COMPARISON OF BLOOD MARKERS IN DIFFERENT GROUPS OF PROTEIN INTAKE IN COLLEGE ATHLETES

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ABSTRACT:

PURPOSE: Compare the concentration of different blood markers between different absolute and relative protein intake groups by sex in university athletes. **METHODS:** A total of 248 athletes were evaluated of which 138 were men (21.4 ± 3.0 years, 73.5 ± 14.0 kg, 175.8 ± 6.7 cm) and 110 women (20.7 ± 2.0 years, 61.7 ± 11.8 kg, 163.7 ± 7.1 cm) sports disciplines of the University of Guadalajara. Applied 24-hour reminder of a day of training in which ingested food was recorded. Subsequently the ingestion of absolute protein (g/day) and relative (g/kg/day) of each athlete was estimated. Then, the sample was divided by sex and applied in turn divided by quartiles of protein intake. In addition, blood chemistry was performed for the evaluation of uric acid, urea, creatinine, cholesterol and triacylglycerides, which were compared between absolute and relative protein quartiles. We only analyzed the data of the subjects who had the usual 24-hour reminder and their blood chemistry within a period of no more than 30 days difference.

RESULTS: The concentrations in creatinine, urea, uric acid and cholesterol in men, no significant differences were found between absolute protein quartiles. However, it was found that in the triacylglycerides there was a tendency (p = 0.10) to have differences between quartile 2 and 4 of absolute proteins. Not biochemical indicator had significant difference between quartiles of relative protein intake. In the case of women, no biochemical indicator had a significant difference between quartiles of absolute protein intake. On the other hand, there were no significant differences in the concentration of creatinine, uric acid, triacylglycerides and cholesterol among quartiles of relative protein intake. However, there was a significant difference (p=0.04) in urea between quartile 2 and 4 relative protein ingestion .

CONCLUSIONS: In this study, no significant differences were found in blood counts among athletes who consumed more protein with those who consumed less protein in absolute or relative form in men and women.

INTRODUCTION

There are beliefs that high protein consumption has negative consequences for health, such as kidney and liver problems, and dyslipidemias (Lowery, 2009). Current evidence suggest that the ingestion 1.4 to 2.0 g protein/kg/day for physically active people is safe and it can improve training adaptations (Jäger, 2017). Previous studies report that consuming high amounts of protein (>2 g/kg/day) do not negatively affect the concentration of blood markers in trained subjects (Antonio, 2015; 2016a; 2016b). We wanted to know if this happened in a cross sectional way in college athletes. Therefore, the purpose of this work was to compare the concentration of different blood indicators, between different absolute and relative protein intake groups, by sex, in college athletes.

METHODS

Subjects

We evaluated 138 men (age 21.4 ± 3.0 y, weight 73.5 ± 14.0 kg, height 175.8 ± 6.7 cm, BMI 23.7 ± 3.8 kg/m^2), and 110 women (20.7 ± 2.0 y, 61.7 ± 11.8 kg, 163.7 ± 7.1 cm, 23± 3.6 kg/m^2), belonging to the representative teams from the University of Guadalajara, previous to the National Mexican University Games.

Anthropometry

Basic anthropometric measurements (height [SECA 213], weight [TANITA TBF 410]) were assessed following the protocol proposed by the International Society for the Advancement of Kinanthropometry (Stewart, 2011).

Blood chemistry

We obtained blood samples to calculate blood concentrations of uric acid, urea, creatinine, cholesterol and triacylglycerides, in a certified clinical laboratory (RANDOX Equipment).

Dietary assessment and grouping

We applied a 24-hour dietary recall for a training day. Then, absolute (g/day) and relative (g/kg/day) protein intake was estimated employing a specialized software (Nutrickal® VO). Then we divided the sample in quartiles of absolute and relative protein intake by sex.

Statistical analysis

The blood indicators were compared between the quartiles of protein intake with the ANOVA test and the Tukey post hoc test if data had normal distribution. Conversely, Kruskal-Wallis test and the Dunn's post hoc test were used. All tests were considered significant at a level of p <0.05. The statistical analysis was performed using the software SPSS® v20 for Windows®.

