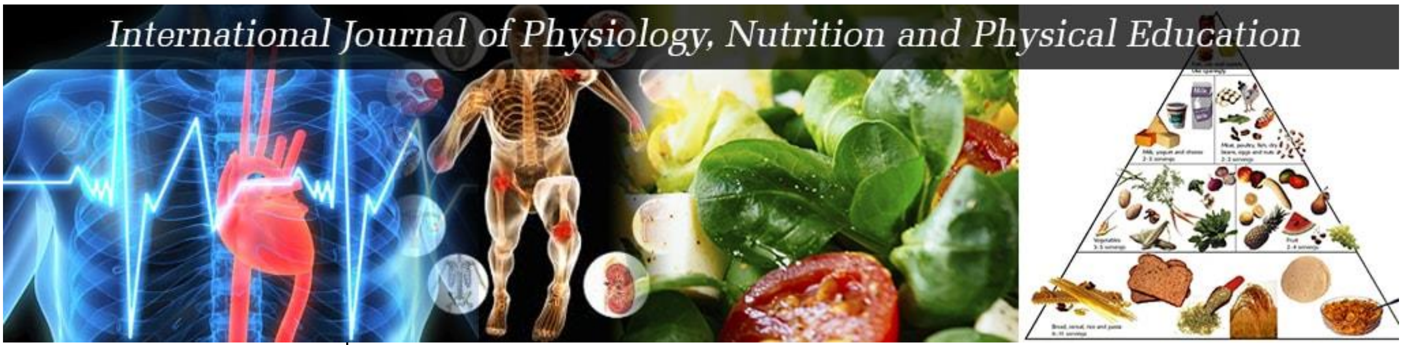

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A lack of nutritional and diet monitoring does not give to athletes the same chance of victory in competitive sports

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Abstract
A good nutrition plays an important role in physical activity and athletic performance. This study aims to show how poor nutritional and dietary monitoring can cause athletes to lose competitions. This review, through a collection of existing and documented information on athlete nutrition and dietetic will show how they impact positively or negatively on athlete performance and contribute to losing or winning competitions. National and international federations must take their responsibilities to offer a chance of victory to everyone during the various competitions, whether it is an individual or team competitive sport. This can only be done by requiring federations/teams to have specialists in sports nutrition and dietetics or consultants in this area in order to allow athletes to have a fair game, with the same chance of success.

Keywords: Athletes, nutrition and dietetic, performance, fair game

Introduction
Physical activity is defined as any bodily movement produced by skeletal muscles those results in energy expenditure (Carl *et al*., 1985) [1]. However, these energy expenditures are strongly correlated with food intake. Moreover everyone performs physical activity in order to sustain health and the amount is largely subject to personal choice and may vary considerably from person to person. Physical activity can be categorized in a variety of ways. A commonly used approach is to segment physical activity on the basis of the identifiable portions of daily life during which the activity occurs. The simplest categorization identifies the physical activity that occurs while sleeping, at work, and at leisure (Montoye, 1975) [3]. Whether it is a competitive sport or not, nutrition and dietetics become some factors of balance and sporting performance. This paper outlines the importance of athlete nutrition and dietetic in competitive sports and how it can favor the game to the detriment of athletes who are not well monitored nutritionally and dietetically. This review show how nutrition and dietetic can impact positively or negatively on athlete performance and contribute to losing or winning competitions.

Sport and Performance
Sports performance expresses the maximum possibilities of an individual or a team in a discipline at a given moment in its development. Sports performance can be expressed in the form of a ranking, a distance, a time or a result, most often during a competition. Performance depends above all on many factors such as physical capacity, age, sex, genetic environment, training, talent, physiological and psychological state and especially the nutritional status of the athlete. That is why having a good nutrition plays an important role in athletic performance (Altavilla and Raiola, 2018) [6]. For high-level athletes, it is advisable to be monitored by an athlete nutrition and dietetics professional in order to best meet their needs and thus optimize their performance. A balanced diet affects multiple parameters and promotes improved performance, maintenance of body weight, better recovery, an increase in muscle mass, a reduction in injuries, etc.

Athlete's diet must be considered from two aspects: Qualitative and quantitative. From a qualifying point of view, this involves optimizing the carbohydrates, lipids and proteins; and the supply of water, vitamins and mineral. quantitatively, it is necessary to ensure the daily energy intake, which can range from 2,000 to 6,000 K calories / day and which varies depending on the nature of the activity, age, sex, climatic conditions, etc.

