

## Role of Cytomax Beverage among Elite Female Badminton Players in Iran

El rol de la bebida Cytomax en jugadoras de alto rendimiento de badminton en Irán

Sepideh Mehraein<sup>1</sup>, Kaveh Khabiri<sup>2</sup>, Mohammad Reza Pouria<sup>3</sup>, Arash Rashidi<sup>4</sup>, Majid Hajifaraji<sup>4</sup>, Aida Mehrad<sup>5\*</sup>

<sup>1</sup>Faculty of Educational Studies, Universiti Putra Malaysia (UPM), Malaysia.

<sup>2</sup>Faculty of Humanities, Islamic Azad University of Ashtian, Arak, Iran.

<sup>3</sup>President of Badminton Federation Islamic Republic, Iran.

<sup>4</sup>Faculty of Nutrition Sciences and Food Technology, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

<sup>5</sup>Faculty of Psychology, Universitat Autònoma de Barcelona (UAB), Spain.

E-mail: aida\_238@yahoo.com.

\*Corresponding author.

### Abstract

Nowadays, one of the main factors that plays a vital role in sports is beverages that have a great contribution on athletes' food style and nutrition. The present study analyzed sports beverages based on performance indicators of elite female badminton players in Iran. This study lasted eight weeks, supplying sport drinks and water to two different groups: one with Cytomax and one with water (79 participants). The data was obtained based on a 24-hour recall questionnaire in three different days every week. Additionally, skin folds brachial triceps index was used for body fat percent assessment. To measure peak of oxygen uptake (VO<sub>2</sub>max), the shuttle run submaximal test was applied. Additionally, to control the fluid intake, 150 ml of liquid for each 70 kg body weight every 15 minutes was recommended for each group; to control the blood volume changes related to plasma, the blood glucose, hematocrit, hemoglobin, sodium, and potassium were measured during three time periods of zero, 30 min and 90 min after the start. Finally, to measure performance, standardized tests measuring aerobic power, speed, flexibility, agility, muscular strength, and endurance indicators were used. The findings showed that supplying enough water, fluids, energy, carbohydrate, protein, and fat during exercising plays an imperative role in increasing the level of female badminton players' performance.

**Keywords:** Badminton; Cytomax; Elite Female Players; Iran; Sports Beverages.

### Resumen

Actualmente, se considera al consumo de las bebidas como un factor importante en la nutrición de los deportistas. El presente estudio analizó las bebidas deportivas, basándose en los indicadores de rendimiento de las deportistas iraníes de alto rendimiento. El estudio duró ocho semanas con 79 participantes divididos en dos grupos (uno con Cytomax y el otro control con consumo de agua). Se aplicó un cuestionario cada tercer día, además se utilizó el índice de tríceps braquial en pliegues cutáneos para evaluar el porcentaje de grasa en el cuerpo. Para medir la cantidad máxima de oxígeno (VO<sub>2</sub>max), se aplicó la prueba sub-máxima de la serie *Shuttle*. Para controlar el consumo de fluidos, en cada grupo se recomendó 150 ml por cada 70 kg de peso cada 15 min; con relación a la glucosa, para controlar el cambio del volumen en sangre en relación a la glucosa, hematocritos, hemoglobina, sodio y potasio se midieron durante tres periodos de cero, 30 min y 90 min después de empezar. Finalmente, para medir el rendimiento, se utilizaron pruebas estandarizadas que miden los indicadores de energía aeróbica, velocidad, flexibilidad, agilidad, fuerza muscular y resistencia. Los resultados muestran que el suministro de suficiente agua, fluidos, energía, carbohidratos, proteínas y grasa durante el deporte juega un rol imperativo en aumentar el rendimiento de las jugadoras de bádminton.

