



Optimizing Performance: Nutrition Strategies For Hockey Players

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Abstract: This paper presents a comprehensive sports nutrition plan tailored to the needs of a 20-year-old male hockey midfielder, with a focus on enhancing performance and supporting recovery. Utilizing anthropometric data (68 kg body weight, 27% body fat, 49.6 kg lean body mass) and the Cunningham equation, the athlete's total energy expenditure was calculated at 3376.8 calories per day. The proposed diet plan adjusts macronutrient intake across pre-season, in-season, and off-season phases to align with varying training and competition demands. Key recommendations include carbohydrate intake ranging from 476g to 612g, protein from 136g to 204g, and fat from 68g to 75g daily, depending on the season. The plan emphasizes hydration, micronutrient intake, and strategic meal timing, with a sample daily meal schedule provided. By integrating periodized nutrition principles, this study offers a practical, evidence-based approach to optimizing dietary strategies for hockey players, aiming to improve endurance, strength, and recovery while supporting long-term health and injury prevention.

Index Terms - Sports Nutrition, Hockey, Macronutrients, Periodization, Diet plan, Performance, Recovery, Midfielder.

I. INTRODUCTION

Hockey is known as a sport demanding high levels of physical fitness that specifically stresses strength, stamina, and speed (Devlin et al., 2016). The key elements in the athlete's diet are macronutrients such as carbohydrates, proteins, and fats, alongside micronutrients like vitamins and minerals (Campbell I., 2003). Carbohydrates have a heavier footing in the athlete's regimen since a consistent energy supply throughout extended continuous stresses like high-intensity hockey games or workouts is essential to achieving optimal performance outcomes (Devlin et al., 2016). Playing hockey requires short bursts of high-intensity effort that typically lasts between thirty and forty-five seconds each time (Jeukendrup and Gleeson 2008). It's a physically demanding sport; forwards usually play between 10 to 17 minutes per game, but some midfielders skate at even faster paces for up to 25 minutes. To adequately support this challenging lifestyle, athletes require a mix of macronutrients like carbohydrates, fats, and proteins, as well as micronutrients such as water minerals (Bonci 2009). These nutrients contribute towards energy provision in the form of calories: carbohydrates offer about 4.2 calories per gram; fats give almost double that amount with 9.4 calories; and proteins yield roughly 5.65 calories per gram (Blake, 2010). Efficient digestion is critical here, as only fully digested and absorbed nutrients can provide the necessary energy required for optimal performance (Blake, 2010). The journey from food to energy is a complex one that occurs in our gastrointestinal tract. The mouth, oesophagus, and small and large intestines are among the important organs that make up this system (Cardwell 2006).

The present investigation is based on the deliberate selection of a 20-year-old male midfielder in the hockey domain. The individual has competed at the state level in multiple tournaments. The event encompasses both the interstate junior tournament and the senior open national competition. The sportsman has remained free from injuries for the preceding half-year and is presently in the phase of the competitive season. Tables 1 and 2 present a comprehensive compilation of the athlete's complete data. The participant provided informed consent by duly completing a consent form following a comprehensive briefing regarding the precise details of the study before its commencement. It utilised the Harpenden Skinfold Calliper fat measurement tool to calculate the body fat percentage and lean body weight. An expert who holds certification in the field of strength and conditioning carried out the measurements

Table 1 Body composition and anthropometric measurements

Details	Data
Age of the athlete (years)	20
Weight (Kg)	68
Height (cm)	168
Body Fat %	27
Lean Body Mass (%)	73
Resting metabolic rate (Kcal/day)	1876

Table 2: Current food consumption

	grams/day	calories	g/kg
carbohydrate	384	1,536	5.65 g/kg
protein	73	292	1.07 g/kg
fats	35	315	0.51 g/kg
total	492	2143	

II. FUNDAMENTAL NUTRITIONAL REQUIREMENTS

Upon evaluating an individual's dietary consumption, it is imperative to formulate intervention strategies to address any deficiencies or irregularities. For athletes participating in physically demanding sports such as hockey, it is crucial to maintain a well-balanced and nutritious diet that caters to their energy requirements and facilitates their athletic performance and recuperation. The daily caloric intake is estimated to be around 2928 calories, as per the meal plan outlined in Table 2. As a hockey athlete, it may be necessary to increase caloric intake to adequately support energy demands. Athletes are required to augment their overall caloric consumption, ensure sufficient protein intake, opt for complex carbohydrates, and maintain proper hydration levels.

