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Electrolyte Disturbances in PICU: A Cross Sectional Study

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Abstract

Objectives: Sodium disorders are one of the most important electrolyte disturbances in children admitted to intensive care unit (ICU). The purpose of this study was to determine the frequency of electrolyte disturbances and the associated factors in pediatric intensive care unit (PICU) patients.
Methods: All patients hospitalized in PICU of Ali Ebne Abi Talib Hospital during a year since October 2015 considered for the study. Electrolyte disturbances involving; sodium, potassium, calcium and magnesium were identified in PICU. Statistical tests were determined at 5% error level.
Results: The prevalence of sodium, calcium and magnesium abnormalities was not significantly different in gender of patients ($P > 0.05$), but, the prevalence of hypokalemia (9.5% versus 1.7%) and hyperkalemia (37.8% vs. 31.3%) were higher in girls compared with boys. ($P = 0.021$). The rate of hyponatremia (29.3% vs. 13.1%) and hypernatremia (18.3% vs. 15.9%) in children who had died were significantly higher than in alive children. ($P = 0.013$). The prevalence of all electrolyte disorders was not significantly different from those of diuretics consumption ($P > 0.05$). Hyperkalemia though (41% versus 27.3%) was significantly higher in children with diuretic use than in other children. ($P = 0.022$). The frequency of electrolytes abnormalities in children was not significantly different between diseases ($P > 0.05$).
Conclusions: The study concluded that the frequency of electrolytes was significantly different in deceased children compared to alive children. However, hyperkalemia was significantly higher in children with diuretic use than in other children. Therefore, it is much necessary to measure these electrolytes in course of hospitalization.

Keywords: Electrolyte Disturbances, PICU, Child

1. Background

In hospitalized children in the pediatric intensive care unit (PICU), electrolyte disturbances are common due to underlying diseases or taking specific medicine (1). The major electrolyte disruption in children are sodium, potassium, calcium and magnesium disorders (1, 2).

The prevalence of sodium disturbances in PICU changes from 20 to 30% (2). These disorders and their treatment are accompanied by increased mortality and morbidity. Therefore, their regular assessment is essential (3). Hypernatremia mostly is iatrogenic so that some authors believe this criterion can be used as a marker for hospital care quality in the PICU (4).

For example, the predominating factors are: using sodium bicarbonate solution to correct metabolic acidosis, urinary tract disorder, using diuretics, urea or glucose solution (5) and losing fluid through nasogastric suction, fever and open wound (6). Hypernatremia is also seen in insipid diabetics due to brain injury and use of lithium and amphotericin B (7). Hyponatremia, on the other hand, often is associated with abnormal vasopressin production, loop diuretics, thiazides, osmotic diuretics, and tubulointestinal damage that reduces sodium and chloride in diluted part of urine. Signs and symptoms of hyponatremia are observed when sodium is rapidly reduced to less than 125 mEq/L (8). It has been demonstrated that seizures and coma caused by cerebral edema observed in sodium less than 110 mEq/L. Hyponatremia symptoms may not be seen in ventilated patients attached to a ventilator and may worsen cerebral edema and create severe effects such as herniation and respiratory tract signs (9).

Another important electrolyte disorder in PICU is potassium disturbances. One of the causes of hypokalemia is a decrease in potassium intake. Other factors are medications that used in this unit such as sympathomimetics, insulin and dobutamine, diuretics, amphotericin B, non-absorbed anions, such as penicillin and aminoglycosides. Signs and symptoms of hypokalemia are more neuro-muscular, including paralysis, weakness, constipation, weakness of the respiratory muscles and rhabdomyolysis. Cardiac arrhythmia, especially in patients with hypertension and heart disease was seen. The changes observed in the ECG including a decrease of the ST wave, the flatness of the T-wave, the depression of the T wave, and the presence of the U-wave (10). Hyperkalemia is another disorder of these hospitalized children, which is due to renal insufficiency, adrenal insufficiency, insulin deficiency and resistance to it, tissue damage caused by rhabdomyolysis, burns or stroke. Medicines used in PICU such as beta blockers, heparin, renin-angiotensin-antagonist, aldosterone, trimethoprim, nonsteroidal anti-inflammatory drugs, and succynylcholine drugs may also be hyperkalemia. It is associated with changes in the ECG, including peaked T waves, short QT intervals, prolongation of PR, decrease in the amplitude of the P wave and the widening of the QRS. Severe hyperkalemia ultimately causes fatal arrhythmias, such as ventricular fibrillation or asystole that lead to cardiac arrest (11).

