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Effects of the Water Consumption on the Performance of Congolese Middle-Distance Running Veteran's Athletes

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Abstract: *Objective*: Appreciate the effect of the water intake on the performance of Congolese veteran middle distance runners. *Methods*: The study took place from 16 March to 16 May 2015 in Brazzaville (Congo). (30) middle distance athletes belonging to the category of veterans formed the sample of it. Their average age was 35.93 ± 5,05years old. These athletes have been practicing endurance racing and had been tested twice; the Sargent and Cooper test. These tests were conducted in two phases: the first, without water intake (WO. W. I.) and the second, with water intake (W. W. I). *Results*: Our sample was 30 subjects. Events selected during our study focused on 800 meter (n = 08), 1500 meter (n = 14), 3000 meter (n = 02) and 5000 meter (n = 06). Body mass index (BMI) (weight / height^2) was 20.33 ± 2.14. Regarding performance, the difference was significant (P> 0.05) in the Cooper test with water intake (W. W. I) from Without Intake (WO. W. I). On the other hand, no difference was observed in the Sargent test in both moments (without water intake and water intake). *Conclusion*: Water, considered vital, had a positive effect in Cooper's test and had no benefit in the Sargent test where performance was declining after consumption.

Keywords: Middle Distance, Performance, Water, Veteran's Athletes

1. Introduction

Athletics is the set of sports disciplines of races, throws and jumps played indoors or outdoors, individually or by team [1]. This discipline is marked by a constant search for performance improvement. With rapid advances in technology and medicine, this ongoing quest for performance improvement has, however, been accompanied by drifts. These mainly linked to doping and considerable sums of money have now contributed to significant changes in performance in endurance racing activities [2].

Some authors suggest that water use is often associated

with sport as a vital and essential component, representing 60% of body weight in adulthood [3]. Several studies have been undertaken on the physiological characteristics of middle-distance athletes in Europe and America [4], but few data are available for African athletes. It emerges from this work that the achievement of high performance is subject to good supervision, good infrastructure and a downhill lifestyle combined with appropriate and judicious nutrition. It is in this context that in most cases the absence of water consumption in these subjects is noted.

Water is perceived as a drink widely consumed by casual athletes or by practitioners in competition, although sometimes neglected by athletes of any class. [5] When practicing a sport activity, the body must maintain a body temperature close to normal. Sweating then acts as a natural cooling system for the body. Thus, the water lost in the form of sweat must be compensated by regular water intakes. Hydration is therefore the key to any good sports practice to avoid the risk of dehydration, the appearance of wounds, tendonitis, or cramps. To remain at an optimal level of hydration, it is necessary to drink before, during and after the exercise [6].

It is essential to drink 500 ml of water per hour, two large sips every 10 to 15 minutes during exercise, and to prolong this rehydration after training or competition. This allows the elimination of "waste", the production of which has been increased during physical activity, by the kidneys. When sweating has been abundant, the athlete may be advised to use highly mineralized water even though water alone is sufficient. In endurance tests, drinks rich in trace elements and glucose can be used to supply the organs and tissues with energy.

In Congo Brazzaville, water production is of two types: industrial and artisanal. In the case of industrially produced water, it is mineral water, source water and the pump [7].

Currently, various municipalities in the capital have become "high risk" zones in the face of the lack of water, resulting in water losses and deficiencies in mineral salts. The idea is not to study all the physiological phenomena related to the consumption of water. But the question is whether water makes it possible to improve sports performance in Congolese middle-distance veteran's athletes.

The aim of this work is to assess the effect of water consumption on the performance of veteran's mid-distance athletes.

2. Material and Method

The study was conducted from 16 July to 10 August 2016 in Brazzaville, Congo. The source population consisted of 50 mid-distance and bottom athletes including 45 men and 5 ladies from the veteran's team. The sample consisted of 30 male athletes selected after a single random draw.

Three inclusion criteria were chosen: having practiced the mid-distance race, having a habit of drinking water, being in good health with a medical certificate duly issued by a doctor.

We had used two tests: the Sargent and Cooper test.

The first is a classical method of assessing the pulse power of the lower limb musculature which consists of a vertical relaxation test.

The second is a field test that allows to determine the VO2Max of a person. It is a question of traveling the greatest possible distance in 12 minutes.

The tests took place after the warm-up by their coaches in two stages:

- At 4 PM, the subjects were subjected to Sargent and Cooper tests with their initial level of training, without imposing the intake of mineral water.
- A week later, the same subjects resumed the tests at the same time, with water intake (1 liter), 30 minutes before the tests.

The data were processed using the Statistica software (Stat Soft, 1993). The mean values were accompanied by the standard deviation.

3. Results

Of the 30 subjects in our sample, the tests used in our study were 800meter (n = 08), 1500 meter (n = 14), 3000 meter (n = 02), 5000 meter (n = 06) (Table 1).

Table 1. *Distribution of Athletes by Type of Test.*

Event	N	%
800m	08	26.67
1500m	14	46.67
3000m	02	06.66
5000m	06	20

m: meter

This table shows that the most common tests are 1500 meter (46.67%) and 5000 meter (20%).

The mean age was 34.93 ± 5.05 years old with a weight of 60.50 ± 7.86 kg. The body mass index (BMI) (weight / height^2) was 20.33 ± 2.14 kg/m^2 (Table 2).

Table 2. *Anthropometric characteristics of veteran midfielder athletes (n = 30).*

variables	Average ± standard deviation	Extreme
Age (an)	34.93 ± 5.05	28 - 40
weight (kg)	60.50 ± 7.86	47 - 80
height (m)	1.71 ± 0.104	1.55 -1.91
BMI	20.33 ± 2.14	17.26–23.63

Regarding performance, no significant difference (P> 0.05) was observed in the two groups compared to the Cooper test with water intake (W. W. I) and without Water Intake (WO. W. I) (Table 3).

