Carnivore Diet and Athletic Performance: A Case Study Analysis

Case Study

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Abstract

Introduction: The carnivore diet, also known as the all-meat diet, has gained popularity in recent years among athletes and fitness enthusiasts. In this case study, we examined the potential impact of the carnivore diet on athletic performance and recovery.

Methods: We observed and obtained data on an 18-year-old female NCAA Division II athlete who had begun the diet one month prior to the start of the soccer season. A total of 22 game sessions over 13 weeks were observed and recorded, collecting TRIMP, average game heart rate, and GPS data (miles, work rate, top speed). Due to the findings of the data, halfway into the season a registered dietitian (RD) intervened to suggest the addition of ~16g carbohydrates pre-game and ~6-10g carbohydrates post-game.

Results: Before the intervention, the athlete measured an average of 240.82 TRIMP compared to the team's average of 205.20 with the same GPS distance load as her counterparts (p=0.03). After the RD intervention, of consuming ~16g of fruit closer to game time, the athlete's number of effect and intensity score changed to be comparable to the rest of the team 208.60 vs. 228.81, increasing the p-value out of significance (p=0.37).

Conclusions: While several factors contribute to high performance, data show that the addition of carbohydrate consumption close to game time in this particular athlete increased performance indicators (TRIMP and GPS Work Rate) for the student athlete.

Key Words: Carnivore diet, sport nutrition, soccer

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Introduction

Proponents of the carnivore diet claim that it can improve athletic performance and provide numerous health benefits[1,2]. Preliminary evidence suggests that following a carnivore diet may improve sprint speed by optimizing nutrient intake and supporting muscle growth and recovery[3]. It is important to note that the carnivore diet is highly restrictive and lacks essential nutrients found in fruits, vegetables, and grains[4].

Some say the carnivore diet can improve athletic performance in the short term, however, there is limited research on the effects of the carnivore diet on athletic performance[5,6]. In this case study, we examined the impact of the carnivore diet on athletic performance and recovery, pre-and post registered dietician (RD) intervention that added carbohydrates around competitions.

Methods

We observed and obtained data on an 18-year-old female NCAA Division 2 athlete who had been began the carnivore diet one month prior to the start of the soccer season. A total of 22 games over 13 weeks were observed and recorded.

Our aim was to determine how impactful a carnivorous diet was on her performance. The observation was designed to understand the athlete's overall performance and recovery and if it would adapt or change over time. Written informed consent was obtained, institutional review board approved the study, and the subject provided informed consent to participate in the study.

Performance Measurement

FirstBEAT training system was used to collect TRIMP and average game heart rate. The acronym "TRIMP" stands for "Training Impulse." TRIMP is automatically calculated by FirstBEAT from the participant's exercise's duration and intensity and is used to measure how hard or intense a workout is. Average game heart rate is a different measure that allows for a measure of work rate intensity for the duration of the game.

SPT Gametraka was used to gather GPS data (distance and work rate). This data was combined to understand internal and external load of the athlete, exercise duration and intensity. GPS data is used to understand intensity of distance covered by two was, 1) overall distance covered in a game, and 2) amount of start/stop and change of direction included in the distance covered. GPS data was gathered by the utilization of SPT Gametraka software. The GPS devices were placed between the players' scapulae through a tight vest. From the data collected by the devices, we extracted a set of training workload indicators through Gametraka.

Data Analysis

Due to the nature of the study and the small sample the data are mainly presented in descriptive terms using mean, standard deviation, and the 95% confidence interval. All the statistical analyses were performed using SPSS.

Athlete's Diet

Prior to the season, the student athlete met with coaches, registered dietitians, and cafeteria personnel in order to ensure their nutritional needs were met at the college. Their diet mainly consisted of whole eggs (not liquid or powdered), bacon (no added sugar), burgers (not frozen/prepackaged), steaks (not frozen/prepackaged, example: New York Strip/Ribeye), butter (Kerrygold or Vital Farms), salt (Redmond's Salt), condiments (sugar-free BBQ, ketchup, mayo), yogurt (no sugar Oikos), and fresh fruit (watermelon, pineapple, cantaloupe). Throughout preseason and full season, the athlete was monitored closely by a sports scientist and a registered dietitian at the college. Note: General sports nutrition advice for soccer athletes includes ~25-30g of easily digested carbohydrates 1 hour before competition, 30-60g/hour of carbohydrate during play, depending on tolerability and body size, and 1-1.2g/kg of complex carbohydrates for the first 8 hours post-competition.