Another major electrolyte disturbance is hypocalcemia. Low total calcium has been reported in 90% of children admitted to PICU, while the prevalence of ionized hypocalcemia is 15% - 20%. The most common causes are acute trauma, chronic renal failure, sepsis, hypoparathyroidism, hypomagnesemia, vitamin D deficiency, and the composition of citrate and albumin. Signs and symptoms of acute hypocalcaemia are muscle spasm, papillary edema, and chest pain. Acute hypocalcemia causes neurological symptoms such as emotional instability, basal ganglion calcification, and extrapyramidal abnormalities. Heart manifestations like long QT, ventricular arrhythmias and heart failure (12). Hypomagnesaemia is relatively common in those children who are admitted in PICU. Mostly, they are asymptomatic and in order to make a diagnosis, there should be strong clinical suspicion to check for the insoluble level. Because they are not routinely measured. One of the important causes of hypomagnesemia is losing magnesium by gastrointestinal tract and kidney. In addition, there are drugs that directly affect the renal toxicology of tuberculosis such as amphotericin, cisplatin and loop diuretics. The use of osmotic substances such as mannitol, glucose in diabetic patients, and urea in the phase of improvement of acute renal failure lead to increased renal excretion of magnesium. Predominant symptom and signs of Hypomagnesaemia occur due to hypocalcemia and its levels are usually differentiated by cut point less than 0.7 mg/dL (13), that includes muscle spasms, the presence of signs and symptoms of shock, palpitations and seizures.

2. Objectives

The present study aimed to determine the prevalence of electrolyte disturbances in children who were hospitalized in PICU of Ali Ebne Abi Talib Hospital and evaluating some related factors.

3. Methods

All children who were hospitalized in PICU of Ali Ebne Abi Talib Hospital during a year from October 2015 to October 2016 were considered for the study. After initial stabilization, the cases were monitored for serum electrolytes and clinical necessity. Electrolyte disturbances of sodium, potassium, calcium and magnesium were identified and the patients were treated appropriately as per the hospital protocol.

3.1. Measurement of Electrolytes

Age, sex, underlying illness, electrolyte disturbances, duration of hospital stay and outcome were recorded. After admission to PICU, one blood sample was collected to measure sodium, potassium, calcium and magnesium after admission. The blood sample was taken from vein. In lab, electrolytes were measured using ion selective electrode method. The samples were analyzed for serum total calcium by the O-cresolphthalein complexone method and for serum sodium and potassium, by the ion selective electrode method. The initial diagnosis of electrolyte disturbances such as sodium and potassium, and calcium, were made as follows: hyponatremia in which sodium is lower than 135 mEq/L and hypernatremia is higher than 145 mEq/L. Hypokalemia was defined when potassium is lower than 3.5 mEq/L and hyperkalemia when it was higher than 4.5 mEq/L. Hypocalcemia refereed to calcium, when lower than 9 mg/dL and hypercalcemia when higher than 10.5 mg/dL. hypomagnesemia occurs in lower than 0.7 mg/dL and hypermagnesaemia when the level is higher than 2.6 mg/dL.

3.2. Criteria

History of chronic renal disorders, renal replacement therapy, endocrine disturbance, chronic diarrhea, history of electrolyte disturbances before hospitalization were exclusion criteria.

3.3. Ethical Approval

Consent form obtained from the participants or their guardians after the study approval. The study was approved as a GP dissertation (ethical code: ir.Zaums.rec.1394.328) by the Ethics Committee of Zahedan University of Medical Sciences, Zahedan, Iran.

