



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

REVIEW ON WATER INTOXICATION

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ABSTRACT:-

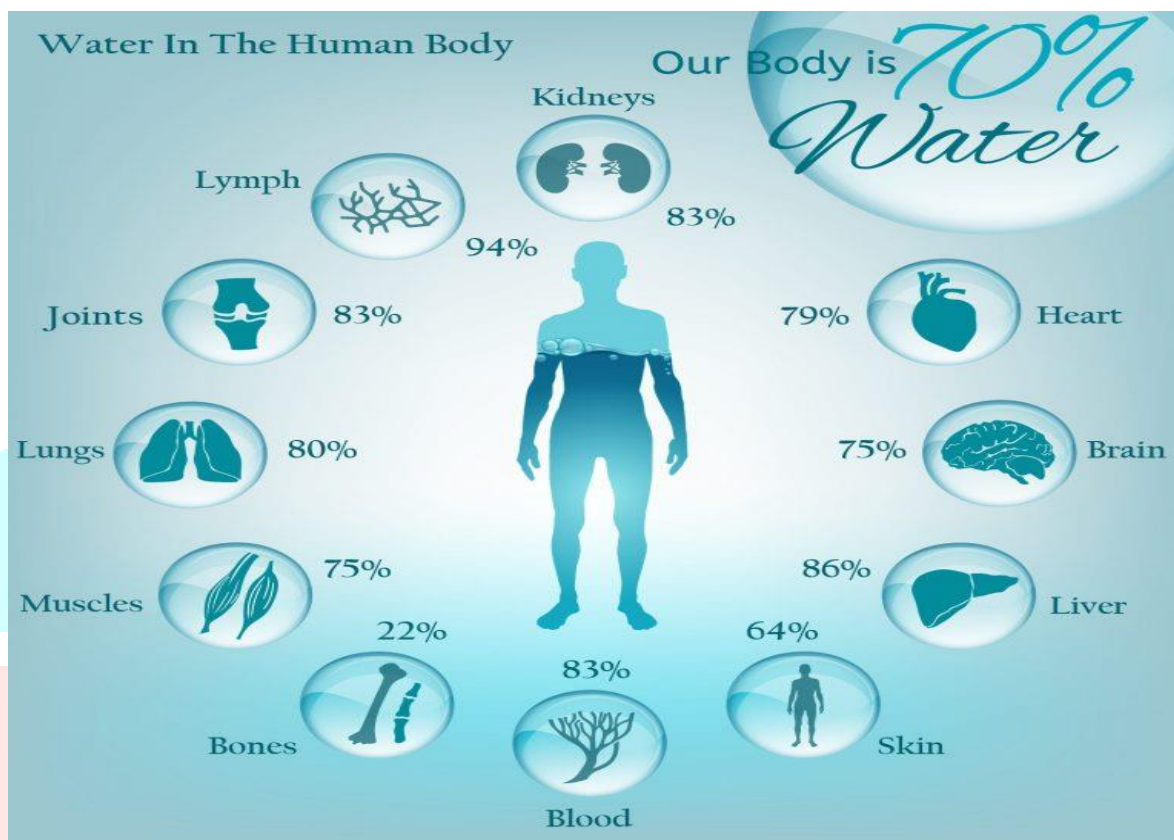
Water intoxication, also known as water poisoning or dilutional hyponatremia, is a potentially fatal disturbance in brain functions that results when the normal balance of electrolytes in the body is pushed outside safe limits by over-hydration. Water, just like any other substance, can be considered a poison when over-consumed in a specific period of time. Water intoxication mostly occurs when water is being consumed in a high quantity without giving the body the proper nutrients it needs to be healthy. Excess of body water may also be a result of a medical condition or improper treatment;

Key Words : Excessive water ingestion, nausea, Hyponatremia , Arginine Vasopressin (AVP) , mental stress, Twitching

INTRODUCTION

Up to 75% of a human body's composition is made up of water during infancy, and while that ratio drops to 45% as one ages, it is still a significant amount. a significant portion of your body weight (Hall et al., 2011). Considering the massive volume of water that is assumed to be present in a human body, it would be a rise in water usage would not significantly negligible effect on its operations. But as it happens, that the homeostatic balance of an organism is greatly more subtle than I had thought, and even a few more Ounces of water may show up as detrimental physical indications. Hypo-osmolar syndrome, a potentially fatal condition resulting from excessive water intake and dilutional hyponatremia, is linked to water intoxication, a lethal disorder that also affects brain function. a shift in the electrolyte balance, such the sharp decline in serum salt levels and the death that followed. Hyponatremia caused a drop in plasma osmolality, which allowed water to enter the brain through the osmotic gradient. This led to hyponatremic encephalopathy and cerebral oedema. Water intoxication manifests as headache, blurred vision, nausea, tremor, and worsening psychotic symptoms. Increased water consumption, as in Psychogenic polydipsia, is followed by high amounts of diluted urine (polyuria). Muscle spasms are among the other severe symptoms. Seizures and comas that are detected early have more serious consequences; untreated cases can be fatal; Marathon runners, members of the armed forces, and athletes are risk factors for water intoxication because these activities promote profuse perspiration, which leads to heat exhaustion and large fluid intake. Excessive fluid replacement causes hyponatremia.

