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Nutrition Knowledge of Amateur Bicyclists in South Florida, USA

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Research article

Nutrition knowledge of amateur bicyclists in South Florida, USA

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Abstract

Nutrition is an important component in chronic disease prevention. Diet plays an important role in the athletic performance and the overall health of the amateur bicyclists; yet information concerning diet and amateur bicyclists is lacking. This was a cross-sectional, convenience sample of 125 amateur bicyclists ages 18-65 years from South Florida who consented to SurveyMonkey, web-designed survey on nutrition knowledge. The survey was validated for endurance runners. Less than one-quarter of the participants had adequate nutrition knowledge (score of 75% or higher). Female bicyclists scored higher on nutrition knowledge as compared to males. There were no differences in nutrition knowledge by race, marital status, education or income. Accessibility to nutrition information is abundant, yet the validity of this information is questionable. Amateur bicyclist may not have access to the health professionals available to professional athletes. There is a need for nutrition counseling targeting amateur athletes.

Keywords: Nutritional knowledge, amateur cyclist, performance

Introduction

While there is a wide collection of research on nutrition knowledge in collegiate and elite athletic populations, research is scarce for bicyclists, exclusively on the amateur level. Nutrition plays an integral role in the performance of athletes (Nazni & Vimala, 2010; Spendlove et al, 2012). Accurate nutrition knowledge is essential for athletes to translate their nutritional needs into dietary practice (Torres-MGehee et al, 2012). Athletes require more calories than their non-active counterparts to balance with physical activity in order to maintain a healthy weight; however, the nutritional requirements for US athletes are based on the Dietary Guidelines for Americans (Department of Health and Human Services, 2015). These guidelines include consume more of certain foods and nutrients such as fruits, vegetables, whole grains, fat-free and low-fat dairy products, and seafood and fewer foods with sodium (salt), saturated fats, trans fats, cholesterol, added sugars, and refined grains. Strategies for diet plans that follow the dietary guidelines are given for pre- and post- athletic practice and competition (Anderson, Young, & Prior, 2015). Extra calories needed for athletic performance should be from complex-carbohydrates; albeit, an overall high-carbohydrate diet is not recommended (Anderson, Young, & Prior, 2015). The Academy of Dietetics and Nutrition (2015) recommends approximately 50-60% of daily caloric intake from carbohydrates, 25% to 30% from fats, and 15% from protein. Protein may be adjusted by body weight with 1.2-1.4 g/Kg per day for power athletes and 1.2-1.7 g/Kg for endurance athletes (Academy of Dietetics and Nutrition, 2015).

Attention to the significance of nutrition in athletics has increased over the years, leading to a greater accessibility to nutrition information (Rosenbloom, Jonnalagadda, & Skinner, 2002). Athletes may be receiving information that is not evidenced-based (Torres-MGehee et al, 2012). This in turn can lead to unhealthy practices which may hinder performance and create a nutritional deficit. Although most athletes have a positive attitude toward nutrition and understand the importance of diet, many lack the appropriate level of nutrition knowledge and fail to translate information into practice (Spendlove et al, 2012; Zawila, Steib, & Hoogenboom, 2003).

In fact, many studies support the fact that nutritional understanding of athletes is suboptimal (Torres-McGehee et al, 2012; Zawila, Steib, & Hoogenboom, 2003; Dunn, Turner, & Denny, 2007). Torres-McGhee and colleagues (2012) reported athletes and athletic coaches have inadequate nutrition knowledge; whereas athletic trainers and conditioning specialists have adequate nutrition knowledge based on a US cross-sectional study. The investigators suggest the main issue is the source of information for athletes and athletic coaches may not be reliable; whereas trainers and specialists rely on registered dietitians (Tores-McGhee et al, 2012). Zawila, Steib and Hoogenboom (2003) measured nutrition knowledge with a convenience sample of sixty female collegiate cross-country runners from 6 colleges and universities in Illinois and Michigan and found major themes were wanting to eat better and not knowing how, body image and weight issues, and nutrition knowledge is necessary for health. Dunn, Turner, and Denny (2007) investigated students from a Southern US university reported that there were gender differences in nutrition knowledge and that although they had healthy attitudes about eating, their nutrition knowledge was limited.