3.4. Statistical Analysis

Patient information was collected and entered into SPSS18 (SPSS Inc., Chicago, IL, USA). Statistical analysis were provided in descriptive and analytical sections. In the descriptive section, mean and standard deviation were reported and chi-square test was used to analyze the qualitative data. All tests were examined at 5% error level.

4. Results

The aim of this study was to determine the prevalence of electrolyte disturbances in hospitalized PICU of Ali Ebne Abi Talib Hospital and related factors. This study was conducted on 189 subjects, of which 115 (60.8%) were male and 74 (39.2%) were female. The results of our study showed that the average age of patients was 1.26 $\pm$ 1.27 years (1 month to 5 years). The average weight of the children studied was 7.39 kg, the mean hospitalization time was 13.14 days, the mean sodium level was 139.14 mEq/L, the mean potassium level was 4.74 mEq/L, the mean calcium level was 7.73 mEq/L, the mean magnesium level was 1.89 mEq/L (Table 1).

As shown in Table 2, 56.6% of the children were aged less than 1 year, 60.8% were boys. Sodium, calcium, potassium and magnesium disturbances were not significantly different in age grouping of children ($P > 0.05$). Considering gender, the prevalence of sodium, calcium and magnesium electrolytes was not significantly different in children ($P > 0.05$). Despite this, the prevalence of hypokalemia (9.5% vs. 1.7%) and hyperkalemia (37.8% vs. 31.3%) were higher in girls than in boys. ($P = 0.021$). As shown, the prevalence of electrolyte disturbances in children was not significantly different from the duration of hospitalization ($P > 0.05$). The prevalences in children were not significantly different from the cause of admission ($P > 0.05$). In addition, the prevalence of potassium, calcium and magnesium disturbances in children was not significantly different ($P > 0.05$). The prevalence of hyponatremia (29.3% vs. 13.1%) and hypernatremia (18.3% vs. 15.9%) in children who were deceased were significantly higher than in alive children. ($P = 0.013$). The prevalence of sodium, calcium, and magnesium disorders in children was not significantly different from those of diuretics consumption ($P > 0.05$).Hyperkalemia though, (41% vs. 27.3%) was significantly higher in children with diuretic use than in other children who did not use diuretics (furosemide). ($P = 0.022$). The frequency of electrolyte disturbances in children was not significantly different from the digitalis ones ($P > 0.05$). The prevalence of electrolyte impairment in children was not significantly different from that of aminoglycoside ($P > 0.05$).

Creatinine means were 0.60 $\pm$ 0.22, 0.61 $\pm$ 0.19 and 1.28 $\pm$ 0.55 in hypokalemia, normokalemia and hyperkalemia respectively.

Table 3 showes the percentage of specific causes of hospitalization in the PICU. As shown in the table, 22.8% of children with pneumonia and lung diseases, 20.6% seizure, 12.7% heart disease, 11.1% sepsis, 10.6% of digestive diseases and 4.2% were cancer patients and 18% were hospitalized due to other diseases such as encephalitis, pericardial effusion, electrical burn and DKA. The frequency of electrolytes abnormalities in children was not significantly different between the causes of hospitalization in PICU ($P > 0.05$).

5. Discussion

The study aimed to determine the prevalence of electrolyte disturbances in hospitalized children in PICU and related factors. The frequency of electrolytes was significantly different among the age groups, sex (except for potassium), duration of and causes of hospitalization, but significant difference found in hyponatremia and hypernatremia in outcome (deceased and alive). The prevalence of sodium, calcium, and magnesium electrolyte disorders in children was not significantly different from diuretic, aminoglycoside and digitalis medication. However, hyperkalemia was significantly higher in children with diuretic use than in other children.

