International Journal of Advanced Sport Sciences Research Vol. 6, No. 4, December 2018, 815-819

The Effect of Carbohydrate Loading in Developing of the PhosphagenCapacities and Some kinds of MuscleStrengthfor theHandball Players

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Article Info

Received: August 13, 2018
Accepted: November 15, 2018
Published online: December 1, 2018

Abstract:

Study of dietary supplements in sport training is very important because dietary supplements contribute to the increase of energy after the metabolic processes which resulting from the analysis of the ATP compound, especially carbohydrate importance in energy production. The problem of the study is the lake of interest in the use of carbohydrate to produce energy which assists in developing of physical player capacities in general and muscular strength especially for player of handball needs to a good physical strength. Aim of the study to identify the effect of carbohydrate loading in developing the phosphagen capacities and some of muscular strength for the handball players. The study concluded that used glucose doses (100-200g) in regular times result in increasing of muscles and liver glycogen store, the advantage of glucose intake depending on the nature of time was in favor of time (one hour before the effort, 3 hours before the effort), given that 200g glucose is better than 100g glucose to increase the metabolic.

Keywords: Carbohydrate, Phosphagen, Muscle Strength, Handball.

1. Introduction:

One of the sciences that interested by some searchers and specialists is physiology, especially in aspect of biochemistry and nutrition because nutrition science is a science to study components of human body requiresof needed nutrients to do physical effort and benefit of it according to variables (age, gender, function processes such as tissue structure and energy production, and health situation, etc), nutrition science is very important to the sport depending on advanced methods to determine the best kind of nutrition that is suitable to sportsman to do their effort such as energy production and metabolism.

Nutrition programs are a regular and recent method to increase the energy of athletic in general and to handball player especially which need them to achieve the movement tasks, the Scientifics confirm that sport training that does not rely on codified nutrition will not be benefit, and there are a set of necessary materials for working muscles and they are a fuel to energy production such (Carbohydrates, Fat, and Protein) which product a high energy materials through series of fast

biochemical operations including (ATP and CP), Metabolism processes give an energy to player by depending on amount of food that player is eaten before exercise training.

Carbohydrate is a main material in energy production for it is an important stuff to the body where it is easy to assimilation and release the (ATP) component, carbohydrate is arguably the most important source of energy for athletes. No matter what sport you play, carbs provide the energy that fuels muscle contractions. Once eaten, carbohydrates breakdown into smaller sugars (glucose, fructose and galactose) that get absorbed and used as energy. Any glucose not needed right away gets stored in the muscles and the liver in the form of glycogen. Once these glycogen stores are filled up, any extra gets stored as fat(Ibraheem and Yousef., 2000).

Adequate carbohydrate intake also helps prevent protein from being used as energy. If the body doesn't have enough carbohydrate, protein is broken down to make glucose for energy. Because the primary role of protein is as the building blocks for muscles, bone, skin, hair, and other tissues, relying on protein for energy (by failing to take in adequate carbohydrate) can limit your ability to build and maintain tissues. Additionally, this stresses the kidneys because they have to work harder to eliminate the products of this protein breakdown. Given the important of carbohydrate in metabolism, the study interests to the effect of carbohydrate especially glucose because is a main source for the energy and to employ its importance in increasing physical exertion because of handball game one of the team games which are a mixture system.

The scientific developing needs to increase functional efficiency by using some of assistance methods (e.g nutrition), given that don't using a special program by the players built on the basis of right scientific such as identifying those instruments are randomly without determiningthe amount of substance covered or determine the time of give it as a type of using activity for handball player, and to looking for new methods to increase physical exertion faster and because of a lake of performance and level back, lake of the body function systems capacity,and less regular and coordinate nutrition which contribute to raising the level.The study aims to identify the effect of carbohydrate loading in phosphagen capacities and in some kinds of muscle strength.

2. Theoretical Studies:

2.1 Carbohydrate:

The roles of carbohydrate in the body includes providing energy for working muscles, providing fuel for the central nervous system, enabling fat metabolism, and preventing protein from being used as energy. Carbohydrate is the preferred source of energy or fuel for muscle contraction and biologic work (Costill and Miller., 1980).

