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A Study Of The Impact Of Some Sporting Drinks On Some Vital Signs In Athletes.

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Abstract

Background: Over the past 15 years, many scientific papers have extensively reviewed the effects of exercise-induced body weight loss on endurance performance and physiological functions. The general and common message conveyed by those papers is that exercise-induced body weight loss significantly impairs endurance performance. For instance, from 1996 to 2006, the American College of Sports Medicine's Position Stand on Exercise and Fluid Replacement recommended that "during exercise athletes should consume fluids at a rate sufficient to replace the water lost through sweating or consume the maximum amount that can be tolerated." In their 2007 update of this position stand, the American College of Sports Medicine slightly altered their message and this time proposed that "dehydration >2% of body weight degrades aerobic exercise performance in temperate-warm-hot environments and that greater levels of dehydration will further degrade aerobic exercise performance."**(Goulet 2012)(Shirreffs 2009)**

The main aims of sports drink consumption do vary according to the exercise situation, but, from a hydration point of view, are likely to be one or more of the following: to speed rehydration, to stimulate rapid fluid absorption, to reduce the physiological stress of exercise and to promote recovery after exercise.

Objective: The present study investigated the impact of some sporting drinks on some vital signs in athletes.

Design: Cross-sectional study, 27athlete child and adolescent from both sexes joined the design, all childrenand adolescent were interviewed for food intake , anthropometric measurements and body composition were taken. A random of participants were chosen to follow a sports drinks routine for 3 months by divided into three group each group drinks a type of sports drink (1) water drink group (2) natural drink group (3) artificial drink group . Tests and measurements was taken before and after intervention .Data for this study was accomplished in the period from April 2015 to June 2015.

Results: - Results indicated that there were positive relationship between anthropometric measurements,body compositions and sports drinks. There was high significant difference between the water and natural drink groups and athletesheight before and after intervention, and significant difference between the artificial drink group and athletes weight before and after intervention. There waspositiverelationshipwitha significant difference between the artificial drink group and fat percentage before and after intervention, Bones weight was significant at natural drink group and at the artificial drink group.

Keywords: Sports drink - Vital signs - Athlete - performance tests.

Asmeanwhile water percentage was not significant difference with sport drink groups.

There were highly significant deference between diastolic and systolic blood pressure and sport drink groups. While heart rate and body temperature were not difference before and after intervention for all sport drink groups. considering performance tests, there were high significant difference between each drink type and abdominal exercise , push up exercise and run. 44.4 % of the athletes consumed ≥ 15% of their energy from protein ,74.1 % of the athletes consumed < 50% of their energy from carbohydrate and 66.7 % of the children consumed ≥ 30 % of their energy from fat.

Conclusion:-We found a direct relationship between the sport drinks consumption and the measurement of systolic pressure and diastolic players while did not appear any relationship between the sport drinks and players body temperature or pulse, results also showed that when playerswell hydrated reflecting positively on their performance. However, furtherresearches are required due to rarity of this research in the Middle East in general and Egypt in particular.

Keywords: Sports drink - Vital signs - Athlete - performance tests.

