



TO STUDY OUTCOME OF FLUID BOLUS IN MECHANICALLY VENTILATED CRITICALLY ILL CHILDREN

Paediatrics

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ABSTRACT

Introduction: In paediatric intensive care medicine, proper fluid management in critically sick children who are mechanically ventilated continues to be a significant issue and a hotly debated subject. However, there is currently no global agreement on fluid management or removal techniques. A growing body of research demonstrates that excessive fluid administration to critically ill patients beyond the resuscitation period is linked to negative outcomes. **Objectives:** This study was done to assess the sodium and bicarbonate levels in mechanically ventilated critically ill children and the effect of normal saline fluid resuscitation. **Materials And Methods:** This is a retrospective study done in the PICU of a tertiary care centre. A total of 10 children admitted who required ventilation and fluid resuscitation were studied. **Results:** Many of the admitted children had electrolyte imbalance at admission. The existence of electrolyte imbalance at admission, however, is the best predictor of mortality because such abnormalities aggravate the course of illness, regardless of the fundamental disease process. **Conclusion:** Regardless of the original illness process, the presence of electrolyte imbalance at the time of admission is a key prognostic signal in critically unwell children and has to be quickly treated as it may actively affect the child's fate and length of hospital stay.

KEYWORDS

ventilation, fluid, electrolytes

INTRODUCTION

In paediatric intensive care medicine, proper fluid management in critically sick children who are mechanically ventilated continues to be a significant issue and a hotly debated subject. A growing number of research demonstrate a link between unfavourable outcomes and either a favourable fluid balance or fluid overload. However, there is currently no global agreement on fluid management or removal techniques. The purpose of this study was to learn more about the current therapeutic practise of fluid therapy in critically unwell children who are mechanically ventilated.

A growing body of research demonstrates that excessive (intravenous) fluid administration to critically ill patients beyond the resuscitation period is linked to negative outcomes. Fluid overload in critically unwell children hospitalised to the paediatric intensive care unit (PICU) was linked, according to a new systematic review and meta-analysis with fewer ventilator free days, a higher risk of acute kidney injury and even an increased risk of mortality

AIM

1. To determine the sodium imbalance in mechanically ventilated critically ill children prior and after fluid therapy.
2. To determine the bicarbonate imbalance in mechanically ventilated critically ill children prior and after fluid therapy

OBJECTIVE

To assess the sodium and bicarbonate levels in mechanically ventilated critically ill children .

MATERIALS AND METHODS

Source Of Data

Study Group: The study was conducted in critically ill children in shock requiring mechanical ventilator support in PICU in RRMCH. Cases were selected based on inclusion and exclusion criteria admitted in-RRMCH BENGALURU.

Sample size- based on Yamane equation - 10

Study design: RETROSPECTIVE STUDY

Study group: All critically ill children in shock requiring mechanical ventilator support in PICU in RRMCH

INCLUSION CRITERIA

1. Children aged >1 month to ≤15 years requiring mechanical ventilation for at least 24 hours.
2. Only the first admission was considered for every patient
3. Written informed consent was obtained from either of the parents or legal guardian

Exclusion Criteria

- 1) Children with congenital heart disease, acute or chronic renal failure, renal tubular defects, post renal transplant, those receiving peritoneal or hemodialysis, and those with advanced malignancies were excluded
- 2) Children who were mechanically ventilated ≥24 hours prior to admission in PICU were also excluded due to uncertainty of previous course and fluid received.
- 3) Readmissions
- 4) Unwillingness to participate in the study
- 5) Death

METHOD OF COLLECTION OF DATA

- a) Cases were selected based on inclusion criteria and detailed clinical examination was be done.
- b) This study is designed to compare sodium and bicarbonate within the normal range prior to and after the fluid therapy and the incidence of electrolyte and bicarbonate dysfunction in the mechanically ventilated group of children.
- c) The medical records of all mechanically ventilated children in shock admitted to PICU in Rajarajeswari Medical College & Hospital were assessed.
- d) Initial Na and Hco₃ performed at admission.
- e) Blood samples collected 3 days after the mechanical ventilation and fluid therapy are analyzed with electrolyte and bicarbonate levels.

Statistical analysis:

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. **Chi-square test or Fischer's exact test** (for 2x2 tables only) was used as test of significance for qualitative data.

Continuous data was represented as mean and standard deviation. **Independent t test or Mann Whitney U test** was used as test of significance to identify the mean difference between two quantitative variables and qualitative variables respectively.