After carbohydrate is eaten, it is broken down into smaller units of sugar (including glucose, fructose and galactose) in the stomach and small intestine. These small units of sugar are absorbed in the small intestine and then enter the bloodstream where they travel to the liver. Fructose and galactose are converted to glucose by the liver. Glucose is the carbohydrate transported by the bloodstream to the various tissues and organs, including the muscles and the brain, where it will be used as energy.

If the body does not need glucose for energy, it stores glucose in the liver and the skeletal muscles in a form called glycogen. If glycogen stores are full, glucose is stored as fat. Glycogen stores are used as an energy source when the body needs more glucose than is readily available in the bloodstream (for example, during exercise). The body has limited storage capacity for glycogen (about 2000 calories), which is why carbohydrate is commonly referred to as the limiting fuel in physical performance (Coyle and Coyle., 1993).

Carbohydrate is divided into two main parts as following:

1- Benefit Carbohydrate: these carbohydrates are digested in the gastrointestinal tract and are absorbed and utilized is composed of sugars and starches.
2- Unbenefited Carbohydrate: Consisting of fibers such as cellulose which is not good for body and doesn't feed the body largely because of the lack of an enzyme that helps to be absorbed in the human body and has indirect benefits for the body (Kais and Mazin., 1991).

2.2 Phosphagen energy system:

The quickest and most powerful source of energy for muscle movement. The phosphagen system is a form of anaerobic metabolism. It uses creatine phosphate to generate ATP (adenosine triphosphate, the chemical which provides energy for all body processes). Unfortunately, it will support activity for only about 10 seconds, just enough time for top-class runners to complete a 100 meter sprint. Although the phosphagen system produces only a little ATP, it generates energy very quickly. This provides the maximal power needed for short bursts of activity, such as when a sprinter explodes out of the blocks, or when a weight-lifter performs a clean-and-jerk. Creatine phosphate is stored in muscle and its depletion causes fatigue. Dietary supplements which increase creatine phosphate levels in muscles may delay fatigue and improve the explosive power of sprinters and other athletes (Baha., 2000), Kreider., (2003) showed that persons who eat a vegetarian diet have a high reaction due to an increase of thiscompoundinto muscles.

2.3 Specifications of Phosphagen system:

1- Does not depend on a long series of chemical reactions fast system.
2- Does not depend on the waiting of conversion of respiratory air oxygen to the working muscles.
3-Muscles storage each of (ATP-CP) directly.
4- Depend on CP to product the energy.

Melhim said that ATP-CP system provides immediate energy through the breakdown of these stored high energy phosphates. If this energy system is 'fully stocked' it will provide energy for maximal intensity, short duration exercise for between10-15 seconds before it fatigues (Melhim., 1999). Whereas Abu Al-Aulla and Mohamad (1993) found that some of activities are under this system as following:

1- Movement maximum strength.
2- Stable maximum strength.
3- Strength speed.

3. Methodology:

Researcher used experimental approach because it is suitable for the study.

3.1 Subjects:

Researcher is identified subjects of the research intentionally; they are handball players of the Babylon university team. The number of the players is (12), researcher divided the subjects onto two groups where each group consist of (6) players. One of group takes a (200)gmdose before one hour of the tests and another group takes a (200)gm dose before 3 hours of the tests. Researcher achieved equal operation between subjects by using pre-test as shown in table (1).

Table (1) shows pre-tests for the share median and tabulated and calculate (K^2) median of the 200 gm glucose dose.

Capacities	Variables	Units	Share Median	Calculate median K^2	Tabulate median K^2	Significant
Oxygen capacities	Sargent Test	cm	680.52	5.33	5.99	No
	10 second test	Second	40.74	3.99		No
Physical capacities	Strength endurance	Minute	36	3.15		No
	Arms strength speed	Second	11	3.15		No
	Legs strength speed	Cm\Second	0.43	1.8		No
	Arms explosive power	Second	8.5	5.85		No
	Legs explosive power	Cm\Second	0.35	3.99		No

3.2 Characteristics of Measurement:

1- Anthropometric measurements:

Researcher measured the weight of the players by electronic device because it is very important to get the values of some anaerobic capacities by scientific quotations. In addition, researcher measured the length of players to know tests values eg (Sargent), amount explosive power and legs strength speed.

