# RECOVERY NUTRITION FOR THE ARAB ATHLETE COMPETING IN TEAM-BASED SPORTS

## BACKGROUND TO RECOVERY NUTRITION

*– Written by Richard Allison and Shaima Al Khaldi, Qatar*

Recovery nutrition is essential for enhancing physiological adaptations to training that will, in turn, optimise performance. Although the key principles are fairly well established, the needs of individual athletes vary greatly and therefore a 'one-size-fits-all' approach to recovery nutrition is scientifically flawed. Irrespective of differing training loads and intensities, there are several external factors such as socio-cultural, religious and climatic that affect an athlete's ability to recover. Yet recovery nutrition is required by all athletes and in its essence is not esoteric; good daily nutritional habits combined with specific nutrition related to the sport in question will augment potential training adaptations.

Recovery involves a complex array of desirable adaptational processes induced by physiological stress. The challenge for any athlete is to enhance their recovery with correct nutritional strategies that facilitate the:

- re-fuelling of muscle and liver glycogen stores.
- replace fluid and electrolytes that are lost via sweat and urination
- regenerate, repair and adapt structural anatomy following catabolic stress.

Nutritional intake will vary depending upon the sport played, the duration and intensity of said sport (and training) and competition demands, all of which should account for fuel utilisation, fluid loss, muscle damage magnitude and stimulus required for protein synthesis. The aim of this article is to provide a cultural review of how athletes competing in Qatar recover with the aid of personalised nutritional strategies thereby highlighting the differences which need to be accounted for when working both in the Gulf region and with Arab athletes.

### MAXIMISING RECOVERY POTENTIAL WITH PRE-PLANNING

Before examining how to develop a personalised recovery strategy, it is important to understand what factors may have a detrimental impact upon an athlete's ability to recover:

- fatigue: athletes are often unwilling or unable to consume recovery nutrition.
- loss of appetite: immediately after a particularly prolonged or intense training session athletes are often disinterested in food or beverages.
- post-exercise commitments: ranging from extended warm-downs to media and TV commitments.

It is also particularly important to identify an individual athlete's likes and dislikes regarding nutrition – often a particular tasting beverage will find acceptance within a squad by as little as 20%. This is important to consider if a team has a particular sponsor and the athletes should be seen with their products. However, a structured post-exercise plan based upon the type, duration and intensity of the training/ competition will help overcome these issues and promote adequate recovery.

Recovery nutrition should maintain optimal health and performance by meeting the increased needs for some specific nutrients required to help combat the catabolic stress induced from heavy training or a significant number of matches played in a short time. Furthermore, it should be specific to the role or position of the player. Football is a varied and dynamic game with specific positional demands. For example, a goal keeper's energy expenditure will be significantly lower than a striker who may cover as little as 1 km, who in turn will cover 1/13th of a centre midfield player (13 km in 90 minutes). Therefore, the inter-player variability of glycogen utilisation, muscle protein breakdown and fluid loss predominately through sweat will be significantly different within a team of players and as such a 'one-size-fits-all' approach can be detrimental to all players.

## WHAT DOES THE NUTRITIONIST HAVE TO CONSIDER FOR ATHLETES COMPETING IN QATAR?

In Qatar, temperatures often exceed 40°C and may also be combined with a humidity of up to 90%. This extreme climatic cocktail alters the training and competition pattern of most clubs and federations. Whereas most European football teams may train 5 to 6 times per week for 2 to 4 hours per day between the hours of 10 am to 2 pm, in Qatar, the majority of teams train 4 to 5 times per week, after 8 pm and usually for shorter periods (1 to 2 hours per day). Often, as summer temperatures rise, training sessions gradually start later into the evening, with the start of a session at midnight not uncommon.

Qatar is also a Muslim country, where the Holy Month of Ramadan has an influential effect on nutritional habits for all players (Muslin and non-Muslim). The percentage of energy derived from macronutrient intake alters during Ramadan, with a shift towards greater intakes of fat and simple sugars[1]. However, evidence suggests that the general overall energy intake remains similar[2]. It is also important to note that Ramadan is a very special and social occasion where Muslim athletes spend a greater amount of time with their families. The clinician needs to be aware of these potential differences and monitor for over-eating simply due to the extra time surrounded by friends, family and food.

Generally, athletes will abstain from playing, training or competing during periods of fasting. However, it is important to convince the fasting athlete that they can still obtain the adaptations and benefits from training with adjustments to their training regimen[3,4], sleep pattern[5] and nutritional and fluid intake[6]. To optimise these effects, it is suggested that a gradual transition to the fasting lifestyle at least 2 weeks prior to Ramadan may alleviate the temporary reduction in performance commonly observed during the first week on Ramadan[7].