Below, the total energy used is calculated using Cunningham's equation.

Table 3 Details of the athlete

Body weight (Kg)	68
Body Fat (Kg)	18.4
Lean Body Mass (Kg)	49.6
Rest Metabolic Rate (RMR)	1876
Level of physical activity	1.8 (active)
Total Energy Expenditure (TEE)	$1.8 * 1876 = 3376.8$ calories

Table 3 provides details. A closer look at the athlete's statistics reveals that their weight is approximately 68 kg, including an estimated 18.4 kg of body fat and 49.6 kg of lean muscle mass. Their resting metabolic rate is approximately 1876 calories per day, and their level of physical activity is moderately high at 1.8. As a result, the total TTE is 3376.8 calories daily as a result of these factors.

Carbohydrates play a role in fueling high-level training and competition efforts, which is necessary for maximising athletic performance (Impey et al., 2018). Exercises based on endurance may suffer from a decline in energy levels if a healthy carbohydrate intake is not maintained; however, eating carbohydrates before or during exercise helps maintain blood glucose levels and ensures adequate muscle glycogen storage (Lemmink & Visscher, 2006). Carbs consumed soon after workouts can further aid the recovery process by restoring depleted glycogen stores. Athletes who are looking to maximise their performance potential need to make sure they incorporate enough carbohydrates into their diets (Impey et al. 2018). The study recommends that athletes who engage in moderate-to-high-intensity exercises need a sufficient carbohydrate intake ranging from 5 to 12 grams per kilogram of body weight each day (Impey et al. 2018), depending on the length and intensity level of their training sessions. Thus, a person weighing approximately 68 kilograms would need to consume anywhere between 340 to 816 grams of carbohydrates daily (Impey et al. 2018). Apart from this, timing is crucial when it comes to carb intake during exercise routines for better results (Impey et al. 2018). A meal or snack high in carbohydrates should be consumed 3 to 4 hours prior to beginning a workout in order to top off glycogen stores for sustained energy levels throughout exercises. Carbohydrate-rich snacks or drinks should also be consumed just before exercising for an additional energy boost (Impey et al. 2018). Carbohydrate consumption during extended workout sessions greater than 60 minutes helps avoid fatigue by keeping glucose levels in control (Burke et al., 2007). In addition, following physical exertion, if carbohydrates are consumed, it can help speed up glycogen storage restoration while expediting the muscle healing process (Impey et al. 2018). Athletes should consume a hefty meal composed of carbs 3–4 hours prior to training (Impey et al. 2018), such as oatmeal stacked with fruits and yoghurt or whole wheat bread turkey sandwiches along with fruits. To instantly boost energy supplies, bananas and sports drinks that are high in simple sugars can assist in prolonging exercise time (Loucks, 2004). Sustaining carbohydrate consumption is vital for athletes during exercise; relying on energy beverages and carbohydrate gels will ensure glucose levels don't decrease, resulting in fatigue (Burke et al., 2001). Even after completing the workout phase, necessary carbohydrates must be consumed to replenish depleted glycogen stores (Noni Brinkman & Keshun Liu, 2016). Smoothie bowls filled with fresh fruit and Greek yoghurt or peanut butter jelly sandwiches built using whole wheat bread act as perfect recovery meals.

Protein serves as an essential macronutrient in repairing and maintaining muscles during various activities, such as field hockey, which causes microtears and damage frequently (Clark and Manore 2015). To enhance athletic performance levels while reducing soreness factors post-exercise among endurance athletes seeking rapid recoveries, increasing an individual's daily protein intake up to a maximum of 1.2 grams per kilogram proves helpful (Imayama et al. 2014). After vigorous exercise, consuming protein right away helps muscles recover by encouraging muscle protein synthesis (Phillips et al., 2016). Field hockey players benefit from sufficient protein intakes, which are vital in supporting growth, repair, and faster recovery times post-game or training. For midfielders looking to maximise performance outcomes in the field, 1.6–2.2 grams per kilogram are recommended daily from high-quality sources consumed throughout their meals and snacks spread over the day, including post-exercise consumption for optimised recovery outcomes. The field hockey midfielder, with a lean body mass of 49.6 kg, knows that proper nutrition is crucial when it comes to excelling in sport. For this athlete, a daily intake of between 79 and 109 grams of protein per kilogram of body weight would be required (Jäger et al., 2017). To achieve this amount effectively, the athlete should add high-quality proteins to their meals and snacks continuously throughout the day; consider chicken, turkeys, fish,

