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Martial arts training, competition and sports nutrition: A future beneficial alliance

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Abstract

Over the last decade, there has been a dramatic increase in martial arts participation driven by health and physical fitness benefits and the expansion of martial arts into Olympic sports. Additionally, the broad popularity of mixed martial arts (MMA), particularly, the Ultimate Fighting Championships (UFC) has also fueled interest. Martial Arts is a broad-based term describing various disciplines and techniques implemented in self-defense, fighting and utilization of weaponry.

Is there a coming intersection of the martial arts category and sports nutrition? The answer to this question depends upon first dissecting the components of training and competition in the martial arts arena and then comparing them to activities requiring the same components. The application of sports nutrition in those related areas should provide clues for this pathway and potential in training and performance relevance.

Keywords: Martial Arts; Dietary Supplement; Sports Performance; VO2 Max; Cognitive; Anaerobic; Sports Vision; Recover

1. Introduction

Over the last 30 years, use of dietary supplements has risen exponentially in almost all sports. Initially, the emphasis on performance enhancing supplements started with American football, where strength and power levels being enhanced led directly to improve on-field performance. There has been an expected exploration of how these supplements might improve performance in other sports. As *martial arts* continue to grow in participation, both in recreation/fitness as well as the competitive arenas, the potential use of supplements is gaining interest. Do the components of successful *martial arts* performance gain from the use of current supplements? Are there evolving supplement areas that would prove beneficial for *martial arts* participants?

2. History

Martial arts originated as a necessity for survival between man and animals, and subsequently between different tribes of humans. Dating back to 2nd Century BC, the most ancient form of martial arts is wrestling, which was popular in Ancient Greece and a staple of the early Olympiads [1]. The ancient Greeks also introduced boxing in the 23rd Olympiad competition in 688 BC. Modern day *martial arts* originated from Indian monk Ta Mo in 527 BC. Mo taught the Shaolin Temple monks the 18 Buddhist Fists, which evolved into the Five Animals of Shaolin - dragon, snake, tiger, leopard and crane.

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Various countries began to develop their own respective version of *martial arts* - Japanese Karate, Korean Tae Kwon Do, Brazilian jiu-jitsu, Israel's Krav Maga, etc. Although the first *martial arts* films arose from Shanghai in 1920, martial arts movies exploded in the 1970s and 1980s with English-dubbed kung fu and ninja themed blockbusters. Legends like Bruce Lee, Jackie Chan and Chuck Norris were responsible for opening *martial arts* schools throughout the world. The music industry also jumped into the battle arena with songs like “Kung Fu Fighting” and the rap group “The Wu Tang Clan”. Technology evolved when an electronic Protective Scoring System (PSS) was utilized in Tae Kwon Do matches during the 2012 London Olympics [2]. Although pankration (the first form of MMA) originated in the Olympic Games in 648 BC, MMA reached commercial popularity with the launch of the UFC in Denver, Colorado in 1993. The utilization and combination of the different martial arts styles and disciplines introduced participants to a new level of training and competition.

Martial arts are a recent draw to para-athletes and special needs individuals as it is seen as an activity that provides a broad range of benefits [3-8]. These include physical development, enhanced cognitive performance, and social situation integration. A broad range of needs has had positive results from *martial arts* training. These individuals are far more likely to train in forms ("kata" in karate or "poomsae" in Taekwondo) or self-defense rather than compete in sparring.

2.1. The Fitness Extension of Martial Arts: Performance and Training

As the movement exploded, there was an awareness that *martial arts* had fitness benefits [9,10], spurring participants who would never likely fight but would participate in training for the perceived benefits. The physiological, neurological, emotional, and cognitive results of training are also factors that lead to improved performance [11-14]. *Martial arts* is a synergy of body, mind, and spirit, so the challenge for martial artists is a four-prong test: physical, mental, emotional, and spiritual.

One obvious purported benefit is the improvement of coordination, specifically the "mind-body" connection. The ability to develop a specific focus, direct or react in movement is developed and honed over time. It also uses strength and flexibility in holding positions and executing a movement. Balance is a crucial feature of *martial arts* styles because positions constantly change, with many movements executed off one foot. Many *martial arts* practitioners also point to the importance of stamina, cardiopulmonary health and visual motor integration in maximizing performance. In essence, practice and training develop and use the same abilities.

While most martial arts activity is sprint or interval in nature, there is no doubt that repeated bouts of rounds of practice enhance energy system fitness. In performance, all skills being equal, the athlete with the better energy expenditure fitness, specifically sprint-based abilities, will have the advantage as the competition/rounds go on [12,13].

