Metabolic acidosis and growth in children

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GUIDELINES

No recommendations possible based on Level I or II evidence

SUGGESTIONS FOR CLINICAL CARE

(Suggestions are based on Level III and IV sources)

- **It is recommended that metabolic acidosis should be corrected to achieve serum bicarbonate levels above 22 mmol/L (i.e. the lower limit of the normal range for children). Direct evidence supporting a beneficial effect on linear growth by correcting metabolic acidosis in children with chronic kidney disease (CKD) or end-stage kidney disease (ESKD) is not available.**

- **Sodium bicarbonate can be added to feeds for oral, nasogastric or gastrostomy administration.**

- **Sodium bicarbonate can be administered as capsules (10 mmol/capsule), as 8.4% solution provided by a pharmacy or by mixing 1 metric teaspoonful of bicarbonate of soda with 100 mL of water to provide a 1 mmol/mL solution.**

- **Oral alkali may be more palatable if given as citrate solution but it should not be given concomitantly with aluminium-containing phosphate binders, to avoid aluminium toxicity.**

Background

Children with CKD or ESKD are frequently acidotic and receive sodium bicarbonate to correct metabolic acidosis.

The objectives of this guideline are to review the available evidence for any relationship between metabolic acidosis and its treatment on growth in children with CKD or ESKD.

Search strategy

Databases searched: Medline (1996 to November Week 2 2003) and Embase (1980 to November 2003). MeSH terms for kidney disease were combined with MeSH terms and text words for metabolic acidosis. The Cochrane Renal Group

Specialised Register of randomised controlled trials was also searched for relevant trials not indexed in Medline.

Date of searches: 1 December 2003.

What is the evidence?

No randomised controlled trials examining the effects of treatment of metabolic acidosis on nutrition, growth, morbidity and mortality in children with ESKD were identified.

A study of 41 children with CKD found that 16 of 21 children with metabolic acidosis had growth impairment while 3 without acidosis had no impairment (West & Smith 1956).

McSherry (1978) studied 8 children and 2 infants with renal tubular acidosis and normal renal function and found that growth improved with correction of acidosis using oral sodium bicarbonate solution.

What do the other guidelines say?

Kidney Disease Outcomes Quality Initiative: Serum bicarbonate levels below 22 mmol/L should be corrected with oral alkali. In haemodialysis, a higher sodium bicarbonate dialysis solution can be used (Evidence and Opinion).

British Renal Association: No recommendations for children.

Canadian Society of Nephrology: No recommendations for children.

European Best Practice Guidelines: No recommendations for children.

Implementation and audit

Data on height, weight and head circumference in relation to serum levels of bicarbonate and intake of sodium bicarbonate could be collected and analysed by members of the Australian & New Zealand Paediatric Nephrology Association (ANZPNA).

Suggestions for future research

No recommendation.

References

McSherry E. Acidosis and growth in nonuremic renal disease. Kidney Int 1978; 14: 349–54.

West CD, Smith WC. An attempt to elucidate the cause of growth retardation in renal disease. Am J Dis Child 1956; 91: 460–76.