Athletes with higher scores of nutrition knowledge are more likely to meet current dietary guidelines for macronutrient intake (Spendlove et al, 2012). While investigations focused on the nutrition knowledge and needs of collegiate and professional athletes, little research has been done in the amateur bicyclist population. The purpose of this study was to assess the nutrition knowledge of amateur bicyclists and its relationship to socio-demographic factors.

Methods

Participants

The study was conducted after approval was received from Florida International University Institutional Review Board (IRB). Informed consent was obtained by a cover letter attached to the survey that explained the intent of the study, risks, and benefits. By completing the survey respondents consented to participate in the study. Bicyclists were recruited for the study and data were collected online using a web-based survey provided by SurveyMonkey.com. The survey's link was posted on various local bicyclists' message boards and parks in South Florida. The final sample included 125 amateur bicyclists 18-65 years of age

Instruments and procedures

There are many questionnaires designed to assess the nutrition knowledge of the general public, but they may not be valid for the specific needs of athletes (Spendlove et al, 2012; Parmenter & Wardle, 1999). The questionnaire used, entitled, Likert-Scale Component of Nutritional Questionnaire, was created by Zawila, Steib and Hoogenboom (2003) to assess nutritional knowledge of endurance runners. Their instrument was a combination of two other questionnaires and was tested for face validity and trustworthiness. Their questionnaire consisted of 76 Likert-scaled nutrition knowledge which was coded with "strongly agree" and "agree" as positive responses and "disagree" and "strongly disagree" as negative responses (Zawila, Steib, & Hoogenboom, 2003). The response, "undecided" was coded as not factual. Positive responses were coded as either "true" or "false" based on whether or not they were factual. Each correctly answered response was assigned 2 point, while incorrect or "undecided" responses were assigned 1 point for each of 76 questions. The possible range was from all correct (a score of 152) to all incorrect (a score of 76). The actual range was from 86 to 152, representing scores from 50% to 88%. Since a score of 75% to 88% was attained by only 24% of the participants (top quartile). A score of 75% or better was considered good nutrition knowledge. Topics of the nutrition knowledge questionnaire addressed understanding of the role of macro and micro nutrients, fruits and vegetables, health benefits, hydration, alcohol, caffeine, weight loss, and attitudes toward the importance of nutrition, and nutrition for the athlete.

Demographics assessed age, gender, race/ethnicity, annual income, marital status, education level, and number of years cycling. Categories were collapsed to have at least 10% in each category for statistical significance. Age (years) had seven original categories; 18-24, 25-34, 35-44, 45-54, 55-64, 65-74, and 75 or older. These categories were collapsed to form four categories; 18-34, 35-44, 45-54, and 55 or older for statistical analysis. Education, income and marital status categories were also collapsed.

Statistical Analysis

Analyses were conducted with SPSS version 21 and a p-value of < .05 was considered statistically significant. Nutrition knowledge and sociodemographics were analyzed by gender and were performed by cross-tabulation with the Pearson's Chi-Square as the statistical test for significance.

Results

General characteristics are shown in Table 1. A total of 125 bicyclists completed the survey, 72 of whom were female and 53 were male. The majority of bicyclists were between the ages of 35 to 44. Approximately two-thirds of females were self-reported White, non-Hispanic as compared to Hispanic and other; whereas, approximately one-half of males constituted the Hispanic and other group. Forty percent held a 4-year college degree but there was a significant difference of 28.3% of males having some college or less compared to 5.6% of females, while 41.7% of females held a graduate degree compared to 17% of males. Annual income was higher than the overall US average with 42.7% reporting an annual income of 75,000 to 124,999, 28.2% reporting below 75,000 and 29% reporting above 125,000.

There were no statistical differences in marital status between genders. Approximately half the bicyclists have been cycling for greater than 5 years. The majority of participants had less than adequate nutrition knowledge (Table 2). A score of 75% to 88% was attained by only 24% of the participants.

Nutrition knowledge by gender is presented in Table 3. Females had a higher percent (80) scoring 75% or more for nutrition knowledge as compared to males (20). Years of cycling experience, age, education, and income were not associated with nutrition knowledge. Additional analysis was performed to assess the relationships with nutrition knowledge and sociodemographics. Neither race, nor years married were associated with nutrition knowledge (p = 0.466, p = 0.579, respectively).

