



IMPORTANCE OF SPORTS DRINKS AS A PERFORMANCE PREREQUISITES

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ABSTRACT

Optimal hydration is an essential consideration for athletic performance and it involves activities before, during and after exercise. Hence, adequate hydration not only provides benefits for health but also facilitate to maintain athletic performance. Therefore, the objective of the present study is to evaluate the importance of sports drinks as a performance prerequisites. The central aim of sports drinks utilization differ according to the mode of exercise regime but from a hydration point of view it depends upon rapid fluid absorption, reduction of physiological stress and faster recovery after exercise. So, proper intake of different essential macro and micro nutrients will help our body to hydrate. Sports drinks is a such a product which contain almost all the things which we lost during sports performance. Similarly, dehydration is a condition which cause negative impact on sports performance. The performance of the athlete is very much depends upon their hydration point of view, which may lead to cause both psychological as well as physiological illness. During activity the major fluid loss occurs through sweat. Thus it causes increment of heart rate, body temperature and also reduces the fluid absorption rate, making out body resistive against the minimum demand of work. All these problems can be overcome with the help of isotonic sports drinks. It helps replenish the lost fluid and also provide essential electrolytes and carbohydrates to the athletes which ultimately helped them to execute better performance output.

Keywords: Hydration, Sports Drinks, Sports Performance.

Introduction

The meaning of sports drinks vary person to person. Mainly it is utilized during sports activity or exercise. It is also

consumed as pre or post workout drink. If we go by the definition of sports drinks then it states that, a substance which is made up of water and other essential micro nutrients to help our body to recover from stress

situation and fulfill the need of bodily demand. But now a day's sports drinks are made of with different combinations of nutrients so diverse sports drinks are available in the market. Therefore intake of sports drinks helps us to maintain our intra cellular and extracellular water balance (Shirreffs, 2009).

Brief history of Sports Drinks

Around the globe, there were various types of historical data related with the invention of sports drinks. It was stated by United States that the first sports drink named as Bengal Punch, was given to athletes at Louisiana State University in the year 1958.

It was also evident from 1965 chronicle that the University of Florida Gator's assistant football coach and a team of university physicians recognized that their athletes were affected by the heat. After that an investigation was carried on regarding energy expenditure and then realized by the team of physicians that the fluid which was lost during the practice was not totally recovered. The electrolytes and carbohydrates were the major ingredient which were lost as fluid during exercises. Since then Gatorade, the sports drink was emerged as a most recognizable sports drink in that decade. .

In the year 1927 the multi-billion dollar industry launched sports drink 'Glucozade' (otherwise known as 'Lucozade'). It was one of the first sports drinks which were arrived in the field of sports and nutrition. The thing was designed by chemist William Owen. According to

him it was digestible energy fluid and helps to deliver quick relief from common illness. It was simple citrus flavoured sugar water. In the year 1938 the Beecham Company acquired Lucozade. After a year later, it which was finally merged with Smith Kline company to produce the same drink with few modifications.

Functions of Sports Beverages

In a nut cell a sports drinks is a composed liquid which is associated with sports or exercise activities for the enhancement of our body recovery mechanism during or after exercise will be termed as sports drinks. The main aim of these beverages is to fuel our essential organs which are working rigorously during activity and also to supply carbohydrate, essential minerals to boost up our overall recovery process during exercise. A functional sports drink helps our body to stay hydrated and also to improve athletic performance by preventing specific health hazards (Stachenfeld, 2014).

Now a day the sports drinks which we are using those are nothing but electrolytes which is used by our muscles as fuel whenever they get fatigued. The primary component of sports beverages are water, salts and glucose substances which were further modified with the secondary materials like vitamins, minerals, choline and other different micro nutrient elements. Therefore these sports beverages are processed to encourage our energy systems, mental focus, immune system and reduces joint pain (Hoffman *et al.*, 2017). In order to get the benefit of sports beverages it needs to be drink before the activity. These will be

processed in the proximal part of the small intestine and around 50%-60% will be used as fuel for the activity.

