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# Carnitine Supplementation Affects Some Biochemical Variables and Level of 400 Meters Crawl in Swimmers

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***Abstract***
*This research aims to identify the effect of taking carnitine supplementation on some biochemical variables (ammonia, amino acids and lactic acid) and level of 400 meters crawl swimmers. The researcher utilized the experimental approach, the pre and post design for one group, with (12) swimmers from Tanta Sport Club team U 15, who were selected by deliberate way. Results: (1) Taking compound of carnitine reduces rates of (ammonia - amino acids - lactic acid) in 400 meters crawl swimmers U 15. (2) Taking compound of carnitine has a positive effect on achievement level of 400 meters crawl swimmers U 15. The researcher recommended that Swimmers should take compound of carnitine as a supplementation as its importance in overcomes the increase in rates of (ammonia - amino acids - lactic acid). The necessity of eating meals includes a high proportion of antioxidants during competition.*

***Key words:*** *Carnitine - Supplementation – Biochemical - 400 meters crawl.*

## Introduction

In recent years, a multitude of dietary supplements and nutrition strategies have been promoted as "magic bullets" to boost fat metabolism, reduce body fat, and improve athletic performance. Though some of these substances may enhance exercise capacity and, in particular, fat metabolism, most claims are based on anecdote, testimony, and inventive marketing, rather than sound science.

The search for strategies to improve athletic performance has prompted a recent surge of interest in nutrition practices that, in theory, could promote fatty acid oxidation, slow carbohydrate utilization, and improve exercise capacity. However, most of these interventions have little or no scientific basis and should not be recommended for use by healthy individuals or athletes to improve exercise performance.

Carnitine (L-3-hydroxytrimethylaminobutanoate) is a naturally occurring compound that can be synthesized in mammals from the essential amino acids lysine and methionine (Bremer J, 1983), or ingested through diet. Primary sources of dietary carnitine are red meat and dairy products; however, commercially-produced supplements are also available and have been shown to be safe in humans (Rubin MR., 2001). Carnitine is stored primarily in skeletal muscle, but is also found in plasma (although in much smaller concentrations) (Ramsay, R. R., 2001).

Previously observed enhanced carbohydrate (CHO) oxidation during 60 min cycling exercise in endurance-trained males following supplementation with Carnitine for 2 weeks (Abramowicz & Galloway, 2005), whereas the promoted benefits of carnitine supplementation include increased fat oxidation.

Studies in athletes have shown that carnitine supplementation may foster exercise performance. As reported in the majority of studies, an increase in maximal oxygen consumption and a lowering of the respiratory quotient indicate that dietary carnitine has the potential to stimulate lipid metabolism. Treatment with carnitine also has been shown to induce a significant post exercise decrease in

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plasma lactate, which is formed and used continuously under fully aerobic conditions. Data from preliminary studies have indicated that carnitine supplementation can attenuate the deleterious effects of hypoxic training and speed up recovery from exercise stress.

Muscular exercise causes rapid adenosine triphosphate consumption, and energy deficiency is an important factor in fatigue (Sahlin K, 1998). Thus, exogenous dietary substances that can lead to adenosine triphosphate production are considered to be candidate anti physical fatigue materials.

In addition, physical exercise inducing fatigue elevates blood ammonia level (Mutch BJ, 1983), and cerebral ammonia uptake and accumulation during exercise provoke the subjective feeling of fatigue (Nybo L, 2005).

This research aims to identify the effect of taking carnitine supplementation on (ammonia, amino acids and lactic acid) and level of 400 meters crawl swimmers.

## Procedures

### The research sample:

The researcher utilized the experimental approach, the pre and post design for one group, with (12) swimmers from Tanta Sport Club team U 15, who were selected by deliberate way, Their age, height, weight, training age and level of 400 m crawl were 13.95 ± 0.65 years, 162.50 ± 5.19 cm, 55.25 ± 4.33 kg, 4.80 ± 0.90 years, and 4.31 ± 0.15 minutes, respectively (Mean ± SD), and biochemical variables, ammonia, amino acids and lactic acid 58.33 ± 3.18 mg%, 6.91 ± 0.96 µmol/L, 5.07 ± 0.79 mmol/L, respectively (Mean ± SD).

### Tools and equipment of collecting data:

The researcher performed the pre-measures on 15/03/2012 by taking blood samples by specialist after test of 400 m crawl. Started 16/03/2012 by giving research sample a capsule of carnitine containing (350) milligrams, without taking vitamins, for a period of (1) week for (7) sessions per week until 22/03/2012. 24/03/2012 the researcher performed the post measures.

### Statistical methods:

The researcher used the SPSS 15.0, statistical program for data processing.