eggs, dairy products like milk or yoghurt, and legumes such as lentils, beans, and tofu. Consuming some sort of protein within the first hour after working out can help increase muscle protein synthesis and promote recovery through timing effects on muscle recovery and adaptation optimization (Imayama et al., 2014). To improve performance, this player should try to eat a protein-rich snack or meal after every practice or game. To perform at their best, athletes should always keep nutrition top of their minds. Fat is one nutrient that cannot be ignored. Although it may have a bad reputation, fat is a crucial part of our diet and exercise routine. To perform physical activity, we require energy, and fat is a great source that provides up to twice as much energy per gram compared to carbohydrates or protein (Jeukendrup & Gleeson 2019). Additionally, it helps conserve muscle glycogen, paving the way for better performance over longer periods (Coyle 1994). Another way that a sufficient intake of fat supports athletic endeavours is through the production of hormones. When it comes to muscle growth, repair, and recovery, hormones like testosterone and oestrogen are essential (Nattiv et al. 2007). You are therefore advised to eat enough dietary fat to maximise athletic potential. Cortisol regulation is also necessary for maintaining excellent athletic performance under pressure (Hill et al. 2008). Finally, since maintaining health is so important for athletes, immune function shouldn't be ignored. When it comes to preventing infections or healing wounds, controlling inflammation levels is important (Calder et al. 2009). So ensuring you're consuming enough dietary fats should be a priority. For athletes' diets to be balanced effectively, they should aim for an adequate daily fat intake within the range of 75–105 grams. To keep things healthy, it's best if these come through nutritious options like nuts, seeds, avocados, or olive oil instead of unhealthy fast foods or sugary snacks that contain hidden yet harmful trans fats. These balanced intakes must include the right amount of carbohydrates, proteins, and fats in meals throughout their training regimen, not only from a health perspective but also crucial to maintaining peak athletic performance levels (Sawka et al. 2007).

In order to perform at your peak athletically and recover from workouts effectively, adequate hydration is crucial. Experts advise drinking between 8 and 10 glasses of water per day to ensure you are properly hydrated throughout the day. They also advise drinking more fluids prior to, during, and after exercise to replace any lost electrolytes.

III. PERIODIZATION

Executing periodicity in sports nutrition is crucial for hockey athletes. It produces returns because they have changing nutritional prerequisites brought about by different events undertaken throughout the calendar year, whether it be training or actual competitions held (Kreider et al., 2010).

Preseason Dietary Guidelines:

The preseason period is crucial for athletes looking to prepare adequately for what lies ahead. They need to focus on building up their endurance, strength, and speed while ensuring proper nutrition is part of the routine. This means incorporating a healthy mix of carbohydrates, protein, and beneficial fats into their diet plan- such combinations provide them with sufficient energy levels along with nutrients necessary for workouts and recovery. During training sessions in this period leading up to the season start date, they must be adequately fueled - meaning that they consume a meal containing both carbohydrates and proteins at least 2-3 hours before each training session. They could indulge in dishes like oatmeal served with berries & almond butter, or perhaps sip on green smoothies comprising banana slices accompanied by Greek yoghurt & spinach leaves [Eleat Sports Nutrition, 2023]. Athletes can further benefit from snacking on carbohydrate-rich foods around thirty minutes before training sessions- options like fruits or small servings of granola are convenient choices that serve as excellent sources of quick energy (Canfitpro, 2023).

During-Season Guidelines:

To maintain energy levels throughout the season and support optimal performance ability, an athlete's nutrition plan must incorporate elements that promote recovery. This is particularly true during periods of more frequent games and training sessions, where adequate nutrition is even more crucial. After each training session or game, athletes should focus on consuming a well-rounded meal that includes carbohydrates, protein, and healthy fats within 30 to 60 minutes [Eleat Sports Nutrition, 2023]. Grilled chicken breast paired with brown rice and roasted vegetables represents an excellent option in terms of recovery-promoting food choices (Canfitpro, 2023). To stay properly fueled during this time, athletes should plan opportunities for

carbohydrate-rich pregame or pre-training snacks(UK Healthcare, 2023). Bananas and/or energy bars provide quick energy boosts leading up to competition without sacrificing nutritional value.

