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# Vitamin D and its pathway genes in myopia: systematic review and meta-analysis

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## Abstract

**Objective:** To conduct a systematic review and meta-analysis of the association of blood vitamin D (25-hydroxyvitamin D, 25(OH)D) concentration and vitamin D pathway genes with myopia.

**Methods:** We searched the MEDLINE and EMBASE databases for studies published up to 29 January 2018. Cross-sectional or cohort studies which evaluated the blood 25(OH)D concentration, blood 25(OH)D3 concentration or vitamin D pathway genes, in relation to risk of myopia or refractive errors were included. Standard mean difference (SMD) of blood 25(OH)D concentrations between the myopia and non-myopia groups was calculated. The associations of blood 25(OH)D concentrations and polymorphisms in vitamin D pathway genes with myopia using summary ORs were evaluated.

**Results:** We summarised seven studies involving 25 008 individuals in the meta-analysis. The myopia group had lower 25(OH)D concentration than the non-myopia group (SMD=-0.27 nmol/L, p=0.001). In the full analysis, the risk of myopia was inversely associated with blood 25(OH)D concentration after adjusting for sunlight exposure or time spent outdoors (adjusted odds ratio (AOR)=0.92 per 10 nmol/L, p<0.0001). However, the association was not statistically significant for the <18 years subgroup (AOR=0.91 per 10 nmol/L, p=0.13) and was significant only for 25(OH)D3 (likely to be mainly sunlight derived), but not total 25(OH)D (AOR=0.93 per 10 nmol/L, p=0.00007; AOR=0.91 per 10 nmol/L, p=0.15). We analysed four single nucleotide polymorphisms in the VDR gene from two studies; there was no significant association with myopia.

**Conclusions:** Lower 25(OH)D is associated with increased risk of myopia; the lack of a genetic association suggests that 25(OH)D level may be acting as a proxy for time outdoors.

**Keywords:** genetics; optics and refraction.

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