Introduction

Sport drinks are flavored beverages that often contain carbohydrates, minerals, electrolytes (eg, sodium, potassium, calcium, magnesium),and sometimes vitamins or other nutrients.**American Academy of Pediatrics (2011).**There is a large and growing body of scientific evidence that documents the benefits of ingesting salt and glucose (carbohydrates) during prolonged exercise. Those benefits include maintenance of cardiovascular function, enhanced carbohydrate oxidation, blunted decline in plasma sodium concentration and improved performance**Murray (2007).**Up to 35 minutes after the ingestion of 500 ml water, blood pressure and vascular-resistance increased and heart rate decreased. The authors suggest that hydration leads to an increase in the sympathetic vasoconstrictor and thus triggers a blood pressure response that stimulates the reflex vagal modulation, decreasing heart rate**Vanderlei*et al.*(2013).**Although water is often suggested to many general fitness enthusiasts who may exercise for relatively short periods of time (< 75 minutes), carbohydrate-electrolyte sport drinks are highly recommended and appear to be the beverage of choice for most serious athletes–aerobic athletes in particular. Regardless, carbohydrate-electrolyte beverages are widely consumed and represent a multi-billion dollar segment of the food and beverage industry. **Kalman*et al.* (2012)**Athletes undertaking sustained exercise greater than 2 hours should consider strategies utilizing combined carbohydrate formulas to maximize carbohydrate and fluid delivery, which may support enhanced exercise performance. **Roberts *et al.*(2014)**Commercial sports drinks such as Gatorade, Powerade, and Allsport appeal to competitive and recreational athletes because the manufacturers of many of these products suggest that they enhance endurance performance and help maintain fluid-electrolyte balance during exercise. Indeed, the physiological benefits of being well hydrated prior to training and competition are widely accepted. It is also generally agreed that carbohydrates (CHO) and electrolytes added to fluid replacement (FR) beverages are beneficial during long-term exercise (.2 hours) because they increase the palatability, replace electrolytes lost to sweat, drive the thirst mechanism, prevent a fall in plasma volume, and possibly delay the onset of fatigue**.Bachle*et al.*(2001)**In general, except for some casual differences, regarding type, intensity and duration of the proposed exercise, both hydration with water or isotonic solution promoted the

same effects on cardio-respiratory parameters.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 athlete who wants to optimize exercise performance needs to follow good nutrition and hydration practices, use supplements and ergogenic aids carefully, minimize severe weight loss practices, and eat a variety of foods in adequate amounts. **American College of Sports Medicine (2000)**

Aim Of Study

Find out the impact of some sporting drinks on biomarkers by using several kinds of drinks on young athlete .

Methodology:

Subjects:

The sample of participants was 27 athlete child and adolescentfrom 10 to 15 years old from SheikhZayed youth center at 6 October region in Cairo. Players were randomly assigned to three groups experimental (water, n = 9), (natural, n = 9), and (artificial, n = 9). The water group consumed water , natural consumed natural sport drink (consists of fresh fruits juices) , artificial group consumed Gatorade an artificial sports drink from the markets. Participants and parental consent were completed, and all participants were interviewed at baseline to obtain the anthropometric measurementsaccording to **WHO(2002)** ,body compositionwere measured with body complete diagnostic scale (Beurer - Body Complete Diagnostic scale - BF 100 - Germany) and dietary intakewere determined using food composition table Egyptian Food Composition tables of the **NationalNutrition Institute NNI (2006)**. Diastolic and Systolic blood pressure, heart ratewere measured and were calculated from changes detected in the pressure pulses using (Sejoy blood pressure digital monitor - China) the outcome data recorded All data compared with The American Heart Association (AHA) Guidelines for classifications of hypertension **Smith (2005)**. and body temperature were recorded with a digital tympanic infrared scanner (Omron digital ear thermometer 520- China)**.**Blood sample were taken to assessment red blood count (RBC) ,Haemoglobin (Hb)were measured using (Mindray BC2800 Haematology analyzer) for the determination

of HB & RBCs count according to **Marshall *et al.* (2008)**. The assigned physical performance variablesas describe by **Nieman(2011).** All groups performed physical tests included 3 activities such as push up, abdominal exercise and run on their place.Vital sign ,blood sample and performances tests were taken at baseline, and after the intervention.

Results And Discussion

Data presented in **Table (1)** illustrated that there was a highsignificant difference between the water and natural drink groups and athletes height before and after intervention with mean value ±SD (1.50 ± 0.1, 1.51± 0.1) and (1.49 ± 0.1, 1.50 ± 0.1) respectively. While no significant difference between artificial drink group and athletes height before and after intervention at with mean value ±SD (1.55 ±0.1) .

In the same table, there was a significant difference between the artificial drink group and athletes weight before and after intervention with mean value ±SD (45.9 ± 4.5, 46.5±3.6) respectively. Meanwhileno significant difference between the water and natural drink groups and athletesweight before and after intervention with mean value ±SD (41.9 ±3.1,42.2±4.2) and (46.4±4.3, 47.6±2.6) respectively.

