

Effect of a Nutrition Compound (Honey and Water) on Blood Glucose, Body Temperature and Some Physiological Variables in Wrestlers

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Abstract: Many specialists advise athletes to have vitamins, minerals and nutrition compounds to enhance sports performance. Honey is one of the best sources of sugar that provides the body with energy quickly without side effects and for prolonged periods of time. Two thirds of the human body consists of water. So, it is considered as a nutrient. The human body loses 1.5 liters of water each day through the skin, lungs, intestines and kidneys (as urine). During training, a wrestler loses huge amounts of water through the skin, due to the high intensity training load. This affects the vital functions of internal body systems as the body loses water and body temperature increases accordingly. Also, heavy sweat lost during training and the increase of internal and external body temperature affects the ability of the wrestler to continue training and competition. The current study tries to decrease the skin temperature and maintaining blood glucose using a compound of honey and water. The researchers used the quasi-experimental approach (one experimental group and pre and post- measurements) on a sample of 7 wrestlers from Baladiat Al-Mahalla Sports Club. Results indicated that the recommended honey and water compound had a significant effect on blood glucose and decreasing skin temperature during training. The recommended compound did not affect internal body temperature

Key words: Honey • Skin temperature • Blood glucose • Wrestling

INTRODUCTION

Nutrition compounds play a major role in enhancing the functional status of athletes. Healthy nutrition for athletes is the base of performance level. Although there is no specific food to enhance the performance level, wrong nutrition leads to early fatigue and deterioration of performance level [1]. Most studies indicated bad side effects due to malnutrition and the lack of basic contents in daily nutrition routine [2].

Many specialists advise athletes to have vitamins, minerals and nutrition compounds to enhance sports performance [3]. The major role of food is to produce energy and power necessary for work and production and to provide the human body with warmth under normal conditions as food is a mixture of animal and plant products that contain carbohydrates, proteins, fats, vitamins, minerals and water [1]. Nearly, two thirds of the

human body consists of water. So, it is considered as a nutrient. The human body loses 1.5 liters of water each day through the skin, lungs, intestines and kidneys (as urine) [4].

Water is one of the most important elements in the human body as it is the base of life cycle and physiologically and anatomically, it is the most important element after oxygen. He added that water is a good exit of heat as it absorbs heat resulting from chemical reactions and releases it through skin (sweat) and lungs (exhalation). Thus, water regulates body temperature and maintains it on normal levels without being affected by external heat or cold [5].

If the coach does not know the suitable kind of food for the players, this may lead to adverse effects and may cause diseases. Nutrition is a science and an art that directly affects the individual's health. They also noted that ancient peoples were interested in athletes' food as

they thought that if athletes have honey, especially with queens' food this will enhance their sports performance. The Holy Quran and Sunnah indicated the importance of honey. God says in the Quran "And from its bellies comes a syrup that varies in colors and it is a cure for people and this is a prodigy for those who think" (Al-Nahl 69). Prophet Mohamed said "stick to the two cures; honey and the Quran" (assured by Ibn Maja and Al-Hakem) [6].

Honey is one of the best sources of sugar that provides the body with energy quickly without side effects and for prolonged periods of time [2].

The ultimate goal for all workers in the sports field is to enhance the physical performance level. To achieve this goal, various sports programs are designed, along with illegal means that are condemned by all means. This leads to the idea of enhancing physical performance through legal means and scientific alternatives that are not banned internationally and are not on the drugs tables. So, athletes usually use alternatives like Chinese punctures, electro-synthesis and nutrition compounds to enhance performance [7].

Honey consists of sugar, water, vitamins, minerals, proteins and enzymes [8]. Also, honey has many advantages as it never scratches the internal walls of the gastro-intestinal system and is absorbed quickly and easily through the intestines. This enables the athlete to take it for recovering his/her strength and then takes a shower quickly [9].

Honey is a natural, effective and nutritious alternative of carbohydrates. In a follow-up study of 9 cyclists who had three different kinds of nutrition compounds (honey - glucose - calorie-free colored tablets) as gel for 3 weeks, it was clear that glucose and honey were effective in reducing the time needed for finishing training sessions as it increased the athletes' endurance and strength, compared with the placebo group that took the calorie-free tablets. The same study indicated a lighter effect of honey on blood sugar as taking honey with proteins increased muscle recovery from pain resulting from tension and exercises [10].