2.2. How Sports Supplements have been Employed in Similar Situations

Sports supplements have grown in awareness and use exponentially over the last four decades [15, 16, 17]. Historically, supplements have had the earliest push to sports where strength and power have a critical role in performance, with the prime examples being football and basketball. The drive to use supplements for performance gains received the most significant push from increased reliance on strength and associated training to develop more powerful and faster athletes [18-24]. Thus, compounds like creatine monohydrate and whey protein have had a substantial ramp-up in use starting in the 1980s. More recently, efforts using agents that increase nitric oxide production have generated interest [25].

Supplement studies have often shown a difference in a specific fitness/performance variable, yet not an effect on overall performance. That is likely because the specific variable at a heightened level needs time for the athlete/participant to integrate into practice and performance. This also highlights a fundamental view of nutritional research as it relates to health and performance: was the application acute or chronic? Acute studies are short-term, from one to a few doses, and often have a short time frame afterward concerning measurement. Chronic applications have the subject take the supplement over an extended time and then repeat some testing in controlled conditions. Examples could include an isokinetic strength profile or a VO2 max test. For the supplements that have shown effects, there are dietary supplements that work short-term and some that work long-term with changes in subject physiology.

In addition, there is a distinction between performance from training. Often, what an athlete does to train effectively is much more demanding than the actual performance. For example, a *martial arts* athlete may perform resistance training for 60 minutes or utilize repeated interval training to prepare for a three-round match. However, with superior skill and tactics, the match may be over in one round. In this case, the *martial arts* athlete would train for the whole round match and try to end it before their combined abilities are taxed.

2.3. What has Worked for Athletes/Participants in Sports with Shared Physical and Cognitive Attributes with Martial Arts?

As most sports share a need for greater strength and power, and resistance training has become universally accepted in some form for almost every sport, this was the natural starting point for a mass supplementation movement. Protein supplementation and the use of creatine monohydrate received their primary usage justification from enhancing this part of the physiological profile. The research summarizes that these supplements can boost strength gains with sufficient training intensity [20-24]. They do not have strong efficacy results in moderate or cardio-vascular dominated activities, like distance running.

2.4. Cognitive Function, Attention, Sports Vision

As energy drinks in various forms are mass marketed, it is no surprise that many of these studies focus on the effects of these products. In this area, dietary supplements have proven to be effective overall. Many of these studies have placed the abilities in a group test, pre, and post-supplement. The difference in study design leads to the conclusion that these energy drinks have limited results in these areas. Furthermore, the long-term effects of certain supplements, especially those with caffeine [26, 27], have yet to be well documented. Given the precise nature of *martial arts* training and competition, it may be that the short-term benefit of increasing arousal and attention is negated by the harmful effects of caffeine over the long term. Other supplements, such as Medium Chain Triglyceride (MCT)-based complexes, have a research conclusion of improved cognitive function in a broad area that translates into sports performance. Certain proprietary formulations have shown published improvements in VO2 max, overall cognitive function, balance, hand-eye coordination, sports vision acuity and shortened reaction time [28-35].

2.5. Energy System Abilities: Specifically Anaerobic or Sprint Performance

Supplements affecting energy system abilities have demonstrated positive results [36, 37, 38]. The energy pathways for sprint performance have a crossover relationship to strength and power [38, 39, 40]. Some of these supplements contain caffeine, which, outside of the physiological effect, narrows the focus of the subject, likely leading to an enhanced effort.

2.6. Recovery to Train Again

Recovery is an emerging area of emphasis in sports nutrition [41,42]. As training schedules increase, the ability to recover before the next session or competition gains importance. Measuring recovery is difficult because of the need for more accepted and quantifiable definitions. Research in this area has used single substances, with anti-inflammatory properties, in an acute intervention with positive results in decreasing muscular soreness [43-46]. For example, substances used include curcumin and tart cherry. Polyphenols, or plant-based esters, have shown recovery properties [47]. In addition, antioxidants have a relationship with muscular and total systemic recovery.

3. Conclusion

As the *martial arts* continues an upward participation trend there will be heightened interest for *martial arts* to make further gains in both training and competition. Given the emphasis on cognitive abilities, this is likely the area where *martial arts* participants will look for nutritional aid. It will have great appeal if the supplement can enhance reaction time, mental focus, concentration, specific movement, balance and accuracy.

The effects of supplements that affect the physiological realm are likely more complex with *martial arts* individuals. For example, even though there is strong evidence for supplements improving strength performance, that application would depend upon the individual's regimen of strength training as preparation. The same applies to supplements that increase energy system fitness, especially anaerobic abilities. If the individual only uses sparring sessions to enhance abilities, they will have at best moderate relevance. However, if the individual has dedicated training focusing on energy system abilities, there is likely a better improvement potential. As *martial arts* continue to evolve, it is expected that training in these areas will be more formal, leading to the further application of research-validated sport-enhancing supplements.

Compliance with ethical standards

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Author Roles

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