2- Phosphagenanaerobic capacities:

- Vertical jump test to Sargent (Robert., 2000) picture (1,2, and 3).
- Purpose: Measurement of Phosphagen without oxygen capacities.
- Required resources: Tape Measure, wall, chalk, step ladder, assistant and scales.
- Performance characteristics: The athlete warms up for 10 minutes and then the athlete chalks the end of his/her finger tips, after that the athlete stands side onto the wall, keeping both feet remaining on the ground, reaches up as high as possible with one hand and marks the wall with the tips of the fingers (M1). The athlete from a static position jumps as high as possible and marks the wall with the chalk on his fingers (M2), the assistant measures and records the distance between M1 and M2. The athlete repeats the test 3 times, the assistant calculates the average of the recorded distances and uses this value to assess the athlete's performance.

To get the Phosphagen capacity can using this quotation.

Phosphagen capacity = 21.67 x Weight (Kg) x difference between two distances

Pictures (1,2, and 3) show Sargent test

3- Step test (10 Second) (Robert, et al., 2003):

- Purpose: Measure of phosphagen anaerobic capacity.
- Equipment required: The platform needs to be of solid construction, and the height will be 40 cm. We need also a stopwatch, and we need a metronome or pre-recorded cadence tape.
- Procedure:The athlete steps up and down on the platform for 30 second.
- Scoring: The results are based on the number of steps up and down. Picture (4) shows step test, we can get the value of phosphagen anaerobic capacity from fowling equation:

$$\text{Phosphagen capacity} = 1.33 \times \frac{\text{Body weight (kg)} \times 0.4\text{ m} \times \text{number of steps in 10 second}}{\text{Time 10 second}}$$

Picture (4) shows step test

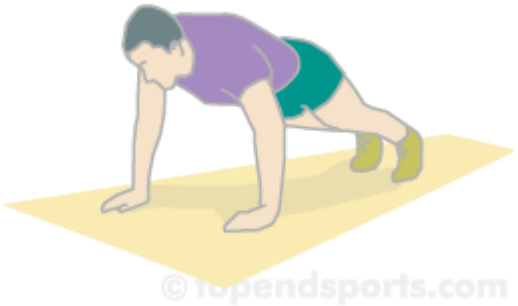
4- Physical Tests: Researcher measured following physical capacities (Strength endurance, Explosive strength, Strength speed) depend on experts nominated.

1- Strength endurance (McGill and Stuart., 1999):
- Sit-up: The sit-up is an abdominal strength endurance training exercise commonly performed to strengthen the abdominal muscles. Sit-ups have a fuller range of motion and condition additional muscles, picture (5) shows sit-up.
- Tools: whistle and handball court.
- Procedure: It begins with lying with the back on the floor, typically with the arms across the chest or hands behind the head and the knees bent in an attempt to reduce stress on the back muscles and spine, and then elevating both the upper and lower vertebrae from the floor until everything superior to the buttocks is not touching the ground.
- Scoring: calculating the number of times that players are carried until exhaustion.

picture (5) shows sit-up

2-Speed Strength for Arms (Qais and Ahmad., 1984):
- Name of test: Push-up test
- Purpose: Measure upper body speed strength.
- Tools: We will need a floor mat, metronome (or audio tape, clapping, drums), stopwatch, wall, chair.
- Procedure: A standard push up begins with the hands and toes touching the floor, the body and legsin a straight line, feet slightly apart, the arms at shoulder width apart, extended and at a right angles to the body. Keeping the back and knees straight, the subject lowers the body to a predetermined point, to touch some other object, or until there is a 90-degree angle at the elbows,

then returns back to the starting position with the arms extended. This action is repeated, and test continues until 10 second, Picture (6) shows the test.
- Scoring: Record the number of correctly completed push-ups for 10 seconds.



Picture (6) shows the test

3- Speed strength for Legs (Risan., 1989):
- Name of the test: Vertical Jump Test from Movement.
- Purpose: Measure of speed strength for legs.
- Tools: Measure tape, chalk for marking wall, and wall highest (3m).
- Procedure: The athlete stands side on to a wall and reaches up with the right hand that is closest to the wall. Keeping the feet flat on the ground and then athlete starts to run 3 meters and Attempt to touch the wall at the highest point of the jump, the point of the fingertips is marked or recorded, as shown in picture (7).
- Scorning: Three attempts isgiven and the best one is recorded.

