

ABSTRACT

American football athletes are exposed to repetitive head impacts (RHI) that, even in the absence of a clinically discernible head injury, result in quantifiable neurological damage. Pre-clinical studies utilizing rodent models indicate that traumatic brain injuries (TBI) can cause a reduction in neuronal omega-3 fatty acids (n-3FAs), specifically docosahexaenoic acid (DHA). Pre-injury administration of n-3FAs, however, has shown to effectively allay the pathological response to TBI. Furthermore, one study has demonstrated the potential neuroprotective effect of DHA supplementation in American football athletes evidenced by a marked reduction in blood biomarkers of axonal injury. Given that the American diet is scarce in the n-3FAs DHA and eicosapentaenoic acid (EPA), the potential neuroprotective effect of n-3FA supplementation may uniquely benefit American football athletes. **PURPOSE:** This descriptive study sought to examine the omega-3 index, an indicator of n-3FA status, in American collegiate football athletes not supplementing with n-3FAs. **METHODS:** One hundred twelve (n = 112) athletes participated in this study. Blood was obtained via finger stick and collected on blood spot cards pre-treated with an antioxidant cocktail. The dried blood samples were analyzed by gas chromatography for fatty acid (FA) levels (expressed as a % of total blood FAs). A regression formula (r = 0.98) was used to estimate the percentage of DHA and EPA in red blood cell phospholipids (omega-3 index). **RESULTS:** Levels of DHA, EPA, and alpha-linolenic acid (ALA) were (mean ± SD) 2.27% ± 0.01% (range = 1.1% - 5.2%), 0.35% ± 0.00% (range = 0.2% - 1.2%) and 0.39% ± 0.00% (range = 0.1% - 1.0%), respectively. Mean omega-6 levels were 9.55 ± 1.72 (range = 4.5 - 13.9) times higher than n-3FAs levels. The mean omega-3 index was 4.35% ± 0.01% (range = 2.8% - 8.0%). Sub-optimal n-3FA levels (i.e., an index < 8.0%) were observed in 99.12% of participants. **CONCLUSION:** These data suggest that dietary intake of the n-3FAs DHA and EPA may not be adequate in American collegiate football athletes. Though the current evidence relates n-3FA deficiency to an increased risk for cardiovascular risk, American football athletes may derive neuroprotective benefit from n-3FA supplementation with little to no risk.

BACKGROUND

Omega-3 fatty acids (n-3FAs) assume a variety of important roles in health and human development. The essential n-3FAs, EPA and DHA, are critical components of phospholipid membranes and have proven important for cardiovascular and neurological health. Humans cannot efficiently synthesize these FAs, therefore it is necessary to acquire EPA and DHA from dietary sources. However, dietary intake of EPA and DHA is low, particularly in American diets. The omega-3 index is the sum of EPA and DHA in erythrocyte membranes and is expressed as a percentage of total erythrocyte FAs. A low omega-3 index has been linked to an increased risk for heart disease. Further, a low omega-3 index has also been linked to accelerated aging of brain structure, major depression, and poor neurocognitive function. Given the multidimensional role of n-3FAs in health and human disease, the omega-3 index may serve as a marker of overall health. As n-3FA status has proven important via clinical trials and population studies, investigators have postulated that n-3FA status may be exceptionally important for athletes from both a health and performance perspective. Most adults are not meeting recommended levels of n-3FAs and several studies report that most elite athletes (e.g., collegiate and Olympic level) are also not meeting recommended levels of n-3FAs.

PURPOSE

This descriptive study sought to examine the omega-3 index, an indicator of n-3FA status, in American collegiate football athletes not supplementing with n-3FAs.

METHODS

- The data presented in the abstract includes only a preliminary report and additional data are presented in the current presentation.
- A retrospective, cross-sectional investigation was utilized to examine the FA profiles of NCAA American football athletes.
- Four, geographically distinct NCAA Division I American football teams that were known by investigators to independently conduct Omega-3 Index testing provided data.
- Each team utilized Omega Quant Analytics, LLC (Sioux Falls, SD) for FA analysis and analyses were conducted per the description available in the abstract.
- FA profiles as well as demographic data were collected from a total of 404 NCAA American football athletes.

RESULTS

Demographic characteristics of athletes (N = 404)

Characteristic	(M±SD)
Age	20.3±1.7
Weight (kg)	101.5±25.4
Height (cm)	182.2±28.3

n-3 FA Status

Marker	(M±SD)
DHA	2.30% ± 0.60%
EPA	0.38% ± 0.13%
ALA	0.42% ± 0.19%
Omega-6:Omega-3 Ratio	9.39 ± 1.61
Omega-3 Index	4.36% ± 0.8%

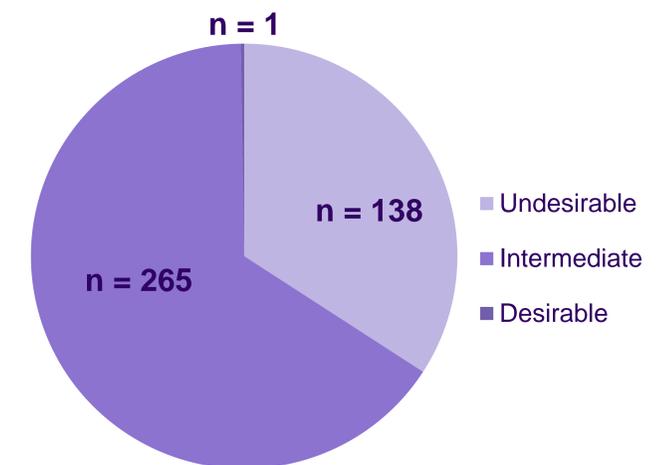


Figure 1. Number of subjects with an undesirable (<4%), intermediate (4-8%), and desirable (>8%) omega-3 index.

CONCLUSION

- In the current sample of 404 athletes, all but one individual had a suboptimal omega-3 index.
- These findings indicate that dietary intake of n-3FA is low in American football athletes.
- Though current evidence relates low n-3FA to increased cardiovascular risks, research demonstrating the potential neuroprotective benefit of n-3FA suggests that low n-3FA may also be detrimental to those at risk for repetitive head injuries.