



COMPARISON OF MICRONUTRIENT INTAKES OF NAVY OFFICER CANDIDATES TO MILITARY DIETARY REFERENCE INTAKES AT OFFICER TRAINING COMMAND



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Introduction

Dietary optimization can help prevent musculoskeletal injury (MSKI) during initial recruit training and optimize health and operational readiness. In a prospective study, **our objective** was to assess micronutrient intake and status of Navy enrollees during initial training at Officer Training Command (OTC).

Methods

Participants: Enrollment at OTC (15 females, 38 males) with measurements taken at early, mid, and late training.

- Dietary Intake:** Weighed food trays (pre- and post-meal) with foods matched to the 21-day cycle menus provided by the galley
- Micronutrient Intake:** Estimated using ESHA Food Processor dietary analysis software
- Dried Blood Spots:** Analyzed for vitamin D status, omega-3 index

Food trays were weighed on a digital scale before and after each meal



Figure 1: Food items were identified and analyzed via ESHA Food Processor software, with portions determined based on scale weights. Photos courtesy of NHRC.

Statistical Analysis: Data summarized using means and standard error (SE) with significance set at $p < .05$ and false discovery rate of $q < .05$.

- Analysis of variance for group differences in dietary intake and biomarkers.
- t -Tests to compare dietary intake versus Military Dietary Reference Intakes (MDRI)¹

Results

Age and Demographics:

- OTC: age=26.1±3.5y; ~80% White, 8% Black, 12% all other races

Table. Micronutrient Intakes at OTC Throughout Training

Micronutrient	Females mean(SE)	MDRI ¹	Males mean(SE)	MDRI ¹
Vitamin A (ug/d)	940 ± 72	700	1264 ± 58	900
Vitamin D (ug/d)	7.3* ± 0.6	15	9.4* ± 0.6	15
Vitamin E (mg/d)	12.7* ± 0.6	15	16.8 ± 0.7	15
Vitamin K (ug/d)	198 ± 25	90	273 ± 23	120
Vitamin C (mg/d)	111 ± 15	75	154 ± 16	90
Folate (ug/d)	456 ± 22	400	599 ± 21	400
Vitamin B12 (ug/d)	6.4 ± 0.5	2.4	8.8 ± 0.4	2.4
Calcium (mg/d)	1328 ± 95	1000	1534 ± 75	1000
Phosphorus (mg/d)	1937 ± 78	700	2509 ± 69	700
Magnesium (mg/d)	419 ± 26	320	534 ± 20	420
Iron (mg/d)	17.2 ± 1.0	18	20.8 ± 0.7	8
Zinc (mg/d)	12.8 ± 0.5	8	17.4 ± 0.4	11
Potassium (mg/d)	3654* ± 201	4700	4852 ± 164	4700
Omega-3 (g/d)	2.5 ± 0.3	1.1	2.9 ± 0.1	1.6
Omega-6 (g/d)	24.1* ± 1.6	12	29.4* ± 1.1	17

Dietary Intakes (Table 1) for OTC (* $p < .05$ vs. MDRI)

- Total energy intake was 3065±74kcal/d (39.3±0.9kcal/kg body weight)
- Micronutrient intake was less than MDRI for vitamin D ($p < .001$), vitamin E ($p = .003$), and potassium ($p < .001$) for females and vitamin D ($p < .001$) for males
- In addition, four women had very low calcium intake (<1000 mg/d)
- Four individuals (2 female, 2 male) sustained MSKIs during training