Mokhtari et al. showed that mortality rate was higher in patients with hyponatremia (34% vs. 16%) and hypernatremia (55% vs. 18%) than in other patients significantly. The mortality rate in the hypernatremic group was higher than the hypothermic group, and both were higher in patients with no disorder significantly. It was found that sodium disorders are common in ICU patients. These disorders are associated with increased mortality and are more common in older ages; moreover, mortality rates are higher in hypernatremia (4). The results of this study are similar to those of our study.

Studies have shown that hypernatremia associated with higher mortality and morbidity in general and surgical care units (14, 15) ranging from 40 to 60% with an increased risk of mortality (14), which is associated with mortality rates in the present study.

Aiyagari et al. (15) showed that although the mortality rate increased with hypernatremia (30.1% vs. 10.2%) in patients who were admitted to the surgical intensive care unit, only severe hypernatremia increased independently from mortality and morbidity enhancement. A study has shown that the mortality rate in patients with hypernatremia is 39% during admission and 43% in admission, which is significantly higher than in patients without hypernatremia (24%) (3). A study has also highlighted the role

Table 1. Descriptive Statistics for Quantitative Variables in the Study

Variables	N	Minimum	Maximum	Mean ± SD
Age, y	189	0.08	5.00	1.27 ± 1.27
Weight, kg	189	2.10	21.00	7.40 ± 4.24
Hospitalization duration, day	189	1.00	70.00	13.15 ± 11.75
Sodium (Na)	189	118.00	166.00	139.15 ± 7.30
Potassium (K)	189	2.50	7.90	4.475 ± 0.73
Calcium (Ca)	189	6.60	11.00	8.74 ± 0.69
Magnesium (Mg)	189	0.90	3.00	1.89 ± 0.43

Table 3. Sodium, Calcium, Potassium and Magnesium Electrolytes Correlation with the Causes of Hospitalization[a]

Variable/Status	Pneumonia and Lung Diseases	Seizure	Cancer	Digestive Diseases	Sepsis	Heart Diseases	Other Diseases	P Value
Sodium (Na)								0.488
Hyponatremia	8 (18.60)	9 (23.10)	0 (0.00)	5 (25.00)	4 (19.00)	3 (12.50)	9 (26.50)	
Normal	31 (72.10)	26 (66.70)	6 (75.00)	11 (55.00)	11 (52.40)	17 (70.80)	17 (50.00)	
Hypernatremia	4 (9.30)	4 (10.30)	2 (25.00)	4 (20.00)	6 (28.60)	4 (16.70)	8 (23.50)	
Total	43 (22.75)	39 (20.63)	8 (4.23)	20 (10.58)	21 (11.11)	24 (12.70)	34 (17.99)	
Potassium (K)								0.638
Hypokalemia	3 (7.00)	1 (2.60)	0 (0.00)	1 (5.00)	1 (4.80)	0 (0.00)	3 (8.80)	
Normal	30 (69.80)	25 (64.10)	6 (75.00)	13 (65.00)	12 (57.10)	15 (62.50)	15 (44.10)	
Hyperkalemia	10 (23.30)	13 (33.30)	2 (25.00)	6 (30.00)	8 (38.10)	9 (37.50)	16 (47.10)	
Calcium (Ca)								0.898
Hypocalcaemia	21 (48.80)	24 (61.50)	5 (62.50)	13 (65.00)	10 (47.60)	13 (54.20)	21 (61.80)	
Normal	21 (48.80)	15 (38.50)	3 (37.50)	7 (35.00)	11 (52.40)	11 (45.80)	13 (38.20)	
Hypercalcaemia	1 (2.30)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	
Magnesium (Mg)								0.077
Hypomagnesemia	4 (9.30)	6 (15.40)	4 (50.00)	0 (0.00)	5 (23.80)	4 (16.70)	3 (8.80)	
Normal	37 (86.00)	32 (82.10)	4 (50.00)	20 (100)	16 (76.20)	18 (75.00)	30 (88.20)	
Hypermagnesemia	2 (4.70)	1 (2.60)	0 (0.00)	0 (0.00)	0 (0.00)	2 (8.30)	1 (2.90)	