**Palabra clave:** Bádminton; Cytomax; mujeres deportistas de alto rendimiento; Irán; bebidas deportivas.

Recibido: 24 de marzo de 2017

Aceptado: 18 de septiembre de 2018

Publicado: 11 de abril de 2019

**Como citar:** Mehraein, S., Khabiri, K., Reza-Pouria, M., Rashidi, A., Hajifaraji, M., & Aida Mehrad (2019). Role of Cytomax Beverage among Elite Female Badminton Players in Iran. *Acta Universitaria* 29, e1897. doi: <http://doi.org/10.15174/au.2019.1897>

## Introduction

Diet planning is considered as the main factor in individuals' life, especially for athletes. Furthermore, apart from physical exercises, experts and sport trainers are more concerned about this fact (Bailey *et al.*, 2009). In recent years, producing and selling sports beverages have a brilliant movement; in addition, most companies advertise them remarkably. Consuming these beverages is very common among athletes; in this regard, companies have a great market in most sport clubs. In fact, athletes believed that sport beverages contain ergogenic substances that have a considerable contribution on their performance when exercising and competing (Zytnick, Park & Onufrak, 2015). However, energy beverages are different from sports beverages and are the cause of a high level performance in athletes. Moreover, the present study focused on the role of the sport beverage Cytomax and the control of food intake on elite female badminton players' performance.

## Role of Sport Beverage on Athletes' Performance

The issue of sport players and effective factors has been discussed for many years, and a lot of researchers emphasized on various factors such as the kind of nutrition, activity, and internal and external conditions. Sports beverages are considered as important factors for preventing dehydration and for improving the body by using carbohydrate and replacing the electrolytes that have been excreted through sweating. These carbohydrates are divided in two groups: beverages with high carbohydrate density (more than 10%) and sports beverages with low carbohydrate density (less than 10%). The low carbohydrate density has been used before and after competitions (Logan-Sprenger, Heigenhauser, Jones & Spriet, 2015). In the study, Coso, Estevez, Baquero & Mora-Rodriguez (2008) explained that dehydration is a cause of body temperature increase. In the same vein, Larson, DeWolfe, Story & Neumark-Sztainer (2014) examined the difference between sports beverages and energy beverages. In their study, one third of athletes has been using sport beverages at least once a week. The users group showed a higher level of activities; in addition, they drank more fruit juice, as opposed to unhealthy drinks. Peltier *et al.* (2013) have studied the impact of sport beverages before exercise on tennis players. In their study, the researchers did not consider the control of food planning; in this regard, they did not mention the factors of feeling thirsty and stomach fullness as a positive impact of sport beverage. On the other hand, Baker, Dougherty, Chow & Kenney (2007) reported that dehydration is not determined as a main factor of a low level performance and energy. In addition, Harris & Anderson (2009) explained that energy beverages do not have a beneficial impact on the increase of daily calories. In 2015, Laffaye, Phomsoupha & Dor stated that beverages do not play a considerable role on rising the performance of players during exercise. In addition, Urdampilleta *et al.* (2015) identified that dehydration in short time does not have a specific influence on muscles performance.

Samavati, Hojatti, Vojdani & Kashrafi (2013) examined 22 female athletes in Iran. The participants were divided in two groups (control and moderator). In this study it has been shown that consuming sports beverages with carbohydrate (6%) 20 min before the test has a noticeable role on athletes' performance. In the same study, Kazemi, Gaieny & Kordi (2000) focused on the effect of sport beverages on the performance of athletes. The researchers described that using sport beverages such as Fantom and Deragon had an ergogenic impact on the endurance performance of 12 girl students. Additionally, Gaieny, Sattari & Rezaie (2012) studied the small impact of two types of sports beverages on anaerobics of female student athletes at Tehran University, Iran. The results showed that using sports beverages do not play any role on decreasing female athletes' fatigue. Regarding the important role of athletes' nutrition and sport community requirements, there is a lack of studies in this area; furthermore, in the current study the researchers focused on them.

As well, in the present study the Cytomax beverage was considered with the indicators of aerobic power, speed, flexibility, agility, muscular strength, and endurance in elite female badminton players in Iran.