Table 1. Socio-demographic characteristics (n=125)

Variable	Females (n=72)	Male (n=53)	*p*-value
Age (years)			.431
18 to 34	10^{a}(13.9)	13^{a} (24.5)	-
35 to 44	27^{a}(37.5)	16^{a}(30.2)	-
44 to 54	23^{a}(31.9)	14^{a}(26.4)	-
≥ 55	12^{a}(16.7)	10^{a}(18.9)	-
Education			.001
< Two-year college degree	4^{a}(5.6)	15^{b}(28.3)	-
Two-year college degree	10^{a}(13.9)	7^{a}(13.2)	-
Four-year college degree	28^{a}(38.9)	22^{a}(41.5)	-
Graduate school	30^{a}(41.7)	9^{b}(17.0)	-
Race/ethnicity			.017
White non-Hispanic	48^{a}(66.7)	24^{b}(45.3)	-
Hispanic and Other	24^{a}(33.3)	29^{b}(54.7)	-
Income			.396
≤75,000	19^{a}(26.8)	16^{a}(30.2)	-
75,000 to 124,999	28^{a}(39.4)	25^{a}(47.2)	-
≥125,000	24^{a}(33.8)	12^{a}(22.6)	-
Marital Status			.431
Married	37^{a}(51.4)	31_{a}(58.5)	
Not Married	35^{a}(48.6)	22^{a}(41.5)	
Years Cycling			.424
≤ 2 years	15^{a}(20.8)	15^{a}(28.8)	-
3 to 5 years	20^{a}(27.8)	10^{a}(19.2)	-
≥5 years	37^{a}(51.4)	27^{a}(51.9)	-

Notes: Data are presented as *N* (%). A *p*-value of <0.05 was considered significant. Columns with the same letter are not significantly different.

Table 2. Percent of participants with a high nutrition knowledge score

Knowledge Score	Frequency	Percent
High ≥75% correct	30	24.0
Low <75% correct	95	76.0
Total	125	100.0

Table 3. Nutrition knowledge compared to sociodemographic factors.

Variable	Knowledge < 75%	Knowledge ≥ 75%	*p*-value
Gender			.004
Female	48^{a}(50.5)	24^{b}(80.0)	-
Male	47^{a}(49.5)	6^{b}(20.0)	-
Age			.159
18 to 34	20^{a}(21.1)	3^{a}(10.0)	
35 to 44	34^{a}(35.8)	9^{a}(30.0)	
45 to 54	28^{a}(29.5)	9^{a}(30.0)	
≥ 55	13^{a}(13.7)	9^{b}(30.0)	
Education			.901
< Two-year college degree	15^{a}(15.8)	4^{a}(13.3)	-
Two- year college degree	13^{a}(13.7)	4^{a}(13.3)	-
Four-year college degree	39^{a}(41.1)	11^{a}(36.7)	-
Graduate Degree	28^{a}(29.5)	11^{a}(36.7)	-
Income			.854
≤ 75,000	28^{a}(29.5)	7^{a}(24.1)	-
75,000 to 124,999	40^{a}(42.1)	13^{a}(44.8)	-
≥125,000	27^{a}(28.4)	9^{a}(31.0)	-
Years Cycling			.112
≤ 2 years	27^{a}(28.7)	3^{b}(10.0)	
3 to 5 years	21^{a}(22.3)	9^{a}(30.0)	
> 5 years	46^{a}(48.9)	18^{a}(60.0)	

Notes: Data are presented as *N* (%). A *p*-value of <0.05 is considered significant. Columns with the same letter are not significantly different.