[a]Values are expressed as No. (%).

of hypernatremia as an independent predictor of mortality. Lindner et al. (3) showed that hypernatremia in the general health care unit is an independent risk factor for prediction of mortality (odds ratio of 2.1). The present study found that the frequency of hypernatremia and hyponatremia was significantly higher in children who died, similar to the mentioned studies. On the other hand, acute hyponatremia can lead to death if brain edema is not treated promptly. Conversely, if chronic hyponatremia is rapidly corrected, osmotic demyelination occurs which is potentially fatal. Typically, hyponatremia is a predictor of mortality in patients with advanced heart failure and cirrhosis. In these circumstances, it is generally assumed that hyponatremia indicates the severity of the underlying disease rather than direct involvement in mortality. As summing the same subject, recently reported an association between hyponatremia and mortality in patients with pulmonary embolism, pulmonary hypertension, pneumonia, and myocardial infarction (16).

Recent data show that chronic mild hyponatremia is associated with mortality in the general population (17). Our study also found that hyponatremia was far more than hypernatremia in children who had died. Therefore, one of the predictors of mortality in children admitted to ICU is sodium, which is necessary for regulating this electrolyte in patients.

Subba and Thomas et al. (18) reported that all children admitted to the pediatric ICU had a high frequency of electrolyte and prognosis disorders, of which 32.45% had at least one electrolyte disturbance in which 7.9% had a combination of electrolyte disturbances. Hypercalcemia was 14.4%, hyponatremia 9.5%, hypernatremia 4.9%, and hypocalcaemia 3.6%.of 24.2% of deceased patients, 46% hyperkalemia, 25% hyponatremia, 8% hypernatremia and 12.5% hypocalcemia. Our study also found that 20.1% of children had hyponatremia, 16.9% had hypernatremia, 4.3% had hypokalemia, 33.9% had hyperkalemia, 56.6% had hypocalcemia, 0.5% had hypercalcemia, 13.8% had hypomagnesemia and 2.3% had hypermagnesemia. Unlike the study though, we found that only sodium was associated with mortality among the electrolytes. The reason for this difference may be due to the difference in the sample size, the difference in the demographic characteristics of patients, the difference in entry and exit criteria, and the reason for the admission of the subjects. At the same time, as noted earlier, some scholars believe that partly because of hypernatremia as a part of patient care in ICU (11, 15, 18), this partial difference may indicate a lower level of patient care standards in the center. Of course, it should not be overlooked that hypernatremia is a problem in the ICU. Studies have shown that despite repeated measurements of sodium in the ICU, the incidence of hypernatremia is still prevalent, and primary care is often inadequate and delayed (18).

In a study conducted by Luu et al. (19) on 102 patients between 1 month and 2 years of age resulted that hyponatremia prevalence was 22%, which had no relation to epilepsy, intubation, and corticosteroid use (20). The results of this study are in line with our findings. A study by Dias et al. (20) was conducted on 337 children and examined the concentration of ionized calcium over a period of ten days and associated organ dysfunction. The results of this study were interpreted based on age, nutrition, sepsis and the use of steroid. Resulted that 77.5% of these people had hypocalcaemia, of which 95% of them had an organic disorder that is independent of hypocalcemia. Medicines that produce hypocalcaemia are methylprednisolone (dosage greater than 2 mg/kg/day) and furosemide (more than 2 mg/kg/day). In this study, there was no definitive association between hypocalcemia and mortality. In our study, it was found that 56.6% of patients had hypocalcemia, 0.5% had hypercalcemia, and similar to the mentioned study, there was no significant relationship between calcium disorder and mortality.

Zahedi (21) aimed to investigate the prevalence of electrolyte disturbances and its association with mortality. They found out that 69% of the patients had hyponatremia, 14% normal and 17% hypernatremia, 36% had hypokalemia, 43% normalized and 21% had hyperkalemia, and 33% had hypomagnesemia, 58% normal and 9% hypermagnesemia. Based on the findings of this study, it can be concluded that there is a significant relationship between mortality and sodium and magnesium electrolytes, but there is no significant correlation with potassium electrolyte disturbances.