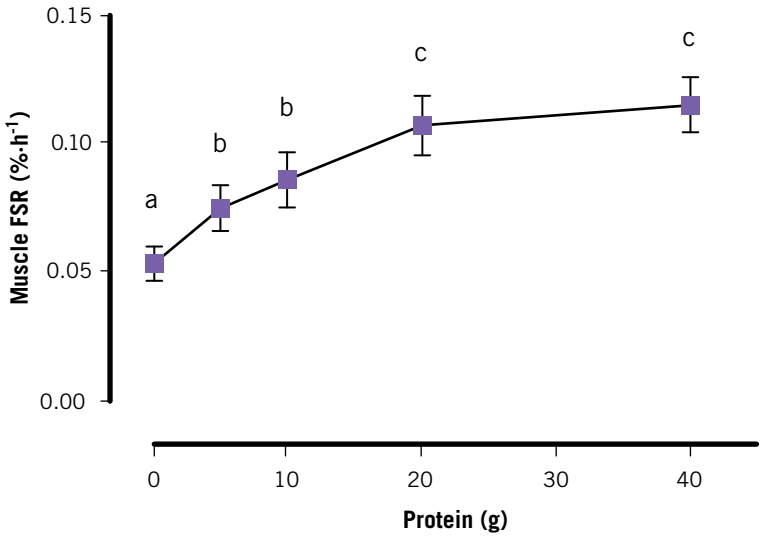


**Figure 1:** Mean (± SEM) mixed-muscle fractional protein synthesis (FSR) after resistance exercise in response to increase amount of dietary protein[11] (Figure reproduced with permission of *American Journal of Clinical Nutrition*).

THE ROLE OF CARBOHYDRATE IN RECOVERY

For the majority of out-field footballers, glycogen is the primary source of fuel (moderate to high intensity exercise). The depletion of glycogen will cause fatigue and thus performance may be compromised by an athlete's inability to replenish glycogen stores. Therefore, the principle aim of recovery nutrition is to optimise muscle and liver glycogen status. This replenishment is dependent on exogenous carbohydrate (CHO) intake, before, during and after a game, enhancing insulin sensitivity and muscle permeability to glucose through increased GLUT-4 activation[9].

Timing of CHO ingestion is similarly important. It has been established that the rate of muscle glycogen storage is 33% greater with earlier CHO feeding (<1 hour) compared to delayed feeding (>2 hours)[9]. This is due to increased rates of glycogen synthesis that present themselves during the first hour post-exercise, due to the activation of glycogen synthase stimulated by glycogen depletion. While synthesis rate is greater immediately post-exercise, it is also important to note that glycogen synthesis continues up to 72 hours post-exercise. Post-exercise CHO intake should be 1 to 1.2 g/kg body weight (BW) of a moderate to high glycaemic index.

In sessions, where moderate to intense exercise exceeds 1 hour, the consumption of 30 to 60 g CHO/hour is recommended to maintain workload and should be consumed every hour subsequently. Sport drinks containing 60 g CHO have been demonstrated to maintain blood glucose levels and sustain exercise performance[10]. Dates are a cultural delicacy in Qatar that are also high in simple sugars (~18 g CHO per date). We find that for those Qatari athletes who do not find CHO drinks palatable, dates are a suitable snack before training.

For the exercising athlete, special consideration should be paid to the overall daily CHO load. International guidelines suggest:

- 5 to 7 g/kg BW per day for low to moderate training days.
- 7 to 10 g/kg BW per day for moderate to heavy training days.

Maximum glycogen storage for the vast majority of athletes occurs at ~6 g/kg BW per day. Very rarely do Qatari athletes require 6 g/kg BW per day. This may need to be reduced in the summer months when training load significantly decreases due to the summer heat and humidity.

THE ROLE OF PROTEIN IN RECOVERY

Dietary protein is an essential nutrient which is utilised in connective tissue, cell membranes and muscle cells. It is constructed from 20 different amino acids in varying sequences, eight of which must be acquired exogenously. Protein is a very important macronutrient and needs to be consumed post-exercise, since exercise provides an effective stimulus for protein synthesis and causes a substantial breakdown of muscle protein. The rate of protein turnover in skeletal muscle increases in the 30 minutes post-training and if training is conducted in a fasted state or with restricted protein intake, muscle gains are severely limited; as the catabolic processes combined with the gradual increase in anabolic processes may last for up to 24-hours post-exercise[11].

