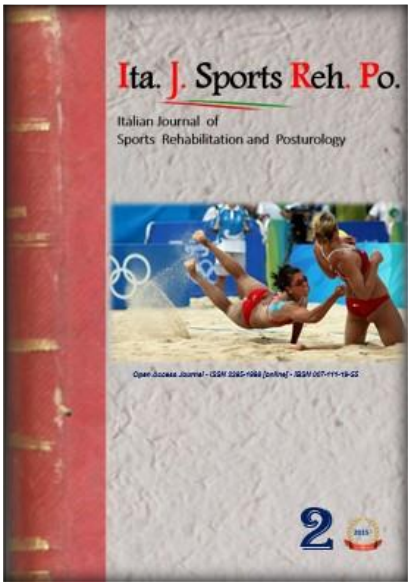
Ita. J. Sports Reh. Po.

Italian Journal of
Sports Rehabilitation and Posturology

Open Access Journal - ISSN 2385-1988 [online] - IBSN 007-111-19-55

2

2015



Editor in Chief : *Rosario D'Onofrio*
Current issue : *April 2015*
Volume : 2
Issue : *2*
Page : 211 - 258
Years : *2*
Publication Start Year : *2014*
Country of Publication: *Italy*
Title Abbreviation: *Ita J Sports Reh Po*
Language : *Italian/ English*
Publication Type(s) : *No Periodical*
Access Journal : Free (Only Members)
ISSN : *2385-1988 [Online]*
IBSN : *007-111-19-55*
ISI Impact Factor : *None*
Index : *Open Academic Journals Index (OAJI)*

Italian Journal of Sports Rehabilitation and Posturology Journal of Sports Rehabilitation and Posturology

Ita. J. Sports Reh. Po.

Italian Journal of
Sports Rehabilitation and Posturology

Official Journal of the :

Italian Scientific Society of Rehabilitation and Posturology of the Sports
Italian Football Medical Association
Italian kinesiological Taping Association
Italian Group for Evidence Based Sport Osteopathy
European Academy of Osteopathic Medicine

Italian Journal of Sports Rehabilitation and Posturology Journal of Sports Rehabilitation and Posturology

Ita. J. Sports Reh. Po.

Italian Journal of
Sports Rehabilitation and Posturology

Dear Readers,

The idea of creating an Italian Journal of Rehabilitation and Sport Posturology in English, with an international outlook, will allow us to establish a scientific exchange with health professionals who deal with sport all over the world.

This is a very interesting aspect of our study. It will enable us to widen the sphere of our professional experiences, both the theoretical and the practical ones, and to enter into relations with different scientific circles. The written and the oral exchange of information is the source and the essence of knowledge and it allows us to have an ethical, serious, professional communication whose content is validated by the International Scientific Literature.

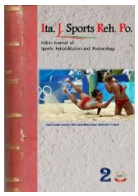
Our editorial purpose in Italy is to encourage studies and researches, not only in Universities, but also in sports in order to avoid the empiricism that for years has understimated the Rehabilitative Science applied to Sport.

Rosario D'Onofrio
Editor In Chief

Table of Contents

Ita J. Sports Reh. Po. 2015 ; Vol. 2 ; 2; 211 -259

Articles



Joseph A. Giandonato, Victor M. Tringali,, and Christopher D. Policastro
Evaluative Analysis of Glutamine Supplementation Among Athletic Populations
Ita J Sports Reh Po 2015 ; 2; 2 ; 254 -259
ISSN 2385-1988 [online] - IBSN 007-111-19-55

Ita. J. Sports Reh. Po.
Italian Journal of
Sports Rehabilitation and Posturology

Evaluative Analysis of Glutamine Supplementation Among Athletic Populations

Joseph A. Giandonato[1], Victor M. Tringali[2], and Christopher D. Policastro[3],

[1] MBA, MSc, CSCS serves as the Coordinator of Fitness Programs at Drexel University located in Philadelphia, Pennsylvania, USA.

[2] MSc, CSCS is the Executive Director of University Wellness at Drexel University located in Philadelphia, Pennsylvania, USA.

[3] MSc, CSCS is the Director of Recreation, Fitness, and Wellness at Manhattan College located in Riverdale, New York, USA.

Abstract

The fundamental purpose of this article is to evaluate the efficacy of glutamine supplementation among healthy athletic populations. Glutamine, a non-essential amino acid, has customarily gained acceptance among athletes and bodybuilders for its purported benefit of attenuating muscle protein degradation following exercise. The supposed benefits of glutamine supplementation and associated clinical applications will be briefly examined through an unbiased review of existing scientific literature.

