

## INTRODUCTION

Age-related physiological changes act in older adults modifying dietary preferences, and impairing absorption of vitamins, leading to vitamin deficiencies and malnutrition. Few studies have examined the association of vitamin intake and adherence to recommended daily vitamin intake with frailty.

**This study assessed the prospective association between vitamin intake and adherence to recommended daily intake of vitamins and incident frailty in older adults.**

## METHODS

- We analyzed data from **1646 participants aged 65** and older from a cohort recruited in 2008-2010 and followed-up prospectively to 2012.
- **Vitamin intake was assessed at baseline** with a validated dietary history.
- **Incident frailty was defined according to Fried scale**, as presence of at least three of these following criteria: unintentional weight loss, exhaustion, low handgrip strength, slow walking speed, and low physical activity.
- Analyses were performed with logistic regression and adjusted for the main confounders.

## RESULTS

At follow-up 89 participants (5.4%) were frail. The odds ratios (OR; 95% confidence interval) of incident frailty for those in the lowest versus the highest tertile of vitamin intake were OR 2.80 (1.38- 5.67) for vitamin B6, OR 1.93 (1.00-3.83) for vitamin E, and OR 2.34 (1.21-4.52) for folates, and we found a marginally significant relationship for vitamin C OR 1.65 (0.93-2.95), but the latter association was statistically significant in non-parametric analysis. Results for vitamin A, thiamine, riboflavin, niacin, vitamin B12, and vitamin D did not reached statistical significance. Non-adherence to recommended daily intake of vitamins was related to frailty for thiamine OR 2.09 (1.03-4.23), niacin intake OR 2.80 (1.46-5.38), and vitamin B6 OR 2.23 (1.30-3.83). Compared with participants who met 7 or more daily vitamin intake recommendations, those who met lower than 5 had increased risk of frailty OR 2.84 (1.34-6.03).

Figure. Dose-response association between vitamin intake and frailty

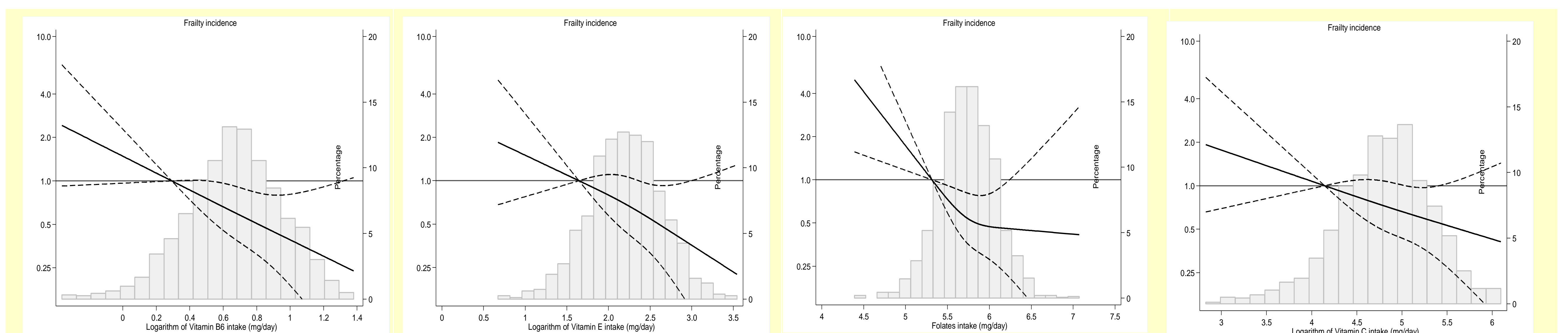


Table. Odds ratios (Confidence interval 95%) for the association between achievements of Recommended Dietary Allowances (RDA) for Vitamins and incident frailty. (N=1646)

VITAMIN INTAKE RECOMMENDATIONS	INCIDENT FRAILTY					
	VITAMIN A Men ≥ 1000 µg/day Women ≥ 800 µg/day	THIAMINE Men ≥ 1 mg/día Women ≥ 0,8 mg/día	RIBOFLAVIN Men ≥ 1,4 mg/día Women ≥ 1,1 mg/día	NIACIN Men ≥ 16 mg/día Women ≥ 12 mg/día	VITAMIN B6 Men ≥ 1,8 mg/día Women ≥ 1,6 mg/día	
N/Frail	551/27	1434/73	1320/75	1447/69	1166/49	
Meet recommendation	<b>1.00 (Ref.)</b>	<b>1.00 (Ref.)</b>	<b>1.00 (Ref.)</b>	<b>1.00 (Ref.)</b>	<b>1.00 (Ref.)</b>	
N/Frail	1095/62	212/16	326/14	199/20	480/40	
Does not meet recommendation	<b>1.14 (0.68-1.92)</b>	<b>2.09 (1.03-4.23) *</b>	<b>0.97 (0.49-1.91)</b>	<b>2.80 (1.46-5.38)**</b>	<b>2.23 (1.30-3.83)**</b>	
	VITAMIN B12 Men ≥ 2 µg/día Women ≥ 2 µg/día	VITAMIN C Men ≥ 60 mg/día Women ≥ 60 mg/día	VITAMIN D P75 ≥ 4,4 µg/día	VITAMIN E Men ≥ 12 mg/día Women ≥ 12 mg/día	FOLATES Men ≥ 400 µg/día Women ≥ 400 µg/día	
N/Frail	1619/85	1497/791	420/16	435/18	367/13	
Meet recommendation	<b>1.00 (Ref.)</b>	<b>1.00 (Ref.)</b>	<b>1.00 (Ref.)</b>	<b>1.00 (Ref.)</b>	<b>1.00 (Ref.)</b>	
N/Frail	27/4	149/10	1226/73	1211/71	1279/76	
Does not meet recommendation	<b>2.12 (0.64-7.13)</b>	<b>1.59 (0.76-3.34)</b>	<b>0.75 (0.40-1.32)</b>	<b>1.35 (0.71-2.56)</b>	<b>1.36 (0.70-2.67)</b>	

\*P <0,05; \*\* P <0,01.

Model adjusted for sex (men, women), age(years), educational level ( primary, secondary, university),body mass index kg/ m<sup>2</sup> (quartiles), smoking status (never smoker, former smoker, current smoker), alcohol intake (g/day), time of television watching weekly hours (quartiles), total energy consumption kcal/day (quartiles) and prevalent diseases (coronary heart disease, stroke, cancer, chronic obstructive pulmonary disease, and diabetes mellitus type 2).

## CONCLUSION

**Low intake of vitamin B6, vitamin E, folates, vitamin C, and low adherence to recommended daily intake of vitamins were associated with frailty in older adults**