Forced Water Intoxication: A Deadly Form of Child Abuse

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Introduction

Water intoxication is a dangerous condition that often goes unnoticed until it is too late (Chamberlain, 2012). It is potentially hazardous because it can lead to hyponatremia, a condition that can result in brain injury or death when sodium levels in the body drop too low (Farrell & Bower, 2003). Literature suggests that prepubescent children are at a higher risk of developing this rare, and often lethal, condition (Arieff & Kronlund, 1999). Water intoxication of children may be accidental; however, it is also a serious and possibly under-recognized form of abuse. Since forced water intoxication is rare, symptoms are not widely recognized and frequently go undetected or are mistaken for other causes. Improved education of healthcare providers can help prevent or minimize long-term harm associated with water intoxication (Verbalis et al., 2013). In order to prevent forced water intoxication abuse, it is necessary to understand what water intoxication is, how it is used as abuse, and methods of water intoxication detection and prevention.

Water Intoxication

Water intoxication is the result of excessive water intake that exceeds the kidney’s ability to eliminate (Arieff, & Kronlund, 1999; Farrell & Bower, 2003; Joo, & Kim, 2013 Rowntree, 1923). Early signs of water intoxication may include: confusion, vomiting, disorientation, and psychotic symptoms (Chinn, 1974; Rowntree, 1923; Vieweg, Rowe, David, Sutker, & Spradlin, 1984). Excessive water intake in turn, can contribute to polyuria, the ejection of heavily diluted urine (Arieff & Kronlund, 1999; Farrell & Bower, 2003; Rowntree, 1923). Excessive water intake resulting from polydipsia (i.e., extreme thirst) has been observed in those suffering from medical conditions such as diabetes and schizophrenia (Radojevic et. al., 2012) and may also be a consequence of abusing certain drugs (especially methylenedioxy-methamphetamine, MDMA/Ecstasy) (Hall, 1997; Milroy, 2011).

The ingestion of large amounts of water, including flavored drinks and sodas with very low sodium content, normally results in a compensatory production of very dilute urine. However, excessive water intake can overwhelm the kidney’s ability to eliminate water (Joo, & Kim, 2013), resulting in hyponatremia, a reduction in plasma sodium below normal levels, typically defined as 135 mEq/L or less (Verbalis, 1989). Two secondary symptoms of forced water intoxication include hyponatremic encephalopathy, a symptom affecting the brain, and hypoxemia, an insufficient amount of oxygen in the blood (Chamberlain, 2012). The brain is very sensitive to sudden shifts in blood sodium. Other more severe symptoms of hyponatremia include: seizures, brain damage, and even death (Radojevic et al., 2012). The risk of seizures increases exponentially when plasma sodium falls below 125 mEq/L, especially when levels drop suddenly (Barber, & Whitefield, 2012). Water intoxication is thus a serious condition that if left untreated can have extremely negative consequences.
Water Intoxication as a Form of Child Abuse

Although water intoxication can occur accidentally, it has been identified as a rare, yet often fatal, form of child abuse known as “forced water intoxication” (Arieff & Kronlund, 1999). Forced water intoxication of children is classified as intentional poisoning (Dine & McGovern, 1982). Victims of previous physical abuse are at greater risk for forced water intoxication (Arieff & Kronlund, 1999). An example of this type of abuse involved a six-year-old boy forcibly fed water through a garden hose. The boy repeatedly interrupted his mother by asking for a glass of water. The mother responded by placing a hose in the child’s mouth and closing his mouth around the hose. Upon seeing this, the child’s playmate alerted his own parents, who then called the police. The child was found unconscious and frothing at the mouth, but was resuscitated and reportedly sustained no lasting physical injuries (Radojevic et al., 2012). In another case, a two-year-old girl presented multiple times with recurrent seizures associated with hyponatremia, twice requiring resuscitation in the hospital (Barber, & Whitefield, 2012). The etiology was initially thought to be due to renal salt-wasting disease or adrenal insufficiency before finally being associated with abuse (i.e., forced water intoxication).

