

Japanese Acupuncture - Current Research

Japanese Traditional Medicine Text (6) – Orthopedic

Disorders C Sports

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1. Introduction

In our current society, the border between health and disease is often unclear. Health care and its focus now must aim to cure disease and include promotion of life style choices that improve quality of life and increase life expectancy, early detection of disease and early treatment. In the field of sports and athletic performance as well, beyond the treatment of sports injuries, treatment for prevention of injuries or for physical disabilities and conditioning, health maintenance and athletic performance have become important themes.

Oriental Medicine has characterized itself by aiming to “treat the unseen disease”, that is treating the tendency to develop disease (root causes) before the disease has a chance to disrupt essential physiological processes like immune function, respiratory capacity, circulation, digestive processes etc. In short, Acupuncture treatment starts with information about the athletes physical condition and practice environment/routines and aims to estimate and repair impediments due to past injuries, help prevent new injuries, fatigue and poor performance due to over use by teaching the athlete to maintain their optimally healthy condition. Akimoto et al¹⁾ reported the results of questionnaires regarding Acupuncture treatment answered by university athletes (577 subjects). The percentage of respondents who had experienced Acupuncture treatment was 51.3%. The researchers also reported that higher level athletes tended to have had more experience with acupuncture. Miyamoto et al²⁾, queried 195 athletes (141 men, 54 women) from Ibaraki prefecture, attending a national sports event; 31.3% of these athletes had experienced

acupuncture. Nichols et al³⁾ conducted a survey on opinions about Complementary and Alternative Medicine (CAM); subjects were 309 University of Hawaii athletes. Results showed that more than 46% of respondents had received some form of alternative or complimentary (CAM) treatment within the previous 12 months, a percentage greater than the general population. Contents of the CAM treatments included 38% massage, 29% chiropractic, 14% LomiLomi massage (unique to Hawaii) and 12% acupuncture. Compared to earlier research, Sports athletes who had tried acupuncture were more prevalent than in the average population and as the athlete’s level of performance increased, the rate of experience with acupuncture increased as well.

Historic references for sports athletes receiving acupuncture reach back to Homma’s research in 1949 and include 6 editions of “Ido no Nihon” Journal as well as numerous international and domestic reports⁴⁾. Concerning acupuncture sports medicine, Homma discussed 1) treatment prior to competition to improve endurance, maximum strength and power, dexterity and resistance to impact, 2) methods for measuring fatigue related to sports and treatment methods for rapid recovery, 3) Acupuncture and moxibustion for sports injuries and dysfunction, 4) sports medicine used with acupuncture and moxibustion treatment. Following Homma’s contributions to acupuncture sports medicine, research until the mid-1980’s focused mainly on case studies reported here and there.

In 1990, Miyamoto presented a series of 4 papers on acupuncture and Physical Therapy for sports injury⁵⁾. The topics include research on acupuncture treatment for sports and exercise, the current situation of acupuncture treatment for sports injuries and dysfunction and acupuncture treatment for muscle fatigue as it relates to sports and movement. Palham’s 2001 review article introduced the study of acupuncture treatment on muscle strength, cardio (aerobic) training, flexibility and sports performance, re-asserting the need for

systematic guidelines for acupuncture in the field of sports medicine⁶⁾.

Since 1980, the number of papers published within the area of sports and acupuncture treatment in major medical university journals (MEDICINA) (keywords: acupuncture, electro-acupuncture, embedded needles x sports injuries) has been steadily increasing: 98 reports between 1980-89, 328 reports between 1990-99, 969 reports between 2000-09 (See Figure 4). However, among the 1,395 papers reviewed, most were transcribed minutes from meetings and only 332 were original papers. Keywords from these research papers included 1) Acupuncture x Sports (175) 2) Acupuncture x muscle fatigue (47) 3) Acupuncture x muscle endurance (1) 4) Acupuncture x delayed onset muscle soreness (DOMS) (10) 5) Acupuncture x Sports injury/dysfunction (88) 6) Acupuncture x Conditioning (5).

Similarly, of the Sports related acupuncture articles published Internationally in Pub Med between 1980 and 2009, there was a similar and marked upward trend: (keywords included: acupuncture x sports injury, DOMS, muscle endurance, muscle fatigue, movement, motion, exercise) between 1980-89, 59 reports, between 1990-99, 140 reports, between 2000-09, 526 reports (See Figure 4). The frequency of relevant keywords was as follows: acupuncture x sports injury (17 reports), acupuncture x DOMS (4 reports), acupuncture x muscle endurance (12 reports), acupuncture x fatigue muscle (12 reports).

