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## Effect of vitamin A and zinc on circulating profile of IL-2, IL-12 and IFN $\gamma$ cytokines in pulmonary tuberculosis patients

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Tuberculosis (TB) is a major public health problem throughout the world and one of the leading causes of mortality. Vitamin A and zinc deficiency is frequently observed in patients of pulmonary TB and thus, diminish the activity of their immune system. The aim of this study was to investigate the effect of vitamin A and zinc supplementation on sputum conversion time and immunological profile in pulmonary TB patients receiving antitubercular treatment. This was a double-blind, placebo-controlled study. The cases comprised those outpatients with active pulmonary TB (new sputum smear positive) who had attended the DOTS center in the Department of Pulmonary Medicine, King George's Medical University, Lucknow, Uttar Pradesh, India. Total 260 patients were enrolled and randomly grouped into four categories of intervention. After completion of the follow-up, some patients dropped out from the study so that total 208 patients completed it. The level of interleukin-2 (IL-2), IL-12 and interferon gamma (IFN $\gamma$ ) was significantly ( $P=0.001$ ) changed and the sputum smear conversion was significantly early in the vitamin A and zinc supplemented group. In this study we demonstrated that vitamin A and zinc may directly or indirectly influence the activation of cytokines. The circulating cytokines play an especially important role in the pathogenesis of active pulmonary TB.

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