Sport drinks can be found in different forms like hypertonic and isotonic or hypotonic. Most of the sport drinks likely to be isotonic in nature which suggests that they are the concentrated forms of salts and carbohydrates. It is generally found in the human body but most of the sport drinks are having 6%-9% carbohydrate (weight/volume) content and sodium. From the sports point of view when we exercise at certain level our body use to drain waste product through sweat. With this process our body also releases essential electrolytes. This deficit can only be fulfilled by consumption of water and its modified liquid namely sport beverages (Evans *et al.*, 2017).

Sports Drinks and Fluid Balance

The most common procedure to stay hydrated is the balance between the intake and losses of water. The intake of fluid generally comes from fluids as well as solid foods (Evans *et al.*, 2017). If we consider food then the major sources of fluids are fruits and vegetables. These fruits and vegetables are undergone with oxidation process. Then it is possible to create fluid from these substances. Our body usually drains waste products via water and through the urinary system, sweat glands, gastrointestinal tract and respiratory pathway (Villiger *et al.*, 2018).

The different elements of fluid balance mechanism are managed by the homeostatic method. It constantly maintains our intra

cellular and extra cellular water balance. If it senses the water deficit then it automatically increases the ionic concentration of the extra cellular cubicle. As a result our cells get affected and then it shrinks. There are different indicators to measure our hydration status, the most common of them is weight change. The other pathological changes like plasma and urine osmolarity also help us to identify the hydration status (Bak *et al.*, 2017).

Importance of Sports Drinks

Whenever an athlete is getting ready for a particular event in an environment which is more likely to be hot and humid then maintenance of hydration is very challenging. It is difficult for the athletes to adjust with these extreme climatic situations. In order to acclimatize themselves then they need to have at least 8 to 10 exposures (30 to 45 minutes each). The hot air or climate may cause the heat stroke, headache, nausea etc. These may happen simply because of the amount of exposure they got from the sun. The large are of the body mass is constantly exposed to the environment for significant heat gain. One of the main mechanisms i.e. sweating is constantly help our body to remove external heat via evaporation. Apart from that constant sweating can lead to greater risk of dehydration (Pediatrics, 2000).

More precisely if someone is getting constant heat revelation more than an hour then they possibly can lose essential micros such as sodium, potassium, chloride etc. and then these deficits cannot be fulfilled by normal water (Ahmad, 2008). Under this circumstances sports drinks showed greater

role to decrease fatigue and also help to replenish electrolyte lost through sweat (Story & Klein, 2012). From the above discussion we may say that whenever an athlete is engaging themselves for a prolonged activity or physical exercises then they should consume sport drinks instead of plain water to regain their strength and to focus more on the activity (Story & Klein, 2012). The carbohydrate which is an essential component of sports drinks helps to improve muscle glycogen store and prevent breakdown of muscle protein. It is helpful for the active muscle to produce constant effort during activity. Lastly the carbohydrate rich sports drinks facilitate to maintain nutrients balance in proper ratio.

Fluid Electrolytes for Health and Performance

Two of the most key elements of human life are oxygen and water. From the physiological point of view approximately 65% of our human body is made up of water and it is contained in various tissues, bones and blood. Mainly there are two compartments of water exists in the body, firstly the intra cellular (approximately 65% within the cell) and secondly extracellular (approximately 35% in the cells). When electrolytes dissolve in the water then it ionizes (i.e. acquires a positively or negatively charged) in to electrons. These electrolytes are made up of sodium, potassium and magnesium. This will help to maintain our bodily stability of the internal systems and it is crucial form the hydration point of view (Rodriguez *et al.*, 2009).

Fluid is also used as a lubricant, insulator, shock absorber and transporter of

nutrients and waste products. For instance a new born body consists of 75% fluid while a healthy adult's body is composed of 60% of fluid. During vigorous activity our body eliminate extensive amount of fluid. This eliminated fluid needs to replenish through the consumption of electrolytes in order to maintain homeostasis. Homeostasis must exist for the cell to function properly. There are variety of method are used by our body namely diffusion, active transport, filtration and osmosis. The fluid in each compartment has to be stable or be maintained in specific limits because deviation outside these limits create a fluid imbalance and can result in serious or life threatening consequences (Nuccio *et al.*, 2017).

