



PROSPECTIVE HYDRATION STATUS EVALUATION BY BIVA IN PATIENTS REQUIRING CRRT



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INTRODUCTION AND AIMS

Disorders of fluid balance is an important risk factor for morbidity and mortality in critical patients. Total body fluid status is particularly important and poor studied in patients requiring CRRT.

The aim of the study was to evaluate the variation of Hydration Status (HS), measured by Bioelectric Impedance Analysis (BIVA), in critical ill patients at the beginning of CRRT, in the following days and at the discontinuation of treatment.

This study investigated:

- (1) the HS of patient that requires Continuous Renal Replacement Therapy (CRRT) and how this varies during the treatment;
- (2) the relationship between HS assessed by BIVA and survival of patients with CRRT;
- (3) whether BIVA patients hydration evaluation is useful tool for accurate assessment of HS in critical ill patients and for attaining the optimal body fluids homeostasis.

RESULTS

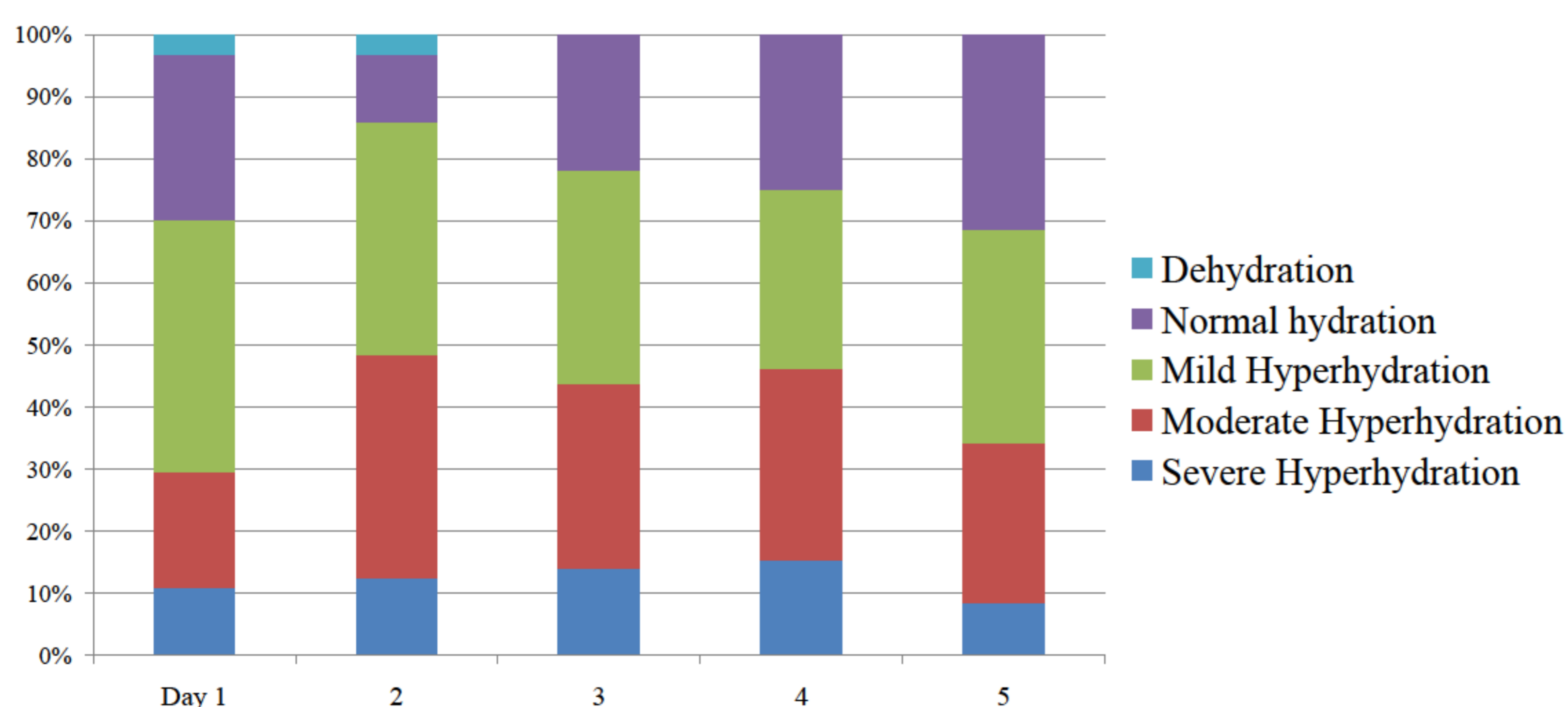
The most common indication for CRRT has been the state of fluid overload with oliguria (in 13 of 21 pts), followed by sepsis (in 11 of 21 pts).

The variation of the degree of body hydration status is shown in Fig. 2 and Fig. 3. It is interesting to note a gradual increase in body hydration with a median 6% higher at fifth day than the day of beginning of the treatment despite removal of fluids through CRRT.

