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Review Article

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The Role of Hypothalamus in Physiopathology of Diarrheal Dehydration

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Abstract The structure effective in regulating the body water balance by the nervous way is hypothalamus that it is located at the base of the 4th ventricle and is connected with cortex cerebri. In this paper, the role of hypothalamus in physiopathology of diarrheal dehydration has been described in brief.

Keywords Hypothalamus, Diarrheal Dehydration

Introduction

The importance of body water balance

Water is one of the basic conditions of life and is a suitable medium for living organisms. In order for cells to benefit from various mineral salts, these substances must be dissolved in water. Again, the various substances absorbed from the digestive tract must be dissolved in water to reach the cells. O_2which is necessary for cell life and CO_2that is the result of metabolism are dissolved in water. In addition, water is used to adjust the body temperature with the heat holding and transmitting feature. The water, which is so important for the organism, is constantly kept in balance with the body's regulatory systems. If this balance is disturbed by water, a clinical picture called dehydration appears.

Diarrheal Dehydration

The amount of water and ion absorbed from the digestive tract is always high from the amount taken by eating and drinking. Because the water and electrolytes in the gastro-intestinal lumen are not only oral. There is a constant exchange of fluid and electrolyte between the body and the gastrointestinal tract. During the digestion and absorption events many electrolytes and water are given to the digestive tract from the body. The nutrients in the digestive tract have a certain rate of progression, so for some reason this transit rate increases or if the water in the lumen is insufficiently absorbed, the rate of water content should be taken out excessively. The amount of fluid given to the digestive tract during food intake in humans and pets may cover the entirety of the extracellular fluid. In order for this fluid to be absorbed back, the intestinal wall must be healthy and its contents must pass at a certain rate. However, in some cases, structural or functional team disorders in the intestinal wall may occur or the speed of passage may change and accelerate. Causes electrolytes and water from the intestinal lumen to not be absorbed. Diarrhea is due to this. In patients with diarrhea the findings of clinical dehydration are formed very quickly. The eyes collapsed into the orbit, the skin lost its elasticity and gained a dry appearance. In the case of dehydration, some systems in the body activate regulatory mechanisms. Have a hypothalamus in one of these.

The Role of Hypothalamus in Physiopathology of Dehydration

The structure effective in regulating the body water balance by the nervous way is hypothalamus that it is located at the base of the 4th ventricle and is connected with cortex cerebri.

a) Role of -preoptic nucleus

It has been clearly established that hypothalamus has the necessary nuclear centers for the integration of various signaling types that alter body water balance and water uptake [1-2]. The clinical physiology of water metabolism: part I: the physiologic regulation of arginine vasopressin secretion and thirst. It has been stated that thirst could be elicited by direct administration of hyperosmotic solutions to the anteromedial hypothalamus [3]. Preoptic-hypothalamic periventricular lesions: thirst deficits and hypernatremia. As another research of injections of hypertonic solutions directly into the preoptic-hypothalamic third ventricle was be indicate that the desire to drink water emerges [4]. Periventricular preoptic-hypothalamus is vital for thirst and normal water economy [5]. Despite the fact that physiological and endocrinological responses work independently to a degree in dehydration, preoptic and hypothalamic regions play an important role in strengthening and coordinating these effects [6]. The neurobiology of thirst and sodium appetite. Another a study suggested that lesion in the medial preoptic area by unilateral injection of the lidocaine chlorhydrate causes a transient increase in water intake induced by water deprivation in rats but lidocaine released into the lateral preoptic area slightly decreased or did not change water intakeas compared with controls [7]. The involvement of the hypothalamic preoptic area on the regulation of thirst in the rat. Takahashi et.al. demostrated that stimulation of neostigmine through microdialysis probe increased extracellular concentration of acetylcholine in the preoptic area and anterior hypothalamus, and was accompanied by a dose-dependent fall in body temperature and increased water intake [8].

b) Role of supraoptic nucleus

The supraoptic and paraventricular nuclei of the hypothalamus contain two types of magnocellular neurons that produce antidiuretic hormone also called vasoppressin (ADH). About 5/6 of these magnocellular neurons are located on the supraoptic nucleus. ADH synthesized here is transported along the axons of neurons and stored in the posterior pituitary [9]. Dendritic release of vasopressin and oxytocin [10], The Vasopressin Receptors Colocalize with Vasopressin in the Magnocellular Neurons of the Rat Supraoptic Nucleus and Are Modulated by Water Balance, When the supraoptic and paraventricular nuclei are stimulated by increased osmolarity or other factors [11]. Osmoreceptors, osmoreception, and osmoregulation, the nerve impulses move downward and come to the end of the nerves, the permeability of the membrane changes, resulting in increased calcium entry. ADH is released in response to calcium entry. The released ADH is confused with systemic circulation from the posterior pituitary [9] Dendritic release of vasopressin and oxytocin, Vasopressin and oxytocin receptors in the central nervous system. The increase in osmolarity of body fluids stimulates the release of ADH by stimulating the magnocellular fields that are located on supraoptic and paraventricular nuclei. In addition, reduced blood volume and low blood pressure also stimulate ADH release. ADH comes to the kidneys with systemic circulation, provides increased reabsorption of water from the collecting ducts and the last part of the distal tubule. Thus, both urine is concentrated and increased osmolarity is balanced again. Physiology and pathophysiology of the vasopressin-regulated renal water reabsorption [9, 12]. Increased hyperosmolarity also stimulates the thirst center in the lateral hypothalamus known as Subfornical organ. In this way the desire for water intake increases in the organism [13-14].

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