Our study also found that 20.1% of children had hyponatremia, 16.9% had hypernatremia, 4.8% had hypokalemia, 33.9% had hyperkalemia, 56.6% had hypocalcemia, 0.5% had hypercalcemia, 13.8% had hypomagnesemia and 2.3% had hypomagnesemia. Although unlike the study, we found that only sodium was associated with mortality among the electrolytes. The reason for this difference may be due to the difference in the sample size, the difference in the demographic characteristics of patients, the difference in entry and exit criteria, and the reason for the admission of the subjects.

In a study by Bindu and Beeregowda (22) to examine the association of sodium with prognosis in children who were admitted to the ICU. A total of 152 patients between 1 and 14 years were studied. The prevalence of hyponatremia was 33.5%. Of the 51 cases, hyponatremia was 25.49% moderate hyponatremia and 13.73% severe hyponatremia. The prevalence of hyponatremia in bronchopneumonia was 41.3% and acute encephalitis was 24%. The duration of hospitalization (day) was higher in cases of severe hyponatremia than in cases of moderate hyponatremia. At the end of the study, one third of PICU-treated patients had hyponatremia. By adding more hyposmotic fluid, it is more likely that the percentage of children with hyponatremia will increase. The results of the Bindu and Beeregowda (22) study were consistent with the findings of our study. However, in our study, there was no significant difference in the duration of admission in terms of sodium level. Then again, intense hyponatremia can prompt demise if cerebrum edema is not dealt with instantly. On the other hand, if chronic hyponatremia is quickly revised, osmotic demyelination happens which is possibly lethal. Regularly, hyponatremia is an indicator of mortality in patients with advanced heart problems and cirrhosis. In these conditions, it is commonly expected that hyponatremia shows the seriousness of the underlying pathology as opposed to contribution in mortality. Expecting a similar subject, ongoing reports have mentioned the relationship between hyponatremia and mortality in patients with pulmonary embolism, pulmunary hypertension, pneumonia, and myocardial infarction.

5.1. Study Limitations

The main study limitation was lack of proper cooperation of the parents of participants that decreased the sample size.

5.2. Conclusions

From the study, it was concluded that the frequency of electrolyte disturbances was not significantly different between the age groups, sex (except for potassium), duration of admission and the cause of hospitalization, but it was found that the frequency of hyponatremia and hypernatremia in deceased children was significantly more than alive children. The prevalence of sodium, calcium, and magnesium disorders in children was not significantly different from diuretic, aminoglycoside and digitalis medications. However, the rate of hyperkalemia was significantly higher in children with diuretic use than in other children who did not use diuretic (furosemide). The main reason probably is due to higher creatinine in hyperkalemia.

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Footnotes

Authors' Contribution: Concept and design: Simin Sadeghi-Bojd and Noor Mohammad Noori. Data collection: Elham Damani. Processing and data analysis with interpretation: Alireza Teimouri. Literature search: Noor Mohammad Noori, Simin Sadeghi-Bojd, and Alireza Teimouri.

Conflict of Interests: It is not declared by the authors.

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Table 2. Electrolyte Abnormalities According to the Factors in the Study[a]