At discontinuation of CRRT, that was performed for recovery diuresis and improvement of renal function or for resolution of the state of shock, patients had however a state of over-hydration with a median of 87.2% of total body water.

There were no statistically significant difference in survival between patients with overhydration and normohydrated, probably due to the limited sample number and a fair degree of fluid overload in all patients.

FIG 2: Hydration States (HS) in the first five days of CRRT Treatment



METHODS

This was a prospective cohort study in adult critically ill patients requiring in Intensive Care Unit (ICU) with indication for CRRT. 89 BIVA measurements were performed at beginning and during treatment every day for 5 days in 21 patients under the treatment for at least 48 h.

Assessment of body HS was made with an electrical impedance analyzer and Cardio EFG software (Aker, Pontassieve, Florence, Italy).

The CardioEFG machine performs the measurement of the three parameters (resistance, reactance and phase angle) calculating the resulting vector and determining the position of the vector tip on the validated nomogram. The machine is also capable to transform the vectorial analysis into a hydration scale typical for the studied patient in which a color coded numerical diagram (Hydragram score®) allows to identify the status of hydration of the patient in percent of body mass (Fig. 1). We decided to show the result as a percentage value for every single measurement, using the "Hydragram score"® values because of its more immediate comprehension and utility for future clinical references. Therefore BIVA data on hydration (HYD) were reported as numerical values expressed in percentage (%). Normal values of HYD range is 72.7-74.3%. Dehydration is classified into mild (HYD=71-72.7%), moderate (69-71%), and severe (<69%). Similarly, over-hydration is classified into mild (HYD=74.4-81%), moderate (81-87%), and severe (>87%).