Nutritional strategy for optimal performance in athletes

Sports nutrition is a complex, less vulgar field. It involves the application of nutrition principles to improve sports performance. Sports nutrition is applied on athlete's feeding strategies to promote good health and adaption to training, to recover quickly after each exercise training session, and to perform optimally during competition. Therefore, sports nutrition is the practical science of hydrating (adequate water intake) and fueling (adequate food intake) before, during, and after exercise. Executed properly, sports nutrition can help promote optimal training and performance, but when done incorrectly or ignored, it can derail training and hamper performance (Oladipo, 2008) [7]. There is no doubt that what an athlete eats and drinks can affect health, body weight and composition, substrate availability during exercise, recovery time after exercise, and ultimately, exercise performance. As the research and interest in sport nutrition has increased, so has the sale of ergogenic aids, supplements, herbal preparations and diet aids, all aimed at improving sports performance (The American Dietetic Association and the Dietitians of Canada, 2000). The Nutritional Strategy for better sports performance is the basis of victory. This strategy includes good nutritional and dietary monitoring and good hydration of athletes. For competitive sports, this inevitably translates into a failure for poorly or less followed athletes. Indeed, so that practicing a sport remains a pleasure whatever its level, it is essential to take care of the athlete's diet and hydration. As for all individuals, athletes are recommended to eat a balanced and diversified diet, taking into account the specific needs generated by the sport practiced.

Let's take two scenarios A and B

Case A represents athletes who are well monitored nutritionally and dietetically by a professional or consultant in the field. This includes nutrition and hydration strategies in the pursuit of performance for assured victory. Nutritional strategies include macronutrient and micronutrient intakes both qualitatively and quantitatively. Macronutrient intakes include energy molecules, their quantities and the different periods of their administration. In fact, Athletes are no exception to the rules of balanced nutrition. On the contrary, they are even essential to ensure good sporting performance. A balanced diet is based on a wide variety of foods that covers all needs.

Macronutrient requirements for exercise

Macronutrients consist of the three nutrients that are required in large quantities in the diet: Carbohydrates, fats, and proteins. These nutrients provide the energy required to maintain the body's functions as well as uphold cellular structure and homeostasis. Whether in energy production or cellular structure, these nutrients play a vital role in athletic performance as well as the overall health of an individual. Carbohydrates are naturally occurring compounds that are composed of carbon, hydrogen, and oxygen. It should be noted that 1 Kg of carbohydrate produces a quantity of energy equal to 4 Kcal. As the length of the exercise increases, the source of this carbohydrate may shift from the muscle glycogen pool to circulating blood glucose, but in all circumstances, if blood glucose cannot be maintained, the intensity of the exercise performed will decrease (Coyle *et al*., 1986) [9]. Fats are specifically esters formed when fatty acids react with glycerol. Many other lipids exist and are significant in the diet. The lipids of greatest importance in the body and the diet are triglycerides, fatty acids, phospholipids, and cholesterol. Fats serve many functions in the body: They provide energy for tissues and organs, membrane makeup, nerve signal transmission, and vitamin transport as well as cushioning and insulation for internal organs. In addition, in endurance athletes they are a vital fuel source for skeletal muscle. It should be noted that 1Kg of lipid produces a quantity of energy equal to 9 Kcal. Proteins are nitrogen-containing compounds composed of dozens, hundreds, or thousands of amino acids. Amino acids are joined by peptide bonds, and several amino acids joined together become a polypeptide. Polypeptide chains then bond together and form various proteins. The human body is composed of 18% protein on average. Proteins provide structure to bodily tissues such as skeletal muscle, connective tissue, bone, and organs. Protein contributes to the energy pool at rest and during exercise, but in fed individuals it probably provides less than 5% of the energy expended (El-Khoury *et al*., 1997; Phillips *et al*., 1993) [10, 11]. As the duration of exercise increases, protein may contribute to the maintenance of blood glucose through gluconeogenesis in the liver. Recent studies have shown that ingesting protein during exercise improves muscle reconstruction and limits the destruction of muscle fibers.

