Macronutrient Intake And Blood Markers Concentrations In Mexican University Athletes.

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ABSTRACT:

PURPOSE: To analyze the association between the concentration of different blood markers and macronutrient intake by sex in university athletes.

METHODS: 242 (139 males, 103 females) athletes of different sports of were evaluated on their food habits. We administered 24-hour dietary recalls of a training day by standardized staff. Then, we estimated the absolute (g/day) and relative (g/kg/day) macronutrient intake. Also, we obtained uric acid, urea, creatinine, cholesterol, triacylglycerides, glucose, hemoglobin, and hematocrit concentrations from blood analysis. We only analyzed the data of subjects who had their blood samples and dietary recall within a period of no more than 30 days apart. The analysis was divided by sex.

RESULTS: Subjects` age, body weight and height were: 21.4 ±3.0 and 20.7 ±2.0 years, 73.6 ±14.1 and 61.7 ±11.6 kg; and 175.8 ±6.8 and 163.6 ±6.9 cm, for men and women respectively. For males, there were significant associations between relative (beta [95% CI], -0.328 [-0.037 to -0.619]; p = 0.027) and absolute (-0.005 [-0.001 to -0.009]; p = 0.027) protein intake and uric acid concentrations; similarly, absolute protein intake was significantly associated with lower creatinine concentrations (-0.014 [-0.001 to -0.027]; p = 0.031). For females, there was a significant association between relative carbohydrate intake and blood glucose (1.912 [0.259 to 3.566]; p = 0.024). No other significant association was found.

CONCLUSIONS: In this study, protein intake was associated with lower blood creatinine and uric acid concentrations in males, and carbohydrate intake with higher blood glucose concentrations in females.

INTRODUCTION

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Blood markers are commonly used for health screening; might be modified by macronutrient intake(1). Frequent monitoring of blood markers may help to identify individual excess or deficiencies on macronutrient and micronutrient intake (2).

Athletes usually eat differently in comparison with untrained people. Accordingly, relationship between the macronutrient intake and blood markers could be different in athletes.

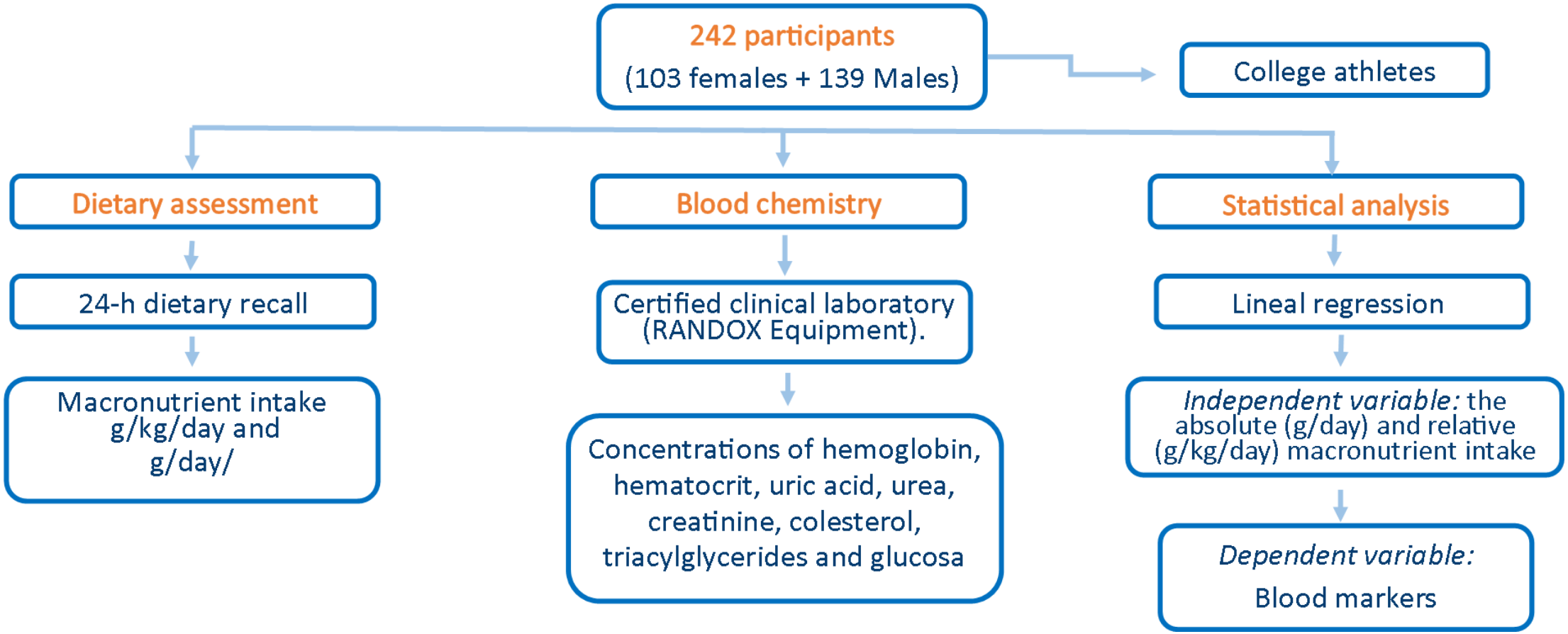
Tracking and monitoring fasting and longer-term blood glucose through biomarkers may help athletes to monitor the nutritional adequacy of their diet (3).