Clearly, despite the overall increase in the number of the internationally and domestically published papers, there is a distinctly small number of original reports from Japan in Japanese. Concerning the field of acupuncture research for sports medicine, of particular interest is the 2010 issued report on Clinical Sports Medicine, "Special Report: Evidence for the Effectiveness of Acupuncture Treatment for Sports Medicine"⁷⁾. Within the field of Sports injury and dysfunction, the researchers present a picture of current trends in

Sports Medicine Acupuncture and introduce randomized control trials using embedded needles to treat sports related injuries.

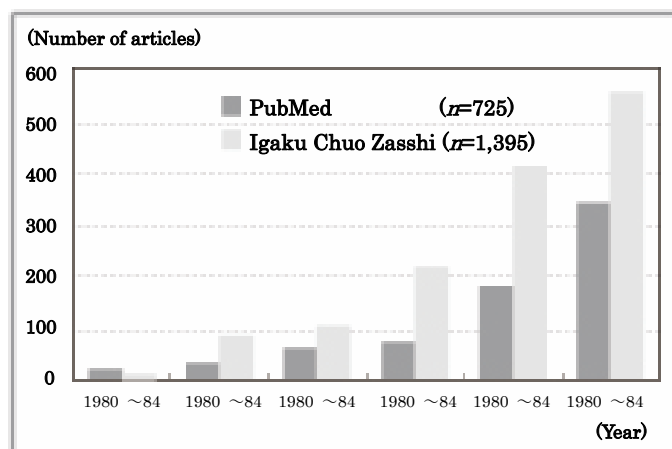


Figure 4: Number of Published Articles on Acupuncture for Sports Medicine

2. Clinical Studies Abroad

Kleihenzt al.⁸⁾, performed double blind RCTs on 52 sports athletes with shoulder tendinitis to investigate the efficacy of Acupuncture treatment. The subjects were divided into two groups: acupuncture that penetrates the skin layer or sham acupuncture that does not penetrate the skin layer completely. The results showed 1) for the acupuncture group pain, function, ROM, muscle strength (as measured by the Constant-Mureley-score all improved significantly more than the sham acupuncture group 2) three months following the treatment sessions a tracking questionnaire revealed that, although at the time the sessions were complete there had been no distinction between groups, the sham group reported distinctly different effects compared to the acupuncture group. Within the body of research using Acupuncture treatment for sports related injuries, this investigation represents the highest quality research.

Below are the research results from Brattberget al.⁹⁾, they compared the effects of steroid injections with acupuncture treatment for tennis elbow. Their finding are as follows 1) Compared to the control

group, the acupuncture group reported significantly more relief from pain. 2) Seventy percent of the acupuncture group had received steroid injections in the past, but had experienced little relief as a result. 3) Several subjects in the steroid injection group experienced a worsening of symptoms, but no such negative result or side effects of the treatment were experienced by the acupuncture group. According to the NIH and WHO, this research represents grounds for establishing acupuncture as the treatment for choice for Tennis Elbow. Further, Trinh et al. conducted a systematic review of Acupuncture for Tennis Elbow and Epicondylitis. However, many of the subjects for the study developed tennis elbow from activities other than tennis. Concerning domestic Japanese research, clinical studies of Tennis Elbow are not uncommon but comparative studies examining the relative effectiveness of acupuncture have not yet been researched.

Zhang et al.¹⁰⁾ investigated previous cases of ankle joint sprains treated with acupuncture, and found tension in the Peroneus and Tibialis Anterior muscles, local swelling, pain and feelings of anxiety were all lessened. Hahm¹¹⁾ reported that in rats with ankle sprains, electro-acupuncture of 2 Hz frequency was effective for relieving pain and reducing edema and 100Hz electro-acupuncture was effective for pain reduction alone. Park et al.¹²⁾ found that electro-acupuncture stimulation of 2 Hz frequency inhibited inflammation in injured ankle joints. Koo et al.¹³⁾ reported that a combination of 100Hz and 2Hz electro-acupuncture stimulation effectively increased the load bearing capacity in subjects with sprained ankles.

Virchota et al.¹⁴⁾ divided 48 athletes with plantar fasciitis into three groups: acupuncture, sham acupuncture and general injury recovery treatments including stretching, icing, aspirin-like pain relievers and practice restrictions and then assessed degree of pain, pressure pain and training satisfaction. Research results showed that, compared to sham acupuncture and general injury

recovery protocols, acupuncture provided significantly greater pain relief but also that, compared to the other test groups, pressure pain was not significantly improved in the acupuncture group.

