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Vitamin D and LL-37 Levels in Childhood Tuberculosis Disease and Latent Tuberculosis Infection

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Objectives: Vitamin D is an important prohormone with a regulatory role in the immune system and there is strong evidence of its role in the development of tuberculosis(Tb) disease in childhood. Our aim is to determine the levels of vitamin D in patients with Tb disease, latent Tb infection(LTBI) and healthy children and an antimicrobial peptide synthesized by means of vitamin D, "cathelicidin B"(LL-37) levels. Our second aim of this study is to determine the relationship between microbiological characteristics and the presence of vitamin D and/or LL-37 reduction in the development of the disease, the prevalence and severity of the disease.

Methods: Healthy controls (n=21), children with Tb (n=32) and LTBI (n=35) who were diagnosed and followed in Hacettepe University Department of Pediatric chest disease were included and vitamin D, LL-37 levels were analyzed. Demographic characteristics, clinical, radiological, microbiological findings, TST results, treatment status were recorded.

Results: The mean age in the Tb group, LTBI group and healthy children was 10±5.5 years, 11.3±5.1 years and 8.4±4.6 years, respectively. Vit D level mean±SD(Min-Max) in three groups comparison; In the Tb group, 18.2±7.9 (5.32-34.70) was found to be significantly lower, 23.6±7.3 (9.16-43.40) in LTBI group and 19.8±5.76 (11.29-32.57) in healthy controls (p=0.018). Six patients (18.8%) had vitamin D deficiency (Vitamin D level ≤10), 16 patients(50%) had vitamin D insufficiency(Vit D=10-20) and 10 patients (31.3%) had normal vitamin D levels. When patients were divided into subgroups according to Tb types, in severe Tb (Miliary-Disseminated Tb group) (n=7); Vitamin D level was found to be 15.8±5.6 (9.1-24) and 18.7±8.36 (5.3-34.7) in the other Tb group, and the mean vitamin D level was lower in the severe Tb group, but this was not significant (p=0.31). Vitamin D insufficiency or deficiency was found in 85.7% of patients with ARB positive and 87.5% of patients with Tb PCR positive group. Vitamin D insufficiency or deficiency was detected in 82.4% of patients with positive tuberculosis culture. Vitamin D insufficiency or deficiency was significantly higher in the tuberculosis culture positive group(p=0.04).

Conclusion: Our study showed that vitamin D levels were significantly lower in patients with Tb disease than LTBI and healthy controls; this is significantly more evident in the group where Tb was proven microbiologically. Because of low levels of LL-37 do not significantly accompany low vitamin D levels; our results also suggest that the pathogenesis of vitamin D deficiency in Tb disease is not due to low LL-37.

Keywords: Tuberculosis disease, latent tuberculosis infection, Vitamin D, cathelicidin