Observation

A sport scientist working with the team was tasked with observing the athlete's performance indicators to ensure she was able to perform and recover properly due to her diet. It was observed that the work rate was significantly higher than the average of the team. The higher work rate indicates the athlete's body was unable to maintain the intensity of training, making her become fatigued faster, which in turn, decreases performance.

Intervention

Halfway through the season, after having conversed with the sport scientist, a registered dietitian formally met with the athlete and suggested a few adaptations to her diet (to be called the "intervention"). The first suggestion was for her to eat an additional yogurt prior to games and the second was for her to eat seven ounces of fruit closer to game time. Lastly, the RD suggested an increase of carbohydrates after the game for recovery (minimally 6-10g to help replenish stores of glycogen). These suggestions were intended to increase dietary carbohydrate intake minimally, so as not to disturb her carnivore diet. The carnivore diet lacks carbohydrates that provide not only quick energy, but also short-term energy for intermittent sports. The rationale was to provide more immediate energy for her to utilize and therefore improve the TRIMP score, average game heart rate and work rate.

Before the intervention, the athlete consumed a Celsius energy drink and seven ounces of fruit (pineapple and/or cantaloupe) 2-2.5 hours prior to game time (~16g carbohydrates). Within two hours of the completion of her game, she consumed approximately one pound of steak and a six-ounce Greek yogurt (~6-10g carbohydrates). After the intervention, the athlete changed the timing of her consumption of fruit to one hour before game time instead of 2-2.5 hours. However, she maintained her other dietary practices pre- and post-competition as opposed to fully following the suggestions from the RD.

Results

For the first half of the season, games 1-12 (n=12), the athlete measured an average of 240.82 TRIMP score afterwards (14.79% higher), significantly higher when compared to the team's average of 205.20 (p=0.03). The participant's average game play average HR was significantly higher than that of the rest of the team (p=0.001). GPS work rate also reported significantly higher workloads (p=0.04) than her teammates (Table 1).

Table 1. Participants vs. Team Pre-Intervention Performance Data

	Participant (n = 1)	Team (n = 22)	p value	% diff
Time Played (min)	53.36	49.97	0.2986	6.37%
Average HR (%)	0.71	0.66	0.0010*	7.49%
TRIMP	240.82	205.20	0.0397*	14.79%
TRIMPmax (%)	0.74	0.70	0.1874	5.76%
GPS Distance (miles)	5.65	5.27	0.1336	6.69%
GPS Work Rate	57.84	53.03	0.0486*	8.32%
Top Speed (mph)	18.51	17.11	0.0820	7.58%

* Indicates $p \leq 0.05$

For the second half of the season after the RD intervention, games 13-22 (n=9), the athlete measured an average of TRIMP of 208.60, -9.89% lower than and the overall score for the team was 228.81. In addition to the athlete's TRIMP score, the participant's game play average HR also changed before and after the intervention. The participant's game play average HR was no longer significantly higher than the team's average, instead averaged 1.6% lower. GPS work rate was also no longer significantly higher (p=0.37), dropping from 8.32% higher than the team's average to 4.66% (3.66%). It is noted that the player's average game playing time increased per game, but was lower than the team's average by 15.23% (Table 2).

Table 2. Participants vs. Team Post-Intervention Performance Data

	Participant (n = 1)	Team (n = 22)	p value	% diff
Time Played (min)	57.00	65.68	0.1407	-15.23%
Average HR (%)	0.67	0.68	0.3079	-1.60%
TRIMP	208.60	228.81	0.1905	-9.69%
TRIMPmax (%)	0.64	0.73	0.0952	-13.16%
GPS Distance (miles)	6.24	6.34	0.2797	-1.66%
GPS Work Rate	60.24	57.44	0.3701	4.66%
Top Speed (mph)	18.22	17.25	0.1301	5.31%

* Indicates $p \leq 0.05$

For the season, the athlete measured an average of 225.48 TRIMP (4.46% higher) compared to the team's average of 215.41 Before the intervention her average heart rate game performance percentage was 11.51% higher (71%) than the average of the team (62%), along with a higher GPS work rate (6.35%). However, none of these measures were significant when analyzed for the whole season with the exception of the participant having a higher top speed ($p = 0.03$) (Table 3).

