

Effect of glutamine supplementation on physical fitness and some physiological variables level for soccer youngsters

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Abstract: Aim of this study was to determine the effect of glutamine supplementation on physical fitness and some physiological variables level for soccer youngsters, the researcher used the experimental method pre-post measurement, (20) soccer youngster were chosen from Port Fouad club under (16) years to participate in the study, (10) players as experimental group and (10) players as control group, the experimental group administered glutamine (5) grams per day after training unit for (42) days, the control group administered placebo after training unit for (42) days, (5) ml blood was withdrawn before and after the experiment for all participants for determine level of... T.protein, b. FGF and testosterone beside physical fitness variables... transient speed, endurance of speed, muscular ability for arms and legs and endurance of strength, in conclusions, glutamine supplementation improve physical fitness level with improvements of T. protein, b. FGF and testosterone for soccer youngsters.

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Key words: Glutamine - Physical fitness - Physiological variables - Soccer youngsters

1. Introduction and research problem

Sports supplements are part of the integrated nutrition approach, scientific studies show that in addition to well-known benefits of maintaining proper health, physical and mental performance can be enhanced with sports nutrition supplements, Protein offers a convenient and economical way to get daily high quality protein intake, for maximum aerobic energy which is of interest to long distance athletes, special drink can be used, recent research also supports the use of supplement nutrition therapy to help reduce pain and inflammation and heal injuries.

Hatfield (2013), Hamed El-Ashkar (2013) reported that glutamine is one of the eleven non-essential amino acids, (60%) of our glutamine is found in the skeletal muscle with the remainder residing in the lung, liver, brain and stomach, more than (60%) of amino acids come in the form of glutamine and during time of stress, glutamine reserves are depleted and need to be replenished through supplementation. (19: 566), (17: 362).

Hussein Heshmat (1997) stated that the nutrition plays an important role in increasing growth and activities of athletes, building of the body needs many elements such as amino acids in right amounts are the building stones of protein. (22: 127).

Heshmat and Mohamed (2009) added that the proteins have many functions such as formation of the nucleus and protoplasm of the cells, enzymes, actin and myosin for contraction, hormones, plasma proteins, albumin, globulin and fibrinogen, hemoglobin, antibodies and health, enter in repair

operation of wounds, recovery of healings, give the muscle the property of contraction. (21: 205).

Mohamed Hefnawi (1997) stated that the natural herbs are amusing world of much secrets that the scientist tried to reach by evaluation and studying, due to their importance in curing the diseases and act as a prophylactic measures and complement nutritional values, rich in energy production and viability which may be used as a substitution of the doping materials their negative and side effects. (27: 36).

Carling (2005) reported that football match play can be sustained for a long period reaching more than (90) minutes, which lead to decreased muscle activity and a longer of energy which is reflected in the decline of work rate towards the late part of the game, which might be replaced through the special nutritional practices to encounter the resulting fall in physical performance. (9: 6).

However, Calles et al. (1995), Levadoux et al. (2001) stated that the age related decline in metabolic rate and increase in body fat accumulation is related specifically to a decrease in muscle mass and not aging. (8: 266), (24: 39).

The aim of this study was to determine the effect of glutamine supplementation on physical fitness and some physiological variables level for soccer youngsters.

It is hypothesized that glutamate supplementation may improve physical fitness and some physiological variables level for soccer youngsters.

2. Research procedures

Research method: The researcher used the experimental method (pre –post) measurement of a control and experimental groups due to the suitability of the nature of the study.

Research sample: (25) young soccer players were chosen from Port Fouad club under (16) years to participate in the study, (20) players for the main study and (5) players for the pilot study.

Homogeneity & equivalence of sample:

Table (1): Research sample

The club	Main study		Pilot study
Port Fouad under (16) years	20 players	10 10	5 players
		Control group Experimental group	

Table (2): Arithmetic mean, median, standard deviation, skewness in variables of age, height, weight, BMI and training experience. N=20

Variables	U of M	A. Mean	Median	S.D.	Skewness
Age	years	16.42	16.40	0.22	0.08
Height	cm	174.15	174	3.88	0.07
Weight	kg	67.25	68	3.21	-0.78
BMI	g/m ²	22.21	22.04	0.72	1.69
Training experience	years	6	6	0.89	-0.61

Table (3): Significance of differences between the control group & the experimental group in variables of the study N₁=N₂=10

Variables	U of M	S. Ranks		RanksV.		(U) value		Sig
		C	E	C	E	Table	Calcu.	
Age	years	93.5	116.5	61.5	38.5	23	38.5	no
Height	cm	88	122	67	33	23	33	no
Weight	kg	102	108	53	47	23	47	no
BMI	kg/m ²	120	90	35	65	23	35	no
Training experience	years	97	113	58	42	23	42	no
Transient speed	s	123	87	32	68	23	32	no
Endurance of speed	s	95	115	60	40	23	40	no
Muscular ability (arms)	m	89.5	120.5	65.5	34.5	23	34.5	no
Muscular ability (legs)	cm	93	116	61	39	23	39	no
Endurance of strength	count	111	99	44	56	23	44	no

Table (2) reported that skewness were between (± 3) indicating homogeneity of the sample.

