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Treatment Methods and Effectiveness of Lumbar Muscle Strain Caused by Basketball Sports

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Abstract. Lumbar muscle strain, as a common disease, widely exists in basketball players. This study focuses on analyzing the effectiveness of various treatments for lumbar muscle strain, and ultimately provides a more effective, comprehensive treatment plan for patients with lumbar muscle strain caused by basketball. The results of this study showed that the common and effective TCM treatment methods were acupuncture, massage and external application of Chinese medicine, while the common and effective Western medicine treatment methods were usually drug treatment, and surgical treatment was usually used for very serious back injuries and was not included in the scope of this study. In addition to TCM and Western medicine treatment, physical therapy, such as core training and yoga was also effective in treating lumbar muscle strain. The results of this study provide a comprehensive treatment plan and a reference standard for a wide range of basketball players and even basketball enthusiasts when treating lumbar muscle strain, so that all basketball players are no longer worried about the failure to effectively treat lumbar muscle strain.

Keywords: Treatments, TCM, western medicine.

1. Introduction

Back pain has gradually emerged in all ages and is widespread around the world. It is increasing due to aging and an expanding world population [1]. Low back pain is a major cause of limited mobility and absenteeism in many parts of the world, and it places a huge financial burden on individuals, families, communities, industry and governments [2]. In addition, it will also bring long-term troubles to professional athletes and even affect their careers.

Early international research focused on using the chemical properties of traditional drugs such as analgesics and muscle relaxants to relieve pain or treat muscle damage. The limitation of these traditional drug treatments is that they often require long treatment cycles and long-term use of drug treatments makes the body resistant. Therefore, in recent years, it has turned to exercise rehabilitation therapy and innovation of traditional drugs to achieve the purpose of improving efficacy. China, in its early days, considered using either traditional Chinese medicine or Western medicine alone to treat the disease, but now it is combining Western medicine with Chinese medicine. The main contradiction in the treatment of lumbar muscle strain is that there is no unified evaluation system for the efficacy of lumbar muscle strain.

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Basketball is a world-class sport, and there are many people playing basketball all over the world. The sport has intense physical confrontation, varied footwork, and lots of jumping. Because of this, many parts of the body, such as the shoulders, lumbar spine, knees, ankles, and lower back, are subjected to extreme loads when people play basketball. Drakos et al. note that lumbar injuries account for10% of NBA injuries and ankle injuries for14% [3]. It can be seen from the posture of bending the waist and dribbling when people play basketball that the back is exerting force when playing basketball, so it is difficult to avoid muscle damage in the lower back, which leads to a high prevalence of lumbar muscle strain. This study aims to analyze several treatments for lumbar muscle strain, analyze their corresponding treatment populations, and ultimately develop a standard that can judge the treatment effect of lumbar muscle strain on a global scale.

2. Comparison of treatment methods and therapies for lumbar muscle strain caused by basketball sports

In the field of basketball, the decline in performance of NBA players due to lumbar muscle strain has attracted much attention, with the most typical case being Yao Ming. In the early days, Yao Ming was plagued by waist injuries. Due to long-term high-intensity games and training, he was diagnosed with chronic lower back strain that had affected the nerves in his lower limbs. Yao Ming's team has developed targeted training and professional treatment programs, such as reducing symptoms by strengthening the lumbar and abdominal muscles, reducing the number of back impacts and playing time, and combining acupuncture and moxibustion, physical therapy and other methods to alleviate the pain of chronic lumbar strain.

Targeted training is certainly important, but the choice of treatment method is still crucial. Effective treatment methods and understanding the symptoms and causes of lumbar muscle strain are very important. Lumbar muscle strain is a type of sports injury caused by long-term use. It is a condition in which the muscles, ligaments, and smooth sacs in the lower back become swollen and adhered, leading to inflammation and pain. The main symptoms of lumbar muscle strain include recurrent pain in the lower back, which may manifest as stabbing pain or soreness, and may initially radiate to the buttocks [4]. The treatment methods covered in this study include, but are not limited to, traditional Chinese medicine and Western medicine. Acupuncture and moxibustion, massage, drug therapy (such as non-steroidal anti-inflammatory drugs, skeletal muscle relaxants, etc.) and laser therapy are selected as the research objects.