Table 3. Participants vs. Team Season-Long Performance Data

	Participant (n = 1)	Team (n = 22)	p value	% diff
Time Played (min)	55.18	56.30	0.6015	-2.03%
Average HR (%)	0.71	0.62	0.0543	11.51%
TRIMP	225.48	215.41	0.2787	4.46%
TRIMPmax (%)	0.70	0.71	0.3258	-2.58%
GPS Distance (miles)	5.93	5.81	0.3691	2.06%
GPS Work Rate	58.98	55.23	0.0862	6.35%
Top Speed (mph)	18.37	17.18	0.0311*	6.49%

* Indicates $p \leq 0.05$

Discussion

The results in this case study show evidence that carbohydrates are indeed important for optimal performance. The student athlete's TRIMP score, average game heart rate and work rate all improved by the game following the intervention. As she continued to eat the fruit closer to game time, her scores continued to improve, even scoring better than the average of the rest of the team. As can be seen in the results, the change for the TRIMP score is from 14.79% higher than the team to 9.8% lower than the team average – indicating a 24.6% positive change in TRIMP. It is important to note that these scores are performance indicators, and therefore are very significant when considering the team is vying year after year for a national championship. Likewise, average game heart rate when compared to the rest of the team was significantly higher at 7.49% pre-intervention and 1.6% lower post intervention – indicating a 9.1% positive change in HR. Finally, work rate improved from 8.32% to 4.66%, a nearly 4% improvement in work rate.

If the student athlete embraced all of the suggested interventions, the nutritional research shows that recovery time[7], cognitive function, reaction time[8], and performance[9] could be optimized with an increased carbohydrate intake. The student athlete was recruited to a high-level NCAA Division 2 soccer program for her sheer talent and has been able to be successful. However, the evidence in this case has shown that her performance increased with the small adjustment of carbohydrate intake timing. It is unknown whether her overall performance could be enhanced with an evidence-based carbohydrate-rich diet for intermittent sport athletes. From the position stands of several well-known and well-respected institutions including Academy of Nutrition and Dietetics (AND, formerly ADA), American College of Sports Medicine (ACSM)[10], and the International Society of Sports Nutrition (ISSN)[11], carbohydrates are of clear importance for performance (recovery and cognitive function included).

The athlete began her carnivorous diet one month prior to the start of the college season. The general recommendation for a significant dietary change is to give the body a minimum of a few weeks, but often several months are needed to fully adapt to the metabolic adjustments necessary for high performance[12]. Utilization of fat for energy takes a significantly longer amount of time and is more complex when compared to utilizing carbohydrates as energy[13]. This athlete began the transition a month before starting her career as a collegiate athlete, which could be a compounding variable in this case study. Perhaps, her body will be better adapted in future seasons.

As a freshman attending college for the first time, experiencing a new atmosphere and a new team, and all the aspects that accompany this transition, the effects on the athlete's mind and body could have been a compounding variable in the results. One might argue, including the athlete, that during the first half of the season, she was more anxious and nervous trying to adapt and adjust to the collegiate game, new teammates, etc., therefore increasing her TRIMP score, heart rate, and work rate. This ultimately may have affected the results of the observed data due to her adaptation of becoming more comfortable and less nervous[14]. However, there was a marked difference in these measures between the game prior to the intervention and the game directly following the intervention, and therefore unlikely that these variables directly changed at the same time as the intervention.

Conclusion

While the research is on-going to determine the impact of the carnivore diet on performance, this case study shows that for one athlete, carbohydrates closer to game time increased performance indicators. Game-day significance for the TRIMP scores has not been fully elucidated in research. However, the measures that calculate it are well-known to drastically affect performance, especially when considering the level of competition. Perhaps only one of the improvements noted would not be as worthy of attention, but when 3 crucial performance indicators change significantly, overall performance is likely to increase.

The aforementioned research shows the importance of carbohydrates (amount and timing) for optimal performance. The question remains, would more intake of carbohydrates benefit the athlete's performance in the short and long-term? More research is needed to determine if the carnivore diet is as good or even superior for performance when compared to the well-researched high-performance diet for soccer athletes. In addition, evidence is lacking regarding the amount of intake as well as the precise timing of carnivore diet products in order to be at the highest energy availability during competition. Research is needed to determine all aspects of performance and the carnivore diet. While several factors contribute to high performance, in this case study, the data show that the addition of carbohydrate consumption close to game time increased performance indicators for the student athlete.

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