Additional pediatric clinical cases involving water intoxication have been linked to child maltreatment. In psychogenic polydipsia, a psychiatric disorder characterized by compulsive water consumption that culminates in severe self-induced water intoxication (SIWI), water is typically metabolized and eliminated through various pathways, including the kidneys in the form of urine, skin evaporation, the respiratory system through inhaled water vapor, and minimal water loss from the gastrointestinal tract (GI). Water has an oral LD50 of greater than 90 ml/kg in rats. The current review demonstrates the potentially fatal implications of consuming large amounts of water.



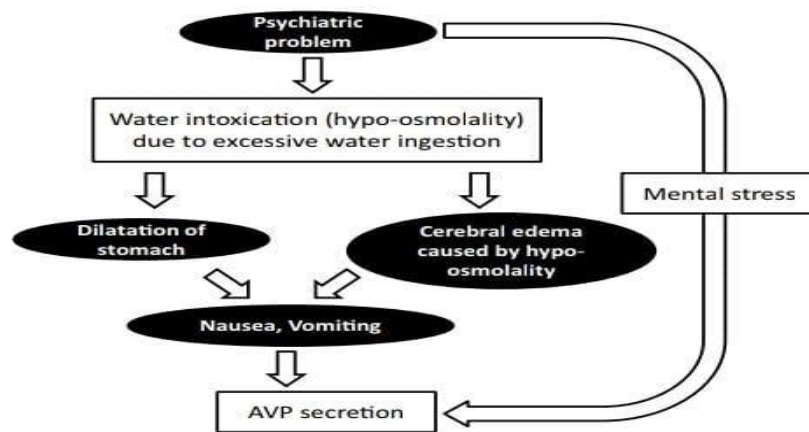
GENERAL CONSIDERATION

WATER METABOLISM -

Water metabolism in the human body The majority of human bodily fluids are made up of water, which is essential for many chemical and enzymatic reactions in the body. In the gastrointestinal (GI) tract, particularly the proximal intestine, the mucosal surface is important for water metabolism, and normally, not much water is lost from the digestive tract. Significant isotopic fractions of the stable atoms of hydrogen and oxygen occur in the respiratory system between water vapor and condensed water, making respired water vapor the other important pathway for the body to excrete water. The kidneys remove water from the body primarily through the excretion of urine; depending on the body's requirements, the kidneys may remove up to several gallons of urine daily or less than a pint. Every day, less than one liter of water evaporates from the skin. Excessive perspiration brought on by intense physical activity, hot weather, or high body temperature will greatly increase this amount of water lost through evaporation.

Concept Of Hyponatremia :-

The term hyponatremia, which has Greek and Latin origins, means "insufficient salt in the blood," which is a fitting moniker considering that it is a illness marked by high water retention levels in the body, which subsequently dilutes salt and electrolytes to the point of non-function. Numerous physical issues result from this interruption of the kidney's regular function (Coco Ballantyne, 2007). There are several levels of severity and persistence, and there are also different symptoms corresponding to these levels. A gradual decrease in blood salt levels is known as chronic hyponatraemia. However, when it falls over a shorter period of time, acute hyponatraemia, often known as water intoxication, is even more severe and has stronger signs and symptoms (Stöppler). According to medicine, this condition is identified by a blood sodium level below 135 mEq/L and is described as an acute neurological disorder as a result of swollen brain cells that interfere with regular brain function. (Hyponatremia, or intoxication by water)



