International Journal of Innovative Research and Advanced Studies (IJIRAS)
Volume 4 Issue 11, November 2017

ISSN: 2394-4404

Diabetes Insipidus In Children

S. Geetha

Asso. Professor, Department of Child Health Nursing,
Sree Balaji College of Nursing, Bharath University, Chrompet, Chennai

Abstract: ***Diabetes insipidus (DI) is part of a group of hereditary or acquired polyuria and polydipsia diseases in which the kidneys pass large amounts of water irrespective of the body's hydration state. DI is due either to deficient secretion of ADH by the pituitary gland (central or neurogenic DI) or to renal tubular unresponsiveness to vasopressin (nephrogenic DI). Central DI in the acute phase after traumatic brain injury is associated with hypernatremia and increased intracranial pressure and high mortality rates of 33-82%. The earlier onset of nephrogenic DI and the reduced ability to treat this variety of the disease render the child more prone to attention deficit, hyperactivity, learning disorders, and psychomotor delay. Diagnosis is based on the presence of high plasma osmolality and low urinary osmolality with significant water diuresis. Neonates and young infants are better managed with fluids alone. Older children with CDI are treated with desmopressin. The oral form is safe, highly effective, with more flexibility of dosing and has largely replaced the intranasal form. In NDI besides treatment of the underlying cause, use of high calorie low solute diet and drugs to ameliorate water excretion (thiazide, amelioride, indomethacin) are useful. Children with NDI however well treated, remain short and have mental retardation on follow up. Parents must be educated regarding water replacement in infants and young children who cannot express thirst or access fluids without assistance. Gastrointestinal illnesses that cause decreased intake, increased stool losses, or both must receive early and serious attention to prevent life-threatening electrolyte and fluid balance abnormalities.***

Keywords: Diabetes insipidus, polydipsia, polyuria

I. DIABETES INSIPIDUS

Diabetes insipidus is a condition that results from insufficient production of the antidiuretic hormone (ADH), or vasopressin, a hormone that helps the kidneys and body conserve the correct amount of water. Normally, ADH controls the kidneys' output of urine. It is secreted by the hypothalamus (a small gland located at the base of the brain), stored in the pituitary gland, and then released into the bloodstream. ADH is secreted to decrease the amount of urine output so that dehydration does not occur. Diabetes insipidus, causes excessive production of very diluted urine and excessive thirst.

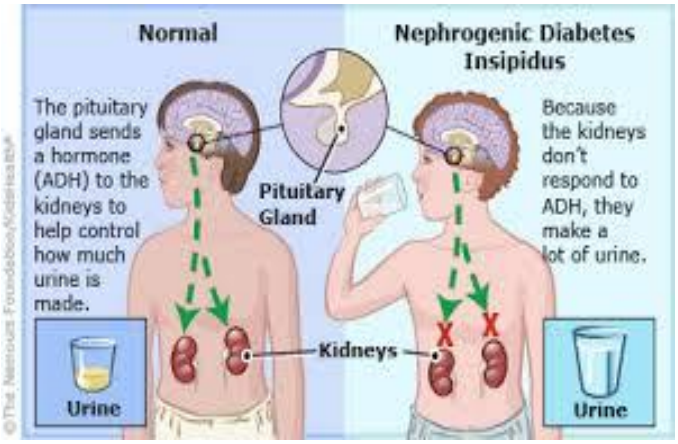

Figure 1

II. CAUSES DIABETES INSIPIDUS

Diabetes insipidus can be caused by several conditions, including the following

- ✓ Malfunctioning hypothalamus (that produces too little ADH)

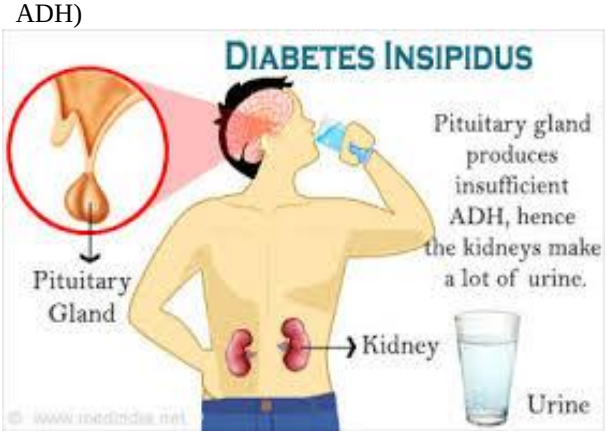

Figure 2

- ✓ Malfunctioning pituitary gland (that fails to release ADH into the bloodstream)
- ✓ Damage to hypothalamus or pituitary gland during surgery
- ✓ Brain injury, Tumor, Tuberculosis, Blockage in the arteries leading to the brain
- ✓ Encephalitis, Meningitis.
- ✓ Family heredity