While some incidents of forced water intoxication are the direct result of the abuse, forced water intoxication is a secondary result of abuse that must also be understood. One example is forced bathtub emersion (as a form of abuse), which may result in forced water intoxication (Nixon & Pearn, 1977). Healthcare providers should be equipped to recognize the signs of forced water intoxication, as they are in the best position to detect it early and are often some of the first people to come into contact with victims of abuse.

Accidental Water Intoxication

In addition to water intoxication as a form of abuse, healthcare providers must also be aware of the possibility of accidental water intoxication in children. Although rare, water intoxication may result among children from common activities such as bottle-feeding, swimming lessons, juice consumption, or irrigation of the nasal passages (Bruce & Kliegman, 1997; Schulman, 1980). A 2007 study found that water intoxication might increase for bottle-fed newborns (Ophir, et. al., 2007). Risk of water intoxication may also occur among children who accidentally swallow water during swimming lessons (Goldberg, Lightner, Morgan, & Kemberling, 1982). Another rare form of accidental water intoxication may occur from the consumption of large amounts of sweetened beverages, like juice and soda. As with pure water ingestion, excessive consumption of these beverages (which contain a high percentage of water and very little sodium) may potentially lead to hyponatremia (Dolezel, 2010; Furth, & Osi, 1993). In the medical setting, water intoxication can also result from excessive intravenous infusion of solutions that are hypotonic (i.e., with low amounts of electrolytes). For individuals who have not yet reached puberty, death or brain damage through acute hyponatremic encephalopathy is the most prominent danger associated with water intoxication (Arieff & Kronlund, 1999).

Reported cases of accidental water intoxication in adults are often related to the overconsumption of water by athletes prior to endurance races, military personnel during military basic training, individuals attempting to dilute urine for a drug test, and persons with schizophrenia (Ristedt, 1999). Cases of water intoxication by endurance athletes have been reported in endurance activities lasting longer than seven hours. The athlete voluntarily hyperhydrates with hypotonic solutions and experiences moderate sodium chloride losses through sweat (Noakes, Goodwin, Rayner, Branken, & Taylor, 1985). Reported cases of water intoxication in military basic training follow a similar etiology to endurance athlete water intoxication, with the motivation for hyperhydration being the avoidance of heat injury (Garigan, & Ristedt, 1999). Water intoxication has also been described following intentional efforts to dilute urine prior to drug of abuse testing (to hide presence of illicit drugs) by drinking large quantities of water (Tilley, & Contant, 2011). Self-induced water intoxication has also been reported in some individuals diagnosed with schizophrenia (de Leon, Verghese, Tracy, Josiassen, & Simpson, 1994; Smith, & Clark, 1980; Vieweg, David, Rowe, Wampler, Burns, & Spradlin, 1985).
Conclusion

Forced water intoxication may be an unfamiliar form of child abuse to many professionals and can be a potentially lethal form of abuse. The deadly nature of water intoxication is exacerbated by the public’s lack of awareness about its detection and prevention. Symptoms of water intoxication may go unnoticed or be mistaken for other ailments, which may indirectly facilitate the onset of hyponatremia, leading to brain damage and even death. Increasing awareness about forced water intoxication as a form of child abuse may help to reduce the number of incidents. Healthcare workers should consider forced water intoxication in the differential diagnosis of otherwise unexplained hyponatremia.

A major step to spread awareness about forced water intoxication is educating healthcare workers and those working with at-risk populations. Greater awareness of the signs and symptoms of forced water intoxication is necessary in order to facilitate swift and accurate identification of this potentially fatal form of abuse. One way healthcare providers could identify incidents of forced water intoxication is by including queries pertaining to forced water intake in child abuse assessments, as some parents may use the practice as a misguided form of punishment. Another recommendation is to educate caretakers on the dangers of forced water intoxication. Medical doctors involved with prenatal and pediatric care should inform new mothers and caretakers of the risks that water overconsumption can pose. Those who are well informed about the detection and prevention of water intoxication should collaborate closely with the community, medical, and mental health providers in order to consider all possible factors in a critical evaluation.

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