Possible mechanism of AVP secretion under low plasma osmolality

Hypo-osmolar syndrome, a potentially fatal condition resulting from excessive water intake and dilutional hyponatremia, is linked to water intoxication, a lethal disorder that also affects brain function. A shift in the electrolyte balance, such as the sharp decline in serum salt levels and the death that followed. Hyponatremia caused a drop in plasma osmolality, which allowed water to enter the brain through the osmotic gradient. This led to hyponatremic encephalopathy and cerebral oedema. Water intoxication manifests as headache, blurred vision, nausea, tremor, and worsening psychotic symptoms. Increased water consumption, as in Psychogenic polydipsia, is followed by high amounts of diluted urine (polyuria). Muscle spasms are among the other severe symptoms. Seizures and comas that are detected early have more serious consequences; untreated cases can be fatal; Marathon runners, members of the armed forces, and athletes are risk factors for water intoxication because these activities promote profuse perspiration, which leads to heat exhaustion and large fluid intake. Excessive fluid replacement causes hyponatremia. Additional pediatric clinical cases involving water intoxication have been linked to child maltreatment. In psychogenic polydipsia, a psychiatric disorder characterized by compulsive water consumption that culminates in severe self-induced water intoxication (SIWI), water is typically metabolized and eliminated through various pathways, including the kidneys in the form of urine, skin evaporation, the respiratory system through inhaled water vapor, and minimal water loss from the gastrointestinal tract (GI). Water has an oral LD50 of greater than 90 ml/kg in rats. The current review demonstrates the potentially fatal implications of consuming large amounts of water.

The abnormal water retention by the kidneys as a result of different neurological and gastrointestinal conditions forms the biological basis for this condition issues. The body's excess water dilutes the electrolytes and salt to extremely low concentrations. To restore this concentration and return to homeostasis, the body's cells are consequently compelled to absorb this water. But as time goes on, the inflammation of the cells persists and interferes with other body processes, eventually reaching the brain cells and producing cerebral edema, which can lead to a coma, a stroke, or even death (Farrell et al., 2003; Coco Ballantyne, 2007). Although the primary cause of this condition is excessive water retention, a number of physical and psychological factors can hasten its onset. This is particularly concerning for patients who exhibit severe depression because they frequently and strongly consider taking their own lives. Since water is a reasonably accessible substance, people try to overdose by consuming excessive amounts of it (Water intoxication alert). Patients with schizophrenia are also found to be more susceptible to this illness because of their deranged mental states. Research indicates that this is accurate, particularly in prison populations where access to alternative suicide methods may be limited (Schoenly, 2012). A higher risk of water intoxication can also be attributed to biological conditions such as cortisone, cirrhosis, and hypothyroidism. water and electrolyte balance in your body, as all of these illnesses impact it (Addison's disease symptoms). Additionally, taking drugs like sulfonyleureas, diuretics, and antidepressants can have a negative effect because they lower blood sodium levels when prescribed to treat other symptoms (Stöppler, Water intoxication symptoms). Additionally involved is a biological syndrome called Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH), which occurs when the kidneys cannot excrete properly and so start to build up an excess of water (water intoxication alert). This happens as a result of the brain's posterior pituitary gland being stimulated to release more vasopressin, an antidiuretic hormone that causes the kidneys to retain more water (Coco Ballantyne, 2007). Since hyponatremia and SIADH are closely related, doctors frequently check a patient's medical history for hyponatremia when diagnosing SIADH (Thomas, 2013) Early on, it can be difficult to identify water intoxication because it presents with symptoms that are fairly common, like headaches, dizziness, nausea, and vomiting. has been connected to numerous illnesses (Farrell et al., 2003). In terms of the nausea and altered mental state that are experienced, the symptoms of water intoxication are actually quite similar to those of alcohol intoxication (Julia).

Because the stomach cannot hold more water than usual, nausea is always the initial symptom. The body tries to regain homeostasis but fails because there is no way to excrete the excess water, resulting in slurred speech, weakness, headache, bloating, hallucinations, and muscle cramps (water intoxication symptoms). At this point, a distinct feature of the illness manifests itself in the form of, in contrast to the other typical signs, symptoms of psychosis, such as drinking more water while insane (Farrell et al., 2003). After this, the extra water starts to affect brain tissue, causing swelling in the brain cells—a condition called cerebral edema. In addition to the compromised brain function, this condition is rendered more hazardous by the stiff constraining mechanism of the skull and the increased overall pressure on the brain's soft tissue caused by the swelling (Stöppler). Due to the escalating intracranial pressure and compromised brain activity, the body either passes out in a coma or experiences severe seizures that may finally result in demise. Because of this, people who suffer from severe hyponatremia have a 50% chance of dying from it. because of cerebral edema, which, if the cerebral inflammation is not promptly relieved, leads to the failure of the nervous system (Bhananker et al., 2004). Monitoring the body's fluid levels, sodium and salt contents, and other parameters helps diagnose this issue by pinpointing the precise degree of balance disruption. The medical history is also checked for episodes of prolonged vomiting, excessive perspiration, and blood and urine tests conducted in the past (Stöppler). The

primary determinant of treatment is the quantity of extra water consumed, as this is correlated with the degree of homeostatic imbalance and the the degree at which the body's systems have started to malfunction. For these reasons, even with its difficulty, early detection is essential to stop the fatal onset. That nearly always leads to potentially fatal outcomes like comas and seizures (Farrell et al., 2003). Treatment with an IV fluid containing electrolytes can correct the issue if the condition is detected early enough to restore homeostasis and the normal salt concentration in the blood (Julia). Increasing the intake of foods high in salt can also help achieve this (symptoms of water intoxication). In order to treat more severe cases, vasopressin receptor antagonists are also used, which stop the posterior pituitary gland from releasing vasopressin. Consequently, the quantity of Water intoxication occurs when the body conserves less water and produces less vasopressin, which affects the kidneys. This allows the excess water to be expelled naturally.

signs and symptoms.