Variables	Sodanum (Na)			P Value	Potassium (K)			P Value	Calcium (Ca)			P Value	Magnesium (Mg)			P Value
	Hyponatremia	Normal	Hypernatremia		Hypokalemia	Normal	Hyperkalemia		Hypocalcaemia	Normal	Hypercalcaemia		Hypomagnesemia	Normal	Hypomagnesemia	
Age, y				0.565				0.197				0.667				0.87
< 1	19 (17.80)	68 (63.60)	20 (18.70)		5 (4.70)	60 (56.10)	42 (39.30)		61 (57.00)	45 (42.10)	1 (0.90)		15 (14.00)	88 (82.20)	4 (3.70)	
1 - 5	19 (23.20)	51 (62.20)	12 (14.60)		4 (4.90)	56 (68.30)	22 (26.80)		46 (56.10)	36 (43.90)	0 (0.00)		11 (13.40)	69 (84.10)	2 (2.40)	
Total	38 (20.10)	119 (63.00)	32 (16.90)		9 (4.80)	116 (61.40)	64 (33.90)		107 (56.60)	81 (42.90)	1 (0.50)		26 (13.80)	157 (83.10)	6 (3.20)	
Gender				0.292				0.021				0.523				0.069
Boys	22 (19.10)	77 (67.00)	16 (13.90)		2 (1.70)	77 (67.00)	36 (31.30)		67 (58.30)	47 (40.90)	1 (0.90)		15 (13.00)	99 (86.10)	1 (0.90)	
Girls	16 (21.60)	42 (56.80)	16 (21.60)		7 (9.50)	39 (52.70)	28 (37.80)		40 (54.10)	34 (45.90)	0 (0.00)		11 (14.90)	58 (78.40)	5 (6.80)	
Hospitalization duration, days				0.444				0.493				0.056				0.116
<10	16 (20.50)	52 (66.70)	10 (12.80)		2 (2.60)	49 (62.80)	27 (34.60)		38 (48.70)	40 (51.30)	0 (0.00)		7 (9.00)	68 (87.20)	3 (3.80)	
≥ 10	22 (19.80)	67 (60.40)	22 (19.80)		7 (6.30)	67 (60.40)	37 (33.30)		69 (62.20)	41 (36.90)	1 (0.90)		19 (17.10)	89 (80.20)	3 (2.70)	
Outcome				0.013				0.102				0.04				0.827
Alive	14 (13.10)	76 (71.00)	17 (15.90)		2 (1.90)	68 (63.60)	37 (34.60)		54 (50.50)	53 (49.50)	0 (0.00)		15 (14.00)	87 (81.30)	5 (4.70)	
Dead	24 (29.30)	43 (52.40)	15 (18.30)		7 (8.50)	48 (58.50)	27 (32.90)		53 (64.60)	28 (34.10)	1 (1.20)		11 (13.40)	70 (85.40)	1 (1.20)	
Consuming Duritic medicine				0.966				0.022				0.74				0.297
No	30 (21.00)	92 (64.30)	21 (14.70)		11 (7.70)	93 (65.00)	39 (27.30)		80 (55.90)	62 (43.40)	1 (0.70)		17 (11.90)	121 (84.60)	5 (3.50)	
Yes	18 (21.70)	52 (62.70)	13 (15.70)		1 (1.20)	48 (57.80)	34 (41.00)		46 (55.40)	37 (44.60)	0 (0.00)		15 (18.10)	67 (80.70)	1 (1.20)	
Consuming digitalis medicine				0.571				0.511				0.218				0.959
No	40 (20.30)	128 (65.00)	29 (14.70)		11 (5.60)	125 (63.50)	61 (31.00)		114 (57.90)	82 (41.60)	1 (0.50)		28 (14.20)	164 (83.20)	5 (2.50)	
Yes	8 (27.60)	16 (55.20)	5 (17.20)		1 (3.40)	16 (55.20)	12 (41.40)		12 (41.40)	17 (58.60)	0 (0.00)		4 (13.80)	24 (82.80)	1 (3.40)	
Consuming amino medicine				0.155				0.112				0.18				0.085
No	21 (16.70)	86 (68.30)	19 (15.10)		4 (3.20)	85 (67.50)	37 (29.40)		76 (60.30)	49 (38.90)	1 (0.80)		18 (14.30)	102 (81.00)	6 (4.80)	
Yes	27 (27.00)	58 (58.00)	15 (15.00)		8 (8.00)	56 (56.00)	36 (36.00)		50 (50.00)	50 (50.00)	0 (0.00)		14 (14.00)	86 (86.00)	0 (0.00)	

[a] Values are expressed as No. (%).