Fat utilization during exercise impacts lipid profiles by reducing resting levels of total cholesterol and triacylglicerydes thereby improving cardiovascular health profiles(4).

There are beliefs that high protein consumption has negative consequences for health, such as kidney and liver problems, and dyslipidemias (5). Also a study showed that high amounts of protein do not negatively affect the concentration of blood markers in trained subjects (6).

Therefore, the purpose of this study was analyze the association between the concentration of different blood markers and macronutrient intake by sex in university athletes.

METHODS


242 participants
(103 females + 139 Males)
College athletes
Dietary assessment
24-h dietary recall
Macronutrient intake g/kg/day and g/day/
Blood chemistry
Certified clinical laboratory (RANDOX Equipment).
Concentrations of hemoglobin, hematocrit, uric acid, urea, creatinine, colesterol, triacylglycerides and glucosa
Statistical analysis
Lineal regression
Independent variable: the absolute (g/day) and relative (g/kg/day) macronutrient intake
Dependent variable:
Blood markers

RESULTS

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Table 1. Association between macrontrient intake and blood markers in males.

MALES	HEMOGLOBIN	HEMATOCRIT	URIC ACID	TOTAL CHORESTEROL	CREATININE	GLUCOSE	TAG	UREA
Relative Fat (g/kg)	-.128 (-1.010-.754)	.448 (-2.411-3.307)	-.166 (-.558-.225)	4.225 (-7.090-15.541)	-1.099 (-2.232-.035)	-2.383 (-9.866-5.101)	-4.853 (-15.957-6.251)	-.301 (-1.306-.704)
Relative Pro-tein (g/Kg)	.235 (-.429-.900)	1.066 (-1.085-3.217)	**-.328 (-.619--.037)**	.838 (-7.718-9.393)	-.900 (-1.753--.046)	.052 (-5.604-5.708)	-3.549 (-11.930-4.833)	.351 (-.407-1.108)
Relative CHO (g/Kg)	.204 (-.046-.453)	-.043 (-.860-.775)	-.098 (-.209-.013)	2.672 (-.537-5.880)	-.299 (-.623-.026)	-1.321(-3.451-.809)	-1.675 (-4.844-1.494)	-.040 (-.328-.247)
Absolute Fat (g)	-.006 (-.019-.007)	-.002 (-.044-.041)	-.002 (-.008-.004)	.031 (-.137-.200)	-.012 (-.029-.005)	-.057 (-.168-.053)	-0.043 (-.209-.122)	.001 (-.014-.016)
Absolute Protein (g)	-.001 (-.011-.009)	.008 (-.024 - .040)	**-.005 (-.009- -.001)**	.002 (-.115-.128)	**-.014 (-.027- -.001)**	-.011 (-.095-.073)	-.058 (-.182-.065)	.004 (-.007-.015)
Absolute CHO (g)	.002 (-.002-.006)	-.003 (-.015-.009)	-.001 (-.003-.000)	.029 (-.017-.076)	-.004 (-.009-.001)	-.026 (-.057-.005)	-.025 (-.070-.021)	-.001 (-.005-.003)