III. SYMPTOMS OF DIABETES INSIPIDUS

The following are the most common symptoms of diabetes insipidus. However, each child may experience symptoms differently. Symptoms may include:

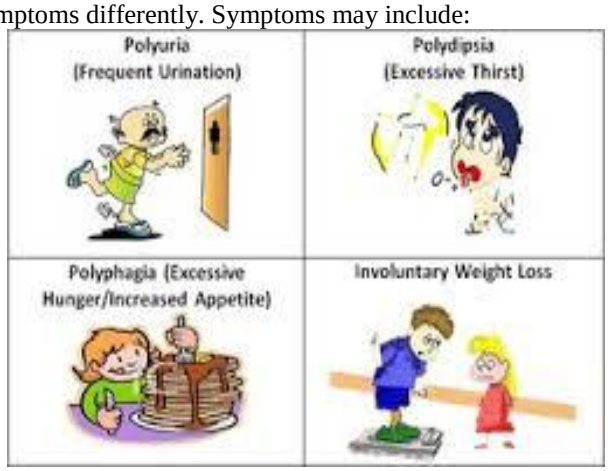

Figure 3

- ✓ Excessive thirst, Excessive urine production, Dehydration

Infants with diabetes insipidus may also exhibit the following symptoms, Irritability, Poor feeding, Failure to grow. High fevers

IV. DIAGNOSETIC STUDIES

In addition to a complete medical history and physical examination, including the child's daily fluid intake, dietary intake, and voiding (bowel and bladder elimination) patterns, diagnostic procedures for diabetes insipidus may include:

- ✓ *Urine tests.*
- ✓ *Blood tests*
- ✓ *Water deprivation test.* To observe if dehydration occurs. This test must only be done in the hospital.
- ✓ *Magnetic resonance imaging (MRI).* A diagnostic procedure that uses a combination of large magnets, radiofrequencies, and a computer to produce detailed images of organs and structures within the body; to check for pituitary abnormalities.

TREATMENT

If left untreated in children, diabetes insipidus can lead to brain damage, impaired mental function, intellectual disability, hyperactivity, short attention span, and/or restlessness. Treatment for diabetes insipidus depends on what is causing the disease. Treating the cause usually treats the diabetes insipidus. Specific treatment for diabetes insipidus will be determined by your child's doctor based on:

- ✓ Child's age, overall health, and medical history
- ✓ Extent of the disease
- ✓ Child's tolerance for specific medications, procedures, or therapies
- ✓ Expectations for the course of the disease.

Figure 4

Figure 5

Treatment may include modified antidiuretic hormone medications (often taken as a pill, injection, or nasal spray), or medications that stimulate the production of the antidiuretic hormone such as NSAIDs or chlorpropamide. In addition, persons with diabetes insipidus must maintain adequate fluid intake to compensate for the excessive urinary output.. Although children with the disease also need to drink plenty of

fluids, care should be taken to monitor sodium intake in their fluids.

V. PROGNOSIS

Long-term survival in cases of central DI depends on the precipitating cause. In primary central DI, the prognosis is excellent with early recognition and appropriate desmopressin therapy. The earlier onset of nephrogenic DI and the reduced ability to treat this variety of the disease renders the child more prone to attention deficit, hyperactivity, learning disorders, and psychomotor delay.

VI. PATIENT EDUCATION

Parents must be educated regarding water replacement in infants and young children who cannot express thirst or access fluids without assistance. Gastrointestinal illnesses that cause decreased intake, increased stool losses, or both must receive early and serious attention to prevent life-threatening electrolyte and fluid balance abnormalities.

VII. COMPLICATIONS

- ✓ Growth failure, Nocturia and enuresis, Hypernatremic dehydration, Seizures
- ✓ Mental retardation

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