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Behavior of inflammatory molecules in pulmonary tuberculosis patients with zinc supplementation during anti tuberculosis therapy: A pilot study

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Statement of the Problem: In pulmonary tuberculosis an intense inflammatory response is developed in which both the pathogen and the host are involved. Likewise, the effect of zinc as modulator of immune response is well documented. However, no previous studies have been performed on the effects of zinc supplementation on the behaviour of this type of response in pulmonary tuberculosis patients.

Aim: The purpose of this study was to evaluate the effects of zinc supplementation on the changes in pattern of inflammatory molecules in pulmonary tuberculosis.

Methodology: An intervention study was conducted on 21 patients with pulmonary tuberculosis on pharmacological therapy. They were divided into two groups who were given zinc (45 mg/day as gluconate) or placebo for three months.

Findings: The concentrations of cytokines IL-17, INF-gamma and TNF alpha not showed differences between patients controls and also the time between before and after intervention (Table 1). Regarding the concentrations of the acute phase proteins CRP (C-reactive protein), haptoglobin and orosomucoid were above the upper reference limits prior to the intervention and after three months they had diminished markedly; however, the decreases were not affected by zinc supplementation (Table 1).

Conclusion & Significance: It is concluded that addition of a daily supplement of 45 mg of zinc to conventional anti-tuberculosis therapy did not have any additive effect on the normalization of acute phase proteins neither on the behaviour of inflammatory cytokines.

Recent Publications

- Mohan G, Kulshreshtha S and Sharma P (2006) Zinc and copper in Indian patients of tuberculosis: impact of antitubercular therapy. *Biol Trace Elem Res.* 111(1-3):63-69.
- María Teresa Herrera Barrios, Martha Torres Rojas, Esmeralda Juárez Carvajal and Eduardo Sada Díaz (2005) Molecular mechanisms of the immune response in human pulmonary tuberculosis. *Rev. Inst. Nal. Enf. Resp. Mex.* 18(4).
- T U, Ciftci B, Yis Ö, Guney Y, Bilgihan A, et al. (2003) Changes in serum selenium, copper, zinc levels and Cu/Zn ratio in patients with pulmonary tuberculosis during therapy. *Biol Trace Elem Res.* 95(1):65-71.
- Karyadi E, West C E, Schultink W, Nelwan R H, Gross R, et al. (2002) A double-blind, placebo-controlled study of vitamin A and zinc supplementation in persons with tuberculosis in Indonesia: effects on clinical response and nutritional status. *Am J Clin Nutr.* 75(4):720-727.

Table 1: Inflammatory molecules plasma concentration in pulmonary tuberculosis patients before (T0), after (T1) zinc supplementation, and controls (T2). Data expressed as median (SD).

Plasma concentration	Zinc group (n=11)			Placebo group (n=10)		
	T0	T1	Ctrl	T0	T1	Ctrl
Zinc group (n=11)						
IL-17 (pg/mL)	15.4 (15.2)	14.8 (14.8)	11.1 (10.9)	15.4 (15.2)	14.8 (14.8)	11.1 (10.9)
INF-γ (pg/mL)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)
TNF-α (pg/mL)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)
Albumin (g/L)	30 (30)	30 (30)	30 (30)	30 (30)	30 (30)	30 (30)
CRP (mg/L)	4.9 (4.9)	3.3 (3.3)	3.2 (3.2)	4.9 (4.9)	3.3 (3.3)	3.2 (3.2)
Haptoglobin (g/L)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)
Orosomucoid (g/L)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)
Placebo group (n=10)						
IL-17 (pg/mL)	15.4 (15.4)	14.8 (14.8)	11.1 (11.1)	15.4 (15.4)	14.8 (14.8)	11.1 (11.1)
INF-γ (pg/mL)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)
TNF-α (pg/mL)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)	17.1 (17.1)
Albumin (g/L)	30 (30)	30 (30)	30 (30)	30 (30)	30 (30)	30 (30)
CRP (mg/L)	4.9 (4.9)	3.3 (3.3)	3.2 (3.2)	4.9 (4.9)	3.3 (3.3)	3.2 (3.2)
Haptoglobin (g/L)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)
Orosomucoid (g/L)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)	1.1 (1.1)

Biography

Marisol Cordova Rojas is a Researcher at Centro Universitario de Medicina Tropical (CUMETROP), IIBISMED Faculty of Medicine of the University Mayor de San Simon, Cochabamba, Bolivia. Lecturer in Postgraduate programs in Cellular Biology and Immunology (UMSS), National Trainer Teacher in the Congenital Chagas Program (Bolivia). Lecturer in Medical Residence Program at University Hospital Cochabamba Bolivia. Consultant in Congenital Chagas Program, Health Ministry Bolivia. Training Courses: in Belgium, Spain and Peru. Invited Lecturer at the Research Institute CRESIB (Spain). Member of the Bolivian Society of Immunology (SOBOIN) and the Bolivian Society of Women in Science. Extensive experience in cellular immunology and research of the immune response in patients with infectious and tropical diseases..

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