

The role of zinc in acute pyelonephritis

Ruolo dello zinco nella pielonefrite acuta

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INTRODUCTION

Urinary tract infection (UTI) is a common disease among infants and children [1, 2]. UTI might affect the lower urinary tract (cystitis) or the upper urinary tract (acute pyelonephritis) [3]. Acute pyelonephritis is the most severe and dangerous form of UTI. Delay in diagnosis and treatment may result in renal scar and chronic renal failure [1-5]. The prevalence of renal scar formation following acute pyelonephritis is reported as high as 10%-65% [3]. Several risk factors such as vesicoureteral reflux, urinary tract obstruction, nephrolithiasis, and dysfunctional voiding syndrome increase the chance of developing acute pyelonephritis and its complications [1]. Given the role of some trace elements like zinc in various infectious diseases, the following questions arose: What is the status of serum zinc level in children with acute pyelonephritis? Do zinc play a role in the pathogenesis of acute pyelonephritis? Trace elements are mineral nutrients that are fundamental for the normal physiological functioning of the body. Zinc element is crucial for free radical detoxification, antioxidant defense, and immune system function in humans [6-8]. Nowadays, zinc deficiency is a major risk factor for morbidity and mortality, particularly in developing countries [9]. It increases the chance of occurrence of different infectious diseases such as skin and respiratory

infections, diarrhea, malaria, and tuberculosis [10,11]. Due to the high prevalence of acute pyelonephritis, it is important to identify the factors involved in its pathophysiology. Therefore, this study was conducted to compare serum concentration of zinc in children with acute pyelonephritis and healthy children.

PATIENTS AND METHODS

This case-control study was conducted at Qazvin Children Hospital affiliated to the Qazvin University of Medical Sciences in Qazvin, Iran in 2012-2013. This hospital is the only children's teaching hospital in Qazvin Province. In this study, 60 children with acute pyelonephritis (the case group) and 60 healthy children (the control group) were compared in term of serum zinc level. The ages of all children were between two months and 12 years. The sample size was calculated based on the following formula:

$$n = \frac{2 \left(z 1 - \frac{\alpha}{2} + z 1 - \beta \right)^2 \sigma^2}{(\mu_1 - \mu_2)^2}$$

where $\alpha = 0.05$; $1 - \alpha/2 = 0.975$; $\beta = 0.2$; $1 - \beta$ (power) = 0.8; $\sigma = 8$; $\mu_1 = 83 \mu\text{g/dL}$; and $\mu_2 = 79 \mu\text{g/dL}$ [12]. Consecutive sampling continued until the desired sample size was reached. The inclusion criteria for children with acute pyelonephritis (case group) were:

- first UTI;
- having clinical signs and symptoms of acute

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