Introduction

Glutamine, a non-essential amino acid found in copious expanses in muscle and plasma, marshals a plethora of homeostatic functions by contributing a substantial amount of the nitrogen needed to facilitate nucleotide biosynthesis, an exhaustive process characterized by the rapid division of cells to support metabolic and immunologic functions. Severe and/or prolonged adversative stressors, such as illness, acidosis, and trauma disrupt glutamine homeostasis as evidenced by decrements in plasma glutamine levels (1,15). The aforementioned stressors are also associated with elevated plasma concentrations of cortisol and glucagon and in conjunction with inadequate nutritional status, and increased utilization of glutamine to fuel gluconeogenesis. Based on existing literature, plasma glutamine levels among hospitalized individuals (5,9) and critically ill patients (15) may be an extrapolative determinant in mortality and morbidity (16). Decreased plasma glutamine levels may vitiate lymphocyte, neutrophil, and leucocyte functioning (10) and temper the antioxidative capacity of glutathione (15), an endogenous compound that is synthesized from amino acids which increase the longevity of vitamin E in its active form and assists in the elimination of free radicals, including reactive oxygen species, superoxide, and hydrogen peroxide (12). Lowered plasma glutamine levels are correlative with multiple organ failure among pediatric patients. Glutamine supplementation among individuals with compromised health status elicited discernable improvements in gastrointestinal functioning (19), cellular repair following burn injuries (18), and in the treatment of severe acute pancreatitis (9). In the latter study, a significant reduction in the length of hospitalization was noted.

Glutamine Supplementation

Physiological stressors elevate cellular turnover, a process in which cells are broken down and regenerated. The regeneration of cells is enabled by the cleaving of nitrogen molecules from amino acids, which are biologically indispensible constituents of protein that support numerous homeostatic functions (13). Depletion of intramuscular glutamine has been directly correlated with amplified catabolic activity (1), therefore plausibly indicating glutamine supplementation to maintain skeletal muscle mass. While the enteral and/or parenteral administration of glutamine may be integral to successful outcomes of hospitalized individuals and critically ill patients, studies involving glutamine supplementation among healthy subjects have produced confounding results.

A study involving the administration of glutamine at a dose of (0.9 g/kg lean tissue) in conjunction with a six week total body resistance training program revealed little to no improvement in increased muscle mass and strength between the glutamine and control groups, leading the authors to conclude that glutamine supplementation provides no significant effect of muscle performance, body composition, or muscle protein degradation in healthy individuals (17). The effects of glutamine supplementation were also examined among college wrestlers during a 12-day weight reduction program. While glutamine was hypothesized to allay losses in lean body mass, the results indicated no notable differences in body mass, lean body mass, and fat mass between the glutamine and control groups (6).

Glutamine supplementation has also been surmised to enhance glycogen repletion following exercise. Ingestion of glutamine as a standalone, and in conjunction with carbohydrates following exercise, was not enough to elicit a significant elevation in intramuscular glycogen levels (14). It has been speculated that the level of glycogen depletion resulting from exercise, particularly resistance training, may not be impactful enough to benefit from glutamine supplementation (17). For example, a typical bout of resistance training results in glycogen depletion of only 36% (11).

Additional benefits may be derived from glutamine when cocktailed with whey protein and other amino acid constituents, including the branched chain amino acids (BCAA), leucine, isoleucine, and valine, versus supplementing with whey protein alone. Resistance trained males who consumed 40 g of whey protein per day along with 5 g of glutamine and 3 grams of BCAA, experienced greater improvements in body composition and exercise performance than the group who had only consumed protein (4).

It has been suggested that glutamine supplementation may serve an assistive role in staving off immunological issues typified by extensive and prolonged exercise. A study involving 151 endurance runners and glutamine consumption revealed that those ingesting glutamine reported far lower infection rates (19%) than the control (81%) (3).

Practical Consideration

The response to physiological stress is dose dependent. The magnitude of stress induced by terminal illnesses and traumatic injuries dwarf the stress caused by physical activity. Eccentric exercise-induced muscle damage characteristic of intense resistance training does not affect plasma glutamine concentrations in comparison to other forms of tissue injury, including burns and elective surgery (7). Increases in plasma cytokines are also shown to be less marked after eccentric exercise-induced muscle damage compared with other forms of tissue trauma (2). As such, the effects of glutamine, in conjunction with other therapeutic and pharmacological interventions, will appear more tangible, especially in the presence of a nutrient deprived state. Based on the inferences emanating from existing literature, the common crux of many treatment strategies appears to be maintaining body weight and lean body mass. Ultimately, a positive nitrogen balance must be achieved and maintained to ensure there is a sufficient amount of energy to support the enzymatic, signaling, transportative, and structural functions of protein. Suggested glutamine doses have ranged from 20 grams to 0.65 g/kg body weight, however, the purposes of supplementing with glutamine, including increasing glycogen resynthesis and mitigating catabolic effects associated with exercise, have not received universal support from well-controlled scientific studies in healthy populations (8).

Conclusion

Standalone glutamine administration should be restricted to hospitalized and critically ill and injured patients to augment traditional treatment modalities, perchance reducing the duration of hospitalization and improving outcomes. Based on the literature, adjunctive glutamine supplementation may prove beneficial, especially in the presence of sound training and nutritional strategies.

References

1. Antonio, J. & Street, C. (1999). Glutamine: a potentially useful supplement for athletes. *Canadian Journal of Applied Physiology*, 24, 1-14.