Table (3) reported there are no statistically significant differences between the control group & the experimental group in variables of the study indicating equivalence between groups.

Data collection tools:

- **Height:** by using... Restameter.
- **Weight:** by using... Medical scale.
- **Body Mass Index:** by using formula... BMI = weight / height².
- **Physical fitness:** the researcher determined the tests of physical fitness which is appropriate to the nature and purpose of the study through the survey and analysis of scientific references specialized in soccer field which were obtained. (2), (13), (18), (26), (28), (33)... physical fitness tests:

1- Transient speed... (30) meter sprint... (second).

2- Endurance of speed... (30) meter sprint X (5) times... (second).

3- Muscular ability for arms... overhead medicine ball (3) kg throw (throw in position)... (meter).

4- Muscular ability for legs... steady wide jump... (centimeter).

5- Endurance of strength... bush two medicine balls by foot for one minut... (counting).

Validity & Reliability for physical fitness tests:

Validity: The researcher used the discrimination validity by applying the tests on two groups under (16) years of each (10) players from outside of the main sample, one of them from Al-Masry club and the other non-practitioners and applied tests on the groups on 02/09/2015.

Table (4) reported there are statistically significant differences between practitioners group & non-practitioners group for practitioners group, that the (U) calculated value less than the (U) tabular value Indicating validity of tests.

Reliability: The researcher used the test-retest method by applying the tests on group of players under (16) years from Al-Masry club which used before for validity and after one week on 10/09/2015.

Table (4): Discrimination validity for used physical tests between practitioners group & non-practitioners group.
N₁=N₂=10

Tests	U of M	S. Ranks		Ranks V.		(U) value		Sig
		P	Non	P	Non	Table	Calcu.	
(30) Meter sprint	S	73	137	82	18	23	18	S
(30) Meter sprint X (5) times	S	68	142	87	13	23	13	S
Overhead medicine ball (3) kg throw	m	140.5	69.5	14.5	85.5	23	14.5	S
Steady wide jump	cm	136.5	73.5	18.5	81.5	23	18.5	S
Bush two medicine balls by foot for one minuet	count	56.5	153.5	98.5	1.5	23	1.5	S

Table (5): Reliability of the physical tests by using Spearman correlation coefficient. N=10

Tests	U of M	A. mean		S. (d ²)	(r _s) value		Sig
		Test	Retest		Table	Calcu.	
(30) Meter sprint	S	4.03	4.05	10	0.648	0.895	S
(30) Meter sprint X (5) times	S	42	41.4	10	0.648	0.887	S
Overhead medicine ball (3) kg throw	m	2.21	2.18	10	0.648	0.857	S
Steady wide jump	cm	2.20	2.50	10	0.648	0.876	S
Bush two medicine balls by foot for one minuet	count	23.40	23.30	10	0.648	0.829	S

Table (5) reported there is statistically significant correlation between test-retest in used physical tests indicating high level of reliability.

- **Physiological variables:** (5) ml venous blood were withdrawn before and after the experiment for all participants for determination of... T. Protein, Fibroblast growth factors b.FGF and Testosterone hormone... by using... Elisa.

- All blood samples were withdrawn by a specialist, laboratory measurements were conducted at... Allawah laboratory in Port Said.

Pilot study:

(5) young soccer players were the participants of the pilot study, they were from the same group chosen for the study, for a period of (3) days before the study on 12/09/2015, the reason is to...

- Investigate the soundness of the equipment and tools.

- To know the problems this might face the study.

- Determine the best ways to perform measurements and record data.

Main study:

-Pre-measurements on 16/09/2015.

-The training program was applied to the experimental & control groups for (6) weeks beginning on 17/09/2015 to 28/10/2015 with (6) days training per week, (36) training units and (90) minutes training unit time.

-Experimental group administered glutamine (5) grams per day... after training unit for (42) days.

-Control group administered placebo... after training unit for (42) days.