Data expressed as Coefficient B and CI. Bold numbers denote significant associations (p<0.05). CHO: Carbohydrates; TAG: Triacylglycerides

Table 2. Association between macrontrient intake and blood markers in females.

FEMALES	HEMOGLOBIN	HEMATOCRIT	URIC ACID	TOTAL CHORESTEROL	CREATININE	GLUCOSE	TAG	UREA
Relative Fat (g/kg)	.528 (-.260-1.317)	.169 (-2.424-2.761)	.034 (-.282-.350)	-4.753 (-15.639-6.133)	.148 (-.757-1.053)	3.795 (-1.753-9.343)	2.935 (-7.053-12.924)	.183 (-.759-1.125)
Relative Protein (g/Kg)	.282 (-517-1.081)	1.463 (-1.132-4.057)	.025 (-.293-.343)	-1.534 (-12.533-9.465)	-.017 (-.929-.894)	3.581 (-2.013-9.174)	-.377 (-10.452-9.699)	.072 (-.878-1.021)
Relative CHO (g/Kg)	.100 (-.140-.340)	.206 (-.578-.991)	-.025 (-.120-.071)	.011 (-3.299-3.321)	-.034 (-.308-.240)	**1.912 (.259-3.566)**	.301 (-2.730-3.332)	-.006 (-.292-.279)
Absolute fat (g)	.009 (-.004-.022)	-.014 (-.056-.027)	.000 (-.005-.006)0	-.090 (-.265-.086)	.005 (-.009-.020)	.038 (-.052-.128)	.059 (-.102-.220)	-.002 (-.018-.013)
Absolute Protein (g)	.007 (-.007-.021)	.011 (-.035-.058)	.001 (-.005-.006)	-.039 (-.235-.158)	.004 (-.013-.020)	.032 (-.069-.133)	-.003 (-.183-.178)	-007 (-.024-.010)
Absolute CHO (g)	.002 (-.002-.007)	.004 (-.010-.019)	-.001 (-.003-.001)	-.003 (-.064-.058)	.000 (-.005-.005)	.028 (-.003-.059)	.016 (-.040-.072)	-.002 (-.007-.003)

Data expressed as Coefficient B and CI. Bold numbers denote significant associations (p<0.05). CHO: Carbohydrates; TAG: Triacylglycerides

There were significant associations in males between relative (p = 0.027) and absolute (p = 0.027) protein intake and uric acid concentrations, the higher the protein intake, the lower the uric acid concentrations; similarly, absolute protein intake was significantly associated with lower creatinine concentrations (p = 0.031). (Table 1). For females, there was a significant association between relative carbohydrate intake and blood glucose (p = 0.024); that is to say, the higher the CHO intake, the higher the glucose concentrations in blood (Table 2). No other significant association was found.

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CONCLUSIONS

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In this study, protein intake was associated with lower blood creatinine and uric acid concentrations in males, and carbohydrate intake with higher blood glucose concentrations in females. Most of the studied participants had their biomarkers within normal values, therefore it may explain why we did not find any other significant association.

There is still need to do more studies in athletes using blood markers, this approach to biomarker will allow to better monitor groups of highly variable athletes who will inevitably have highly different diets and other behaviors that affect performance.

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