Protein needs vary between athletes, but the accepted range of 1.2 to 1.7 g/kg BW for moderate-intensity athletes. It is commonly accepted that muscle hypertrophy can occur at the lower end of these range (1.2 g/kg/day). However, a large number of the football players in Qatar have a lower muscle mass than their European, African and American counterparts and we have found beneficial results when protein intake increased by as much as 1.5 g/kg per day.

The amount of protein given immediately post-exercise is determined by the dose response of protein synthesis. Ingestion of 15 to 20 g of protein immediately after exercise is advised (Figure 1), as no significant increase in muscle fractional synthetic rates are observed with intakes greater than 20 g. Ideally, this protein source should contain 6 to 9 g of branch chain amino acids to increase net protein synthesis.

Traditional Qatari dishes consist of both high amounts of CHO and protein such as rice served with a variety of roasted meat, fish and chicken. Generally, without the addition of 'junk calories' from western-style fast food outlets, a Qatari diet is quite healthy. Indeed, a combination of protein and CHO post-exercise appears to improve recovery at a faster rate. Protein degradation and synthesis increase during exercise, for which total net protein balance can remain negative for up to 3 hours post-exercise without nutritional intervention. Various studies have demonstrated that CHO

consumed together with protein within 30 minutes of exercise improves glycogen repletion[9], protein balance[14] and markers of muscle damage[15], all of which subsequently improve future performance[16]. Practically, this CHO and protein combination can be provided simply in a milk drink or via a ready-made protein shake.

## WHY IS HYDRATION IMPORTANT AND HOW CAN WE REPLACE LOST FLUID?

Fluid loss during exercise is dependent on how much the athlete sweats, based upon their metabolic heat production and the environmental condition they are playing in and how much fluid they consume while exercising. Fluids play an essential role in temperature regulation, muscle, brain and joint function. The increase of heat production in training or competition leads to significant sweat loss, even in cold weather that can result in hypohydration. It has been observed that some athletes competing in Qatar can lose up to 3 litres per hour during the summer months. Consequently, post-exercise fluid replacement is crucial. Consensus guidelines on hydration recommend commencing exercise in a euhydrated state, drinking to thirst and planning fluid intake strategies to avoid body mass losses ≥2%. However, fluid replacement should be individualised and is dependent on on fluid loss. Athletes should monitor fluid loss during exercise (calculated by body mass pre-exercise – (minus) body mass post-exercise + (plus) fluid consumed) and replace 1.5% of lost fluid within 4 to 6 hours-post exercise[17,18].

*Fluid loss=body mass pre-exercise - body mass post-exercise + fluid consumed*

Furthermore, while guidelines state that players should avoid a urine osmolality of >700 mosmol/kg, in our experience football players in Qatar regularly present with values >1000 mosmol/kg. This is important as despite these indices of dehydration, all these players drink to thirst response and do not appear to have the reductions in performance. However, this area requires further research as osmolality values appear to be ethnicity-specific; we encourage and educate all players in Qatar to enter all training and competition in a euhydrated state. Players can approximately gauge their hydration status by monitoring the colour of urine (it should be pale and not yellow or orange).

Sports drinks should be consumed during exercise >1 hour in duration with compositional range of ~5 to 10% CHO, 78 to 195 mg/L potassium and 460 to 1,150 mg/L sodium. Electrolyte supplements may be added to water, which may be of particular importance to Qatari athletes training and competing in the summer months where sweat rates are considerably higher. However, special care should be provided regarding the consumption of readily available 'commercial' sports drinks. Anecdotal evidence from the Aspetar Sports Nutrition Department suggests over-consumption of sports drinks. Education has been provided to the players, coaching and associated medical staff with the message that during technical and low intensity training lasting under 1 hour, there is no performance or nutritional gain to be had from consuming CHO sports drinks. Furthermore, the players did not appreciate the excess consumption of calories caused by this drink consumption.

## IS THERE A VALUE TO SUPPLEMENTING WITH VITAMINS AND MINERALS?

During a tournament situation, football matches in Qatar may be scheduled every 48 hours. This short duration between games may compromise an athlete's immune function. While the evidence is non-existent to suggest that vitamin and mineral supplementation improves athletic performance, there is some evidence to suggest vitamins A, B6, B12, C, D, E and folic acid and the trace elements iron, zinc,

> ***The percentage of energy derived from macronutrient intake alters during Ramadan, with a shift towards greater intakes of fat and simple sugars***

copper and selenium work in synergy to support the protective activities of the immune cells. Combined with an adequate energy intake post-exercise, these nutrients may 'protect and maintain' health and performance during periods of heightened stress[19]. Speculatively, deficiencies may have a negative effect of the immune system and result in increased risk of infections, in particular upper respiratory tract infections.

