

Hypovitaminosis D in a normal, apparently healthy urban European population[☆]

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Abstract

Serum 25 OH Vitamin D (25 OH D) concentrations generally vary with latitude, season, and the composition of the population studied. There is a growing recognition that rather than a seasonal specific decline in serum 25 OH Vitamin D, a significant proportion of the population may exhibit asymptomatic subclinical Vitamin D insufficiency. Vitamin D insufficiency has been described in populations at risk, such as nursing home residents and the homebound elderly. We assessed a population of normal, apparently healthy volunteers at a single European urban center for 25 OH Vitamin D sufficiency. Serum 25 OH D concentrations were determined using an automated LIAISON[®] 25 OH Vitamin D assay. For the purposes of this study, Vitamin D insufficiency was defined as a serum 25 OH Vitamin D concentration of <15 ng/mL. Of the total population ($n = 126$) 34% exhibited 25 OH Vitamin D concentrations of <15 ng/mL. The mean \pm S.D. serum 25 OH Vitamin D concentration among the total, sufficient, and insufficient populations was 19.4 ± 7.7 , 23.6 ± 6.4 , and 12.1 ± 2.3 ng/mL. From these data, we conclude that 25 OH Vitamin D insufficiency is more common than previously thought, and is not restricted to high-risk groups.

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1. Introduction

A number of factors have been found to affect the concentrations of 25 OH Vitamin D in the blood. Serum 25 OH Vitamin D (25 OH D) concentrations vary with latitude, season, race, age, dietary intake, and the composition of the populations studied [1]. There is growing recognition that rather than seasonal specific decline in serum 25 OH D, a significant proportion of the population may exhibit asymptomatic subclinical Vitamin D insufficiency, particularly in the winter months [2,3]. Vitamin D insufficiency has been described in populations at risk, such as nursing home residents and the homebound elderly [4–6]. Vitamin D insufficiency has also been described in the general population in several European countries [7,8]. The concentration at which a person is Vitamin D insufficient has not been firmly established. Suggested concentrations range from 10 to 30 ng/mL (25 to 80 nmol/L) [2–8]. This study confirms the presence

of 25 OH Vitamin D insufficiency in an urban Western European population.

2. Materials and methods

2.1. 25 OH Vitamin D assay

Serum 25 OH Vitamin D concentrations were determined by the LIAISON[®] 25 OH Vitamin D assay. For the LIAISON[®] assays, samples are placed in the sample racks of the analyzer. Aliquots (25 μ L) are added to a reaction cuvette with anti-25 OH Vitamin D coated microparticles (20 μ L), 25 OH Vitamin D-ABEI conjugate (20 μ L), and assay buffer (220 μ L). The cuvettes are incubated for 30 min, washed, and trigger reagent is added, with a 3 s read cycle.

2.2. Samples

Samples ($N = 126$) were obtained from normal apparently healthy volunteer subjects in Brussels, Belgium during the late winter months. Subjects consisted of 39 males and 87 females with an age range of 21–65 years.

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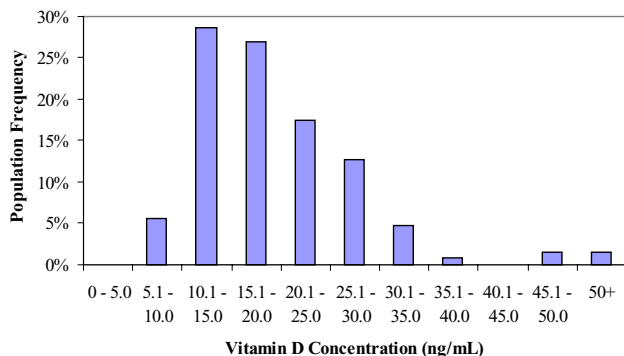


Fig. 1. Frequency distribution of 25 OH Vitamin D concentrations.

Table 1
Summary of frequency distributions

Parameter	Identified populations		
	Total	Vitamin D sufficient	Vitamin D insufficient
Number of subjects	126	83	43
Males	39	11	28
Females	87	72	15
Total population (%)	100	66	34
Mean concentration (ng/mL)	19.4	23.6	12.1
Standard deviation	7.7	6.4	2.3
Median	17.8	23.6	12.6

Table 2
Gender differences in 25 OH Vitamin D concentrations

Parameter	Males	Females
Total population (%)	31	69
Concentration, ng/mL (mean \pm S.D.)	13.8 \pm 3.1	24.2 \pm 7.2
Concentration, ng/mL (median)	14.3	24.0
Subjects (%) <15 ng/mL	72	17

3. Results

The frequency distribution for 25 OH Vitamin D concentrations is shown in Fig. 1. From this distribution 34% of the samples are within a concentration range that would be considered to be 25 OH Vitamin D insufficient (<15 ng/mL or <40 nmol/L). Because the population is not normally distributed, the median values as well as the mean \pm S.D. are shown in Table 1. While the population was predominantly female (69%), the subjects exhibiting insufficiency were predominantly male (Tables 1 and 2).

4. Discussion

The gender differences observed in this population have not been reported previously. At the present time we do not know why the males in this population exhibit greater 25 OH Vitamin D insufficiency than the females. Given the small population size, and the relative under-representation

of males in this population, it is difficult to determine the significance of this observation.

There is growing recognition that rather than seasonal specific decline in serum 25 OH D, a significant proportion of the population may exhibit asymptomatic subclinical Vitamin D insufficiency, particularly in the winter months [2]. Vitamin D insufficiency has been described in populations at risk, such as nursing home residents and the homebound elderly [2,3,8]. Insufficiency in normal populations is just beginning to be reported in the literature, and seems to exhibit wide variations from 7 to 80% [7].

The serum concentration of 25 OH Vitamin D corresponding to insufficiency was set at <15 ng/mL for this study (\sim 40 nM). This value was chosen after a survey of the literature describing hypovitaminosis D in various populations [2–8]. It should be noted that some authors have considered significantly higher concentrations for the cutoff value for insufficiency. Recent suggestions of 60 nM (\sim 25 ng/mL) or 80 nM (\sim 30 ng/mL) as the threshold for insufficiency would result in insufficiency in up to approximately 75% of the general population (Fig. 1). Regardless of the specific value chosen, it is clear that a significant proportion of the general population exhibits 25 OH Vitamin D insufficiency, and that hypovitaminosis D is not only a health risk for the homebound elderly.

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