

Water and Sodium Status in Critically Ill Children after Acute Central Nervous System Injury

Thesis

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**التغيرات فى مستوى الماء والصوديوم بالجسم فى
الأطفال مرضي الحالات الحرجة بعد الإصابة الحادة
فى الجهاز العصبي المركزي**

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Summary

Fluid and electrolyte disturbances are commonly seen in children after acute central nervous system (CNS) injury. Cerebral salt wasting syndrome, inappropriate secretion of anti-diuretic hormone and central diabetes insipidus are frequently observed disorders after acute CNS insults (*Loh et al., 2000 - Ferry et al., 2001- Taplin et al., 2006*).

This study aimed to assess water and sodium homeostasis in critically ill children who were subjected to acute central nervous system insults such as: CNS infections (Encephalitis-meningitis and brain abscess)- Hypoxic ischemic insults - Intracranial haemorrhage and Status epilepticus.

The study included 31 critically ill children ranging from 1 month to 6 years old with mean age 1.69 ± 2.07 years who were subjected to acute central nervous system insults.

Thirteen (41.9%) of the studied cases did not have any changes in their serum sodium levels after acute central nervous system insult, whereas 8 patients (25.8%) have become hyponatremic, 3 patients)9.7%(of them were diagnosed as cerebral salt wasting syndrome, while 5 patients (16.1%) were hyponatremic due to other causes mainly SIADH. Ten patients (32.3%) have become hypernatremic after acute central nervous system insult, 6 of them (19.4%) were due to confirmed central diabetes insipidus, while the other 4 patients (12.9%) had unconfirmed central diabetes insipidus.

بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ

قَالُوا سُبْحٰنَكَ لَا عِلْمَ لَنَا اِلاّ مَا

عَلَّمْتَنَا اِنَّكَ اَنْتَ الْعَلِیْمُ الْحَكِیْمُ

صَدَقَ اللّٰهُ الْعَظِیْمُ

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List of abbreviations

ACTH	: Adreno-cortico trophic hormone
ADH	: Anti-diuretic hormone
ALT	: Alanine transaminase
ANP	: Atrial natriuretic peptide
AST	: Aspartate transaminase
ATP	: Adenosine tri-phosphate
AVP	: Arginine vasopressin
BBB	: Blood brain barrier
BNP	: Brain natriuretic peptide
BUN	: Blood urea nitrogen
CA	: Cardiac arrest
CBC	: Complete blood count
CDI	: Central diabetes insipidus
CNP	: C-type natriuretic peptide
CNS	: Central nervous system
CPR	: Cardio-pulmonary resuscitation
CSF	: Cerebrospinal fluid
CSW	: Cerebral salt wasting
CT	: Computerized tomography
CVP	: Central venous pressure
D1	: Day 1
D5	: Day 5
dDAVP	: Desmopressin
DIDMOAD	: Diabetes insipidus, diabetes mellitus, Optic atrophy, Deafness
DKA	: Diabetic keto acidosis
EABV	: Effective arterial blood volume
ECF	: Extra cellular fluid
EEG	: Electro encephalogram
ELISA	: Enzyme-linked immunosorbent assay
GCS	: Glasgow coma score
H⁺	: Hydrogen
H₂O	: Water
HIE	: Hypoxic-ischemic encephalopathy
HSV	: Herpes simplex virus
ICF	: Intra cellular fluid
ICHge	: Intra-cranial hemorrhage

IV	: Intra-venous
K	: Potassium
MAP	: Mean arterial pressure
mEq/L	: Milli equivalent per liter
Mg/dl	: Milligram per deciliter
mmHg	: Milli meters mercury
mmol/L	: Milli mol per liter
MRA	: Magnetic resonance arteriography
MRI	: Magnetic resonance imaging
MV	: Mechanical ventilation
Na	: Sodium
NaCl	: Sodium chloride
NICU	: Neurological intensive care unit
PCR	: Polymerase chain reaction
PELOD	: Pediatric logistic organ dysfunction
Pg/ml	: Pico gram per milliliter
PICU	: Pediatric intensive care unit
RAAS	: Renin-Angiotensin-Aldosterone system
S	: Serum
SD	: Standard deviation
SE	: Status epilepticus
SIADH	: Syndrome of inappropriate secretion of anti-diuretic hormone
SIDS	: Sudden infant death syndrome
U	: Urine

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