Editorial Commentary

Two decades of research in soccer and acupuncture: to what point should we stick?

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Soccer and musculoskeletal injury

Soccer is the most popular sport with nearly 260 million participants of either sex and all ages worldwide (1). Elite soccer players perform high-speed running while dribbling, passing, kicking or throwing the ball during training and competitions. Players are also required to make fast, accurate movements requiring multi-directional body deceleration and acceleration, in addition to rapid changes of direction—therefore requiring high-level performances. Nonetheless, the physical and psychological stress associated with training and competition might temporarily affect the players' capacity for subsequent performance and increase the risk of musculoskeletal injuries (2).

Injuries of the lower extremity are highly frequent (~70%) in professional soccer players, with an average of 8 injuries per 1,000 h of exposure. Each player accumulates on average 2 injuries/season, which might result in a decline in physical performance during the hours and days following training and/or competition (2). Recovery is complete when the player reaches or exceeds a benchmark performance in at least one particular task related to muscle strength, power, or postural balance. In this scenario, there is a need for valid and reliable techniques to prevent musculoskeletal injuries, improve sports performance and accelerate the rehabilitation of injured soccer players.

Herein we summarize the evidence obtained over the last two decades of research in acupuncture intervention for promoting health, healing soccer injuries, and increasing the performance of élite soccer players.

What is acupuncture?

Acupuncture is one therapeutic resource of Chinese medicine, alongside dietary and herbal compounds, and mind-body exercises (taijiquan and qigong) (3). Chinese medicine explains the health-disease status in terms of a systematic-philosophic analogy with nature (4), with a framework emphasizing injury (primary) prevention rather than treatment or rehabilitation (secondary and tertiary preventions). Historically, acupuncture faced periods of fame and glory that contrasted with periods of limited practice, abolition, prohibited practice, and current reinvention worldwide; currently, acupuncture is among the most commonly used complementary and alternative medicine interventions worldwide (5).

Acupuncture for prevention of sports injury

The effects of acupuncture as a primary prevention resource for sport-related injury in soccer players remain largely unknown. Notwithstanding, this is a promising area in which acupuncture might find its greater contribution. For instance, anxiety is an important factor associated with injuries, mostly tendinopathies and fractures, in which acupuncture showed the potential to decrease both cognitive and somatic anxiety prior to a competition in young athletes (6). Such an application of acupuncture as primary prevention seems more suited to the systematic-philosophic approach of Chinese medicine as a primary prevention approach.

Acupuncture for rehabilitation of sports injury and enhancing sports performance

The effects of acupuncture as a therapeutic resource for sport-related injury in soccer players have been systematically investigated for at least two decades. Acupuncture falls within the scope of 'rehabilitation and physical therapy methods' as recovery strategies to exercise-induced inflammation (7). With the growing research on the use of acupuncture for the primary and secondary preventions of sports-related injuries, its application in elite soccer players has been also questioned; several narrative reviews have examined this issue, which we summarized herein.

Pelham *et al.* (8) discussed the influence of acupuncture on pain, physical performance, muscle strength, aerobic conditioning, and flexibility. The level of evidence was encouraging but mostly based on only a few studies available or translational research. Wadsworth (9) reported that acupuncture intervention is safe when practice by experts with proper training; acupuncture was also found effective in several chronic musculoskeletal conditions related to high-performance sports practice and was recommended as an adjunct intervention to treat pain originating from an acute muscle injury. Ahmedov (10) updated the review of Pelham *et al.* (8) investigated the ergogenic effect of acupuncture intervention in sports and found conflicting evidence in support of traditional acupuncture protocols to enhance muscular strength and power. Altogether, those reviews highlight in common that the role of acupuncture in elite sports medicine—and soccer in particular—remains encouraging though as much unclear as since the first review in the early 2000s.

Should we stick to the point?

There are several challenges hindering the prompt recommendation of acupuncture in professional soccer players and possibly other high-performance sports athletes in general. First, the physiological mechanisms after needling an acupuncture point are not yet well understood—be it via the nervous system, inflammation, immune response, neuroendocrine, or even placebo (11-16), if any. Additionally, whether acupuncture exerts beneficial effects for exercise-induced inflammation remains to be determined (7). Second, systematic reviews and meta-analyses about acupuncture intervention for various conditions and populations (17)—and those specifically investigating sports-related injuries such as ankle sprain (18,19)—have consistently considered the included clinical trials of having either low methodologically quality or a high risk of bias. Therapeutic effects of acupuncture have been consistently reported with weak evidence and often attributed to a myriad of factors others than acupuncture theory or needling itself (10,20).

A controversial hot topic regards whether acupuncture can be considered as doping (21). Acupuncture and other complementary and alternative medicines are debatable influences that might improve the overall athlete's performance; nonetheless, the endogenous response attributed to acupuncture intervention may arguably be considered as 'natural' (8-10).

What to expect for the next two decades of research?

Despite the current scenario where acupuncture has unclear evidence of therapeutic benefits for preventing, treating, or rehabilitating athletes after sport-related musculoskeletal injuries, it is apparent that acupuncture intervention—including not only needling but other stimulation methods such as moxibustion or cupping—is now a common practice in élite soccer players (22). A recent survey showed that acupuncture and/or reflexology is frequently used as a post-exercise recovery strategy by team sport athletes of different competition levels, mostly international competitors (23).

With the continued growth of high-quality research on acupuncture in general, we expect that further evidence fills the gap between a patient-centered report of benefits and both the traditional theory and physiologic mechanisms of acupuncture intervention. A clear understating of the real effects of acupuncture in élite soccer players is mandatory for an evidence-based decision about prescribing acupuncture for this population.

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