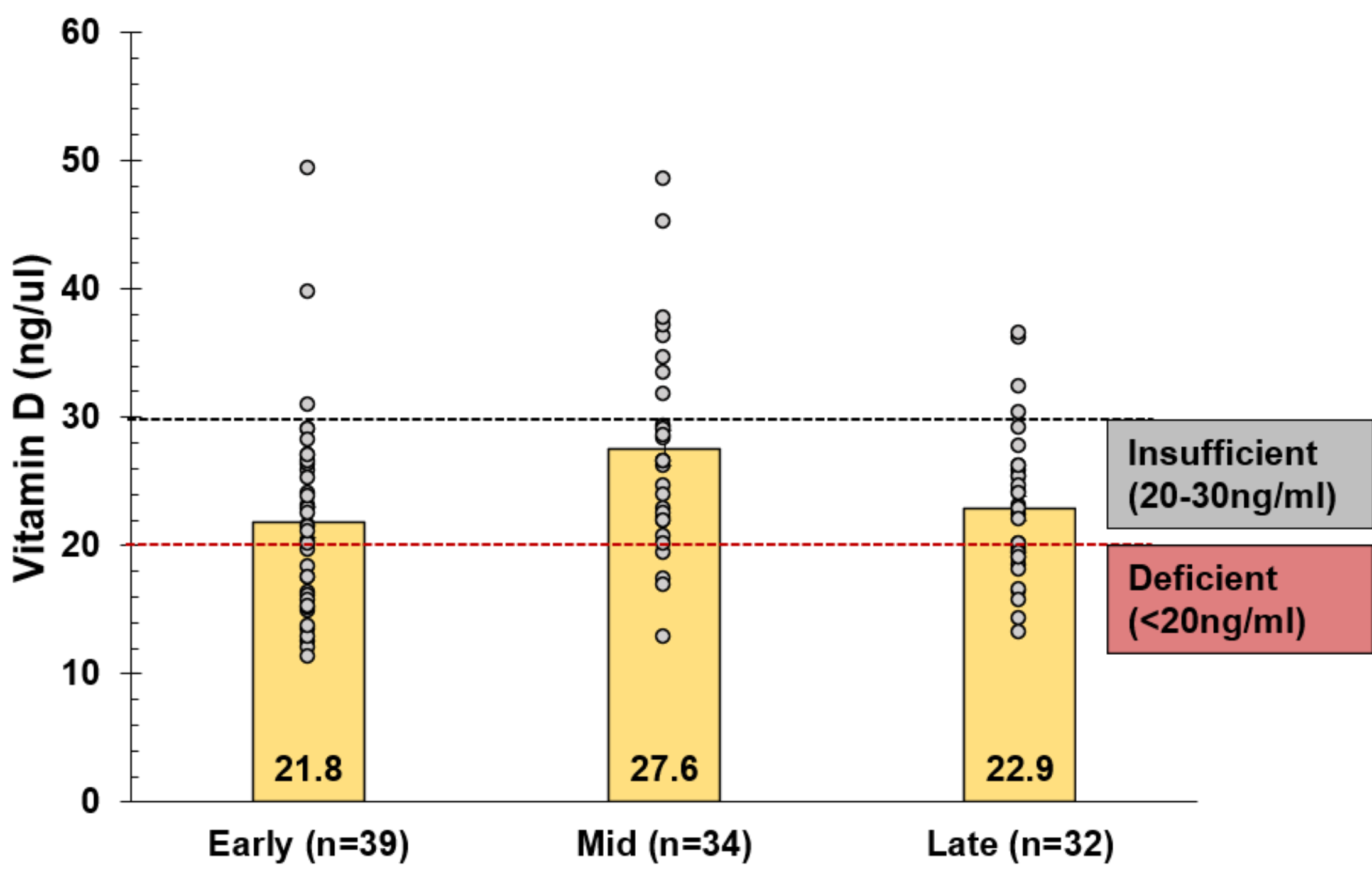


Figure 2. Vitamin D status: serum vitamin D was less than 50ng/ml ($p < .05$).

- >70% of candidates and recruits were either insufficient (20–30ng/ml) or deficient (<20ng/ml)