The best way to take honey to enjoy its fast effect and easy absorption of its components is to take it a solution in warm water. Studies indicated that the best amount for an adult to take is (100 -2000g) maximum [11].

If the athlete takes two big spoonfuls of honey half an hour before competition, his/her level and endurance increase. Studies indicated that taking honey in each meal, with a rate of 12:16 tea spoonfuls every day, makes the athlete maintains a stable level of strength, effort and

stamina and never gets tired during matches or feels unable to finish the game. This is why American wrestlers take honey as 60% of their total consumption of sugar [9-11].

Glucose provides body cells with energy. Some cells need continuous supply of glucose. Nervous cells, especially brain cells, are the most affected cells by lack of glucose. Also, lack of glucose in blood leads to heart palpitation and sweating [12].

A wrestler loses huge amounts of sweat during training due to the intensity of training load. This affects body vital functions due to lose of water and the increase of body temperature. This also affects the wrestler's ability to continue training sessions and competitions. The current study is trying to decrease skin temperature and maintain blood glucose using a compound of honey and water, as blood glucose is formed of liver glycogen and honey does not exhaust the gastro-intestinal system in this transformation process. Also, water helps maintaining body temperature around its normal rates under training conditions. As a former wrestler and a current coach of wrestling and through literature review, the researchers noticed that there are no similar studies in this field. Thus, the researchers performed this study to identify the effect of honey and water compound on blood glucose, body temperature and some other physiological variables in wrestlers.

The Current Research Aimed At:

- Identifying the effect of honey and water compound on blood glucose and body temperature for wrestlers.
- Identifying the effect of honey and water compound on some other physiological variables for wrestlers.

The Researchers Hypothesized That:

- There are statistical significant differences between the pre- and post- measurements of the sample on the effect of honey and water compound on blood glucose and body temperature in favor of the post-measurement.
- There are statistically significant differences between the pre- and post- measurements of the sample on the effect of honey and water compound on some other physiological variables in favor of the post-measurement.

The Researchers Adopted the Following Terminology:

Honey: is a sweet substance produced by bees through sucking flowers nectar and transforming it into honey then exert it into wax holes [13].

Blood Glucose: Is the blood sugar and it is a means to load carbohydrates in blood. The mean value in average adult is 70-120 mg/ml [14].

A study entitled "The effectiveness of taking a folk nutrition compound on physical performance and delaying fatigue" was performed on a sample of 30 players (19-23 years). Results indicated that taking honey, queens' food, pollen and jinxing one hour before matches affected positively on performance duration, pulse and transforming muscle and liver glycogen into glucose while it did not affect blood pressure after effort [15]. Another study dealt with the effects of a nutrition compound on oxygen free radical in some athletes. Sample included 20 athletes and results indicated that the recommended nutrition compound decreased oxygen free radicals in sample [16]. A third one studied the effects of taking anti-oxidants on the effectiveness of technical performance and some biological variables in junior wrestlers. Sample included 10 wrestlers and results indicated that taking anti-oxidants enhanced technical performance and increased red blood cells and hemoglobin while blood platelets and glucose were not affected [9].

MATERIALS AND METHODS

Approach: The researchers used the quasi-experimental approach (one group and pre- and post-tests).

Sample: Sample (7 wrestlers) was purposefully chosen from the wrestling team of Baldiat Al-Mahala Sports Club (mean age 18-20 years).

Sample Was Chosen According To:

- Wrestlers' punctuality in training and their high ranks in national and regional championships.
- Wrestlers' desire and consent to involve in the study.

Table 1 shows the statistical description of the sample in age, height, weight and years of experience (n=7)

Table 1: Statistical description of the sample in age, height, weight and years of experience

Variables	Means	Median	SD±
Age	19.86	20	1.07
Height	173.9	172	6.8
Weight	71	69	7.7
Years of experience	4.7	4	2.8

Data Collection Tools:

Data Recording Form for Each Wrestler (Appendix 1).

