

Vitamin D is a fat soluble vitamin, essential in multiple physiological functions. Studies suggest that vitamin D deficiency is associated with obesity and vice versa, low vitamin D levels might be an independent predictor of obesity. A randomized, double-blind, placebo-controlled trial was conducted among 125 overweight and obese Caucasian volunteers with vitamin D deficiency or insufficiency. Volunteers were randomly assigned to either oral vitamin D (Dlux 3000) supplement (intervention, n=76) or placebo (control, n=49), on a daily basis for 3 months following a weight loss diet. Fat mass, weight, BMI, RMR and serum 25(OH)D were monitored on baseline and each month. DNA samples were extracted from buccal swabs and genotyped for the rs2228570 (*VDR*), rs1544410 (*VDR*), rs731236 (*VDR*), rs1800544 (*ADRA2A*), rs1801252 (*ADRB1*), rs1042713 (*ADRB2*) and rs4994 (*ADRB3*) polymorphisms. Significant improvement in vitamin D status and reduction in weight, BMI and fat percentage were observed in the intervention group ($p < 0.05$). In the intervention group, carriers of the rs2228570 T allele showed greater vitamin D level improvement compared with the homozygous C allele ($p = 0.067$). Furthermore, heterozygous (CT) for the rs731236 showed lesser weight loss ($p = 0.068$) and for the rs1042713, a significant lower decline in fat percentage was observed for homozygous AA carriers compared with the heterozygous ($p = 0.051$). In the control group, differences in weight loss ($p = 0.055$) and BMI ($p = 0.045$) were observed between rs1544410 AA and GG homozygous. We finally concluded that Vitamin D oral spray supplementation improved 25(OH)D levels and obesity markers in overweight and obese volunteers with vitamin D deficiency or insufficiency. Genetic polymorphisms seem to influence vitamin D supplementation response and obesity markers.