-Post-measurements on 29/10/2015.

Statistical data analysis:

Using (SPSS) including...

-Arithmetic mean.

-Median.

-Standard deviation.

-Skewness.

-Spearman correlation coefficient.

-Mann-Whitney U test.

-Wilcoxon signed rank test.

-Rates of change formula.

3. Results

Table (6): Significance of differences between pre & post measurements in variables of the study for the control group.
N=10

Variables	U of M	N. Ranks		S. Ranks		(T) value		Sig
		-	+	-	+	Table	Calcu.	
Transient speed	S	10	0	55	0	8	0	S
Endurance of speed	S	8	0	36	0	3	0	S
Muscular ability (arms)	m	0	10	55	0	8	0	S
Muscular ability (legs)	cm	0	9	0	45	5	0	S
Endurance of strength	count	0	10	0	55	8	0	S
T.Protein	g/dl	0	10	0	55	8	0	S
b.FGF	pg/ml	2	7	4.5	40.5	5	4.5	S
Testosterone max	ng/dl	0	10	0	55	8	0	S

Table (6) reported statistical significant changes between pre & post measurements for the control group in variables of the study and for post

measurement, that the (T) calculated value less than the (T) tabular value.

Table (7): Significance of differences between pre & post measurements in variables of the study for the experimental group. N=10

Variables	U of M	N. Ranks		S. Ranks		(T) value		Sig
		-	+	-	+	Table	Calcu.	
Transient speed	S	10	0	55	0	8	0	S
Endurance of speed	S	10	0	55	0	8	0	S
Muscular ability (arms)	m	0	10	0	55	8	0	S
Muscular ability (legs)	cm	0	10	0	55	8	0	S
Endurance of strength	count	0	10	0	55	8	0	S
T.Protein	g/dl	0	10	0	55	8	0	S
b.FGF	pg/ml	0	10	0	55	8	0	S
Testosterone max	ng/dl	0	10	0	55	8	0	S

Table (7) reported statistical significant changes between pre & post measurements for the experimental group in variables of the study and for

post measurement, that the (T) calculated value less than the (T) tabular value.

Table (8) Significance of differences between control group & experimental group in variables of the study. N₁=N₂=10

Variables	U of M	S. Ranks		RanksV.		(U) value		Sig
		C	E	C	E	Table	Calcu.	
Transient speed	S	144	66	11	89	23	11	S
Endurance of speed	S	143	67	12	88	23	12	S
Muscular ability (arms)	m	72.5	137.5	82.5	17.5	23	17.5	S
Muscular ability (legs)	cm	75	135	80	20	23	20	S
Endurance of strength	count	55.5	154.5	99.5	0.5	23	0.5	S
T.Protein	g/dl	55	155	100	0	23	0	S
b.FGF	pg/ml	55	155	100	0	23	0	S
Testosterone max	ng/dl	55	155	100	0	23	0	S

Table (8) reported statistical significant changes between the control group & the experimental group in variables of the study and for the experimental

group, that the (U) calculated value less than the (U) tabular value.

Table (9) Rates of change between control group & experimental group in variables of the study. N₁=N₂=10

Variables	U of M	Control group		differences between means	Change rate%	Experim. group		differences between means	Change rate %	Change direction
		Pre.	Post.			Pre.	Post.			
Transient speed	S	5.10	4.80	0.30	5.88	5.00	4.20	0.80	16.00	E
Endurance of speed	S	30.10	29.00	1.10	3.65	30.20	28.10	2.10	6.95	E
Muscular ability (arms)	m	9.25	9.89	0.64	6.91	9.19	11.25	2.06	22.41	E
Muscular ability (legs)	cm	165.85	175.45	9.60	5.78	165.90	230.00	64.10	38.63	E
Endurance of strength	count	3.00	3.50	0.50	16.66	3.10	5.00	1.90	61.29	E
T.Protein	g/dl	5.86	6.86	1.00	17.00	5.84	8.02	2.18	37.33	E
b.FGF	pg/ml	12.10	15.90	3.80	31.40	12.4	26.00	13.60	109.60	E
Testosterone max	ng/dl	543.60	570.30	26.70	0.05	539.10	642.10	103.00	19.10	E

Table (9) reported that the experimental group outperformed the control group in the rates of change in all variables of the study.

summarized in heredity may be an important background in achieving total fitness, the environment affects all persons on condition that basic needs are met to be free of disease or injury, as one cannot consider himself fit if disease or injury in present, also personal interest is one of the major components of fitness involves personal choices from not smoking, drinking, arguing and worrying, freedom from stress

4. Discussion

Fitness indicated a good health and good physical condition as the result of exercise and proper nutrition, the components of fitness can be

as stress may affect negatively the athletic life also to leave a peaceful life, all these components will affect fitness as it is difficult to separate health and performance related physical fitness.