Used Equipments:

- Laminar sterilizer.
- Needles for taking blood samples (used once for each wrestler).
- Glass tubes for storing blood samples.
- Edeta anti-clotting substance and disinfectant solution.
- Spectrophotometer for measuring samples.
- Thermometer.
- Blood pressure device.

Measurements: Age - height - weight - years of experience.

Bio-chemical Measurements: Blood glucose - skin temperature - body temperature - red blood cells - blood platelets - blood pressure - pulse.

Interviews: the researchers interviewed the sample members to assure their consent on taking blood samples and to explain the importance of this study to them.

Choosing Assistants: The researchers chose an assistant (a blood analysis specialist with a master degree) to help taking and storing samples before sending them to lap analysis.

Preparing the Nutrition Compound: The researchers made use of the advice of Dr. Mohamed Baseem (Faculty of Agriculture) to identify the correct ratio of mixing honey with water and to calibrate the needed amount of the compound and the right times of administering it. Best ratio was 1:2 (50gm honey to 100ml water) as previous studies indicated that the best ratio was 100:200 gm [11]. The compound was administered 3 times 30:60 gm before training - 40:80 gm during training - 30:60 gm after training) so that the internal system make use of it. Observation indicated that the best amount for an adult is 100 - 200 gm/day [17-19].This treatment lasted for 2 weeks by eight

training modules as pervious studies indicated this period as a best treatment period for the body to adapt to the compound and use it effectively [9].

Pre-Test: Blood samples, body temperature and skin temperature were taken for the sample after the training unit on Saturday 24/4/2010 and sent to the lab at the same day.

Post-Test: Blood samples, body temperature and skin temperature were taken for the sample after the training unit on Saturday 8/5/2010 (after 2 weeks of administering the compound) and sent to the lab at the same day.

Statistical Treatment: The researchers used the following statistical treatments: means - standard deviation - median - (t) test - improvement percentage

Appendix 1: Registration and biochemical measurements form

Name :	Age:
Weight:	Height:
Years of experience:	
Glucose	
Skin temperature	
Body temperature	
Red blood cells	
White blood cells	
Blood platelets	
Systolic blood pressure	
Diastolic blood pressure	
Pulse	

RESULTS AND DISCUSSION

Table 2 indicates statistically significant differences in skin temperature and glucose while body temperature was not significant as (t) values were between 0.66 and 5.8 while (t) table value was 1.94.

Table 2: Difference significance between pre- and post- measurements on body temperature, skin temperature and blood glucose (n=7)

Variables	Measurement	Pre-test		Post-test		Means difference	Variance significance	(t) value
		Means	SD±	Means	SD±			
Glucose	ml-mol/ liter	81.44	16.12	95.37	10.14	13.9	10.11	3.7*
Body temperature	Centigrade	37.1	0.26	37.2	0.27	0.08	0.34	0.66
Skin temperature	Centigrade	36.8	0.16	36.04	0.39	0.76	0.35	5.8*

(t) table value on $p \leq 0.05 = 1.94$

Table 3: Variance percentage between pre- and post- tests on body temperature, skin temperature and blood glucose (n = 7)

Variables	Measurement	Pre-test means	Post-test means	Variance Percentage (%)
Glucose	ml-mol/ liter	81.44	95.37	%17.1
Body temperature	Centigrade	37.1	37.2	%2.6
Skin temperature	Centigrade	36.8	36.04	%2.1

(t) table value on $p \leq 0.05 = 1.94$

Table 3 indicates statistically significant differences between the pre- and post- tests, in favor of the post-test, in skin temperature and glucose while body temperature was not significant as (t) values were 3.7 for glucose and 5.8 for skin temperature while (t) table value was 1.94. Body temperature was not statistically different between the pre- and post tests as (t) value was 0.66. This indicates that the recommended compound affected positively (although high intensity conditions of wrestling training) and reduced the skin temperature and enhanced the glucose in blood due to its fat absorption and its moderating effect on blood glucose. This is in agreement with previous studies that noted similar results when using honey, queens' food, pollen and jinxing [15,20,21].

