

Hemodiafiltration maintains a sustained improvement in BP compared to conventional hemodialysis in children - the HDF, Heart and Height (3H) study

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Introduction: Fluid overload, hypertension and cardiovascular disease are common in children on dialysis. In adults, hemodiafiltration (HDF) may reduce cardiovascular mortality, but data in children are scarce. A non-randomized parallel-arm study to compare outcomes on conventional hemodialysis (HD) versus post-dilution on-line HDF - the HDF, Heart and Height (3H) study – has shown a significant difference in 24-hour ambulatory mean arterial pressure standard deviation score (MAP-SDS), with 81% of HD and 38% of HDF patients having MAP-SDS above 2SD of normal at 12-month follow-up. However, the trend in BP over time and risk factors for hypertension were not studied.

Method: This is a post - hoc analysis of the 3H-dataset. The time-averaged 24-h mean arterial pressure (MAP) was used for the analyses and hypertension defined as 24-h MAP standard deviation score exceeding the 95th percentile.

Results: All 133 children who completed 12 months follow-up in the 3H study were included in this post - hoc analysis. 78 (59%) were on HD and 55 (41%) on HDF. At baseline MAP-SDS was > 95th percentile in 64 (82%) of children on HD and 23 (41.8%) patients on HDF, but these data are skewed by a high percentage of prevalent dialysis patients in the study. Both incident and prevalent HD patients increased their MAP-SDS from baseline to 12-months ($p = 0.007$ and $p = 0.004$ respectively), whereas there was no change in incident or prevalent HDF patients ($p = 0.38$ and $p = 0.11$ respectively). 43 (55%) of HD patients and 23 (42%) of HDF patients were on antihypertensive medications, and uncontrolled hypertension (BP>95th centile on medications) was present in 38 (88%) of HD patients and 6 (25%) of HDF patients. In the stepwise logistic regression at baseline, independent risk factors for hypertension were gender (OR 2.29; 95%CI 1.06–4.96; $p=0.04$) and inter-dialytic weight gain at baseline (OR 1.3; 95%CI 1.1–1.55; $p=0.004$). Over the one-year study period, MAP-SDS increased by 39% in HD patients and 12% in HDF patients ($p < 0.001$) (Figure). Significant risk factors for hypertension over time were dialysis modality (OR for HD compared to HDF 7.65; 95% CI 3.23 – 18.12; $p < 0.001$), inter-dialytic weight gain (OR 1.21; 95% CI 1.05 – 1.39; $p=0.007$), and dialysate sodium (for 1 mmol/L increase in dialysate sodium MAP-SDS increased by 1.1mmHg ; 95% CI 1.01 – 1.21; $p=0.04$).

Discussion: Children on HD compared to HDF had a 7.6-fold higher 24-hr MAP-SDS and a sustained increase in BP over the one-year study period. Higher inter-dialytic weight gain and higher dialysate sodium levels were associated with a higher MAP-SDS in both groups.