Benefits of Sodium in Sports Drinks

Researches have shown that in order to restore the lost fluid, the sodium is one of the main ingredient which is used as rehydration solution. After exercise it is very important to bring back the lost fluid and maintain plasma volume by using sport drinks (Nose *et al.*, 1988). Sodium plays major role to retain fluid, maintain fluid balance in the cells, help transmit nerve impulses and assist our active working muscle to contract and relax. Other than sodium, potassium is also helpful to generate and maintain constant muscle contraction and nerve impulse. It is also prevent our blood from clotting and maintain blood pH level. Potassium act as store keeper in order to store carbohydrate in the muscles. It is the glucose which assists the absorption of water and electrolytes. The sugars can be stored as glycogen in the muscles and liver. During activity it is used

as energy and assists our muscles to recover quickly. Intake of high volume of sodium concentrated liquid helps to restoration of plasma volume (Wemple and Morocco, 1997).

Sodium based solution provide benefit to the athlete by promoting stabilization of plasma volume. It ultimately it limit our cardiovascular strain during exercise. So overall sodium and potassium is very useful element of sports drinks.

Benefits of Sugar in Sports Drinks

In the commercial sport drinks the different elements which are used as main carbohydrate resources for example sucrose, glucose, fructose and maltodextrins are designed to produce energy. Thus it is helpful for our body to absorb this simple carbohydrate content during exercises. But there are some of the carbohydrate elements which are complex in nature and do not provide quick energy to our body. However a study conducted by Sasaki *et al.*, (1987) has made an experiment between two sport drinks. One was made up of glucose and sucrose which was the two main carbohydrate ingredients in Gatorade and another drink was made up of glucose and fructose which was the two main carbohydrates present in all sport drinks. It was evident from the results that the glucose and sucrose drink tends to show better absorption rate then glucose and fructose drink.

It was seen that during intense endurance exercise our body loses substantial amount of water which sometimes lead to dehydration and reduction

of blood glucose level and it cause depletion of muscle and liver glycogen, and electrolytes in the body. So for the optimal performance this reduction has to be compensated with adequate amount of fluid and electrolytes. The electrolyte enriched sports beverages are useful for the endurance athletes because it will support them to maintain their performance level at humid climatic condition (Jeukendrup, 2004). The carbohydrates not only help to rebuild or energy system it also help as dietary energy substrates. It is very quick to digest than protein and fats. An electrolyte also promotes solute absorption in the gastrointestinal tract and helps to buffer endogenous acids (Mitchell *et al.*, 1989).

A 6% (w/v) glucose containing solution is effective for supporting our gastrointestinal emptying and performance during activity. If we consume 1 liter of sport drinks per hour then in 250 ml aliquots delivers 1 g/min of glucose and that will enhance our energy availability (Murray, 1998). A study conducted by Jentjens *et al.* (2004) has tried out combinations of hexoses (e.g. 2 glucose / fructose) drink. It was basically a drink which was made up of solute content above 6% by taking benefit of specific intestinal transporters and it will also help to uphold solute absorption rate (Kayano *et al.*, 1980). Another study (Scheepers *et al.*, 2004) was conducted to track the oxidation impact of isotopically prepared solute of a specific sport drinks which showed that the metabolite profile of the drink increases energy delivery system.

Effectiveness of Sports Drink

It was previously discussed that the athletes loses water and electrolytes, particularly sodium, potassium (small amount) and chloride during training, exercise and competitive sports. The electrolytes are very useful to perform our biological functions. Sodium and potassium helps to regulate our body water, muscle excitability, cellular permeability and also protein and CHO synthesis. Other than sodium and potassium, chloride plays a vital role as an indispensable component of gastric juice by maintaining osmotic pressure and acid-base balance of our body. Normally whenever we perform rigorous exercise regime we lost our body fluid as sweat. It is depends upon individuals and other different influencing factor such as rate of sweating, diet and acclimatization (Stachenfeld, 2014). As sweat is hypotonic in nature so there is a link between heavy sweat loss and muscle cramps. Due to sweating, we loss substantial amount of salts so the athletes those are more prone to muscle cramp must have sweating habits during exercise (Stofan *et al.*, 2005). But due to this reason if we consume more salts then it will create negative effect within the physiological systems of our body such as blood pressure, cardiovascular functions etc. This concept will help the dieticians for planning the high sodium drink for an individual those are prone to take salt frequently. It was noted that if the exercise routine is less than three hours then isotonic drink containing 0.5 to 0.7 gm/Lt sodium must be consumed and if the activity level sustain more than three hours then we can

consume 0.7-1 gm/Lt sodium (American College of Sports Medicine, 2007).