2.1. Classification and principles of main treatment methods for lumbar muscle strain injury

2.1.1. Traditional Chinese medicine therapy

Acupuncture and moxibustion are a kind of traditional Chinese medicine therapy. Its principle is that the essence of acupoint sensation is nerve sensation. Acupuncture can excite different types of nerve components to produce needle sensation [5]. Different acupuncture methods (stimulation form and amount) can excite different types and quantities of peripheral nerves, thereby producing different regulatory effects in nature, scope, and time [5]. By needling specific acupoints in patients with lumbar muscle injury, the goal of relieving and treating pain can be achieved. This study refers to two methods of acupuncture and moxibustion, one is warming and unblocking acupuncture to treat lumbar muscle strain, the other is acupuncture and moxibustion combined with Chinese medicine hot compress to treat lumbar muscle strain [6,7].

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The difference between the Wen Tong acupuncture method and the conventional acupuncture method is that special techniques are used to retain the needle at different skin depths after insertion, and a unique acupuncture technique is used to achieve therapeutic effects that conventional acupuncture cannot achieve. Regarding the selection of acupoints and the reasons for selecting acupoints, the main cause of lumbar muscle strain is liver and kidney deficiency, or muscle and pulse blockage and poor qi and blood circulation caused by cold and excessive fatigue [6]. Therefore, when selecting acupoints, the Shen Shu and Guan Yuan Shu, which are most closely related to the liver and kidneys, are the main acupoints, while the Yao Yang Guan and Wei Zhong are the supporting acupoints [6]. Acupuncture and moxibustion can relieve or treat lumbar muscle strain by stimulating nerves, relaxing muscles and dredging blood vessels.

In terms of acupuncture and moxibustion combined with a hot compress of traditional Chinese medicine, lumbar muscle strain belongs to the category of "low back pain" and "arthralgia syndrome" of traditional Chinese medicine [7]. This type of disease is divided into two categories: excess syndrome and deficiency syndrome. Excess syndrome is often caused by cold and dampness, qi stagnation leading to muscle block, restricted lumbar movement, and lumbar muscle strain; Deficiency syndrome is caused by congenital body deficiency, excessive strain, and other factors that result in poor circulation of qi and blood, leading to local hypoxia or ischemia, hindering metabolism, and ultimately causing lumbar muscle strain [7]. Therefore, acupuncture and moxibustion are used to dredge blood vessels, relieve muscle tension, and stimulate peripheral nerves to speed up metabolism, so as to achieve the purpose of treatment. In addition, in combination with the different effects of many traditional Chinese medicines, such as safflower (such as safflower has the effect of promoting blood circulation and removing blood stasis), the treatment of lumbar muscle strain with acupuncture and moxibustion can enhance the efficacy of acupuncture and moxibustion [7].

Tuina, as one of the traditional treatment methods in China, is easy to understand in terms of its principles. By pressing and rubbing the uncomfortable area with external force, relaxing muscles, accelerating blood circulation, stretching fascia, etc., the therapeutic effect of relieving discomfort symptoms can be achieved. In addition, massage can also treat non-fractured joint displacement and other issues through specific techniques. A considerable proportion of people worldwide use massage (or massage, with similar principles) to treat lumbar muscle strain, especially for patients with mild symptoms. Therefore, this study referred to two massage techniques: one is Chinese massage reduction combined with focused shock wave therapy for treating lumbar muscle strain, and the other is four-in-one massage therapy for treating cold-dampness type lumbar muscle strain [4,8].

Chinese massage combined with focused shock wave therapy for lumbar muscle strain, as a combination of traditional Chinese medicine and Western medicine, may have better effects in treating lumbar muscle strain [4]. Tuina, as a traditional Chinese medicine therapy, can unblock meridians, accelerate local blood circulation, and relax muscles. Focused shock wave therapy is a novel physical therapy method that effectively alleviates muscle pain and improves muscle spasms by applying high-energy and high-precision shocks to the affected area. The four-in-one massage therapy is a new type of massage method for treating lumbar muscle strain. Based on the holistic concept of traditional Chinese medicine, it combines exercise rehabilitation with traditional massage to achieve a close combination of passive treatment and active rehabilitation, thereby enhancing the therapeutic effect [8].

DOI: 10.54254/2753-8818/2025.AU27851

2.1.2. Western medicine therapy

Drug therapy is the most widely used method worldwide for treating any injury or disease, apart from surgery. For lumbar muscle strain mainly caused by muscle injury, drug therapy has a long history of application. Using the chemical components of drugs to relax the lumbar muscles, accelerate metabolism, reduce pain, and ultimately achieve the treatment of lumbar muscle strain. Opioids, such as morphine and fentanyl, as drugs with addictive potential, are generally not used for the treatment of common lumbar muscle strain. Even if used for treatment, strict dosage and usage guidelines must be followed to prevent complications or the development of drug resistance that may force an increase in dosage. Although it can produce significant effects in treating lumbar muscle strain, like opioids, it is not the best treatment drug and requires strict management. Non opioid drugs, such as nonsteroidal anti-inflammatory drugs and muscle relaxants, are often the first choice for treating lumbar muscle strain. These drugs have the advantages of low addiction and strong controllability of side effects.