Additional supplementation may be provided in the form of probiotics and Vitamin D tablets. Probiotics containing the Lactobacillus strain have been associated with a significant reduction in illness incidence and duration in highly trained athletes[20]. Likewise, Vitamin D deficiency is highly prevalent in Qatari athletes; recent research shows that a low Vitamin D status may be an important determinant of upper respiratory tract infections risk in endurance athletes21. Therefore, since there is no evidence to suggest that supplementation is adverse for an athlete's health, both are recommended for use with athletes in Qatar as there is 'nothing to lose' in such cases.

Conversely, disproportionate vitamin supplementation is not necessarily better. Taking excessive antioxidants may impair adaptation to training, due to increased free radicals or reactive oxygen species. Currently, no impairment in elite athletes has been demonstrated, but it is considered that excess antioxidants may suppress release of the stress hormone cortisol, resulting in suppressed immunity, although further research is required. Except for any players with a severe deficiencies, such as iron (serum ferritin) or calcium, the majority of vitamins and minerals should come from a balanced diet containing a variety of fruits and vegetables.

## THE CONTROVERSY OF SUPPLEMENTATION WITH READY-MADE PRODUCTS

Supplements are appealing; they are 'sporty' and athletes have sponsorship deals with supplement companies, protein powders and sports drinks alike. Supplements are also convenient, ready to drink and are significantly less-time consuming than preparing a meal with 'real food'. Evidence is in abundance demonstrating the effectiveness of protein, CHO and creatine supplements as ergogenic aids and their capacity to improve body composition. Many athletes believe that supplements are the only way to acquire the desired nutritional intake; this is in spite of the potential for supplement contamination and a positive drug test according to the WADA code. However, we have managed to convince many Qatari athletes that low-fat flavoured milk, containing macronutrients similar to protein or recovery powders, is a viable replacement option. Milk contains approximately 87% water, 9.6% CHO, 1.5% fat and 3.6% protein (approximately 82% casein and 18% whey [serum] proteins), additionally, it is safe, tasty, cheap and widely available. Another consideration in athlete education regards excessive calorie consumption. Many athletes consider these products as a supplement and not as a replacement for an element of their global daily energy intake. This potential excessive intake is detrimental to the footballer, particularly those with pre-existing body weight issues.

Ultimately and most importantly, professional players are subject to drug testing. Any untested supplements could contain compounds or substances that are on the WADA prohibited list either intentionally or through contamination. Therefore, it is paramount that all supplements acquired by the athlete or the club/federation, are sourced from an accredited facility that conducted an accredited batch testing programme.

## SPECIAL CONSIDERATION TO THE QATARI DIET

Athletes living in Qatar may benefit from local food as it is rich in complex CHOs and protein, provided it is prepared in a low fat manner. Unfortunately, many younger Qatari athletes are consuming many of their meals outside of the family home, with a preference for fast foods, soft drinks, sweets and chocolates. This is complicated by the fact that many junior athletes are working and/or studying concurrently to competing in their sport.

The main role of Aspetar's sports nutritionists is to educate and teach athletes how to plan and prepare proper meals and snacks, avoiding under- or over-nutrition, that could negatively impact upon athletic

performance. Culturally, Qatari athletes will also not take recovery nutrition directly after training or competition, waiting until their evening meal which could be after 2 hours. We are not sure of the cultural reasons behind this, but we spend a large amount of time presenting the 'optimal window' for recovery nutrition. Furthermore, there are a few key traditional drinks that are not common in Europe that nutritionists should be aware of such as karak, a type of sweet tea. Traditionally, many Qatari athletes may drink red tea, which has been shown to inhibit iron absorption. Therefore, we advise the consumption of this tea outside of meal times, especially for those athletes with a low iron status.

## CONCLUSION

While post-exercise recovery nutrition strategies are well described, the regional variations presented here relating to climatic, social and cultural differences seen in Qatar present challenges which require variation from standard advice. By adhering to the straightforward and simple advice, athletes competing in Qatar can maximise their recovery potential through optimal nutrition. Clearly, education for all athletes, their families and their associated coaching staff is crucial for proper recovery nutrition. All parties need to be advised about the number of meals and snacks, timing and composition of said meals based upon the athletes training load. Finally, regardless of the availability of CHO and protein drinks and ready-made supplementation products, without a correct base diet, all attempts to improve performance will be wasted.

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*Richard Allison*

*Acting Lead Sports Dietician*

*Shaima Al Khaldi*

*Sports Dietician*

*Aspetar – Orthopaedic and Sports Medicine Hospital*

*Doha, Qatar*

*Contact: richard.allison@aspetar.com*