

ABSTRACT

Electrolytes routinely measured in patients in Intensive Care Unit (ICU) are sodium, potassium, chloride, calcium, magnesium and phosphate. Of these; sodium, potassium, chloride and calcium are measured as part of tests done during blood gas analysis (BGA) using arterial blood. However, magnesium and phosphate are measured from a venous serum sample since they cannot be measured during BGA. Both arterial and venous puncture are traumatizing to the patient and trauma increases when both are done numerous times on the same patient in a single day. Plasma obtained from sodium-heparin anticoagulant is yet to be used as a sample of choice for measuring magnesium and phosphate since it is not clear whether there is clinical equivalence between magnesium and phosphate concentrations obtained from venous serum and arterial plasma. It is clinically important that those measurements should give equivalent results and confirm the closeness to the absolute value. The main objective was to assess the equivalence of arterial and venous blood magnesium and phosphate concentrations. The specific objectives were; to determine the mean difference between magnesium concentration in arterial blood plasma and venous blood serum, to determine the mean difference between phosphate concentration in arterial blood plasma and venous blood serum, to determine the correlation between magnesium concentration in arterial blood plasma and venous blood serum and to determine the correlation between phosphate concentration in arterial blood plasma and venous blood serum. This study used a cross-sectional research design and was carried out at Moi Teaching and Referral Hospital (MTRH) where one hundred and fifty-three patients admitted at MTRH ICU underwent arterial and venous puncture to obtain arterial and venous blood which was used for magnesium and phosphate measurement on an automated chemistry laboratory analyzer. Mean difference between magnesium concentration in plasma and serum calculated using paired t-test was $0.03(t=1.23)$ $p=0.22$ while mean difference between phosphate concentration in plasma and serum was $0.14(t=1.18)$ $p=0.24$. Magnesium correlation between plasma and serum was $r=0.98$ [$p = 0.00 (< 0.05)$] and phosphate correlation between plasma and serum was $r=0.99$ [$p = 0.00 (< 0.05)$]. The study indicates there is clinical equivalence between magnesium and phosphate concentration in arterial blood plasma and venous blood serum, thus arterial blood plasma samples can be used in place of venous blood serum samples for magnesium and phosphate measurements.