## Methodology

In the semi-experimental controlled study, 79 elite female badminton players between 20 and 26 years old were randomly selected. The participants have been divided into two groups as follows: the Cytomax group (CY) included 39 participants, and the water as a control group involved 40, respectively.

The measurements of this study included: 1) the 24 hours recall questionnaire completed in three different days every week (during an eight-week period), the macronutrient and energy intake were measured; 2) the skin folds brachial triceps index was used for body fat percent assessment; 3) to measure the VO<sub>2</sub>max, a shuttle run sub-maximal test was used; 4) to control the fluid intake in every of the two groups, 150 ml of liquid for each 70 kg body weight every 15 min was recommended; 5) to control the blood volume changes related to plasma blood glucose, hematocrit, hemoglobin, sodium and potassium were measured during three time periods of zero, 30 min start and 90 min after the start; 6) to provide the same pressure conditions in practice, the average pressure of exercises for each group over the eight weeks on the mileage scale was included using a pedometer, three indicators understand or feel the pressure; stomach fullness and thirst scale were assessed; 7) to measure performance, standardized tests measure the indicators: aerobic power, speed, flexibility, agility, muscular strength, and endurance. The Cytomax group used the Cytomax sports beverage. In the present study have been applied the descriptive statistics, the Gabriel's post hoc test, and the paired t-test to examine the differences within the groups via SPSS version 20 statistical software.

## Results

Table 1 shows that the mean of oxygen consumption between the two groups is significant ( $F(1, 77) = 7.80$ ,  $p < 0.01$ ). Based on the Gabriel's post hoc test, there is a meaningful difference between the Cytomax group and the control group ( $p < 0.05$ ). The findings in the paired t-test illustrated that there is a significant difference between the Cytomax group ( $p = 0.0001$ ) and the control group ( $p = 0.034$ ). In addition, the results show that there is no meaningful difference in the mean of changes of speed between both the Cytomax and control groups ( $F(1, 77) = 7.80$ ,  $p = 0.069$ ), nor were there differences between the Cytomax group ( $p = 0.16$ ) and the control group ( $p = 0.19$ ) in the paired-t test. On the other hand, the finding shows that there is no meaningful difference in the mean of changes of flexibility between the two groups ( $F(1, 77) = 2.11$ ,  $p = 0.073$ ). In the paired t-test, a difference between the Cytomax group ( $p = 0.04$ ) and the control group ( $p = 0.036$ ) can be observed. As well, table 1 displays that there is no significant difference in the mean of changes of agility between both groups ( $F(1, 77) = 3.18$ ,  $p = 0.13$ ). Besides, in the paired t-test a difference between the Cytomax group ( $p = 0.021$ ) and the control group ( $p = 0.035$ ) can be observed. Likewise, the mean of changes of aerobic power is not meaningful for either group ( $F(1, 77) = 9.08$ ,  $p = 0.062$ ). Further, in the paired t-test there is a difference between the Cytomax group ( $p = 0.021$ ) and the control group ( $p = 0.035$ ). The results in table 1 released that the mean of changes of muscular strength is not significant between the two groups ( $F(1, 77) = 3.02$ ,  $p = 0.12$ ). In the paired t-test there is a difference between the Cytomax group ( $p = 0.026$ ) and the control group ( $p = 0.018$ ). The mean of changes of upper limb muscle endurance is not significant between the groups Cytomax and control ( $F(1, 77) = 4.66$ ,  $p = 0.059$ ). In the paired t-test, there is a difference between the Cytomax group ( $p = 0.043$ ) and the control group ( $p = 0.031$ ). In addition, the mean of changes of abdominal muscle endurance is not significant between both groups ( $F(1, 77) = 5.29$ ,  $p = 0.062$ ). In the paired t-test, there is a difference between the Cytomax group ( $p = 0.033$ ) and the control group ( $p = 0.038$ ).

