



## Effect of A Formulated Sports Drink on the Endurance Capacity of Long Distance Runners (18-25 Years)

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### ABSTRACT

*Exercising intensely taps into the stores of glucose that provides the muscles with energy. To rehabilitate muscles and fill their energy reserves back up and also to rehydrate when fluids are depleted after training sessions, sports drinks are administered to athletes. This study involved the formulation and administration of a sports drink to long distance male runners. To twenty subjects, 250 ml of plain water was administered for the first 15 days, followed by the formulated sports drink for the next 15 days. The endurance capacity was assessed using the Cooper's test, the Abdominal test, the Push up test and the Queen's College Step test three times, that is, prior to the administration of water (1st day), on the 15th day after the administration of water and on the 30th day after the administration of the sports drink. The results showed no significant difference in the endurance capacity on the 15th day. However, a statistically significant increase in the endurance capacity of long distance runners was observed after the administration of the sports drink (on the 30th day).*

**KEYWORDS :** Sports drink, endurance capacity.

### INTRODUCTION

Sports drinks are beverages whose stated purpose is to help athletes replace water, electrolytes and energy after training or competition, though their efficacy for that purpose has been questioned, particularly after exercise which is only moderate. The primary purpose of an energy drink is to supply carbohydrate in a rapidly absorbable form in order to help provide fuel for hard-working muscles during vigorous exercise.

The objectives of the present study were to formulate and administer a sports drink to long distance male runners and to assess their endurance capacity using specific tests.

### Specific objectives

- To select 20 men in the age group 18 to 25 years who are involved in long distance running (that is 1500 meters).
- To formulate a carbohydrate and protein based sport drink using banana, milk, honey and wheat germ powder.
- To assess the endurance capacity of the subjects using the Cooper's test, abdominal test, the push up test and the Queen's College Step test on the 1<sup>st</sup> day.
- To administer 250 ml of water to the subjects for the first 15 days (placebo period) and assess the endurance capacity of the subjects using the Cooper's test, abdominal test, the push up test and the Queen's College Step test on the 15<sup>th</sup> day.
- To administer 250 ml of formulated sports drink to the subjects from the 16<sup>th</sup> day to the 30<sup>th</sup> day and assess the endurance capacity of the subjects on the 30<sup>th</sup> day using the Cooper's test, abdominal test, the push up test and the Queen's College Step test.

### Study design

The study design was a pre-test, post-test experimental research design, with the subjects acting as their own controls.

### Sampling design and sample size

Convenience sampling technique was employed to select 20 male athletes between the age group of 18-25 years involved in long distance running.

### Place of conduction of the study

The area chosen for this study was VELS University hostel, Pallavaram, Chennai. The reason for choosing this area was that the University hostel consisted of a number of students who were involved in long distance running.

### Ethics committee approval

The study was approved by the Independent Institutional Ethics Committee of Women's Christian, Chennai before the supplementation

was carried out.

### PHASES OF THE STUDY:

The study was conducted in the following phases

#### PHASE I : FORMULATION OF SPORTS DRINK

The ingredients used in the preparation of one serving (250 ml) of sports drink included Banana (100 g), Milk (150 ml), Wheat germ (20 g) and Honey (15 ml). They are good sources of easily available carbohydrate, proteins, vitamins and minerals.

**Banana** is an excellent source of carbohydrate and it contains antioxidants. The more intense exercise is, the more free radical damage is being done to the body and this leads to the wear and tear of the body tissues. Antioxidants boost exercise endurance

**Milk** is a good source of protein. Carbohydrate-protein complex increases the rate of muscle glycogen storage after exercise (Zawadzki et al., 1992). A study done by Niles et al., (2001) on carbohydrate-protein drink showed that it improves time to exhaustion after recovery from endurance exercise.

**Wheat germ** is a good source of Vitamin B<sub>1</sub>, Vitamin E, folic acid and iron. Betaine is an active substance present in wheat germ Lee et al., (2010). A study done by Craig et al., (2010) on Betaine supplementation on male and female trained athletes proved that it increases their sprint power.

**Honey** contains simple sugars like glucose and fructose and is high in calories. Calorie requirements for athletes depend on the intensity of their training and performance. The athlete who trains to exhaustion on a daily basis needs more fuel than one who performs a milder regimen two or three times per week (Wilmore, et al., 1994 & Grandjean et al., 1990).

#### PREPARATION OF THE SPORTS DRINK

The preparation of the sports drink is presented in flow chart I

#### Flow chart: I

##### Preparation of the sports drink



Two hundred and fifty ml of the formulated sports drink provided 286.75 kcal, 51.35 gm carbohydrate, 10.835 gm protein, 1.93 gm fat and 1.96 mg iron.

**PHASE 2:ADMINISTRATION AND ASSESSMENT**

Table 1 presents the administration and assessment pattern followed in the study.