There was a significant difference between the artificial drink group and athletes fat percentage before and after intervention with mean value ±SD (9.91±1.49,10.0 ± 1.49) respectively. whereas there was no significant difference with sports drink groups, at the water drink group before and after intervention with mean value ±SD (15.58 ± 0.49 %, 15.60 ± 1.47 %) and it was closer to natural drink group with mean value ±SD (14.98 ± 1.98 %, 15.08 ± 1.93 %) before and after intervention respectively .

Water percentage was not significant difference with sports drink groups. Mean value ±SD were the same at the water drink group (61.80 ± 3.70 %, 61.80 ± 3.73 %) before and after intervention and it was closer to natural drink group (61.24 ± 2.18%, 61.18 ± 3.14%) before and after intervention respectively. Whereas the highest percentage was for artificial drink group (65.27 ± 2.03, 65.52 ± 4.37) before and after interventionrespectively.

Bones (Kg) was significant difference at natural drink group and at the artificial drink group with mean value ±SD (9.68 ±1.28, 9.76

±0.48) and (9.81±0.62,9.84 ±1.61) respectively, but with no significant difference between the water drink group.

These results disagree with **(Son *et al.* 2014)**who found that body weight did not change between pre and post testing ,but body fat decreased in both conditions between pre and post testing.also disagree with **Kirchengast and Marosi**(**2008**) several studies plead for a significant negative association between physical activity and body fat mass while others reported only a weak relationship between physical activity and body composition parameter, Body fat mass was independently of gender negatively associated with physical activity. Lean body mass in contrast, was positively with physical activity.

Data in **Table (2)** show vital signs before and after intervention according to drinks type, it was very highly significant deference between diastolic blood pressure and sports drinks groups. There was a very highly significant before and after intervention at natural drink group with mean value ±SD (64.8±4.8 , 69.7±3.5 mmHg) and there was significant differences in artificial drink group with mean value ±SD (72.4 ± 2.8 ,76.7 ± 3.7 mmHg) but there were no significant differences between before and after intervention for the water drink group with mean value ±SD (67.2±5.9 ,67.6±6.3 mmHg).

The systolic blood pressure revealed high significant deference between sports drinks groups. There was significant deference before and after intervention at artificial drink group with mean value ±SD (111.8±8.8 , 117.7±6.4 mmHg) meanwhile there were no significant differences between before and after intervention for the water drink group with mean value ±SD (111.6±11.6 ,112.2±10.4 mmHg) and natural drink group with mean value ±SD (110.9 ± 10.2 ,113.8 ± 11.6 mmHg).

This result is disagreed with**Kalman*et al.*(2012)**who found no differences noted between conditions for heart rate, systolic blood pressure, or diastolic blood pressure when tested both coconut water (natural, concentrated and not from concentrate) and bottled watercompared to a carbohydrate-electrolyte sport drinkconsidering measures of hydration and physical performance.

From the same **Table (2)** the heart rate was not difference before and after intervention for all sports drinks groups ,for water drink group with mean value ±SD (96.9±9.1 ,96.0±7.7 beats/min) and artificial

drink groups with mean value ±SD (90.1 ± 7.0 ,90.0 ± 6.9 beats/min) meanwhile there was slightly reduced heart rate before and after intervention at natural drink group with mean value ±SD (92.1±7.8 ,90.7±6.5 beats/min).This result agrees with **Moreno *et al.*(2013**) who studied the effect of consuming sports drink on heart rate (HR) during and after prolonged exercise, and found that Hydration with sports drink did not significantly influence HR during exercise. Also our results on the line with **Rivera-Brown *et al.*(1999**) who examined the effect of beverage composition on the voluntary drinking pattern, body fluid balance, and thermoregulation of heat-acclimatized trained boys exercising intermittently in outdoor conditions , and found that there was no differences in HR .