2.1.3. Other adjuvant therapies

Edward believes that exercise is the first-line therapy for treating lower back pain lasting more than 12 weeks, and long-term adherence should be considered [1]. Stretching exercises such as yoga can be used to alleviate lower back pain symptoms [9]. Exercise therapies such as core training can be used to strengthen some muscles to increase the load limit of the lower back or waist muscles, so that the lower back muscles can better withstand the intensity of regular exercise [10]. In addition to exercise therapy, physical therapy can also use high-tech methods such as ultrasound therapy, or the simplest methods such as hot compress and cold compress.

2.2. Comparison of therapeutic effects and analysis of characteristics of different treatment methods

2.2.1. Advantages and limitations of traditional Chinese medicine therapy

The Wen Tong acupuncture method is used to treat lumbar muscle strain, with a conventional treatment cycle of about 23 days. According to the patient's recovery results, the cure rate of the Wen Tong acupuncture group is 65.6% (21/32), which is better than the conventional acupuncture group's 40.6% (13/32), and the difference in this data is statistically significant [6]. The research results indicate that the application of the Wen Tong acupuncture method requires a wide range of lower back pain, lower back muscle tension, and no accompanying diseases. Since the principle of acupuncture and moxibustion is to stimulate blood vessels and peripheral nerves, some people are not suitable for warming and unblocking acupuncture: first, patients with bone diseases such as lumbar disc herniation; second is patients with severe cardiovascular and cerebrovascular diseases.

After two weeks of combined treatment of acupuncture and moxibustion and Chinese herbal hot compress for lumbar muscle strain, the effective rate, CODI and VAS index of patients in the observation group (combined treatment group) were significantly better than those in the control group (conventional acupuncture and moxibustion group), with a statistically significant difference. The two doctors also clearly pointed out that the above three indicators of the two groups of patients were almost identical before treatment [7].

According to the characteristics of acupuncture and moxibustion and external application of traditional Chinese medicine, this study summarized that the applicable population has a history of

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long-term recurrent low back pain, accompanied by varying degrees of pain, unilateral or bilateral lumbosacral pain and discomfort, aggravated after fatigue, relieved after rest, and lumbar X-ray examination was normal. Not applicable to pregnant or lactating patients, severe heart and kidney dysfunction patients, and those with spinal diseases such as lumbar disc herniation, lumbar spinal stenosis, and fractures shown on CT images.

Chinese massage combined with focused shock wave therapy for lumbar muscle strain showed a difference in efficacy between the two groups. The observation group had better scores in various tests than the control group, with statistical significance [4]. Tuina combined with shock wave therapy is suitable for lumbar muscle tension accompanied by mild tenderness, unilateral or bilateral sacral spine muscles accompanied by mild tenderness, long-term history of back pain with recurrent episodes, and back pain accompanied by unilateral or bilateral lower limb numbness and pain [4]. The standards that are not applicable include lumbar weakness accompanied by urgency and pain during urination, lumbar spine fractures, dislocations, and other diseases, as well as comorbidities of cardiovascular and cerebrovascular diseases and pregnant women [4]. The four-in-one massage therapy for treating lumbar muscle strain clearly states that after each treatment, the efficacy score of the treatment group is better than that of the control group, and the difference is statistically significant [8]. The applicable and inapplicable symptoms of this four-in-one therapy are basically consistent with the above situation.

2.2.2. Advantages and limitations of western medicine therapy

A Cochrane systematic review on the treatment of acute and chronic back pain with nonsteroidal anti-inflammatory drugs and COX-2 inhibitors included 65 trials (11237 patients), and the results showed that nonsteroidal anti-inflammatory drugs were statistically superior to placebo [11]. Its benefits include overall condition improvement and reduced demand for additional analgesic drugs [11]. Non-steroidal anti-inflammatory drugs also have side effects, such as exacerbating gastrointestinal problems, and muscle relaxants may cause users to experience drowsiness, dizziness, and so on. Therefore, it is suitable for patients with mild, chronic, and acute back pain who have no other illnesses.

Opioids and weak opioid drugs are mainly used to treat pain in lumbar muscle strain, usually for patients who are unresponsive to non opioid therapy and generally have no functional therapeutic effect [12,13]. Compared with other drugs, opioid drugs have the best analgesic effect, but due to their lack of functional efficacy and high addiction and drug dependence, their usage scenarios are limited. In addition, the inevitable side effects of drug therapy, such as nausea, headache, and dry mouth, ultimately require the combination of other drugs to alleviate the side effects when using opioid drugs to treat lumbar muscle strain. This not only increases the treatment cost for patients, but also requires doctors to consider whether patients have multiple diseases at the same time when prescribing, thereby increasing the difficulty of prescribing. Opioids are more likely to be used in specific populations, including patients who are unresponsive to non opioid therapy, patients with severe comorbidities, patients with extremely high pain levels, and patients who only require short-term medication.