Tables (6 & 7 & 8) revealed the effect of glutamine supplementation on physical fitness and T.protein, b-FGF, testosterone level of soccer youngsters.

Regular exercise increases strength as seen in improvement of T.protein, b-FGF, testosterone also expressed in physical fitness level, glutamine supplementation provided an extra improvement in the physical fitness and the physiological variables level of the study.

Corbin and Lindsey (1984) Bouchard et al. (1990) Bryant and Petterson (1992) Robergs and Roberts (1997) Parise and Yarashik (2000) Mohamed and Abou El-Ella (2000) Belabradic et al. (2003) reported that there are many factors that interrelate to produce the concept of strength of the ability to contract the muscles with maximum force such as structural and anatomical factors, physical and biochemical factors, psychoneural factors, external or environmental factors, all these factors as seen in the variables tested affects force output to affect the categories of strength as absolute strength, speed strength, starting strength and explosive strength. (10: 7), (5: 12), (7:45), (32: 66), (30: 489), (25: 69), (3: 2).

Paul Cribb (2006) Daniel (2011) reported that creating and maintaining the optimal bio-environment that builds and preserves muscle actually centers around the amino acid glutamine, as muscle protein synthesis rates and protein accretion are essentially controlled by the amount of glutamine held within the cell. (31: 5), (11: 234).

However, Kimbal and Jefferson (2002) stated that glutamine is the essential fault that drives much indispensable process within the body. (23: 63).

Holecek (2002) added that glutamine is manufactured exclusively by the branched chain amino acids, leucine, isoleucine and valine. (20: 130).

Bouthegourd et al. (2002) reported that the branched chain amino acids are unique in muscle metabolism, they must be present to stimulate protein synthesis within as well as manufacture glutamine also. (6: 572).

Farouk Abd El-Wahab (1997) reported that amino acids specially glutamine, ornithine, lysine, arginine and the branched chain amino acids are the most protein used as supplement to increase the strength and speed of athletes, as they increase the muscle fibers which in turn increase strength and mass of the muscle which help to decrease the speed, this is in accordance with the data of this study as the glutamate increase strength and speed of soccer players, due to increased myofibers and led to higher

mass and more speed, so the glutamate supplement may enhance fitness in soccer players specially with planned exercise programs. (14: 109).

Essam Nour El-Din (1997) also reported the importance of supplement in enhancing performance in sport and gave some examples of supplements such as carnitine, creatine, inosine, chrome and glutamine acid, also minerals and vitamins, he stressed on the use of glutamine as a supplement as it is released as a natural product from the muscle, liver, brain in male and female, as it plays a basic role to transport glutamine acids to be used for energy production by the WBC cells, also it helps as nutritional metabolism of amino acids, this helps to spare glycogen of the muscle which in turn decreased lactic acid utilization and retard fatigue. (12: 155).

This is in accordance with the data of this study table (7), that supplements specially protein helps muscle strength and speed of the soccer youngsters. .

Abou El-Ella (1997) stated that the protein supplement plays an important role in athletes performance, as creatine supplementation helps to regenerate ATP and act as a buffer element to get acid of hydrogen ions and helps in transport of ATP to the muscle fibers to be used in energy production, he also added that creatine is used for muscle loading in a dose of (30) grams daily, so creatine can be used as an anabolic agent as it is naturally found in the muscle and it is used specially by dite athletes which lead to increase the muscle bulk, strength of the muscle and muscular power which also increase the speed in running athletes, boxers and soccer players. (1: 145).

This is in accordance with the results of the study in table (7), as proteins enhance performance in many sports studied.

Tables (8 & 9) indicated that glutamine supplementation affected positively on physical fitness levels, this result is in agreement with Bianca, T. et al. (2011) they revealed that glutamine affect positively on physical fitness, this was also in accordance with the study of Green and Patla (1992) Franchini et al. (1998) Noakes (2001). (4: 799), (16: 299), (15: 2152), (29: 3225).

Conclusion

Glutamine supplementation improves physical fitness level with improvements of T. protein, b. FGF and testosterone for soccer youngsters.

Recommendation

It is recommended to use glutamine supplementation due to its importance in improving physical fitness, T. protein, b.FGF and testosterone level for soccer youngsters.

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