Sports Drinks and Athletes Performance

Sports beverages also known as ergogenic aid. All the elite athletes drink sport drinks to avoid dehydration, replenish their bodily electrolytes loss and also to boost their performances. Many athletes take it as carbohydrate loading before the competition (Fahlstrom *et al.*, 2006). From the health perspective it is better to consume because it provide carbohydrate which can be easily absorb by our body with due time (CNCSMF, 2011). There are numerous benefits of carbohydrate in sports. It enhances our bodily carbohydrate storage and will help to maintain our muscle protein stability. At the point of fatigue carbohydrate can delay it by supplying adequate amount of energy to the working muscle. It also put a placebo effect psychologically (Carter *et al.*, 2004; Chambers *et al.*, 2009).

It is undoubtedly important that optimal concentration of carbohydrate and salt is one of the major considerations of sports nutritionist as well as sports drinks manufacturers (Coombes & Hamilton, 2000). During exercise our body temperature raises due to sweating rate, plasma volume, and skin blood flow. It happens mainly for decrease of bodily water level (Ransone & Hughes, 2004). It was tested that sweat contains essential electrolytes such a potassium, chloride and sodium and losing sweat from dehydration point of view can equally reduces strength, power and performance output of an athlete (Ransone & Hughes, 2004). So, for

endurance athletes isotonic drink is more beneficial than hypotonic drink (Darrell & Will, 2010).

Research Findings

The performance level can be influenced by many factors. One of the major factor and also an emerging issue came to know as sport drinks or sports beverages. There are two of the most popular fluids namely Water and Gatorade are consumed for the hydration purpose of our body (Coso *et al.*, 2008). Our body needs these kind of supplements to regulate our cardiovascular functionality, body temperature and water balance within our body (Danielson *et al.*, 2006).

ATP is the main energy resource of our body. The carbohydrates which contain glucose is stored in our muscles to provide energy. This glucose were finally broken down into muscle cell and converted to ATP. Along with sugar content electrolytes also have essential micro nutrients that are very essential for our intensive exercise. Apart from that the sport drinks contain other elements which work as a performance boosting element for the players (Singh *et al.*, 2011). The practice sessions now a days is very dynamic in nature. So, rehydration between training sessions is very important factor for a performer (Singh *et al.*, 2011). It is very important to know when our body is suffering dehydration. There are few symptoms like nausea, headache, dizziness, weakness etc. which we can be important indicator of dehydration. Another most common and most tried method of dehydration identification is urine colour (Morris *et al.*, 2015). Some of the studied

like Singh *et al.*, (2011) showed that the specific sports drinks like Gatorade can easily help athletes to stay hydrated. Some of the previously conducted studies have also evaluated the useful influence of Gatorade and water in the sports arena.

The study made by Khanna & Manna (2005) showed a similar results by highlighting that the performance, stamina and overall health efficiency was developed when a group of athletes were supplemented with Gatorade compare with the normal drinking water. Before exhaustive exercises such supplementing helps show superior performance output of the selected athletes. It was also noted from the study of Smith (1992) that better hydration automatically develop osmotic gradient and improved muscle contraction.

Conclusion

From the above discussion it very much evident that hydration from sports point of view is very important factor. In order to perform best one must needed to be fit and healthy. So sport drinks play that important role by maintaining good body composition. There are different strategies can be applied to stay hydrated. One of the basic things is that consumption of adequate amount of water. But simple water can only maintain water balance of the body however in order to show strength, stamina, power and energy in the field then isotonic drink namely Gatorade is the best way. This is mostly needed for the endurance type of activities where muscles are working continuously.

The commercial sports beverages available in the market can produce energy, essential electrolytes, pre and post exercise hydration. It is known fact that if we store adequate amount of muscle glycogen then it will help to breakdown to produce ATP. This ATP then easily diminishes the onset of fatigue. Hence sport drinks or sport beverages play an important role in sports nutrition which basically fulfils the need of the athlete. As we know that each and every individual has his or her own dynamic physiological state so in order to full fill the requirements there are need of different electrolytic compositional drinks. Finally, importance of sport drinks cannot be ignored. It is one of the best possible ways for the athlete to delay fatigue and stay hydrated in the field.

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