Micronutrients

This is about vitamins and minerals. They are necessary for many metabolic processes in the body and are important in supporting growth and development. They play an important role in energy production, hemoglobin (Hb) synthesis, maintenance of bone health, adequate immune function, and the protection of body tissues from oxidative damage. Some researchers state that athletes require more vitamins and minerals than their sedentary counterparts, whereas other researchers do not report greater micronutrient requirements. The intensity, duration, and frequency of the sport/ workout and the overall energy and nutrient intakes of the individual all have an impact on whether or not micronutrients are required in greater amounts. Theoretically, exercise may increase or alter the need for vitamins and minerals in a number of ways. Exercise stresses many of the metabolic pathways in which these micronutrients are required, thus exercise training may result in muscle biochemical adaptations that increase micronutrient needs. Exercise may also increase the turnover of these micronutrients, thus increasing loss of micronutrients from the body. The sweating mechanism leads to a loss of sodium, chlorine, potassium, magnesium and iron, which are ions that are essential for the proper functioning of the body. Sodium helps improve the absorption of water and carbohydrates. These two factors help fight dehydration and improve the bioavailability of circulating carbohydrates. Vitamins play a very important role in exercise foods. Vitamin B1 and B6 are useful for the use of carbohydrates, vitamin C is a powerful antioxidant which limits the production of free radicals, and magnesium limits the appearance of cramps. Finally, higher intakes of micronutrients may be required to cover increased needs for the repair and maintenance of the lean tissue mass in athletes (National Research Council, 1989; Institute of Medicine, 1997; 1998) [12-14]. In general, the Cretan-inspired pyramid is a good basis for nutrition for athletes in terms of quality, quantity and diversity. The latter consists of 5 to 6 servings of fruits and vegetables, 4 portions of carbohydrates at a rate of 6 to 8 g/kg/day, three portions of dairy products; two portions of protein at a rate of 1.2 to 1.5 g/kg/day for endurance sports and 1.6 to 2 g/kg/day for strength sports, lipid at a rate of 1.3 to 1.5 g/kg/day composed of 25 to 30% saturated fatty acids; 60% monounsaturated fatty acids and 10 to 15%; polyunsaturated fatty; optimal hydration. However, it is noted that the adequacy of food intake with energy expenditure is a key factor in nutritional recovery. This is why phases such as the training diet, pre-exercise meal, during exercise, post exercise meal are recommended for better monitoring of the athletes.

Training diet

During the training, the athlete must adapt the volume of his plate to the volume of his physical activity. No restrictions. Promote the storage of energy reserves by opting for complex sugars, promote vitamin and mineral intake, favor lean meats and reduce fats. Recommendations for athletes' intakes of energy, macronutrients, vitamins, and minerals are presented in terms of milligram or gram amounts of nutrients (e.g., 6 to 10 g carbohydrate/kg body weight) and must be translated into consistent food choices with food preferences and training schedules of athletes (Rosenbloom, 2000) [15]. It should be noted that there is a fundamental difference between the diet of athletes and the general population. Athletes require more fluid to cover sweat losses and additional energy to fuel physical activity. It is appropriate for much of the additional energy to be supplied as carbohydrate. In some cases needs for other nutrients also increase (e.g., protein, B-complex vitamins).

Pre-exercise Meal

A large analysis of exercise lasting longer than one hour found that 54% of studies reported better performance when food was consumed before exercise. The meal or snack consumed before competition or an intense workout should prepare athletes for the upcoming activity, and leave him or her neither hungry nor with undigested food in the stomach. For that, the athlete must consume at each meal one serving of raw or cooked vegetable; one serving of protein; one serving of starch; one tablespoon of rapeseed oil (seasoning). The athlete must have consumed at least 3 dairy products during the 3 meals and snack spread over the day; two fruits at least; he will have drunk regularly. Athletes must respect the classic interval of 3 hours between the last meal and the activity. She/he must limit foods high in fat or fiber to avoid digestive problems. About the waiting beverage before the competition, it is recommended to drink one hour before the competition a small sips of fruit juice diluted to 50% or fructose in order to maintain hydration level and blood sugar levels. However, Athlete should always ensure that they know what works best for themselves by experimenting with new foods and beverages during practice sessions and planning ahead to ensure they will have access to these foods at the appropriate time.

During Exercise

Water is essential. The choice of exercise drink to use is essential to sports performance. The latter helps fight against dehydration, providing essential ions and energy through carbohydrates. All of these conditions make it possible to maintain an effort longer over time. However, these drinks must be well dosed in sodium and carbohydrates and have an osmolarity to guarantee rapid absorption while limiting gastric residence time. If the duration of the exercise is less than 1 hour, water is sufficient. Beyond an hour it is necessary to provide carbohydrates (40 to 60 g/liter of water). The hotter it is, the more the drink will have to be diluted and vice versa. For long duration exercises athlete will need to eat carbohydrates. Thus, providing exogenous carbohydrate under these conditions would help maintain blood glucose levels and improve performance. Accordingly, performance advantages in short-duration activities may not be apparent when exercise is done in the non-fasting state. For longer events, consuming 0.7 g carbohydrate/kg body weight per h (30 to 60 g per h) has been shown unequivocally to extend endurance performance (Coggan and Coyle, 1991) [16].