Body temperature values werenot significant differences between before and after intervention for the water drink group with mean value ±SD (36.2±0.8 , 36.3±0.8 ºC) and natural drink group with mean value ±SD (36.1 ± 0.3 ,36.0 ± 0.5 ºC) and artificial drink groups group with mean value ±SD (36.1 ± 0.3 ,36.3 ± 0.7 ºC) .This result agrees with**Coso*et al.*(2008**) who found no difference in body temperature between the water and sports drinks groups. While disagree with **Sun *et al.*(2008)** who found that,mean temperature in the gatorade rehydration (GH) group was significantly lower than in the water rehydration (WH) group, also**Shalesh*et al*(2014)**demonstrated that, the physical exercise has made a change in the value of heart rate and blood pressure, There is also significant different in the heart rate and diastolic blood pressure, during the physical effort in favor of the group which have taken sports drink and there is no statistical significant different in the systolic blood pressure between the water group and sport drink group.

Data in **Table (3)** represented the performance tests before and after intervention according to drinks type . There was a very high significant difference (p≤ 0.001) between each drinks type and abdominal exercise and there was a very high significant difference between all sports drinks. Water drink group with mean value ± SD (20.9±2.6, 23.8±2.8) , for natural drink group with mean value ± SD (18.7±1.5, 22.7±0.9) and for artificial drink group with mean value ± SD (20.7 ± 0.8, 25.1±1.3).

Also, there was a highly significant difference (p≤ 0.001) between each three drinks type and push up exercise, natural drink group

was with mean value ± SD (13.0 ± 1.3, 15.1 ± 0.7), water drink group was with mean value ± SD (10.3 ± 0.8,11.3 ±1.6) , and artificial drink group was with mean value ± SD (14.2 ± 0.9, 16.6 ± 1.2).

From these data from **Table (3)** it can be observed that , there was a high significant difference (p≤ 0.001) between each drinks type and run, and there was a very high significant difference between all sports drinks, for water drink group with mean value ± SD (22.7±0.4, 26.1±0.7),for natural drink group with mean value ± SD (21.6±0.5, 26.7±0.1) and for artificial drink group with mean value ± SD (23.7 ± 2.4, 28.3±1.4).

These results agree with**Begum *et al.*(2015)** who reported that, The homemade drink improved exercise performance in a similar manner to that of the commercial drink . alsowith**Hill *et al.*(2008)**whonoted that commercial sports drinks have similar hydration ability to water. Also with**Kalman*et al.*(2012)** who indicated that both coconut water (natural, concentrated and not from concentrate) and bottled water provide similar rehydrating effects as compared to a carbohydrate-electrolyte sport drink.

Table (4) results show the distribution of the studied sample according to % RDA of macronutrients energy ratio of (protein/ carbohydrate/ fat) intake and drinks type, 18.5 % and 18.5% from water and natural drinks group respectively take more than 15 % of their energy from protein meanwhile 22.2% from artificial drink group take from 10% to less than 15 % of their energy from protein.

From the same **table(4)** 33.3 % , 18.5 % and 22.2% which represent 74.1 % of the total sample take less than 55 % of their energy from carbohydrate.

22.2% from each of drinks groups which represent 66.7 % of total sample take 30 % or more of their energy from fat.

This finding disagree with **Jago*at al.*(2004)** who examined the relationships between physical activity and dietary behaviors among 8- to 10-year-old African-American girls and found that physical activity was significantly negatively associated with percentage calories from fat. This result agrees with **DRI (2002/2005)),** Acceptable Macronutrient Distribution Ranges (AMDRs) for protein is 10 to 30 percent for children 4 to 18 years of age .But disagrees with the AMDR for carbohydrate for children which is the same as that for adults45 to 65

percent of energyand the AMDR for fat 25 to 35 % of total energy for children 4 to 18 years of age.

Hoch *et al.*(2008) summarized that , It is important for all children to consume a balanced diet that consists of approximately 50% to 65% carbohydrates, 20% to 30% fats, and 12% to 15% proteins to ensure health and performance. Proper nutrition in young athletes is vitalto prevent inadequate energy intake, which may inhibit normal growth and development and overall performance.

Conclusions

In conclusion, There was a strong relationship between athlete vital signs and sporting drinks. The results indicated that, when the athlete well hydrate it can leaded to improve performance.sports nutrition need more research and studies in the middle east region as all and in Egypt particularly.

