously been found accurate enough in children on HD (Wuhl et al., Nephrol Dial Transplant 1996) 11:75-80).

PATIENTS AND METHODS

- 11 children, 6 boys and 5 girls aged 15.25±3.23 years were investigated.
- Characteristics of investigated children: Body height (BH): 143±14 cm, Body weight (BW): 32.8±7.7 kg, Body Mass Index (BMI): 15.95±2.27. Renal urea clearance absent in 10/15 patients and from 0.29-1.59 ml/min/1.73m² in remaining 5/15.
- Three kinetic volume (V) determinations were performed in each child.
- V was estimated using variable volume single pool (VVSP) UKM with urea immediately after dialysis (single pool) and equivatuated urea taken 60 min. after the end of dialysis (double pool).
- Average of 3 determinations represented V for each patient.
- Dialysis dose expressed as single pool Kt/V was 1.82±0.34.
- The results were compared with anthropometric volume derived from Mellits and Cheek equations for children:

<table>
<thead>
<tr>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>BH &lt; 110.8 cm, V = 0.076 + 0.507 x BW + 0.013 x BH</td>
<td>BH &lt; 110.8 cm, V = -1.927 + 0.456 x BW + 0.045 x BH</td>
</tr>
<tr>
<td>BH &gt; 110.8 cm, V = -10.313 + 0.252 x BW + 0.154 x BH</td>
<td>BH &gt; 110.8 cm, V = -1.927 + 0.456 x BW + 0.045 x BH</td>
</tr>
</tbody>
</table>

- Statistics: Student’s t test for paired samples, Pearson correlation and linear regression analysis were used for comparisons.

RESULTS

Results are presented on Table 1 and Figures 1, 2 and 3.

Single pool UKM significantly underestimated V by 9.68%, p<0.05 (p=0.03) when compared with anthropometric V (18.75±4.04 vs. 20.76±4.43 litres), while correlation coefficient was r=0.737. V/BW ratio was 0.58±0.08 vs. 0.64±0.06.

Double pool UKM slightly overestimated V by 3.32% when compared with anthropometric V (21.45±4.34 vs. 20.76±4.43 litres), the difference was not statistically significant (p>0.05) and correlation coefficient was higher (r=0.786). V/BW ratio was 0.65±0.09 vs. 0.64±0.06.

CONCLUSION

We conclude that kinetic V in children, estimated by double pool UKM is more accurate than the one estimated by single pool UKM. However it does slightly overestimate V (by approx. 3%), which should be kept in mind in interpreting double pool UKM results.