Fig. 1: BIVA in the Clinical Setting

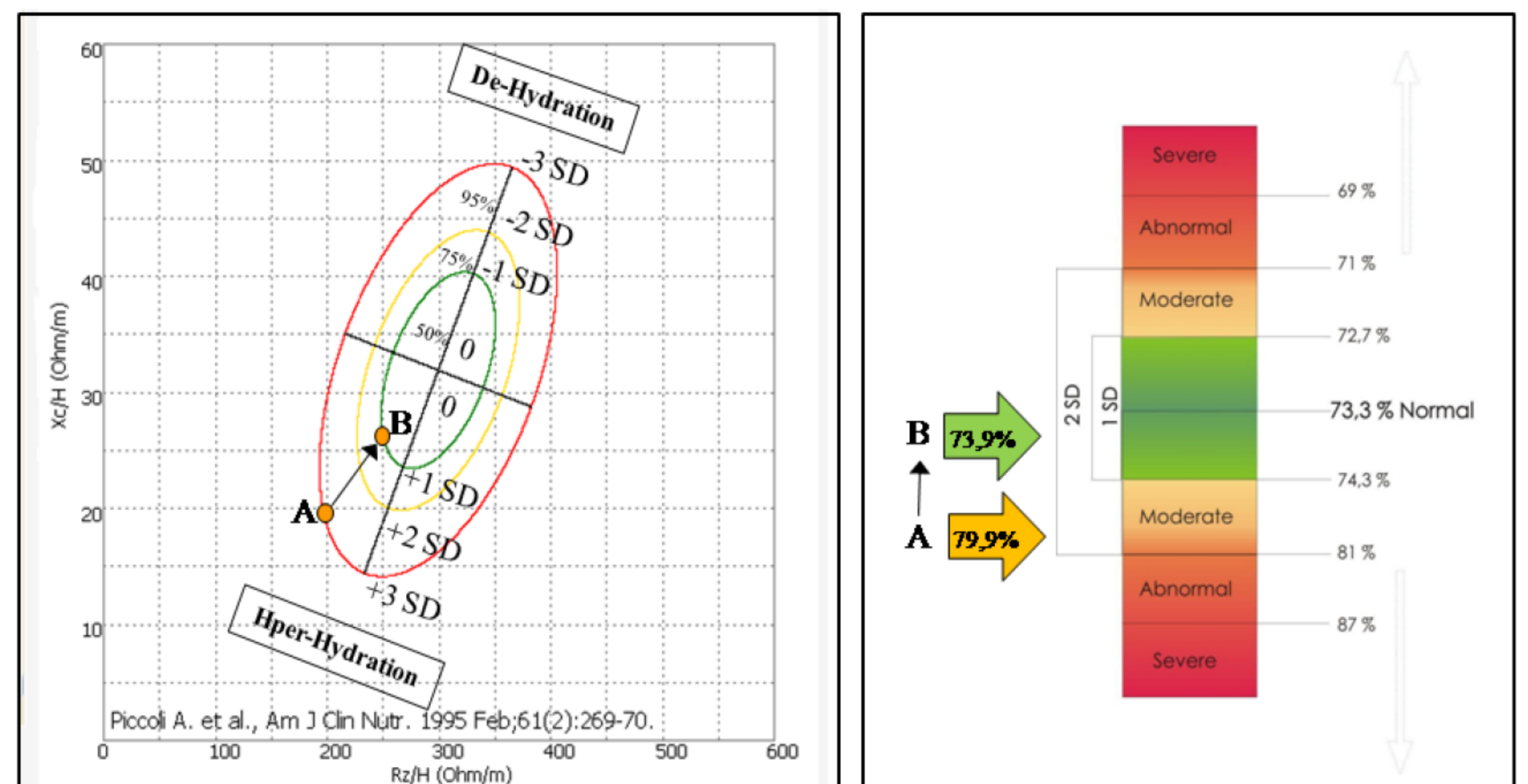
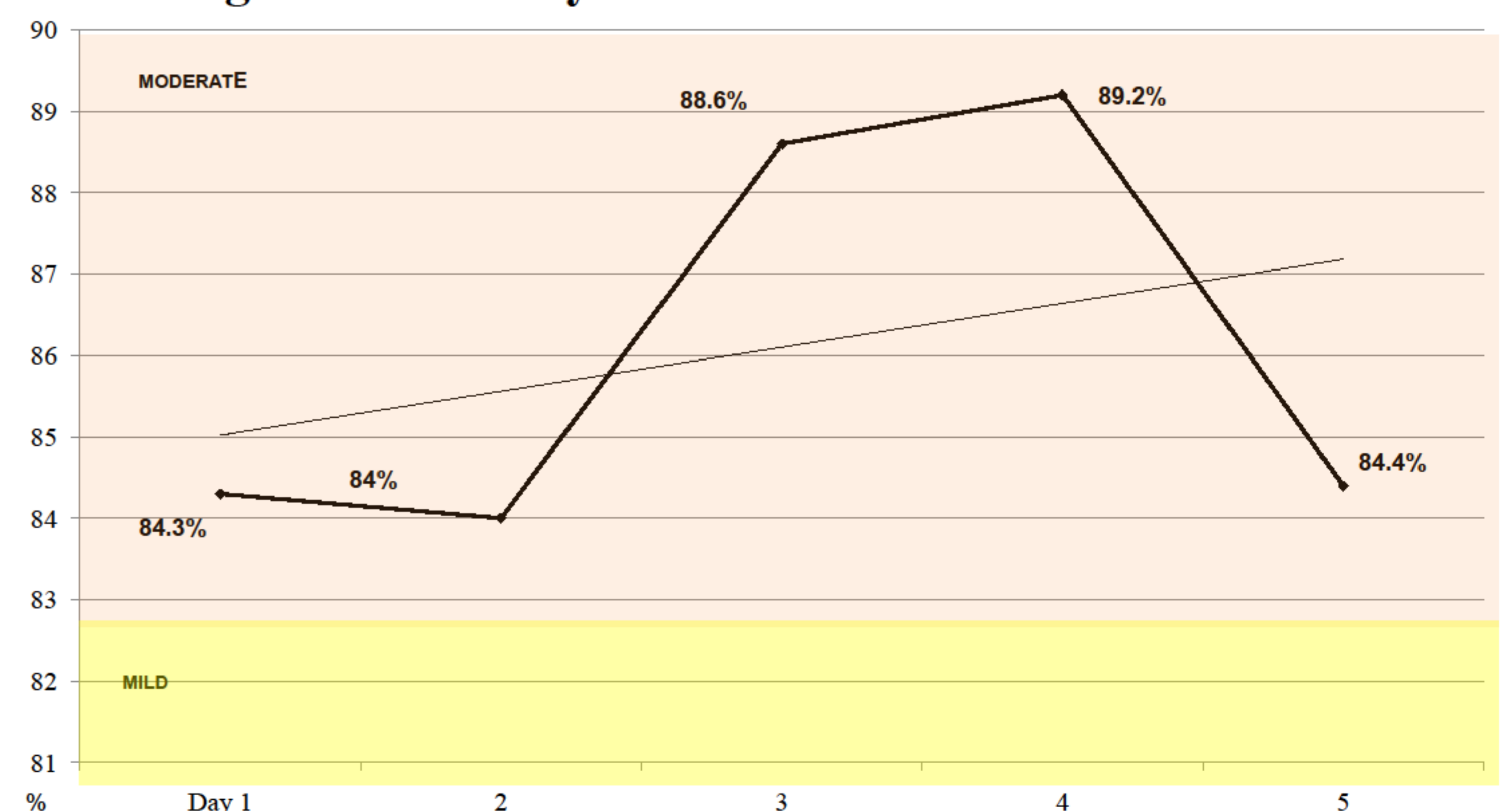


Fig. 3: Median Hydration Status of CRRT Patients



CONCLUSIONS

Fluid overload is common in critically ill patients in CRRT, and this condition persists during treatment. This suggests an inadequacy of the protocols of fluid balance probably related hemodynamic instability of patients requiring CRRT. BIVA may, therefore, is a valuable additional diagnostic method to monitor the hydration status in critically ill patients in Intensive Care Unit.