Table (1) Anthropometric measurements and body composition before and After intervention according to drinks type

		water n. = 9		natural n. = 9		artificial n. = 9	
		Before intervention	**After intervention**	**Before intervention**	**After intervention**	**Before intervention**	**After intervention**
Height	**mean ± SD**	1.50 ± 0.1	1.51 ± 0.1	1.49 ± 0.1	1.50 ± 0.1	1.55 ± 0.1	1.55 ± 0.1
	T.test	3.773 ***		2.39 *		1.83	
Weight	**mean ± SD**	41.9 ± 3.1	42.2 ± 4.2	46.4 ±4.3	47.6 ± 2.6	45.9 ± 4.5	46.5 ± 3.6
	T.Test	1.06		1.64		2.69 *	
Body composition							
Fat %	**mean ± SD**	15.58 ± 0.49	15.60± 1.47	14.98 ± 1.98	15.08 ± 1.93	9.91 ± 1.49	10.01 ± 1.49
	T.test	0.26		0.16		1.89 *	
Water %	**mean ± SD**	61.80 ± 3.70	61.80 ± 3.73	61.24 ± 2.18	61.18 ± 3.14	65.27 ± 2.03	65.52 ± 4.37
	T.Test	1.00		1.00		1.17	
Muscles %	**mean ± SD**	45.81 ± 4.02	45.97 ± 4.02	46.06 ± 3.95	46.25 ± 3.05	49.80 ± 2.66	49.84 ± 2.79
	T.test	1.90		1.56		0.26	
Bones (Kg)	**mean ± SD**	9.31 ± 0.98	9.33 ± 0.98	9.68 ± 1.28	9.76 ± 0.48	9.81 ± 0.62	9.84 ± 1.61
	T.Test	1.51		2.97*		2.00 *	

Table (2) vital signs before and after intervention according to drinks type

vital signs		water n. = 9		natural n. = 9		artificial n. = 9	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Diastolic blood pressure (mmHg)	mean ± SD	67.2 ± 5.9	67.6 ± 6.3	64.8 ± 4.8	69.7 ± 3.5	72.4 ± 2.8	76.7 ± 3.7
	T.test	0.580		0.723 ***		2.03 *	
Systolic blood pressure (mmHg)	mean ± SD	111.6 ± 11.6	112.2 ± 10.4	110.9 ± 10.2	113.8 ± 11.6	111.8 ± 8.8	117.7 ± 6.4
	T.test	0.46		1.83		2.78 *	
heart rate (beats/ min)	mean ± SD	96.9 ± 9.1	96.0 ± 7.7	92.1 ± 7.8	90.7 ± 6.5	90.1 ± 7.0	90.0 ± 6.9
	T.test	1.01		0.87		0.320	
body temperature (ºC)	mean ± SD	36.2 ± 0.8	36.3 ± 0.8	36.1 ± 0.3	36.0 ± 0.5	36.1 ± 0.7	36.3 ± 0.7
	T.test	1.41		0.64		1.64	

Table (3) performance tests before and after intervention according to drinks type

performance tests		water n. = 9		natural n. = 9		artificial n. = 9	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
abdominal exercises	mean ± SD	20.9 ± 2.6	23.8 ± 2.8	18.7 ± 1.5	22.7 ± 0.9	20.7 ± 0.8	25.1 ± 1.3
	T.test	26.00 ***		9.07 ***		5.12 ***	
push up	mean ± SD	10.3 ± 0.8	11.3 ± 1.6	13.0 ± 1.3	15.1 ± 0.7	14.2 ± 0.9	16.6 ± 1.2
	T.test	3.00 **		4.12 ***		2.75 *	
run	mean ± SD	22.7 ± 0.4	26.1 ± 0.7	21.6 ± 0.5	26.7 ± 0.1	23.7 ± 2.4	28.3 ± 1.4
	T.test	7.45 ***		12.08***		14.00 ***	

Table (4)Distribution Of the studied sample according to % RDAof macronutrients energy ratio of (protein/ carbohydrate/ fats) intake and drinks type