Table 3. *Cooper test performance with and without water intake (n = 30).*

Cooper test	Extreme	Average ± standard deviation	Significance
WO. W. I (m)	2430 - 3780	3289.12 ± 0.35	P>0.5
W. W. I (m)	2510 - 3681	3254.8 ± 0.31	

M: meter
WO. W. I: without water intake
W. W. I: with water intake
P> 0.5: difference not significant

However, with the Sargent test, there was a significant difference (P <0.001) between subjects who took water (W. W. I) and those who did not (WO. W. I) (Table 4).

Table 4. *Performance on the Sargent test without plug and intake (n = 30).*

Sargent Test	Extreme	Average ± standard deviation	Significance
WO. W. I (m)	2.38–2.63	2.73 ± 0.018	P<0.01
W. W. I (m)	2.94–2.97	2.72 ± 0.017	

M: meter
WO. W. I: without water intake
W. W. I: with water intake
P <0.01: very significant difference

4. Discussion

Our study focused on the effect of water in sports. In order to verify sensitivity or better, the effect of carrier, garbage, energy or the influence of water consumption in our athletes, an experimental phase was carried out in the field.

We used in this phase the tests of Sargent and Cooper which are well appreciated in the sporting environment.

The explosive force of the legs was evaluated with a vertical expansion test (Sargent test) while the aerobic capacity was determined with the Cooper test.

These tests allowed us to check the effect of water consumption by comparing the results between the two groups (W. W. I and WO. W. I): the averages obtained on the Cooper tests did not reveal any difference between W. W. I and WO. W. I (P> 0.05) (Table 3)

It can be seen that in the Cooper test, the results obtained by the athletes did not change in either group. This is because the water consumed did not strongly affect the athletes' bodies. The duration of endurance racing allowed the circulation of water in the organism which did not have a negative effect on the performance of the latter. Water has ensured the various metabolic functions of the human body during physical activity. She played the role of Thermoregulator in keeping the temperature constant inside the body by absorbing heat and then releasing it into sweat, thus transporting nutrients, hormones and enzymes into the blood and oxygen to the cells [7-13].

In this perspective, many aspects of performance are propelled by water consumption; the water participates in numerous chemical reactions and in particular in the glycolysis necessary for the production of ATP (adenosine triphosphate), the energy used for the muscular contraction [8]. Water contributes to the lubrication of joints (synovia) and organs of the digestive system (mucus and saliva).

However, for our study the quantity of water having a volume of one liter is a bottle, did not cause the dysfunction of the organism.

If the Cooper test did not show a significant difference, that of Sargent on the other hand has a significant difference. In the anaerobic alactic power, the amount of water consumed by our subjects had a negative effect on the muscular power of the legs.

The consumption of water caused a metabolic disorder that justifies the decline in performance (Table 4). This phenomenon is due to the time of the water intake since our subjects consumed the water at 4PM, that is to say 4 hours after the lunch.

Water is perceived as a vital fluid that accounts for 86% of the chemical composition of the human body; this constitute essential to the maintenance of the organism, and consequently of life, requires a constant renewal insofar as a loss of 2500 ml of water per day is observed. Indeed, a perfect hydration is essential hence the interest of a regular and moderate consumption. Similarly managing your water intake is part of the physical preparation to avoid injuries, cramps and decreased performance; it suffices to miss 2% of water in the body to see its capacities decrease to 20% [9]. However, the different types of consumption can harm health, causing dysfunctions in the body. Once consumed in sufficient quantity just before physical activity becomes a danger to the body [10].

However, several studies have shown that immediately after consuming a large amount (3 liters) of water, it is not good to start a sport without observing a rest period. This consumption can lead to hyperhydration [11]. In fact, it is hyponatremia (low blood sodium) to the exertion of hyperhydration which is dangerous because it will break a balance between extracellular medium and intracellular medium. The scientists talk about stress hyponatremia (exercise-associated hyponatremia or EAH). This is a frequent condition since, according to studies [10, 11], up to 30% of athletes participating in an endurance competition (marathon or more) would be in hyponatremia at the end of the event. In fact, any excess water will cause a slight decrease in serum sodium, which will quickly stop the secretion of ADH (antidiuretic hormone) and lead to the elimination of water in the form of urine. However, in case of lack, the sensation of thirst appears.

Several authors incriminate excessive recommendations to prevent dehydration. Indeed, many sportsmen drink conscientiously and abundantly to all the supplies in the sporting events to the point of exceeding their sweat losses [12].

In this perspective, during a maximal effort of short duration, the speed of gastric emptying decreases. It is better not to drink before a sprint or before a temporary acceleration. The hotter the gastric emptying becomes. If the athlete is already dehydrated and overheated, the ingestion of a drink will be less effective because the gastric emptying will be delayed. It may even cause gastric disorders [13]. If dehydration occurs, rehydration and remineralization should be done more quickly and efficiently with a carbohydrate and sodium-enriched beverage than with simple water [14]. For our study, if the performance of our veterans was not satisfactory on the Sargent test, this is explained by the fact that simple water taken in large quantities did not help the athletes to improve their ability to impulse the lower limbs.

5. Conclusion

The purpose of this study was to assess the effect of water intake on the performance of middle distance runners of Congolese veterans.

The results indicate that the water produced a positive change in performance at the Cooper test, while in the Sargent test performance declined after taking water. Indeed, the water consumed in large quantity (3 liters) caused the athletes fatigue, the heaviness and a hyperhydration before the activity.

However, Water, which is considered a vital liquid in many works, has had a beneficial effect in Cooper's test. The amount and time of water consumption before, during or after physical exercise would be a determining factor for athletic performance.

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