3. Current Progress and Developments in Japanese Clinical Research

Effectiveness of Acupuncture for Sports Injuries and Development

Takazawa et al.¹⁵⁾ of the Japan Gymnastics Society presented Sports Medicine Research data on the percentages of athletes with specific injuries who had used acupuncture treatment for their conditions: of the 226 athletes with low back pain, 13.3%, of the 97 athletes with Spondylolysis 6.2%, and of the 140 athletes with disc herniation 15.0% were reported to have tried acupuncture. Further, it was reported that at the Tsukuba University Sports Medicine Hospital, low back pain was the most commonly treated complaint, 40% of all patients receiving acupuncture.

Miyamoto et al.¹⁵⁾ investigated 163 university level athletes who sought acupuncture for their specific injuries. Their results showed that, compared to the first treatment, following the last treatment athletes reported significant improvements in their ability to practice for low back pain, disc herniation and Spondylolysis, but pain relief was felt most by those athletes complaining of low back pain and disc herniation. Izumi et al.¹⁶⁾ also compared the results of 28 athletes following the first and terminal treatment, reporting that training condition, JOA score (Japan Orthopedic Society of low back pain Treatment Performance Criteria) significantly increased but the levels of pain and especially pain while moving the torso and trunk did not improve significantly.

Ito et al.¹⁷⁾ investigated 8 athletes with chronic low back pain who had been treated with acupuncture but had not achieved significant improvement. Treatments were continued for 2 weeks, 9 points on the lower limb were needled until

the third session, thereafter, sessions included retention needling at known trigger points for 10 minutes. Following the trigger point treatment, a VAS score was obtained and reported to verify improvements in experienced pain. The authors reported positive changes in VAS scores but no changes in JOA scores.

Miyamoto et al.¹⁸⁾ interviewed and investigated 43 subjects with pulled hamstrings. These subjects received electro-acupuncture treatments for 1-2 weeks with an average number of 7.6 treatments and, compared to the first treatment, following the final treatment, the subjects reported significant improvements in levels of pain and training condition.

Yoshida et al.¹⁹⁾ investigated the efficacy of electro-acupuncture stimulation on rats with pulled muscles (injured for the study). Compared with only the eccentric contraction group, researchers reported improvement of muscle tension and pain thresholds. Further, Yoshida et al.²⁰⁾ treated model mice with muscle injuries to investigate the effect of electro-acupuncture on degree and rate of recovery and found that, compared to the control group, the electro acupuncture accelerated recovery rates. Overall, there are few high level evidence based clinical research projects in Japan. However, a majority of these reports indicated that, regardless of where the injured area is located, acupuncture treatments help reduce pain and improve athletic training condition during treatment. Unfortunately, there are almost no double blind comparative tests in the literature. However, within Japan, along with an increase in clinical research, the response mechanism of acupuncture using animals for experiments is advancing.

b Randomized control trials on Athletes and Sports Medicine

The difficulty regarding acupuncture research is that, unlike pharmaceutical research, “blinding” both the subjects and the practitioner from the

research protocol is extremely complicated. However, because embedded needles are 1) depending on the stimulation, usually painless so subjects unfamiliar with acupuncture are more easily “blinded” 2) can be inserted with or without a needle tip so practitioners can be instructed to insert the needles without examining the needle tip and to then fix them in the desired location with tape, thereby “blinding” both the subject and the practitioner. For these reasons, embedded needles are very useful for double blind clinical acupuncture studies in general and, as will be discussed below, for sports athletes in particular. Miyamoto et al.²¹⁾ investigated the effectiveness of embedded needles for muscle pain and tension in marathon runners using a randomized double blind protocol utilizing placebo needles as the control. Subjects were 15 university students participating in a full marathon for the first time. Data and materials were collected and analyzed by individuals not involved in the needling or the marathon. Subjects were divided into two groups, the first group included 8 athletes needled with regular embedded needles, and the second group included 7 athletes needled with well-disguised “placebo” embedded needles.