This is also noted other studies that indicated that honey is characterized by fructose, which does not need any effort of the gastro-intestinal system and reaches the liver directly then distributed to all body organs [22,23]. The researchers indicates that the compound, with its simple components, helped decreasing skin temperature and enhanced blood glucose levels without any exhaustion to the gastro-intestinal system in transforming liver glycogen into glucose.

This is consistent with the results of previous studies in that honey strengthens the heart and widens coronary vines as it contains glucose and acetyl Colin [9,8].

The researchers think that having water decreased body temperature, or exactly moderated the temperature of internal systems. This decreased sweat, as noted when measuring skin temperature. This is consistent with the notion that the body balanced its internal and external temperatures although the intense conditions of training [24].

Table 4: Difference significance between pre- and post- measurements on physiological variables (n=7)

Variables	Measurement	Pre-test		Post-test		Means difference	Variance significance	(t) value
		Means	SD±	Means	SD±			
Red blood cells	Million/mm ³	5.34	0.21	5.26	0.19	0.08	0.24	0.88
White blood cells	1000/mm ³	14.5	2.41	14.03	2.1	0.49	0.84	1.53
Blood platelets	Mlg/100ml	258.4	83.43	242.8	84.9	15.57	23.28	1.77
Systolic blood pressure	Mm mercury	133.57	7.48	134.28	11.34	0.71	7.32	0.26
Diastolic blood pressure	Mm mercury	102.86	4.88	80.71	3.45	22.14	4.88	12*
Pulse	B/min	114.43	10.78	112.57	12.35	1.9	6.99	0.70

(t) table value on $p \leq 0.05 = 1.94$

Table 5: Variance percentage between pre- and post- measurements on physiological variables (n=7)

Variables	Measurement	Pre-test Means	Post-test Means	Variance Percentage (%)
Red blood cells	Million/mm ³	5.34	5.26	%1.5
White blood cells	1000/mm ³	14.5	14.03	%3.4
Blood platelets	Mlg/100ml	258.4	242.8	%6.4
Systolic blood pressure	Mm mercury	133.57	134.28	%0.5
Diastolic blood pressure	Mm mercury	102.86	80.71	%27.4
Pulse	B/min	114.43	112.57	%1.6

(t) table value on $p \leq 0.05 = 1.94$

The researchers think that the compound helped decreasing body temperature which, in cases of increase, may lead to fainting. Table 4 showed that variance percentage between pre- and post-tests were 17.1% for glucose and 2.1% for skin temperature. This assures the first hypothesis.

Table 5 indicated statistically significant differences between pre- and post-tests in diastolic blood pressure (t value = 12 while t table value = 1.94). Other physiological variables did not notice any significant differences. The researchers think that these results are due to the duration of treatment with the compound which has a vital effect. This is consistent with the results of several previous studies [9,15,25].

Table 6 indicated weak variance percentages for red blood cells (1.5%), white blood cells (3.4%), blood platelets (6.4%) and systolic blood pressure (0.5%) while diastolic blood pressure was high (27.4%). The researchers think that is due to the timing of measurement as it is taken after effort which leads to changes in blood pressure. This is consistent with a previous study indicating a decrease in blood pressure due to increased training load as this is a temporary condition indicating that the body can not adapt to the load [26]. The recommended compound affected, partially, the diastolic blood pressure as shown in Tables 5 and 6. This assures the second hypothesis.

CONCLUSION

The Researchers Concluded the Following:

- The recommended nutrition compound had a significant effect on glucose and skin temperature during training.
- The recommended nutrition compound had no significant effect on internal body temperature.
- The recommended nutrition compound had no significant effect on red blood cells, white blood cells, blood platelets, systolic blood pressure and heart rate.
- The recommended nutrition compound helped decreasing skin temperature and maintaining internal temperature and this, in turn, helped wrestlers to exert effort and reduce fatigue.

RECOMMENDATION

The Researchers Recommend the Following:

- Using the recommended nutrition compound, with the recommended ratio, for the investigated age group.
- Using the recommended nutrition compound, with the recommended ratio, for the investigated age group to maintain temperature balance and decrease skin temperature.

- Performing more studies to identify the effect of honey and other nutrition compounds on other physiological variables in wrestlers.

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