## Results and Discussion

***Table (1)***
***Difference Significance for Pre and Post Measures for Experimental Group in Biochemical Variables & Level of 400 m Crawl (N=12)***

| Variables | Unit | Pre | | Post | | T- stat |
|---|---|---|---|---|---|---|
| | | Mean | Variance | Mean | Variance | |
| Ammonia | Mg% | 58.33 | 3.18 | 54.02 | 2.94 | 3.98* |
| Amino Acids | µmol/L | 6.91 | 0.96 | 6.37 | 0.78 | 5.64* |
| lactic acid | mmol/L | 5.07 | 0.79 | 4.59 | 0.61 | 4.81* |
| Level of 400 m crawl | Min | 4.31 | 0.15 | 4.16 | 0.13 | 3.15* |

**** Significantly different at p<.05 =2.262***

***Table (2)***
***Rate of Improvement for Post Measures for Experimental Group in Biochemical Variables & Level of 400 m Crawl***

| Variables | Unit | N=12 | | |
|---|---|---|---|---|
| | | Pre | Post | Rate of Improvement |
| Ammonia | Mg% | 58.33 | 54.02 | 7.98% |
| Amino Acids | µmol/L | 6.91 | 6.37 | 8.48% |
| lactic acid | Mmol/L | 5.07 | 4.59 | 10.46% |
| Level of 400 m crawl | Min | 4.31 | 4.16 | 3.61% |

Table (1) shows significant statistical differences at the level of 0.05 between the two measures pre and post of biochemical variables (ammonia, amino acids and lactic acid) and level of 400 m crawl in favour of the post measuring to the pre measuring.

Table (2) shows rate of improvement for biochemical variables (ammonia, amino acids

and lactic acid) and level of 400 m crawl confined between (3.61%: 10.46%) for post measurement.

Improvement in biochemical variables (ammonia, amino acids and lactic acid) as a result of taking compound of carnitine supplementation and antioxidants which lead to improve the antioxidants function, this reduces ammonia, lactic acid and catabolism production, this results in on line with (Geen C., 2002) that taking supplementation is important to reduce production of ammonia, lactic acid and free radicals.

Taking compound of carnitine supplementation during high intensity training improves the antioxidants function and reduces rates of ammonia, catabolism, lactic acid and free radicals (D. Czarnowski, 1995) (Hongo, N., Sachan, D., 2003) (Owen Anderson, 2004) (Simanson, D., 2005).

The researcher attributes the result of improvement in level of 400 m crawl to carnitine which reduces rates of (ammonia - amino acids - lactic acid), thus delay the emergence of muscle fatigue during competition.

This result is on line with (Owen Anderson, 2004) that carnitine supplementation during swimming improves performance level and reduces rates of ammonia, catabolism, lactic acid and free radicals.

Carnitine supplementation appears to blunt the accumulation of ammonia, which may reflect reduced metabolic stress in the exercising muscle or increased ammonia removal from the circulation and this warrants further investigation.

The necessity of supplementation (Carnitine, choline, glucose, vitamins) during training, competition and at the end of competition, to increase energy production and delay the emergence of muscle fatigue, thus improves swimmers performance during training and competition (Clifte, L., et al, 2001).

## Recommendations

1. Swimmers should take compound of carnitine as a supplementation as its importance in overcomes the increase in rates of (ammonia - amino acids - lactic acid).

2. The necessity of eating meals includes a high proportion of antioxidants during competition.

3. Encourage the responsible technical swimmers training staff to rationing training loads according to nutrition table during the training seasons.

## Conclusion

Taking compound of carnitine reduces rates of (ammonia - amino acids - lactic acid) in 400 meters crawl swimmers U 15.

Taking compound of carnitine has a positive effect on achievement level of 400 meters crawl swimmers U 15.

## References

1. Abramowicz, W.N. & Galloway, S.D.R. (2005): Effects of acute versus chronic administration of L-Carnitine L-Tartrate on the metabolic responses to submaximal exercise in males and females. International Journal of Sports Nutrition and Exercise Metabolism, 15, 386-400.

2. Bremer J (1983): Carnitine--metabolism and functions, Physiol Rev, 63: 1420.

3. Clifte,L.,et.,al (2001): Carbohydrate Supplementation, Glycogen Deplaetion, and Amino Acid Metabolism during Exercise, Am J Physiol Endocrinol Metab .

4. D. Czarnowski, J. Langfort, W. Pilis, J. Górski (1995): Effect of a low-carbohydrate diet on plasma and sweat ammonia concentrations during prolonged nonexhausting exercise, European Journal of Applied Physiology and Occupational Physiology, 70, 1, pp 70-74.

5. Geen Carier (2002): Miracle treatment, new scientific discoveries, Jarir Bookstore.

6. Hongo, N., Sachan, D., (2003): Carnitine and choline supplementation with exercise alter carnitine profiles, biochemical markers of fat metabolism and serum leptin concentration in healthy women, the American Society for Nutritional Sciences J. Nutr. 133, (1): 84-89.

7. Mutch BJ, Banister EW. (1983): Ammonia metabolism in exercise and fatigue: a review. Med Sci Sport Exerc; 15:41-50.

8. Nybo L, Dalsgaard M, Steensberg A, Moller K, Secher N. (2005): Cerebral ammonia uptake and accumulation during prolonged exercise in humans. J Physiol; 563:285-90.

9. Owen Anderson (2004): Choline Supplements Essential Compound Have Helped Swimmers, Basketball Players and Distance Runners, Nutrition Supplements, Peak Performance.

10. Ramsay, R. R., Gandour, R. D. & van der Leij, F. R. (2001). Biochim. Biophys. Acta, 1546, 21-43.

11. Rubin MR, Volek JS, Gómez AL, Ratamess NA, French DN, Sharman MJ, Kraemer WJ. (2001): Safety measures of L-carnitine L-tartrate supplementation in healthy men. J Strength Cond Res. Nov; 15(4):486-90.

12. Sahlin K, Tonkonogi M, Söderlund K. (1998): Energy supply and muscle fatigue in humans. Acta Physiol Scand; 162:261-6.

13. Simanson, D., (2005): Effect of Glucose Ingestion on Ammonia Metabolism during Exercise in Human, Journal Applied Physiology.