ASSOCIATION OF FRAILTY WITH VITAMIN D IN ELDERLY WOMEN

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INTRODUCTION

Frailty is geriatric syndrome which leads to vulnerability and decreased physiological reserves [1]. Some studies showed that low levels of vitamin D are associated with frailty [2]. K. E. Ensrud et al. stated that components of frailty such as weakness and slowness are potential outcomes of vitamin D deficiency [3]. However, links between frailty and vitamin D deficiency are controversial.

OBJECTIVE

The aim of this study was to investigate association between frailty and vitamin D in community dwelling elderly women.

MATERIALS AND METHODS

A retrospective cross - sectional study was performed in National Osteoporosis Centre based in Vilnius, Lithuania. Inclusion criteria were: female, age 60 years and older, no current use of vitamin D supplements. Frailty status was defined using Fried's criteria: 1. weakness, measured by handgrip strength; participants in the lowest quintile were included; 2. low walking speed, defined by 4 meter walking test performance; criteria was met for women in the highest quintile; 3. low physical activity, measured using Physical Activity Scale for the Elderly (PASE); subjects in the lowest quintile met the criteria; 4. weight loss, defined as unintentional loss of at least 5 kilograms during last year; 5. exhaustion, which is measured using 10-item Center for Epidemiological Studies Depression Scale (CES-D 10); criteria was met for participants scoring ≥10 points [4]. Women were classified as robust, pre-frail and frail if they scored 0, 1-2, ≥3 out of 5 points, respectively. Vitamin D (25(OH)D) concentration in serum was measured with Cobas E411 (Roche Diagnostic, Germany). Statistical analysis was carried out with SPSS 20.0 program for Windows. Normality of the data was evaluated with Shapiro-Wilk test. Group differences were examined using Kruskal-Wallis test. Association between frailty and vitamin D was determined with multinomial logistic regression. P-value of <0.05 was considered as statistically significant.

RESULTS

The study was performed on 161 women: 103 (64%) robust, 30 (18.6%) pre-frail and 28 (17.4%) frail. Anthropometrical and biochemical characteristics of study participants are shown in Table 1.

Table 1. Anthropometrical and biochemical characteristics of frailty phenotype groups

Characteristic	Robust (n = 103)	Pre-frail (n = 30)	Frail (n = 28)	p
Age (yrs)	69.4 ± 6.2	70.8 ± 7.9	75.8 ± 5.9	<0.001
Height (cm)	160.5 ± 6.5	157.2 ± 6.6	157.4 ± 5.1	0.02
Weight (kg)	71.6 ± 12.8	71 ± 12.4	75.1 ± 14.9	0.48
BMI (kg/m^2)	27.9 ± 5.9	28.7 ± 4.6	30.2 ± 5.3	0.12
25(OH)D (ng/ml)	17.6 ± 8.2	16.2 ± 6.4	13.3 ± 6.2	0.03

BMI - body mass index, 25(OH)D - 25 hydroxyvitamin D

Frailty phenotype groups statistically significantly differed in age (p<0.001), height (p=0.02) and vitamin D concentration (p=0.03). Frail women were the oldest (75.8 5.9 yrs, p<0.001), the shortest (157.4 5.1 cm, p=0.02) and had the lowest vitamin D concentration (13.3 6.2 ng/ml, p=0.03). However, weight and body mass index were not statistically significant between frailty phenotype groups (p=0.48 and p=0.12, respectively). Associations between frailty and changes of vitamin D levels are summarized in Table 2. Unadjusted analysis represented in model 1 showed that in frailty versus robust group high levels of vitamin D were statistically significantly associated with probability of being less frail (OR: 0.91, 95% CI: 0.85-0.97, p=0.009). In other words, robust women were more likely to have higher vitamin D concentration than frail women. After adjusting for the age (model 2), association between frailty and vitamin D in the same group (frailty versus robust) was not statistically significant (p=0.26). That is why, age was also added to models 3, 4 and 5 which represent adjustment for: height, weight and BMI, respectively. Associations between frailty and vitamin D concentration were not statistically significant in all of these models. Furthermore, no statistically significant relationships before and after adjustments were observed in other multinomial logistic regression groups: pre-frailty versus robust and pre-frailty versus frailty groups.

Table 2. Association between frailty and vitamin D in different frailty statuses

Variables	Probability of vitamin D decrease, odds ratio (95% confidence interval)		
	Pre-frailty vs Robust	Frailty vs Robust	Frailty vs Pre-frailty
Model 1	0.98 (0.92-1.03)	0.91 (0.85-0.98)*	0.93 (0.86-1.01)
Model 2	0.98 (0.93-1.04)	0.96 (0.89-1.03)	0.97 (0.89-1.06)
Model 3	0.98 (0.92-1.04)	0.96 (0.89-1.03)	0.97 (0.89-1.06)
Model 4	0.98 (0.93-1.04)	0.95 (0.88-1.03)	0.97 (0.89-1.06)
Model 5	0.98 (0.92-1.04)	0.95 (0.88-1.03)	0.97 (0.89-1.06)

* - p<0.05

CONCLUSIONS

In elderly women unadjusted high levels of vitamin D are associated with being robust. Age adjusted high vitamin D concentration is not related to being robust. Age is the independent risk factor of frailty. No associations between vitamin D and pre-frailty status were found.

No conflicts of interest.

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