

The impact of correcting the Serum Sodium Level for Total Proteins in patients receiving Parenteral Nutrition

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INTRODUCTION

In a majority of Spanish hospitals, serum sodium levels (SNa) are determined by indirect electrode methodology (sodium in the liquid fraction of serum) divided by the total serum volume (mmol/L). To avoid over/underestimating SNa, a formula can be applied: SNa corrected for total proteins (TP) = SNa x 93 divided by (99.1- (0.7 x TP)). Hypoproteinemia is frequent in patients receiving parenteral nutrition (PN), and is probably related to surgery, acute disease, and malnutrition. We have evaluated the impact of hypoproteinemia on the frequency and degree of hyponatremia in PN patients.

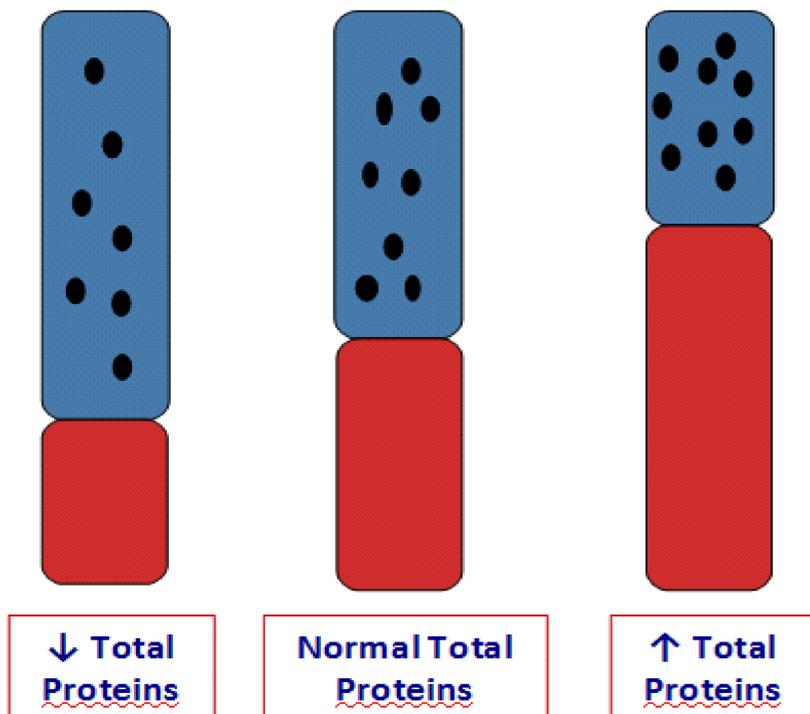


Figure 1. Modification of the liquid fraction from the serum by the different levels of total protein.

METHODS

A retrospective study of patients prescribed PN from 01/11/11 to 01/06/12. SNa was determined at baseline and during PN, and corrected for TP. All sodium levels were corrected for glycemia and presented in mmol/L. Patients with Triglycerides >400 mg/dl were excluded. Indirect SNa (SNa) was compared to SNa as corrected for TP (TP-SNa). Chi-Square, Student T-Test, Mann-Whitney U

RESULTS

222 patients were prescribed PN, 57.2% of whom were men. The median age was 75 [61-82].

47.3% were on the General Surgery Ward, 12% Internal Medicine, 12.1% Oncology, 8.6% Hematology.

14.5% presented malnutrition (by BMI). Median duration of PN was 8 [5-14] days.

Average baseline TP was 5.25 (SD:0.76), with 93% presenting hypoproteinemia (TP<6.5g/dl). Baseline SNa was 138.1 (SD:4.5) and TP-SNa was 134.6 (SD:4.5) (p<0.001) with a difference of 3.5 mmol/L [CI 95%:3.4-3.6] (p<0.001).

Prevalence of hyponatremia (Table 1):

20% presented initial hyponatremia (SNa<135 mmol/l) versus 52% (TP-SNa<135) (p<0.001). 28.7% developed SNa hyponatremia during PN, versus 64.2% with TP-SNa (P<0.001), within 4[2-7] and 3 [1-14] days respectively (p=0.05).

Serum Sodium (SNa)	Initial Hyponatremia	Developed Hyponatremia during PN
SNa no corrected for total proteins	44/222 (19,82%)	51/178 (28%)
SNa corrected for total proteins	88/183 (48%)	61/95 (64%)
	P = 0,001	P = 0,001

Table 1. Prevalence of hyponatremia in patients with parenteral nutrition (PN)

Patients receiving parenteral nutrition often present hypoproteinemia. Therefore, correction of indirect SNa for Total Proteins becomes essential, both to avoid underestimation of the number of patients with hyponatremia, as well as to correctly take into account its degree.