Picture (7) shows Vertical Jump Test

4- Explosive strength for arms (Mohammad., 2002):
- Test: Throw a ball medical talent (3 kg) of sitting on the chair.
- Materials: Measuring tape, medicine balls (3 kg green ball), chair, and whistle.
- Procedure: Athlete should be set up by a chair that allows approximately 20 feet of extended open space, holding the ball with both hands, bring the ball into back of head and then throw the ball out directly in front of you, keeping your arms extended, three attempts are given for the athletes, picture (8) shows the test.
- Scoring: Calculate the distance from the chair to where the longest thrown ball landed, the best throwing is accepted.

Picture (8) shows test of throwing the ball during sitting on the chair

5- Vertical jump test to measure explosive strength for legs used the same Sargent test.

3.3 Main Experiment:

Experiment started on April 22, 2012 after two days of the pre-tests and competed on April 29, 2012, whereas dietary program between two tests was included Glucose substance (powder) which contains a little bit of carbohydrate and then mix the powder with seven up to help on fast dissolve, player drinks a (100g) before one hour of effort and before 3 hours of effort, After one week of first experiment the players take second doses. It is (200g) and the same times of first experiment.

3.4 Statistical Analysis: Researcher used SPSS to analysis the results.

- Spearman Coefficient.
- Percentage.
- Median arrangement.
- Average Deviation.
- Median for two samples.
- K^2 for two samples.

4. Results and Discussion:

Table (2) shows pre and post- effort for value of median, average deviation, calculated and tabulated k^2, and different significance of tests

Table (2) shows pre and post-tests for the median, average deviation, and tabulated and calculate (K^2) median of the 100 gm glucose dose before one hour of test.

Capacities	Variables	Units	Pre test		Post test		Calculate median K^2	Tabulate median K^2	Significant
			Median	average deviation	Median	average deviation			
Oxygen capacities	Sargent Test	cm	631.85	48.48	736.29	101.06	0	0	S
	10 second test	Second	42.56	1.5	50.29	4.96	1	0	No
	Strength endurance	Minute	31	1.5	49.5	4.5	0	0	S
Physical capacities	Arms speed strength	Second	13.5	3.5	14.5	2.5	3	0	No
	Legs speed strength	Cm\Second	0.56	5.13	0.62	0.11	0	0	S
	Arms explosive power	Second	8.75	0.5	10.5	0.38	0	0	S
	Legs explosive power	Cm\Second	0.42	0.06	0.50	0.01	0	0	S

Table (3) shows pre and post-tests for the median, average deviation, and tabulated and calculate (K^2) median of the 100 gm glucose dose before 3 hours of test.

Capacities	Variables	Units	Pre test		Post test		Calculate median K^2	Tabulate median K^2	Significant
			Median	average deviation	Median	average deviation			
Oxygen capacities	Sargent Test	cm	668.45	60. 69	571.67	88.75	1	0	No
	10 second test	Second	36.27	2.66	45.33	2.92	1	0	No
	30 second test	Second	36.23	4.90	44.45	5.16	0	0	S
Physical capacities	Strength endurance	Minute	30	1.5	31.5	2.5	0	0	S
	Arms speed strength	Second	12	0.75	12.5	1	6.5	0	No
	Legs speed strength	Cm\Second	0.38	0.050	0.48	0.045	0	0	S
	Arms explosive power	Second	9	0.25	10.25	0.63	0	0	S
	Legs explosive power	Cm\Second	0.37	0.028	0.45	0.035	0	0	S

Table (4) shows effect of the 200 gm glucose dose before 1 hour of effort in physical and phosphagen capacities.

Capacities	Variables	Units	Pre test		Post test		Calculate median K^2	Tabulate median K^2	Significant
			Median	average deviation	Median	average deviation			
Oxygen capacities	Sargent Test	cm	543.43	730.5	655.23	139.59	0	0	S
	10 second test	Second	38.44	5.9	52.44	6.2	0	0	S
	Strength endurance	Minute	35	2.75	42.5	5	0	0	S
Physical capacities	Arms speed strength	Second		0.25		1.75	0	0	S
	Legs speed strength	Cm\Second	0.43	0.5	0.45	0.04	4	0	No
	Arms explosive power	Second	7.57	0.2	9.5	0.08	0	0	S
	Legs explosive power	Cm\Second	0.38	0.020	0.45	0.015	0	0	S

Table (5) shows effect of the 200 gm glucose dose before 3 hours of effort in physical and phosphagen capacities.