The embedded needles or the placebo devices were placed bi-laterally on 8 acu-points on the lower legs before the start of the scheduled race and removed 5 days later. Data was recorded prior to the race and 5 days following the race. Measurements included VAS for muscle pain, creatine kinase (CK), lactate dehydrogenase isozyme (LDH), trunk flexion and muscle tension. The results of the research findings are as follows: 1) Muscle pain was significantly reduced following the marathon for those athletes with embedded needles ($p > 0.01$) 2) CK, LDH isozyme, LDH 4, LDH5 were all significantly elevated following the race ($p > 0.01$) so it was concluded that embedded needles were ineffective in moderating these cellular products. 3) There was no change in trunk flexion between the two subject groups. 4) Increased muscle tension was

observed in both the VastusLateralis and VastusMedialis muscles ($p>0.05$) indicating that the embedded needles were ineffective in reducing muscle tension. 5) Runners with embedded needles tended to have shorter race times. 6) Athletes were unable to determine if they had been needled with true needles or the control needles. Based on these results, it was concluded that embedded needles slightly reduced muscle pain following a marathon.

Kaneko et al.²²⁾ investigated whether Triathletes experienced less post-race pain following treatment with embedded needles compared to placebo type embedded needles. One hundred forty-nine male and female triathletes were recruited and divided into two groups; the embedded needle group had 79 subjects and the placebo needle group had 70. The placebo needle was the same item used by Miyamoto et al. discussed above. Both groups were needled using the same points, bi-laterally: UB23, UB24, UB25 and UB32. Needles were placed just before the start and removed as the athletes finished. Data was collected using a VAS score for 6 muscles in the lower limb before and after the race, as well as the day following the race. Results were reported as follows: 1) For both groups, muscle pain increased significantly following the race ($p>0.01$). 2) Excluding the Gluteal muscles, muscle pain for the embedded needle group decreased significantly the day following the race compared to immediately following the race ($p>0.01$, $p>0.05$). Athletes reported feeling their condition had returned to pre-race levels. 3) For the placebo group, on the day following the race, athletes reported less hamstring pain compared to immediately following the race ($p>0.05$). 4) Athletes in both groups were unable to determine if they had been needled with true needles or the control needles. From these results, the researchers suggested that embedded needles inhibited the delayed onset muscle soreness characteristic in athletes following strenuous exercise in athletes.

From Miyamoto and Kaneko's research, we have two comparative research studies demonstrating that embedded needles and carefully crafted tip-less placebo needles can be used to effectively blind the subjects and the practitioners to the research protocol, as evidenced by the inability of the subjects and practitioners to accurately determine which needles had been used. Further, embedded needles clearly reduced the muscle pain that commonly follows longer strenuous sporting events such as marathons and triathlons.

4. Summary

Within the field of acupuncture research for sports medicine and injuries, there has been a recent trend toward increased domestic and international research, however there are still few high level evidence based reports available. The difficulties associated with acupuncture treatment during clinical trials include 1) the ethical difficulty of requesting that serious athletes performing daily training programs participate in comparative trials where the placebo control may offer no particular benefit to them, 2) the reality that an integral part of acupuncture treatment involves stimulation with needles, it is often difficult to mask these sensations during clinical trials.

For these reasons, a good deal of creativity is necessary to develop effective research models that maintain the integrity of acupuncture methods and techniques but also meet the necessary criteria for double-blind comparative studies. Despite these challenges, Japan is endeavoring to expand its role in basic research projects that include acupuncture treatment for sports related conditions such as promoting early recovery of post-exercise muscle weakness and repair, preventing muscle atrophy during injury recovery and speeding muscle repair and development. Compared to foreign countries' clinical research, Japan has been conducting advanced research on fundamental areas of sports medicine. However, none of these have been

published in English Journals, so from now there must be more active transmission of Japanese reports abroad. There is a summary of these results in Table 5.

Table 5: Summary of Acupuncture Treatment for Sports Performance and Injuries

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| 1 | Year by year we have seen an increase in Acupuncture research for Sports Medicine, but advanced reports are still relatively uncommon. |
| 2 | Concerning the topic of Sports Injury, compared to the few available foreign research studies, Japanese research maintains higher quality methodology. |
| 3 | Domestic (Japanese) research projects often examine the treatment of low back pain in athletes. Acupuncture has often been shown to reduce pain and improve ADL and athletic performance. |
| 4 | The response mechanism behind acupuncture treatment for sports injuries such as ankle sprains and pulled muscles have been reported in papers both abroad and in Japan using both clinical trials and animal research. |
| 5 | Japanese randomized double-blind clinical trials have been used to demonstrate the significant effectiveness of embedded needles in reducing post-exertion muscle pain for endurance sports such as marathons and triathlons. |

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