Self-induced hyponatraemia is one type of this illness that typically develops into an acute case that requires hospitalization and quick hypertonic saline intervention for treatment. It is typically a complication of mental illnesses like severe depression and schizophrenia, which can have suicidal thoughts and excessive consumption.

Any prolonged drop in blood sodium levels should be treated as soon as possible because it raises the risk of irreversible brain damage. In order to return the body to homeostasis as quickly as possible without causing too many drastic changes, induced urine output is also taken into consideration during treatment (Sterns et al., 2009)Up until recently, it was believed that athletes, particularly those involved in endurance or long-distance sports, were more likely to suffer from this condition. overcompensated for their thirst, resulting in hyponatremia and its detrimental effects (Julia). Athletes used to take great pride in accomplishments like finishing marathons without consuming any water before the 1970s. But since athletes had previously been told that consuming fluids during exercise would impair their performance, starting in the 1970s, they have been advised to overcompensate for their thirst during training. In 1981, the detrimental effects of the directive to consume "as much as tolerable" quickly became evident.when the initial instance of hyponatremia associated with exercise (EAH) happened. After this, more than ten recorded Since 1991, there have been reports of EAH-related deaths due to the encephalopathy that follows. Further investigation has revealed that EAH is a completely preventable condition and that As long as a diagnosis is made early, there is always a chance to stop fatal outcomes. Additionally, there is a risk while receiving treatment due to the quick infusion of electrolyte solutions has the potential to raise intracerebral pressure, which in turn has the potential to cause brain death, respiratory arrest, and coma (Parrish).

CASES OF WATER INTOXICATION -

Instances of water poisoning case of child abuse A 9-year-old girl was brought to the hospital due to sleepiness, nausea, and vomiting that started four hours before to her arrival. She was compelled by her stepfather eight months prior to the admission to drink two 1.8-liter bottles of water in less than two hours. She had an appendectomy, and because of her constipation, the doctor advised her to drink a lot of water following the procedure. When her stepfather forced her to drink two bottles of 1.8 liters of water a day after she was discharged from the hospital following her surgery, the physicians realized she had been the victim of child abuse due to water intoxication when they took her history.

Case Of Psychiatric illness -

A 40-year-old man who had been diagnosed with schizophrenia for 14 years reported experiencing polydipsia, nausea, and vomiting for the first time a year before he passed away. He was also consuming large amounts of water. His health steadily deteriorated, with weight loss and constant large water consumption followed by frequent vomiting and speech difficulties. He was taken to the emergency room the following year due to a disruption in consciousness, and he subsequently passed away.

TREATMENT OF WATER INTOXICATION

Diuretics:- stimulate urination; they work best when there is an excess of blood volume Any agent that increases the production of urine, or diuresis, is a diuretic. Included in this is forced diuresis. Sometimes, informally, a diuretic tablet is referred to as a "water tablet." Water excretion from the body through the kidneys is increased by all diuretics.

vasopressin receptor Antagonist: an agent or medication known as an antidiuretic, like vasopressin (antidiuretic hormone), decreases the excretion of water in the urine. Something that prevents an agent from acting at the vasopressin receptors is called a vasopressin receptor antagonist (VRA). In patients with congestive heart failure, liver cirrhosis, or SIADH, in particular, VRAs are most frequently used to treat hyponatremia

Examples:-

Vaptans

The way that the "vaptan" medications work is by preventing vasopressin from acting at its receptors (V1A, V1B, V2). There are multiple roles for these receptors: the central nervous system expresses the V1A and V1B receptors, while the peripherally expressed V2 and V1A receptors are involved in blood pressure regulation and kidney function regulation, respectively. Many social behaviors in both humans and animals have been connected to V1A, which is expressed in multiple brain regions.

Many compounds with different selectivities are part of the vaptan drug class; as of 2009, several of these compounds were either in clinical trials or already in use in clinical settings.

Unselective (V1A/V2 mixed)

Conivaptan selective for V1A (V1RA)

Relcovaptan selective for V1B (V3RA)

Selective for Nelivaptan V2 (V2RA)

lixivaptan

The Mozavaptan

Satavaptan

In Tolvaptan

somatostatin

One inhibitor of competition is somatostatin.

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