Post exercise meal

Post exercise meal corresponds to the recovery period and must begin ½ hour after the effort, it is fundamental and includes 3 phases: Rehydration: Drink 1.5 liters of water, corresponding to the volume lost during exercise. Carbohydrate reloading: Drink fruit juice, eat cereal bars, gingerbread, chocolate bars, etc. Protein replenishment to repair muscle damage caused by exercise and replenish reserves. The ideal is to combine fast proteins (such as whey proteins), more commonly known as "whey" for athletes, which are rapidly absorbed and rebuild the muscle within 2 hours follow consumption) and slow (egg proteins and milk caseins). However it depends on the length and intensity of the exercise session, and when the next intense workout will occur. Nevertheless, consuming a meal or snack in close proximity to the end of exercise may be important for athletes to meet daily carbohydrate and energy goals. The type of carbohydrate consumed can also affect post exercise glycogen synthesis. When comparing simple sugars, glucose and sucrose appear equally effective when consumed at a rate of 1.5 g/kg body weight for 2 h; fructose alone is less effective (Blom *et al*., 1987) [18].

Hydration

Water represents 60% of the total body mass, divided into two compartments: Extracellular water represents 20% of body mass, therefore 16% of interstitial fluids and 4% non-cellular fraction of blood; intracellular water represents 40% of body mass. In the physiological state in adults, the balance of water entry and exit is zero. Its total volume therefore remains constant. There are three sources of entry for water: 1000 mL corresponds to the water present in food (exogenous water); 1300 mL for drinking water (exogenous water) and 300 mL water linked to glycogen, obtained by oxidation reactions during nutrient metabolism (endogenous water). Exogenous water is controlled by the sensation of thirst; endogenous water can be significantly increased during muscular exercise. During physical exercise athlete will need to drink more because most of the energy is dissipated in the form of heat (75 to 80%), 1 g of water will allow 2.5 kJ to be evacuated. Accordingly, athletes should attempt to remain well-hydrated before and during exercise. (Barr *et al*., 1991; Montain and Coyle, 1992; Walsh *et al*., 1994) [19, 20, 9, 22]. The primary goal of rehydration is to replace both the fluid and the electrolytes lost from the body during exercise. When the time for rehydration is short (< 12h) and substantial dehydration has occurred, rehydration strategies above and beyond the consumption of regular meals and fluid is merited (Sawka *et al*., 2007) [23]. Following exercise and/or heat-induced dehydration, full rehydration can allow for enhanced heat tolerance and recovery of heart rate and core temperature as well as reduced physiological strain during subsequent exercise bouts (Bergeron *et al*., 2009) [24].

Fluid and Electrolyte

Before exercise

Starting an exercise session well hydrated is important not only for exercise performance but also for health by preventing an unsafe rise in body temperature. The goal is to drink enough fluids to minimize dehydration while not overdrinking. Recommendations for fluid intake before exercise vary slightly, but in general, it is suggested drinking 400 to 600 mL of fluid 2-3 h before exercise before exercise (American College of Sports Medicine, 1996) [8].

During exercise

Exercise performance can be compromised by a body water deficit. A practical recommendation is to drink small amounts of fluid (150-300 mL) every 15 to 20 minutes of exercise, varying the volume depending on sweating rate. During exercise lasting less than 90 minutes, water alone is sufficient for fluid replacement. During prolonged exercise lasting longer than 90 minutes, commercially available carbohydrate electrolyte beverages should be considered to provide an exogenous carbohydrate source to sustain carbohydrate oxidation and endurance performance. Electrolyte supplementation is generally not necessary because dietary intake is adequate to offset electrolytes lost in sweat and urine. Although, including sodium in amounts between 0.5 and 0.7 g.L-1 is recommended during exercise lasting longer than 1h because it may enhance palatability and the drive to drink, therefore increasing the amount of fluid consumed (American College of Sports Medicine, 1996; Vrijens and Rehrer, 1999) [8, 25].

After exercise

After exercise, the goal is to fully replace any fluid and electrolyte deficit. Consuming sodium during the recovery period will help retain ingested fluids and help stimulate thirst. Drinks containing sodium such as sports beverages may be helpful, but many foods can supply the needed electrolytes. Consuming up to 150% of the weight lost during an exercise session may be necessary to cover losses in sweat plus obligatory urine production (Shirreffs *et al*., 1996) [26]. Sodium also helps the rehydration process by maintaining plasma osmolality and thereby the desire to drink. In other circumstances, athletes may use supplements and ergogenic aids.