RESULTS

There were no significant differences for creatinine, urea, uric acid and cholesterol blood concentrations in men between quartiles of absolute protein (Table 1). However, there was a trend (p = 0.10) for differences in triacylglycerides blood concentration between quartile 2 and 4 of absolute protein. Not blood indicator showed significant differences between quartiles of relative protein intake in men (Table 2). In the case of women, no blood indicator showed significant differences between quartiles of absolute protein intake (Table 3). There were no significant differences for creatinine, uric acid, triacylglycerides and cholesterol blood concentrations among quartiles of relative protein intake. However, there was a significant difference (p=0.04) in urea concentration between quartile 2 and 4 of relative protein intake (Table 4).

Table 1. Blood concentrations (mg/dL) of five health indicators according to the absolute (g/day) protein intake quartile in men.

	Q1 (<98.5)	Q2 (98.5—128.8)	Q3 (128.9—165.9)	Q4 (>165.9)
Creatinine	0.97 ± 0.20	1.04 ± 0.18	1.01 ± 0.16	0.99 ± 0.24
Urea	20.6 ± 3.4	29.3 ± 2.1	28.1 ± 3.0	28.7 ± 3.9
Uric Acid	4.7 ± 1.3	4.6 ± 1.1	4.2 ± 1.0	4.6 ± 1.0
Triacylglycerides	78.8 ± 30.7	70.2 ± 26.0	76.0 ± 23.9	97.4 ± 46.9
Cholesterol	169.5 ± 26.9	164.2 ± 20.9	163.1 ± 27.8	168.9 ± 32.3

Data are expressed as mean ± standard deviation.
No significant differences were observed between groups.

Table 2. Blood concentrations (mg/dL) of five health indicators according to the relative (g/kg/day) protein intake quartile in men.

	Q1 (<1.39)	Q2 (1.39—1.84)	Q3 (1.85—2.37)	Q4 (>2.37)
Creatinine	0.99 ± 0.19	1.0 ± 0.16	1.04 ± 0.21	1.0 ± 0.21
Urea	28.6 ± 3.6	29.0 ± 2.3	28.7 ± 3.6	28.3 ± 3.1
Uric Acid	4.6 ± 1.1	4.7 ± 1.2	4.3 ± 1.2	4.5 ± 1.0
Triacylglycerides	82.2 ± 33.0	74.7 ± 31.2	78.6 ± 30.0	87.1 ± 42.0
Cholesterol	171.0 ± 24.7	159.4 ± 22.0	167.3 ± 33.7	168.1 ± 26.3

Data are expressed as mean ± standard deviation. No significant differences were observed between groups.

Table 3. Blood concentrations (mg/dL) of five health indicators according to the absolute (g/day) protein intake quartile in women.

	Q1 (<74.8)	Q2 (74.8—105.5)	Q3 (105.6—136.4)	Q4 (>136.4)
Creatinine	0.87 ± 0.20	0.91 ± 0.17	0.94 ± 0.21	0.93 ± 0.18
Urea	27.0 ± 3.6	27.2 ± 3.0	26.9 ± 3.5	28.0 ± 2.4
Uric Acid	4.0 ± 1.2	3.7 ± 0.9	4.1 ± 1.2	4.4 ± 1.2
Triacylglycerides	76.4 ± 38.5	70.2 ± 25.4	68.7 ± 30.1	81.3 ± 30.9
Cholesterol	163.4 ± 21.5	166.6 ± 21.3	167.8 ± 30.1	162.0 ± 26.4

Data are expressed as mean ± standard deviation. No significant differences were observed between groups.

Table 4. Blood concentrations (mg/dL) of five health indicators according to the relative (g/kg/day) protein intake quartile in women.

	Q1 (<1.24)	Q2 (1.24—1.74)	Q3 (1.75—2.30)	Q4 (>2.30)
Creatinine	0.88 ± 0.20	0.90 ± 0.17	0.89 ± 0.19	1.00 ± 0.18
Urea	27.5 ± 3.7	26.3 ± 2.6*	26.8 ± 3.3	28.6 ± 2.5*
Uric Acid	3.9 ± 1.2	3.7 ± 0.9	4.1 ± 1.0	4.4 ± 1.3
Triacylglycerides	78.8 ± 36.9	66.1 ± 25.9	68.8 ± 23.0	82.9 ± 36.6
Cholesterol	165.8 ± 20.8	163.9 ± 27.6	164.0 ± 26.9	166.1 ± 24.8

Data are expressed as mean ± standard deviation.
No significant differences were observed between groups, unless otherwise is stated.
*Quartiles were signficantly different (p<0.05).

CONCLUSIONS

In this study, no significant differences were observed in blood concentrations of five health indicators in athletes who consumed more protein with those consuming it in lower amounts, either expressed in absolute nor relative form in men and women.

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