Nutrient		water n. 9		natural n. 9		artficial n. 9	
		No	%	No	%	No	%
Pro. energy Ratio	< 10%	1	3.7	3	11.1	1	3.7
	10-15%	3	11.1	1	3.7	6	22.2
	≥15%	5	18.5	5	18.5	2	7.4
Carb. energy Ratio	< 50%	9	33.3	5	18.5	6	22.2
	50-70%	0	0	4	14.8	3	11.1
	≥ 70%						
Fat energy Ratio	< 20%						
	20 - 30 %	3	11.1	3	11.1	3	11.1
	≥ 30%	6	22.2	6	22.2	6	22.2

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دراسه تأثير بعض مشروبات الرياضيين علي بعض المؤشرات الحيويه لدي الرياضيين.

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الملخص العربى

يهدف هذا البحث لدراسه تأثير بعض مشروبات الرياضيين علي بعض المؤشرات الحيويه للرياضيين.اشترك في هذه الدراسه ٢٧ طفل و مراهقمن اللاعبين من الجنسين اعمارهم بين ١٠ : ١٥ سنه .اجريت مقابله شخصيه مع كلالمشاركين و قد تم تقسيم اللاعبين عشوائيا الي ثلاث مجموعات مجموعه (١) تناولوا الماء , مجموعه (٢) تناولوا مشروب طبيعي مكون من عصائر الفاكهه مجموعه (٣) تناولوا مشروب تجاري من السوق المحلي و تم عمل القياسات و الاختبارات قبل و بعد تناولهم للمشروبات (استرجاع ٢٤ ساعه لمده ٣ ايام - المقاييس الجسميه - قياسات تركيب الجسم) قبل و بعد تناولهم للمشروبات. و قد دلت النتائج علي ما يلي : اظهرت النتائج علي وجود علاقه بين المقاييس الجسميه و تركيب الجسم مع مشروبات الرياضيين حيث ظهرت علاقه بين طول اللاعبين و مجموعه الماء و العصير الطبيعي , و ظهرت علاقه طرديه بين وزن اللاعبين و مجموعه المشروبات الصناعيه , و كذلك النسبه المئويه للدهون بالجسم مع مجموعه المشروب التجاري بينما تأثر وزن العظام بنوع المشروب في مجموعه العصير الطبيعي و المشروب التجاري في حين لم تتأثر النسبه المئويه لماء الجسم بتناول المشروبات. و تأثرت المؤشرات الحيويه للاعبين بنوع المشروب فظهر ذلك في معدل ضغط الدم الانبساطي , و كذلك في معدل ضغط الدم الانقباضي , في حين لم تتأثر معدل ضربات القلب و لا درجه حراره اجسام اللاعبين . و تأثر اداء اللاعبين بتناول المشروبات في الثلاث مجموعات حيث ظهر تحسن في الاداء مع الثلاث مجموعات و سجلت النتائج ان ٤٤.٤ % من اللاعبين تناولوا ١٥ % او اكثر من الطاقه مصدرها البروتين , ٧٤.١% من اللاعبين تناولوا اقل من ٥٠ % من الطاقه مصدرها الكربوهيدرات بينما ٦٦.٧ % من اللاعبين تناولوا اكثر من او ما يساوي ٣٠ % من السعرات مصدرها من الدهون .و يمكن تلخيص الدراسه انه وجدت علاقه طرديه بين مشروبات الرياضيين و قياس الضغط الانقباضي و الانبساطي للاعبين بينما لم تظهر اي علاقه بين مشروبات الرياضيين و درجه حراره اجسام اللاعبين او النبض و كذلك اظهرت الدراسه انه عندما يكون اللاعب جيد الارتواء من الممكن ان يؤثر ذلك ايجابيا علي معدل اداء اللاعبين و تحتاج تغذيه الرياضيين المزيد من الابحاث في منطقه الشرق الاوسط و مصر تحديدا نظر لقلتها.

الكلمات الكاشفة :مشروبات الرياضيين - العلامات الحيويه - رياضي- اختبارات الاداء.