Graphical representation was done using bar diagram and line diagram.

p value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Statistical software: MS Excel, SPSS version 22 (IBM SPSS Statistics, Somers NY, USA) was used to analyze data

RESULTS

GENDER DISTRIBUTION

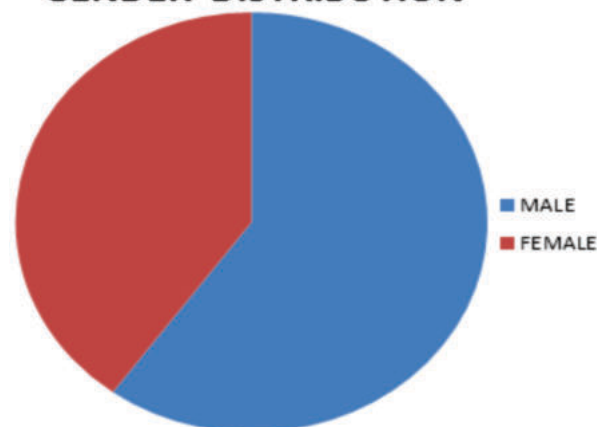


Figure 1 : Showing The Gender Distribution

Table 1 : Mean Na Level Comparison

	Group				P Value
	Admission		After 72 hrs		
	Mean	SD	Mean	SD	
Na	140	4.27	130.29	3.95	0.02

Mean Age in AGA Babies Group was 140 ± 4.27 and in SGA Babies Group was 130.29 ± 3.95 . There was a significant difference in mean Na level comparison between two groups.

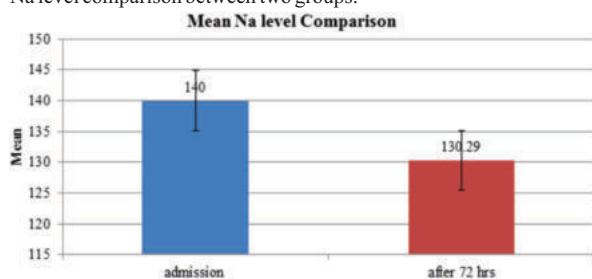


Figure 2: Bar Diagram Showing Mean Na Level Comparison Between Two Groups

Table 2: Mean Hco3 Level Comparison Between Two Groups

	Group				p value
	Admission		After 72 hrs		
	Mean	SD	Mean	SD	
Hco3 levels	28.56	1.14	20.01	1.9	< 0.04

Mean HCO₃ level at Admission 28.56 ± 1.14 and after 72 hrs was 20.01 ± 1.9 . There was a significant difference in mean HCO₃ level comparison between two groups.

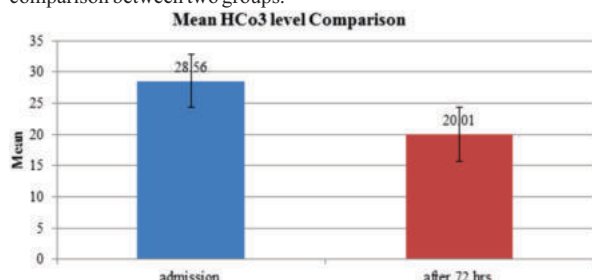


Figure 3: Bar Diagram Showing Mean Hco3 Level Comparison Between Two Groups

DISCUSSION :

In this study, patients with electrolyte problems had considerably longer overall mechanical ventilation times and PICU stays. Even though the majority only had one electrolyte that was abnormal, mixed diseases involving combinations of two, three, four, and all five electrolytes were also observed. The majority, or 80 patients (79.20%), had abnormalities at the time of admission; 20 of them developed new imbalances while they were hospitalised. Five individuals who did not

have any imbalances upon admission eventually acquired them, reflecting the potential mechanism mentioned earlier.

It has been estimated that 30% of intensive care units had dysnatremias (either hypo or hyponatremia).

According to the majority of the research, hyponatremia is more common than hyponatremia.

AKI, MODS, CCF, and SIADH were only observed in patients with electrolyte imbalance, which indicates that morbidity in terms of complications was also high in such circumstances. P-value 0.001 indicates that a substantial number of discharges were seen in cases without electrolyte imbalance. The existence of electrolyte imbalance at admission, however, is the best predictor of mortality because such abnormalities aggravate the course of illness, regardless of the fundamental disease process. Many of the admitted children had electrolyte imbalance at admission.

Patients with electrolyte imbalance stayed longer than those in all other categories. This agreed with earlier investigations that had been done. Due to this, electrolyte imbalance is a significant drain on the meagre health resources of developing and underdeveloped nations.

LIMITATION OF THE STUDY

- The number of cases is relatively small, and further studies including more cases are warranted to confirm the findings.

CONCLUSIONS

Presence of electrolyte imbalance at the time of admission is an important prognostic indicator in critically ill children irrespective of primary disease process and needs to be addressed aggressively which might actively play a role in the duration of the hospital stay and outcome of the child.

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