**Table 1.** Changes between group and among group of indicators (CY = 39, Co = 40)

Indicators	SD		F	p	t	p
	Pretest	Past test				
Oxygen consumption	(CY) 42.1±5.5 (CO) 43.1±1.9	47.1±2.8 45.2±4.3	7.80	0.022	2.49** 3.02*	0.0001 0.034
Speed	(CY) 0.0±93.03 (CO) 0.0±92.02	0.0±95.04 0.0±93.03	2.18	0.069	1.89 1.30	0.16 0.19
Flexibility	(CY) 7±173 (CO) 6±174	8±177 7±179	5.09	0.073	2.55* 3.01*	0.041 0.036
Agility	(CY) 11.0±9.3 (CO) 12.0±2.4	10.0±2.4 10.7±05	3.18	0.13	1.23* 2.03*	0.021 0.035
Aerobic power	(CY) 54.4±3.7 (CO) 59.4±2.2	61.5±0.6 63.6±2.3	9.08	0.062	-8.12* -5.33*	0.025 0.029
Muscular strength	(CY) 37.3±1.2 (CO) 38.3±2.6	38.2±2.9 38.4±9.1	3.02	0.12	-2.15* -2.97*	0.026 0.018
Upper limb muscle endurance	(CY) 6±28 (CO) 3±27	7±33 4±31	4.66	0.059	2.09* 1.91*	0.043 0.031
Abdominal muscle endurance	(CY) 7±54 (CO) 8±55	8±58 6±58	5.29	0.061	-2.18* -2.70*	0.033 0.038

Note. = \*  $p < 0.05$ . \*\*  $p < 0.01$ . CY = Cytomax, Co = Control. df = 77  
Source: Author's own elaboration

## Discussion

Regarding the findings of the study and the meaningful role of beverages in athletes' sport life, it can be said that the changes of aerobics with the indicator of oxygen consumption in the Cytomax group (pretest and past test) is significant. Additionally, in the Gabriel test, there is a meaningful deference between the Cytomax group and the control group. These results illustrate that water, as a main beverage, plays a considerable role on high level performance in sports. On the other hand, the mean of speed in both groups is not significant. The mean of flexibility, likewise, is not meaningful in the Cytomax and control groups. Also, this result was the same for the mean of agility. In the muscular strength indicator, a significant difference between the Cytomax group and the control group has been observed. Similarly, there is a significant difference between the Cytomax group and the control group in the mean of muscle endurance.

These results are in parallel with studies by Coso *et al.* (2008); Kazemi *et al.* (2000); Gaieny *et al.* (2012); Larson *et al.* (2014); Samavati *et al.* (2013); Zytneck *et al.* (2015). Conversely, the findings do not agree with the researches by Baker *et al.* (2007); Harris & Anderson (2009); Laffaye *et al.* (2015); Peltier *et al.* (2013); Urdampilleta *et al.* (2015).

## Conclusion

According to the findings, drinking adequate water and liquids supply during exercise as well as obtaining energy and nutrition is needed. These factors should be controlled and supported via trainers and the sport federation in order to receive acceptable results on athletes' performance.

Some limitations to make improved information on how future studies can be advanced and extended need to be well-thought-out. This study only focused on female athletes that play badminton professionally; in this case, the results cannot cover all types of athletes (female and male in different types: professional, semiprofessional, and nonprofessional). Additionally, the research only concentrated on elite badminton players that have been selected by the federation; therefore, it may not be considered as a representative sample of all badminton players.