Discussion

We found less than optimal nutrition knowledge in amateur bicyclists regardless of their education level, marital status or race. Although females had a higher percent scoring 75% or more for nutrition knowledge as compared to males, years of cycling experience, age, education, and income were not associated with nutrition knowledge. Optimal nutrition is integral to bicyclists' training, performance, and recovery, as it improves energy efficiency and production to meet the high physical demands of the sport (Torres-McGehee et al, 2012; Hinton, Stanford, Davidson, Yakushko, & Beck, 2004). Common weight regulation practices among athletes may result in less than optimal macronutrient intake (Hinton, Stanford, Davidson, Yakushko, & Beck, 2004). Weight regulations practices coupled with a reduction in hunger in response to increased training and intensity of exercise may further inhibit performance and hinder health if adequate caloric and nutrient intakes are not met (Drenowatz, Eisenmann, Carlson, Pfeiffer, & Pivarnik, 2012). Bicyclists with adequate nutrition knowledge may be more likely to meet nutrient for optimal health. The amateur cycler population represents a large group of recreational bicyclists, which may lack the privileges of the collegiate and professional groups who may have better access to nutrition information through coaches and professionals.

Our study showed that only 24% of bicyclists demonstrated a passable understanding of nutrition scoring a 75% or better on a nutrition knowledge survey. These results align with other studies showing that athletes lack the knowledge of nutrition that is fundamental to their sport. Dunn, Turner and Denny (2007) found college athletes of various sports had a mean score of nutrition knowledge of 51.5% (where 75% was considered adequate). University students and athletes continue to demonstrate inadequate nutrition knowledge, receiving scores that are less than average (Torres-McGehee et al, 2012; Rosenbloom, Jonnalagadda, & Skinner, 2002; Zawila, Steib, & Hoogenboom, 2003; Azizi, Rahmani-Nia, Malaee, & Khosravi, 2010; Ozdoğan & Ozceli, 2011). Elite athletes continue to show the same trend as collegiate. Spendlove et al (2012) reported that elite athletes scored 58% on the General Nutrition Knowledge Questionnaire, which was significantly lower than a similar aged community population (63%) and a comparative group with dietetic training (86%). Athletes consistently have sub-optimal nutrition knowledge scores comparable to the general population (Parmenter & Wardle, 1999; Alsaffar, 2012; Hendrie, Cox, & Coveney, 2008; Dickerson-Spillman &Siegrist, 2011).This is alarming since nutritional needs for endurance athletes, particularly bicyclists, are considerably important due to their energy expenditure and the amount of time spent on training.

There were no significant relationships among nutrition knowledge and sociodemographic factors other than gender. Females scored significantly higher than males on the nutrition knowledge survey, with 80% of females having a passing score of 75% or higher as compared to than 20% of males. Our results are in agreement with several other studies that indicated females scored higher than males on nutrition (Spendlove et al, 2012; Zawila, Steib, & Hoogenboom, 2003; Ozdoğan & Ozcelik, 2011). This may be because females tend to place a greater weight on health importance, appearance, and risk aversion than men (Traill, Chambers, & Butler, 2012). Other sociodemographic factors such as years of cycling experience, age, education, and income were not significantly associated with nutrition knowledge. These results do not fit the model of previous studies. Age, income and education were positively associated with nutrition knowledge in an Australian community (Hendrie, Cox, & Coveney, 2008). It was surprising to find that bicyclists with greater experience did not score better than bicyclists with less experience. Ozdoğan and Ozcelik (2011) found that fourth year sports education students had higher mean nutrition knowledge scores than first year students. These results may be attributed to differences in age, type of sport, and access to valuable nutrition resources. The majority of our bicyclist population was between the ages of 35 to 44 years and may be more set in their eating habits as compared to studies on the collegiate athlete population (a much younger population). Collegiate and professional athletes may also have better access to nutritional resources through sports professional, compared to the amateur population (Torres-McGehee et al, 2012). Research suggests that athletes are motivated to eat healthy since they have positive attitudes about nutrition (Zawila, Steib, & Hoogenboom, 2003); however, knowing how to eat healthy may be lacking.

Limitation

Limitations of the study include a convenience sample of a particular geographical area (South Florida). Participants' income and education levels were higher than the US population and it is has not been determined if our population was representative of US amateur bicyclists. The questionnaire used was validated for endurance runners and not for bicyclists; however, it was piloted to establish face validity and reliability.

Conclusion

The results of this study show that amateur bicyclists have a poor understanding of basic nutrition concepts. Diet plays an important role in the athletic performance and the overall health of the amateur bicyclists. There is a need for validated tools that assess nutrition knowledge and its impact on dietary intake behavior for amateur athletes. Low scores on nutrition knowledge for athletes further suggest a need for community programs that address the needs of amateur and professional athletes in terms of nutrition awareness and translation into practice.