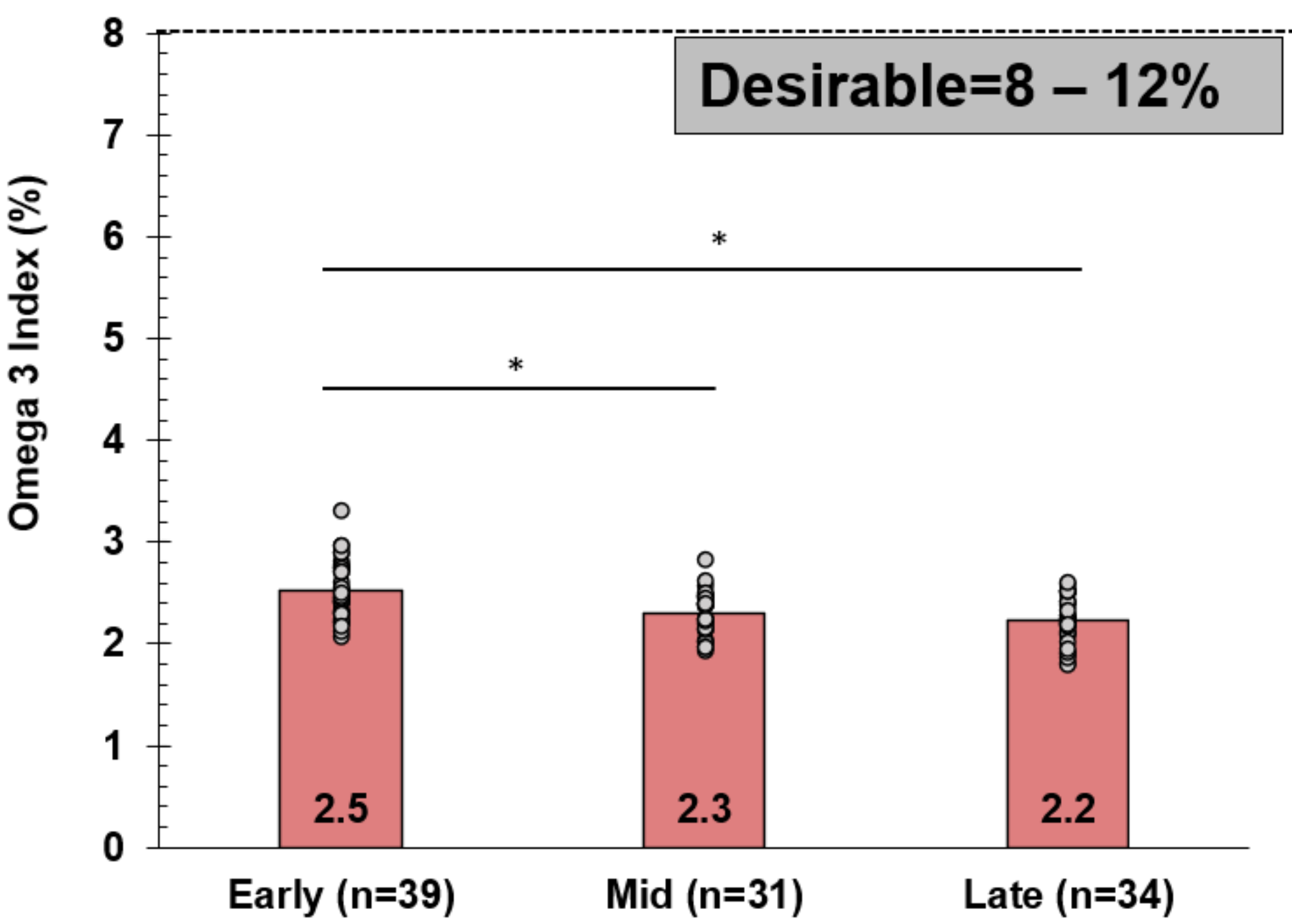


Figure 3. Omega-3 index (indicator of omega-3 status; desirable range: 8–12%) decreased throughout training (* $p < .05$). Other omega-3/6 fatty acid profiles were not in the desirable range (data not shown).

Conclusion

- Despite overall adequate energy intake, Navy Officer Candidates do not meet the MDRI for vitamin D, an essential micronutrient for bone health
- Energy and nutrient intake associated with increased MSKI risk in candidates are:
 - Inadequate Vitamin D dietary intake and status
 - Low omega-3 index (i.e., promotes inflammation)

Reference
1. Department of Defense. Nutrition and Menu Standards for Human Performance; 2017. AR 40-25. OPNAVINST 10110.1/MCO 10110.49, AFI 44-141.