## Reference

- Bailey, S. J., Winyard, P., Vanhatalo, A., Blackwell, J. R., Dimenna, F. J., Wilkerson, D. P., Tarr, J., Benjamin, N., & Jones, A. M. (2009). Dietary nitrate supplementation reduces the O<sub>2</sub> cost of low-intensity exercise and enhances tolerance to high-intensity exercise in humans. *Journal of Applied Physiology*, 107(4), 1144 – 1155. doi: <https://doi.org/10.1152/jappphysiol.00722.2009>
- Baker, L. B., Dougherty, K. A., Chow, M., & Kenney, W. L. (2007). Progressive dehydration causes a progressive decline in basketball skill performance. *Medicine and Science in Sports Exercise*, 39(7), 1114–1123. doi: <https://doi.org/10.1249/mss.0b013e3180574b02>
- Coso, J. D., Estevez, E., Baquero, R. A., & Mora-Rodriguez, R. (2008). Anaerobic performance when rehydrating with water or commercially available sport drinks during prolonged exercise in the heat. *Applied Physiology, Nutrition, and Metabolism*, 33(2), 290–298. doi: <https://doi.org/10.1139/H07-188>
- Gaieny, A., Sattari Fard, S., & Rezaie, V. (2012). Short-term effects of two energy drinks on anaerobic power athlete female students. *Journal of Applied Research in Sport Management and Life Sciences*, 1(1), 69-74.
- Harris, S. S., & Anderson, S. J. (Eds.). (2009). *Care of the Young Athlete*. United States of America: American Academy of Pediatrics Council on Sports Medicine and American Academy of orthopaedic surgeons. <https://www.aap.org/en-us/pubserv/coya/Pages/default.aspx>
- Kazemi, F., Gaieny, A., & Kordi, M. R. (2000). The effects of energy drinks on some cardiovascular parameters female student-athlete. *Journal of Sport Biosciences*, 7, 5-17.
- Laffaye, G., Phomsoupha, M., & Dor, F. (2015). Changes in the game characteristics of a badminton match: a longitudinal study through the Olympic game finals analysis in men's singles. *Journal of Sports Science & Medicine*, 14(3), 584-90.
- Larson, N., DeWolfe, J., Story, M., & Neumark-Sztainer, D. (2014). Adolescent consumption of sports and energy drinks: Linkages to higher physical activity, unhealthy beverage patterns, cigarette smoking, and screen media use. *Journal of Nutrition Education and Behavior*, 46(3), 181-187. doi: <https://doi.org/10.1016/j.jneb.2014.02.008>
- Logan-Sprenger, H. M., Heigenhauser, G. J. F., Jones, G. L., & Spriet, L. L. (2015). The effect of dehydration on muscle metabolism and time trial performance during prolonged cycling in males. *Physiological Reports*, 3(8), e12483. doi: <https://doi.org/10.14814/phy2.12483>
- Peltier, S. L., Leprêtre, P. M., Metz, L., Ennequin, G., Aubineau, N., Lescuyer, J. F., Duclos, M., Brink, T., & Sirvent, P. (2013). Effects of pre-exercise, endurance, and recovery designer sports drinks on performance during tennis tournament simulation. *The Journal of Strength and Conditional Research*, 27(11), 3076-3083. doi: <https://doi.org/10.1519/JSC.0b013e31828a474>

- Samavati Sharif, M. A., Hojatti, S., Vojdani, S., & Kashrafi Fard, S. (2013). The effect of menstrual cycle and 6% Carbohydrate beverage consumption maximal physical performance of active women. *Scientific Journal of Hamadan University of Medical Sciences and Health Services*, 4(20).
- Urdampilleta, A., Gómez-Zorita, S., Soriano, J. M., Martínez-Sanz, J. M., Medina, S., & Gil-Izquierdo, A. (2015). Hydration Chemical ingredients in sport drinks: food safety in the European context. *Nutrición Hospitalaria*, 1(5), 1889-1899. doi: <https://doi.org/10.3305/nh.2015.31.5.7867>
- Zytnick, D., Park, S., & Onufrak S. J. (2016). Child and caregiver attitudes about sports drinks and weekly sports drink intake among U.S. youth., *American Journal of Health Promotion*, 30(3), e110-9. doi: <https://doi.org/10.4278/ajhp.140103-QUAN-8>