Supplements and ergogenic aids

These are substance which improves or is likely to improve muscular work and, therefore, sports performance. Its prevalence is estimated at around 2% among adolescents and is over 60% in some sports such as power lifting. There are several, however, not all substances are authorized by the World Anti-Doping Agency. Anabolic steroids, hormone modulators and diuretics are part of the exhaustive list of prohibited substances.

Case B represents athletes who are not monitored nutritionally and dietetically by a professional or consultant in the field. The fundamental problem here is to show how the performance of athletes who are not monitored nutritionally and dietetically by a professional or consultant in the field is impaired and gives them no chance of winning a competition.

Lack energy requirements

Meeting energy needs is the first nutrition priority for athletes. Achieving energy balance is essential for the maintenance of lean tissue mass, immune and reproductive function, and optimum athletic performance. Energy balance is defined as a state when energy intake (the sum of energy from food, fluids, and supplement products) equals energy expenditure (the sum of energy expended as basal metabolism, the thermic effect of food, and any voluntary physical activity) (Swinburn and Ravussin, 1993) [28]. Inadequate energy intake relative to energy expenditure compromises performance and the benefits associated with training.

Dehydatation

Dehydration is a normal physiological process. In athletes, it is accelerated during training and competitions. Water and minerals lost through sweat must be immediately rewarded to avoid stopping exercise and avoid the risk of heat injuries. Disturbances of fluid and electrolyte balance that can occur in athletes include dehydration, hypohydration, and hyponatremia. In their most severe forms, all can be life threatening. Hyponatremia (low blood-sodium concentrations of less than 130 mmol.L-1) can develop either as a result of prolonged, heavy sweating with failure to replace sodium, or when excess water is retained in the body (Barr and Costill, 1989) [19].

Losses during exercise

Athletes dissipate the metabolic heat produced during physical activity by radiation, conduction, convection, and by vaporization of water. In hot, dry environments, evaporation accounts for more than 80% of metabolic heat loss. Sweat rates will vary depending on variables such as body size, exercise intensity, ambient temperature, humidity, and acclimation, but can exceed 1.8 kg (approximately 1,800 mL) per h (American College of Sports Medicine, 1996) [8].

Effect on physical performance

When fluid intake during exercise is not sufficient, the resultant hypohydration can have a detrimental impact on physical performance as suggested by decreases in maximal aerobic power, exercise time to exhaustion, and completion time on fixed work time-trials (Bergeron, 2009) [34]. When rehydration following physical exertion is not achieved, impairments in physical performance can carry over into subsequent bouts of exercise (Burge *et al*., 1993) [35].

Controversy over unfair competitions

Taking these scenarios A and B, we see that nutritional and dietary monitoring improves the performance of athletes and therefore places them in a good position to win a competition. Furthermore, athletes who do not have nutritional and diet monitoring lose performance and winning a competition for them can only be a matter of chance. However, when the federations allow the two teams to sympathize, one, followed nutritionally and dietetically, and the other not followed, it is necessarily likely that the game is not fair and hence rigged. Therefore, the nutrition and dietetics of athletes is a fundamental element that national and international authorities must monitor in order to make competitions fair.

Roles of consultant in nutrition and dietetic of sport

Nutritionists/dieticians can act as consultants or be recruited within sports federations in order to consult and monitor athletes. To do this, they must educate and provide information on the importance of a balanced diet among athletes; on energy and water needs; educate them about any vitamin/mineral or herbal supplements, ergogenic aids, or performance-enhancing medications an athlete wishes to use.

Conclusion

Through the different analyses, a clear observation emerges. Nutrition and dietetics are increasingly recognized as a key element of sports performance. Executed properly, sports nutrition and dietetic help promote optimal training and performance. Furthermore, if two teams A and B or two athletes are competing and one opposing side is well-monitored nutritionally and dietetically to the detriment of the other, we say that it is a rigged or biased competition in advance. This is a sporting injustice. For that, the different national and international federations must impose one or more Nutrition and dietetic sports professionals within each sports federation or team for better nutritional and dietary monitoring of athletes in order to make the competitions fair and that the athletes have the same chance of winning the competition. The presidents of different clubs must recruit Nutrition and dietetic sports professionals within their clubs for a good nutritional monitoring in order to improve the performance of their athletes and give them the same chance to win competitions.

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