Standardizing serum 25-hydroxyvitamin D data from four Nordic population samples using the Vitamin D Standardization Program protocols: Shedding new light on vitamin D status in Nordic individuals

Knowledge about the distributions of serum 25-hydroxyvitamin D (25(OH)D) concentrations in representative population samples is critical for the quantification of vitamin D deficiency as well as for setting dietary reference values and food-based strategies for its prevention. Such data for the European Union are of variable quality making it difficult to estimate the prevalence of vitamin D deficiency across member states. As a consequence of the widespread, method-related differences in measurements of serum 25(OH)D concentrations, the Vitamin D Standardization Program (VDSP) developed protocols for standardizing existing serum 25(OH)D data from national surveys around the world. The objective of the present work was to apply the VDSP protocols to existing serum 25(OH)D data from a Danish, a Norwegian, and a Finnish population-based health survey and from a Danish randomized controlled trial. A specifically-selected subset (n = 100-150) of bio-banked serum samples from each of the studies were reanalyzed for 25(OH)D by LC-MS/MS and a calibration equation developed between old and new 25(OH)D data, and this equation was applied to the entire data-sets from each study. Compared to estimates based on the original serum 25(OH)D data, the percentage vitamin D deficiency (<30 nmol/L) decreased by 21.5% in the Danish health survey but by only 1.4% in the Norwegian health survey; but was relatively unchanged (0% and 0.2%) in the Finish survey or Danish RCT, respectively, following VDSP standardization. In conclusion, standardization of serum 25(OH)D concentrations is absolutely necessary in order to compare serum 25(OH)D concentrations across different study populations, which is needed to quantify and prevent vitamin D deficiency.

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