Capacities	Variables	Units	Pre test		Post test		Calculate median K^2	Tabulate median K^2	Significant
			Median	average deviation	Median	average deviation			
Oxygen capacities	Sargent Test	cm	556.14	57.45	705.58	48.42	0	0	S
	10 second test	Second	38.30	0.78	42.99	0.84	0	0	S
	Strength endurance	Minute	40	2.25	32.5	1.28	5	0	S
Physical capacities	Arms speed strength	Second	10	0.5	12.5	1	0	0	S
	Legs speed strength	Cm\Second	10.5	0.04	15	0.03	0	0	S
	Arms explosive power	Second	9	0.63	10.25	0.38	0	0	S
	Legs explosive power	Cm\Second	0.35	0.008	0.45	0.45	0	0	S

Results of study showed significance differences between pre and post-tests of phosphagen capacity in Sargent test when researcher was given to players a (100g) dose before 0ne hour. As well as showed significance differences between pre and post-tests and in favor of post-tests in phosphagen capacities. On the other hand, showed improvement in phosphagen capacities after take a (200g) of glucose before one and 3 hours of effort.

Based on what mentioned above the doses of glucose (100 or 200 gm) before effort and at different times have a positive impact on the development of phosphagencapacity and different values both by the amount and type of dose or determined time for a dose of glucose allocated to player and this is evidence of the importance of the glucose and its impact on physical activity because it is main source of energy that can be produced through the fission of sugar in the absence of oxygen to produce the necessary energy that generate calories required for duty or motor performance "The main material that produce energy is been carbohydrates that are suitable for demolition by anaerobic methods through glycogen decomposition, so athletic food have to be rich in carbohydrate from non- athlete food (Ali., 1994).

The importance of the solution of glucose in the performance of physical effort for a solution is fast absorption and quick compensation when need to him. To link the process of decomposition of glucose for energy production to process no oxygen decomposition that showed in research results to compound (ATP), which helps the body to be supplied with no oxygen energy and all of the processes of anaerobic and aerobic glycolysiscontribute effectively to the re-formation of energy in longraces (Muhammad., 1999).

So that the use of a solution of glucose has had an effect on the efficiency of chemical processes to obtain a compound of the (ATP) and lift-off in the range of the dose that drinkby the player and that has helped research sample at rates varying on increasing no oxygen energy efficiency that handball player is needed throughquick movement with or without the ball such as fast break skill.

Also, note the results lead to realize that the importance of glucose for handball player vary depending on the amount of dose and according to the type of system whether phosphagen or lactic, and the fact that the results indicate the importance of increasing the relationship phosphagen more than lactated and thereby increase the production of a compound of the (ATP) by using phosphagen system and then handball player achieves the best in the application of good performance to reach the mathematical level required of him. The researcher attributes this because link handball game to phosphagensystem (Abou El Ela., 1997).

Results of the study showed significant differences between pre and post efforts and in favor of post-tests in physical capacities and this different is explained by researcher that physical capacities are affected by glucose doses where glucose has high affects in muscle working during oxygen and no oxygen decomposition process for energy because of carbohydrate is basic energy source which handball player upon it through the feeding muscle tissue through the blood.

Energy system which is promoted by glucose contribute to increase oxygen consumption in active muscles and then increasing of rate of hemoglobin in blood and in muscles and result in rising support enzyme concentration of the chemical reactions and improve active muscle metabolism through rising muscle function working efficiency especially legs and arms and hip muscles for the handball players. Eating a diet rich in carbohydrate increases the ability to perform physical work with a high intensity, the ratio of the concentration of sugar glucose in blood drop below normal level after performing muscle work of high intensity which lasts for a certain period(fox., 1984).

Because of this increases the importance of the solution of glucose with varying doses and times in association with strength endurance through the help of a handball player to continue inmuscle work as a long as time and the ability to cope with fatigue by taking advantage of the liberalization of the energy of the no oxygenwith two systems (phosphagen and lactic) which dependents on speed-strength of the arms and strength explosive of the arms and legs mainly.