**Table 1**  
**Administration and assessment pattern**

Days	Procedure
1	Assessment
1 – 15	Administration of 250 ml of water
15	Assessment
16 – 30	Administration of 250 ml of the formulated sports drink
30	Assessment

**Assessment of endurance capacity using specific endurance capacity tests**

Specific endurance capacity tests such as Cooper’s Test (distance covered in meters in 12 minutes), Abdominal Test (No of abdominal crunches performed per minute), Push up Test (No of pushups performed until exhaustion) and Queen’s College Step test (No of steppings done in 3 minutes followed by measurement of heart rate per minute) were done to assess the endurance capacity of the subjects on the 1<sup>st</sup> day (base line - before administration of plain water), 15<sup>th</sup> day (Placebo period – administration of plain water from 1<sup>st</sup> to 15<sup>th</sup> day) and 30<sup>th</sup> day (Test period – supplementation of formulated sports drink from 16<sup>th</sup> to 30<sup>th</sup> day). The heart rate was used in the calculation of VO<sub>2</sub> MAX (Kline et al., 1987).

The first assessment done was the recording of the heart rate. This was done just after the subject performed his 12 minute run which is also called as Cooper’s test. This was followed by the Abdominal test, Push up test, with a break of 2 minutes in between the two tests. The Queen’s College Step test was done lastly after a break of 5 minutes, the heart rate was once again recorded. All these tests were done in order to measure the strength and endurance of the athletes.

**RESULTS AND DISCUSSION**

**Dietary pattern**

All 20 subjects were non-vegetarians. All the subjects belonged to the University hostel and followed similar meal pattern and meal timings. The subjects were therefore on a isocaloric diet pattern.

**Exercise pattern :**

The subjects were all involved in long distance running of 1,500 meters. All 20 subjects were trained under the same coach with the same exercise pattern for a period of 2 hours per day. Their training session started with warm up of 20 minutes, then followed by stretches 20 minutes, drills 30 minutes, sprinting 20 minutes and a cooling down of 30 minutes. Therefore there was a total of 2 hour practice session every day.

**Endurance capacity of subjects :**

The effect of supplementation of the sports drink on the endurance capacity of long distance runners as assessed by their performance in the Cooper’s test, Abdominal test, push up test and the Queen’s college step test is presented in table 2

**Table-2**

**Results of specific tests performed to determine endurance capacity of subjects on 1<sup>st</sup>, 15<sup>th</sup> and 30<sup>th</sup> day**

Specific tests	1 <sup>st</sup> day Mean ± SD	15 <sup>th</sup> day Mean ± SD	Level of sig 1 <sup>st</sup> day Vs 15 <sup>th</sup> day	30 <sup>th</sup> day Mean ± SD	Level of sig 1 <sup>st</sup> day Vs 15 <sup>th</sup> day
Body Weight (kg)	63.95 ± 5.434	64.05 ± 5.375	NS	64.85 ± 5.224	p<0.01**
Cooper’s test (m)	2300.00 ± 133.771	2305.00 ± 119.097	NS	2665.00 ± 166.307	p<0.01**
Abdominal test (no of crunches / min)	17.65 ± 1.814	17.95 ± 1.795	NS	23.50 ± 1.906	p<0.01**
Push up test (no of pushup until exhaustion)	13.60 ± 1.142	13.80 ± 1.436	NS	109.40 ± 4.309	p<0.01**
Queens College Step Test (heart rate / min)	103.00 ± 5.005	103.00 ± 4.790	NS	109.40 ± 4.309	p<0.01**
VO <sub>2</sub> MAX (ml/ kg/min)	26.95 ± 0.777	27.54 ± 2.8	NS	28.83 ± 0.332	p<0.01**

NS- not significant ,p<0.01\*\* - Statistically significant

There was a gradual increase in mean values of all the specific tests that were used to assess the endurance capacity of the subjects. Comparing the mean values of the 1<sup>st</sup> and 15<sup>th</sup> day, it was noted that there was a very marginal increase in mean values but it was not statistically significant.

However, on comparing the 15<sup>th</sup> with the 30<sup>th</sup> day, a greater increase in mean values was observed. There was a significant increase in the body weight of the subjects on the 30<sup>th</sup> day after supplementation of sports drink. There was a significant increase in the performance level of the subjects on the 30<sup>th</sup> day as made evident from the results of the Cooper’s test. A statistically significant increase in the number of sit-ups (Abdominal crunches) was observed on the 30<sup>th</sup> day. There was a statistically significant increase in the number of pushups performed by the subjects as assessed using the “Pushup test” on the 30<sup>th</sup> day. There was a statistically significant increase in the number of steppings performed by the subjects as measured using the “Queens College Step test” on the 30<sup>th</sup> day.

There was a significant increase in the heart rate and VO<sub>2</sub> MAX of the subjects on the 30<sup>th</sup> day. The VO<sub>2</sub> MAX of the subjects increased, which indicated that there was a rise in the oxygen uptake of the subjects which was the reason for improved endurance capacity. This showed that the increase in the endurance capacity of the long distance runners was mainly because of the supplementation of the sports drink.

**CONCLUSION**

Therefore it can be concluded from this study that the sports drink formulated with banana, skimmed milk, wheat germ and honey and supplemented for 15 days is sufficient to enhance the endurance capacity of long distance runners substantially. There is evidence that athletes who are under supplementation of sports drinks have higher endurance level, more stamina and are more vigorous when compared with athletes who are not under any supplement. This study shows that the formulated sports drink benefited the athletes in all aspects, be it strength, oxygen intake and their endurance level.

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