Off-Season Guidelines:

In an athlete's off-season nutrition plan, maintaining peak fitness while giving injury healing top priority should be a priority. There may be a slight decrease in nutritional needs during this phase due to reduced workout schedules, but ensuring adequate intake is essential to facilitating full body recovery through nutrient-rich foods like fruits and vegetables, whole grains, lean proteins, and healthy fats (Eleat Sports Nutrition, 2023). These foods support immunity functions, encourage muscle recovery, and maintain overall physiological health (Canfitpro, 2023). Equally important is to maintain your water consumption while incorporating low-intensity activities such as yoga or swimming, which will aid in maintaining fitness levels while allowing the body much-needed rest (UK Healthcare, 2023).

IV. SPECIFIC REQUIREMENTS

As a midfielder, an athlete's frequent running and movement on the field mean they require more energy than other positions. That's why they need to consume foods that are high in carbohydrates, as this can provide support for their endurance during games (Koulmann et al., 1996). Additionally, with a lean body mass of 49.6 kilograms adequate protein intake is essential for supporting muscle maintenance and recovery. To promote muscle protein synthesis, it is advised to consume 1.4–2.0 grams of protein per kilogram of body weight each day (Jager et al., 2017).

Given the athlete's body weight of 68 kg and total energy expenditure (TEE) of 3376.8 calories, the figure can be calculated as follows:

Table 4 Details of the proposed seasonal macronutrients

	Carbohydrate	Protein	Fat	Extra (fibre)	Calories	G/kg Carbs/Protein/Fat for
Pre-Season	544	170	75	20-30	3376.8	8/2.5/1.1
During Season	612	204	68	20-30	3376.8	9/3/1.0
Off-Season	476	136	75	20-30	3376.8	7/2/1.1

The nutrition programme for a season is shown in Table 4 based on the athlete's competition period (pre, during, and off-season).

V. PROPOSED PLAN

Table 5 Proposed diet plan

MEAL	FOOD
Morning Snack	One medium-sized banana with a tablespoon of almond butter, Low-fat cottage cheese with sliced peaches.
Breakfast	Scrambled eggs (4 egg whites + 1 whole egg) with whole wheat toast, sliced avocado, and tomato, Greek yoghurt, Mixed berries and granola, Including skimmed cow milk.
Lunch	Grilled chicken breast with quinoa and mixed vegetables (broccoli, carrots, bell peppers), Whole wheat pita stuffed with hummus, sliced cucumber, and tomato, Mixed greens salad with vinaigrette dressing.
Afternoon Snack	Greek yoghurt, mixed berries, and spinach protein smoothie, whole wheat crackers with low-fat cheese.

Pre Practise snack	2 slices of brown bread - 1 slice of low-fat cheese, 1 medium-sized apple - 1 tablespoon of almond butter
Post-Practise Snack	Consume a glass of chocolate milk and a handful of mixed nuts.
Dinner	Grilled salmon with sweet potato and mixed vegetables (asparagus, Brussels sprouts, bell peppers), Lentil soup with a side of whole wheat bread, Mixed green salad with vinaigrette dressing.
Bedtime Snack	Combine cottage cheese, chopped walnuts, and honey for a delicious and nutritious snack.

Table 6 Proposed food consumption

	grams/day	Calories	g/kg
carbohydrate	330-405	1320-1620	4.9-6 g/kg
protein	120-150	480-600	1.8-2.2 g/kg
fats	75-105	675-945	1.1-1.5 g/kg
total	525-660	2475-3165	

Table 5 provides a suggested meal plan for their daily caloric intake. To tailor the recommendations to an individual athlete, Table 6 provides the recommended amounts of macronutrients based on factors such as body weight, body fat percentage, lean body mass, resting metabolic rate (RMR) and physical activity level.

1. The recommended total calorie intake has been adjusted to 3376.8 calories per day to align with your Total Energy Expenditure (TEE).
2. The recommended daily protein consumption is roughly 1.6 grams per kilogram of body weight, which corresponds to approximately 79.4 grams consumed over one day.
3. The daily carbohydrate consumption recommended is 5-7 grams per kilogram of body weight. This translates to consuming between 340 and 476 grams of carbohydrates each day.
4. Increasing healthy fat intake can help support overall health and athletic performance.
5. Including pre- and post-practice snacks in your routine can aid in providing the necessary fuel and recovery for your training sessions.
6. Including a variety of fruits and vegetables in regular meals can have major health benefits. These natural foods provide the building blocks for good well-being due to their availability of critical elements (Harvard T.H. Chan,2022).

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