As for the physical capacities which did not notice any significant differences have evolved in the values of the median, especially speed-strength of the arms when given a dose of 100

g before (1) hour of effort and by 3 hours of effort and speed-strength of the legs (when given a dose of 200 g before 1 hour of effort) not influence the amount of the administered dose as were not enough to make a change or variation of time or to genetic factors or conditions concerning the type of game and the test. Whenever the nature of the game Handball require fast moves on the court, the more work devices decisiveness different greater the introduction of energy anaerobic and so could not the player to continue performance with high efficiency all the time, so the rules of the game allow the change players during the game and to achieve the upper levels, it is the next development of the estimated anaerobic attention must be paid to the development of aerobic estimated the player and also improve endurance in games need to developing strength, speed, and agility. For the purpose of this statement function differences researcher used the test median (two groups).

Table (6) shows median and median of K^2 calculate and tabulate between (100 and 200g) doses of the glucose for one hour before test.

Capacities	Variables	Units	Share Median	Calculate median K^2	Tabulate median K^2	Significant
Oxygen capacities	Sargent Test	cm	739.95	1.33	3.84	No
	10 second test	Second	50.25	3.09		No
Physical capacities	Strength endurance	Minute	47	1.33		No
	Arms strength speed	Second	15.5	1.33		No
	Legs strength speed	Cm\Second	0.50	8.57		S
	Arms explosive power	Second	10	8.57		S
	Legs explosive power	Cm\Second	0.45	3.09		No

Table (7) shows median and median of K^2 calculate and tabulate between (100 and 200g) doses of the glucose for 3 hours before test.

Capacities	Variables	Units	Share Median	Calculate median K^2	Tabulate median K^2	Significant
Oxygen capacities	Sargent Test	cm	615.7	1.33	3.84	No
	10 second test	Second	42.96	1.50		No
Physical capacities	Strength endurance	Minute	35	2.4		No
	Arms strength speed	Second	14	3.09		No
	Legs strength speed	Cm\Second	0.50	1.50		No
	Arms explosive power	Second	10.5	3.09		No
	Legs explosive power	Cm\Second	0.45	4		S

Tables 7 and 8 discuss the results of differences influence of two doses (100 and 200g) of glucose in the physical and phosphagen capacities depending on the nature of time. The aim in a variation of this timelessness in giving doses of a solution of glucose to show us any time better to give a solution of glucose and in favor of any dose, which is the tonic nourishing for the human body.

The different sources to clarify the time to give a meal that will help the player to do the effort by providing the energy needed, Macardal (2000) stated from a scientific point that the only way to avoid the negative effects of sugar intake by the effort for a period of not less than (60) minutes prior to this effort gives us the hormonal balance before the beginning of the effort. In other study has done by Adel which aimed to identify the effects of a dose of a compound mixture natural diet on time performance, the results showed that the mixture has positive impact on the performance of time before one hour of physical effort (Adel., 2000). Whereas Abidullah clarified that should eat before (2- 2.5) hours of training and before the game about (2- 4) hours. From the above we note that this applies to the search results as the reduced duration of (1-3) hours better than other times, to provide the energy needed to do the vital activity. In addition, Macardal (2000) stated many important tasks to intake sugar before effort as following:

1- An emergency increasing in the proportion of insulin secretion which increases the lack of sugar in the blood and this may in turn affects the reaction of the brain through effort.
2- Affected by the amount of sugar that comes from the muscles, it affects on sugar decomposition found in the muscles and using it as energy sugar, at the same time increasing the proportion of the insulin reduces fat analysis and this reduces the proportion of fatty acids that come out of the fat tissue.
3- Other studies referred to eating sugar by the player before the exercise increases the proportion of sugar in the muscle but reduces the concentration of glucose in the liver to reduce the degree of the liver's ability to store carbohydrates.
4- Used glycogen dose which is used as energy source in the third day lowest dose on the first day and show as remunerative of a lack of glycogen.

Above results agreed with current study results and no show a significant difference only relative difference in the values of the share median is evidence that the difference time of giving glucose based on type of exercise and effort given to the player by the amount of energy used for that effort. Given that the researcher agrees with Macardal about time of giving glucose on time of required effort to reduce glycogen store through using it in other activities because it is very fast in absorption and these velocities in the absorption of glucose lead to no hormonal imbalance, especially the insulin which affects the level of blood sugar in addition to those occurring in inventories glycogen affects the brain in response to the difficult meta sent to the body.

5. Conclusions:

The study concluded that used glucose doses (100-200g) in regular times result in increasing of muscles and liver glycogen store, the advantage of glucose intake depending on the nature of time was in favor of time (one hour before the effort, 3 hours before the effort), given that 200g glucose is better than 100g glucose to increase the metabolic.

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