References

1. Academy of Dietetics and Nutrition (2015). Sports and Performance. http://www.eatright.org/resources/fitness/sports-and-performance and
2. http://www.eatright.org/resource/fitness/sports-and-performance/fueling-your-workout/protein-and-the-athlete
3. Alsaffar, A. A. (2012). Validation of a general nutrition knowledge questionnaire in a Turkish student sample. Public Health Nutrition, 15(11), 2074-2085.
4. Anderson, J., Young, L. & Prior, S. (2015). Nutrition for the Athlete. Colorado State University Extension, no. 9.362. Retrieved from: http://www.ext.colostate.edu/pubs/foodnut/09362.html

5. Azizi, M., Rahmani-Nia, F. M. Malaee, M., & Khosravi, N. (2010). A study of nutritional knowledge and attitudes of elite college athletes in Iran. Brazilian Journal of Biomotricity, 24,105-112.
6. Department of Health and Human Services (2015). Dietary Guidelines for Americans, 2015. Retrieved from: http://health.gov/dietaryguidelines/2015.asp
7. Dickenson-Spillman, M. & Siegrist, M. (2011). Consumers' knowledge of healthy diets and its correlation with dietary behavior. Journal of Human Nutrition and Dietetics, 24, 54-60.
8. Drenowatz, C., Eisenmann, J. C., Carlson, J. J., Pfeiffer, K. A., & Pivarnik, J. M. (2012). Energy expenditure and dietary intake during high-volume and low-volume training periods among male endurance athletes. Applied Physiology, Nutrition, and Metabolism, 37, 199-205.
9. Dunn, D., Turner, L. W., & Denny, G. (2007) Nutrition knowledge and attitudes of college athletes. Sports Journal, 10(4), 45-53.
10. Hendrie, G. A., Cox, D. N., & Coveney, J. (2008). Exploring nutrition knowledge and the demographic variation in knowledge levels in an Australian community sample. Public Health Nutrition, 11 (12), 1365-1371.
11. Hinton, P. S., Stanford, T. C., Davidson, M. M., Yakushko, O. F., & Beck, N. C. (2004). Nutrition intakes and dietary behaviors of male and female collegiate athletes. International Journal of Sports Nutrition, Exercise and Metabolism, 14(4), 389-405.
12. Nazni, P & Vimala, S. (2010). Nutrition knowledge, attitude, and practice of college sportsman. Asian Journal of Sports Medicine, 1(2), 93-100.
13. Ozdoğan, Y & Ozcelik, A. O. (2011). Evaluation of the nutrition knowledge of sports department students of universities. Journal of International Society of Sports Nutrition, 8(11), doi:10.1186/1550-2783-8-11, 2011
14. Parmenter, K., & Wardle, J. (1999). Development of a general nutrition knowledge questionnaire for adults. European Journal of Clinical Nutrition, 53, 298-308.
15. Rosenbloom, C. A., Jonnalagadda, S. S., & Skinner, R. (2002). Nutrition knowledge of collegiate athletes in a Division I NCAA institution. Journal of the American Dietetic Association, 102(3), 418 - 420.
16. Spendlove, J. K., Heaney, S. E., Gifford, J. A., Prvan, T., Denyer, G. S., & O'Connor. H. T. (2012). Evaluation of general nutrition knowledge in elite Australian athletes. British Journal of Nutrition, 107, 1871-1880.
17. Torres-McGehee, T. M., Pritchett, K. L., Zippel, D., Minton, D. M., Cellamare, A., & Sibilia, M. (2012). Sports nutrition knowledge among collegiate athletes, coaches, athletic trainers, and strength and conditioning specialists, Journal of Athletic Training. 47(2),205 -211.
18. Traill, W. B., Chambers, S. A., & Butler, L. (2012). Attitudinal and demographic determinants of diet quality and implications for policy targeting. Journal of Human Nutrition and Dietetics, 25 (1), 87-94.
19. Zawila, L. G., Steib, C. M., & Hoogenboom, B. (2003). The female collegiate cross-country runner: Nutritional knowledge and attitudes. Journal of Athletic Training, 38(1), 67-74.

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