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WATER INTOXICATION

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ABSTRACT

The cells are usually resistant to fluid shifts, certain conditions can lead to water intoxication or intracellular fluid volume excess. Conditions that cause acute or severe fluid volume excesses have a higher incidence of ICF overload. This is because the adaptive mechanisms may be unable to compensate for large or sudden fluid excesses. Water intoxication results from either water excess or solute deficit primarily sodium. In water excess, the number of solutes is normal buy they are diluted by excessive water.

Key Words: Rhabdomyolysis, Delirium, Ketoacidosis.

INTRODUCTION

Water intoxication known as water poisoning is the condition of brain disruption which can lead to hypernatremia (below 135 milli moles per litre) and it is a serious medical condition which arises when someone drinks more water in a short period of time.

PREVALENCE AND RISK FACTORS

Rare. Fewer than 1 million cases per year in India

- Female sex
- Low body weight (infants, children, small women)
- Low sodium intake (fasting, starvation)
- Poorly controlled DM (Diabetes mellitus) with ketoacidosis
- Certain drugs.

CAUSES:

- Administration of excessive amounts of hypo osmolar IV fluids, such as 0.45% (half strength) saline solution or 5% dextrose in water.
- Older clients who consume excessive amount of tap water without adequate nutrient intake
- People with certain psychiatric disorders such as schizophrenia, often drinks water compulsively (Psychogenic polydipsia)

- Forced consumption of excessive water as a form of abuse.
- Intense physical activity such as military training or running a marathon.
- Water Intoxication in Infants: Water intoxication due to diluting baby formula or treating diarrhoea in sick infants with plain water.
- Water Diet" for Weight Loss
- Hard exercise lasting more than 4 hours
- Hot weather, which means more sweating and hence more drinking
- Athletes, especially women, with low body weight, high sweating rates and high salt losses in sweat
- Taking non-steroidal anti-inflammatory drugs (NSAIDs), such as indomethacin or ibuprofen, which stimulate water retention and sodium loss with the urine

SYMPTOMS:

Early Symptoms

First symptoms of water intoxication can appear when the blood sodium levels fall below ~130 mmol/L and can include:

- Headache
- Nausea, vomiting or diarrhoea
- Restlessness, irritability
- Light-headedness, dizziness
- Difficulty concentrating
- Fatigue, muscle weakness, unstable gait

Late Symptoms (Severe Water Intoxication)

The following symptoms may develop from several hours to few days after the onset of the first symptoms, when the blood sodium levels fall below ~105 mmol/L:

- Muscle cramps, tremor, shaking
- Swelling of the hands and feet, or abdomen (ascites), especially in alcoholics
- Drowsiness, blurred vision
- Confusion, unusual behaviour, agitation, hallucinations, delirium
- Coughing up blood (due to lung edema)
- Less urination than expected from the fluid intake
- Seizures (convulsions): jerky limb movements, unusual grimacing
- Collapse
- Coma
- Death, usually within 1-2 days after onset of symptoms

The faster the drop of the sodium levels, the more severe the symptoms Signs

- Dilated pupils on both sides
- Slow heart rate (bradycardia)

- Increased frequency of breathing (in pulmonary edema) or decreased frequency and volume of breathing (in respiratory arrest)
- Bluish discoloration of the lips and hands (cyanosis due to pulmonary edema)
- Decreased (hypotension) or increased blood pressure (hypertension)
- Hypothermia
- Rigid posture with arms bent inward toward the body and hands held on the chest, clenched fists, and legs held out straight (decorticate posture)

MECHANISM (PATHO PHYSIOLOGY)

- Over hydration along with low sodium intake results in a drop of blood sodium levels (hypernatremia), which in turn results in a drop of blood osmolality. According to the principles of osmosis, water then moves from the space with lower into the space with higher osmolality, that is from the blood into the body cells, including the brain cells, which swell. Brain swelling (cerebral edema) causes the brain to get compressed within the tight skull, which is the main cause of symptoms of water intoxication and, eventually, death.

COMPLICATIONS:

Short-Term Effects on the Body Organs

- Brain swelling (cerebral edema)
- Lung swelling (pulmonary edema)
- Muscle breakdown (rhabdomyolysis)

Long-Term Complications

- An episode of a severe hypernatremia may leave a person with a permanent brain damage resulting in:
- Mental retardation
- Diabetes insipidus
- Hearing loss
- Cerebral palsy
- Gait abnormality

MANAGEMENT:

- Restrict fluid to a range of 1000 to 1500ml /day
- Restore sodium levels by IV THERAPY
  - Plasma Sodium levels of 125mEq/L IV normal saline solution (0.9%Nacl) OR lactated Ringers solution may be given if the client is symptomatic.
  - Plasma Sodium levels of 115mEq/L or less IV concentrated saline solution such as 3% NaCL may be indicated until the plasma sodium concentration reaches 125mEq/L.
- Diuretics – furosemide is often IV to prevent pulmonary fluid overload.
- Demeclocycline an agent that antagonizes ADH

CONCLUSION

In condition of water intoxication there is a marked increase in the elimination of urinary chlorides, phosphates, ammonia and creatinine.

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