

## **Abstract:**

**BACKGROUND:** Severe malnutrition contributes up to 50% of childhood mortality in developing countries is frequently characterised by electrolyte depletion, including low total body phosphate. During therapeutic re-feeding, electrolyte shift from extracellular to intracellular compartments may induce hypo-phosphataemia (hypo-P) with resultant increased morbidity and mortality. This biochemical imbalance is under-recognised, and the frequency of this problem among African malnourished children is unclear. **OBJECTIVES:** To determine the magnitude of hypo-phosphataemia in children under five years of age presenting to Kenyatta National Hospital with kwashiorkor and marasmic kwashiorkor and to evaluate the relationship between hypo-phosphataemia and nutritional intervention during the first five days of treatment. **DESIGN:** Short longitudinal survey. **SETTING:** The General Paediatric wards of the Kenyatta National Hospital (KNH), Nairobi. **SUBJECTS:** Children under five years of age presenting with kwashiorkor or marasmic kwashiorkor at KNH were recruited into the study. **Main outcome measures:** Low serum phosphate level ( $< 1.20$  mmol/l) and patient outcome (survival or death) during the first five days of treatment. **RESULTS:** One hundred and sixty five children were enrolled between June 2005 and February 2006 of which 107 (64%) had kwashiorkor and 58 (36%) had marasmic kwashiorkor. They were of mean age 20 months (range 3-60), and 95 (58%) were male. The prevalence of hypo-phosphataemia was 86% on admission, increased to 90% and 93% on day one and two respectively, and then declined to 90% by the fourth day. At admission 6% were hypo-phosphataemic, increasing to 18% and 22% on day one and two respectively, and declining to 11% by day four. On admission mean serum phosphate was below normal at 0.91 mmol/l, declined significantly to 0.67 mmol/l and to a nadir of 0.63 mmol/l after the first and second day of treatment respectively, then rose slightly to 0.75 mmol/l on the fourth day ( $p < 0.001$  comparing each follow-up mean level with the admission level). There was a positive association between severity of nadir serum phosphate level and mortality ( $p = 0.028$ ). There were no deaths among children with normal nadir serum phosphate levels. However, among children with mild, moderate and severe nadir hypo-phosphataemia, 8, 14 and 21% died respectively. Children with dermatosis and hypomagnesaemia showed a trend for association with mortality ( $p = 0.082$  and  $0.099$  respectively). **CONCLUSION:** Hypo-phosphataemia is frequent among children with kwashiorkor and marasmic kwashiorkor presenting at KNH. Serum phosphate levels decline significantly during the first two days of nutritional intervention, and severity of