2. Bruunsgaard, H., Galbo, H., Halkjaer-Kristensen, J., Johansen, T.L,. MacLean, D.A., & Pedersen, B.K. (1997). Exercise-induced increase in interleukin-6 is related to muscle damage. *Journal of Physiology*, 499, 833-841.

3. Castell, L.M., Poortmans, J.R., & Newsholme, E.A. (1996). Does glutamine have a role in reducing infections in athletes? *European Journal of Applied Physiology and Occupational Physiology*, 73, 488-490.

4. Colker, C.M., Swain, M.A., Fabrucini, B., Shi, Q., & Kalman, D.S. (2000). Effects of supplemental protein on body composition and muscular strength in healthy athletic male adults. *Current Therapeutic Research, Clinical and Experimental*, 61, 19-28.

5. Ekmark, L., Rooyackers, O., Wernerman, J., Fläring, U. (2015). Plasma glutamine deficiency is associated with multiple organ failure in critically ill children. *Amino Acids*, 47, 535-542.

6. Finn, K.J., Lund, R., & Rosene-Treadwell, M. (2003). Glutamine supplementation did not benefit athletes during short-term weight reduction. *Journal of Sports Science and Medicine*, 2, 163-168.

7. Gleeson, M., Walsh, N.P., Blannin, A.K., Robson, P.J., Cook, L., Donnelly, A.E., & Day, S.H. (1998). The effect of severe eccentric exercise-induced muscle damage on plasma elastase, glutamine and zinc concentrations. *European Journal of Applied Physiology and Occupational Physiology*, 77, 543-546.

8. Gleeson, M. (2008). Dosing and efficacy of glutamine supplementation in human exercise and sport training. Journal of Nutrition, 138, 2045-2049.

9. Hajdú, N., Belágyi, T., Issekutz, A., Bartek, P., Gartner, B., & Oláh, A. (2012). Intravenous glutamine and early nasojejunal nutrition in severe acute pancreatitis: a prospective randomized clinical study. *Magyar Sebészet Szerkesztősége*, 65, 44-51.

10. Oehler, R., Pusch, E., Dungel, P., Zellner, M. Eliasen, M.M., Brabec, M. & Roth, E. (2002). Glutamine depletion impairs cellular stress response in human leucocytes. *British Journal of Nutrition*, 87, S17-21.

11. Roy, B.D. & Tarnopolsky, M.A. (1998). Influence of differing macronutrient intakes on muscle glycogen resynthesis after resistance exercise. *Journal of Applied Physiology*, 84, 890-896.

12. Scholz, R.W., Graham, K.S., Gumpricht, E. & Reddy, C.C. (1989). Mechanism of interaction of vitamin E and glutathione in the protection against membrane lipid peroxidation. Annals of the New York Academy of Sciences, 570, 514-517.

13. Tringali, V.M., Policastro, C.D., & Giandonato, J.A. (2015). The role of amino acid supplementation following musculoskeletal injury. *Italian Journal of Sports Rehabilitation and Posturology*, 2, 114-121.

14. van Hall, G., Saris, W.H., van de Schoor, P.A., & Wagenmakers, A.J. (2000). The effect of free glutamine and peptide ingestion on the rate of muscle glycogen resynthesis in men. *International Journal of Sports Medicine*, 21, 25-30.

15. Wischmeyer, P.E. (2003). Clinical applications of L-glutamine: past, present, and future. *Nutrition in Clinical Practice*, 18, 377-385.

16. Wischmeyer, P.E., Dhaliwal, R., McCall, M., Ziegler, T.R., & Heyland, D.K. (2014). Parenteral glutamine supplementation in critical illness: a systematic review. *Critical Care*, 18, R76.

17. Candow, D.G., Chilibeck, P.D., Burke, D.G., Davison, K.S., & Smith-Palmer, T. (2001). Effect of glutamine supplementation combined with resistance training in young adults. *European Journal of Applied Physiology*, 86, 142-149.

18. Sun, Y., Wang, L.X., Zhou, Y.F., Sun, S.G., Mao, X.F., Deng, X.D., & Zhang, P. (2013). Effects of glutamine combined with ulinastatin on inflammatory response of patients with severe burn injury. *Chinese Journal of Burns*, 29, 349-354

19. Beaufrère, A.M, Neveux, N., Patureau Mirand, P., Buffière, C., Marceau, G., Sapin, V., Cynober, L., & Meydinal-Denis, D. (2014). Long-term intermittent glutamine supplementation repairs intestinal damage (structure and functional mass) with advanced age: assessment with plasma citrulline in a rodent model. *Journal of Nutrition, Health, and Aging*, 18, 814-819.

Ita. J. Sports Reh. Po.

Italian Journal of
Sports Rehabilitation and Posturology

2014 Ita. J. Sports Reh. Po.
2015 Ita. J. Sports Reh. Po.
OAJI .net Open Academic Journals Index
Italian Journal of Sports Rehabilitation and Posturology ISSN 2385 -1988 [online]
IBSN 007-111-19-55