2.2.3. Synergistic effects of combination therapy regimens

Based on the analysis of various treatment methods mentioned above, the study suggests that combination therapy can be used for patients with mild and chronic back pain, as well as severe and acute lumbar muscle strain. For example, muscle relaxants in non opioid drugs are first used to

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temporarily relieve muscle tension, then Wentong acupuncture method is used to specifically treat low back pain, and with external application of Chinese medicine or traditional Chinese patent medicines and simple preparations to alleviate the side effects of muscle relaxants, while making up for the slow onset of Wentong acupuncture method and Chinese medicine. Research suggests that combination therapy is a trend in breaking down medical barriers, integrating the advantages and disadvantages of various treatment methods, and complementing each other to maximize efficacy and shorten treatment cycles.

2.3. Special considerations for the treatment of lumbar muscle strain in basketball players

Basketball is one of the most popular sports worldwide, with approximately 450 million people participating in the sport. Injuries are not uncommon among professional basketball players, but compared to common and highly valued diseases such as shoulder impingement and ankle sprains, lower back injuries are often overlooked. Based on the analysis of treatment methods for lumbar muscle strain, this study provides targeted treatment plans for basketball players. Due to the fact that basketball players usually need to engage in high-intensity continuous games and training, they need to enhance their confrontational ability to ensure their offensive and defensive advantages, and also require a large amount of back running to ensure sufficient physical fitness during the game. Therefore, the treatment for back injuries in basketball players needs to meet the requirements of a short treatment course, fast onset, minimal side effects, wide adaptability, no adverse sequelae, and enhanced specialized strength, improve the upper limit of back muscle load, and strengthen anti-injury ability.

Given the different positions of players on the basketball court - center, power forward, small forward, shooting guard, and point guard - players in these five positions have different physical attributes, height, weight, and technical responsibilities. Therefore, this study compares different treatment plans with different technical characteristics and height ranges. For example, athletes who are 196-210cm tall and have technical characteristics such as dribbling, shooting, and breaking through from the outside line may experience severe pain, no complications, and no bone problems, such as lumbar spine. In view of the athlete's situation, the study first used weak opioids to relieve pain, then used shock wave therapy to initially relax muscles, then used acupuncture and moxibustion therapy to deeply relax subcutaneous muscle tissue, speed up metabolism to prevent vascular blockage, and finally relaxed the entire back through massage. After treatment, rehabilitation training is carried out. Firstly, low-load yoga is used to awaken the lower back muscles. Then, core training is performed to restore the lower back muscles to normal strength levels and gradually increase the training load to enhance muscle endurance and prevent injury recurrence. Perform stretching activities after each core training session to give the waist and back muscles time to self-repair. For other players, treatment methods need to be adjusted based on their pain index, whether they currently have other illnesses, and whether there are structural injuries to their lower back.

In addition, psychological treatment for injured basketball players is also very important. Injured basketball players often worry about the impact of their injuries on their career prospects, absence from training, inability to fully recover, and other issues, leading to anxiety that is extremely detrimental to treatment and rehabilitation. Therefore, research suggests increasing psychological tests, such as difficulty concentrating and insomnia, as well as anxiety relief measures, such as playing teammate blessing videos.

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3. Conclusion

This study aimed to investigate the effectiveness of common treatments for basketball-induced lumbar muscle strain. This study included acupuncture, massage, external application of traditional Chinese medicine, drug therapy in Western medicine, and other therapies such as physical therapy and exercise rehabilitation. Acupuncture, massage and external application of traditional Chinese medicine have no obvious analgesic effect, and the treatment cycle is longer, but the functional recovery effect is the best. Opioids and non-opiates have good analgesic effects and a rapid onset, but opiates have a general functional effect, while non-opiates have a higher functional effect than opiates, but both drugs have obvious side effects. Finally, the effects of physical therapy and exercise rehabilitation therapy can only be fully demonstrated after the first two treatments are implemented. In conclusion, this study provides a reference for all basketball enthusiasts and even basketball players to treat psoas muscle strain, aimed at alleviating the anxiety of all basketball players when suffering from psoas muscle strain. Even though this study refers to several treatment methods, similar injury symptoms may not be treated with the same treatment plan, because each patient's injury severity, physical conditions and other factors are different, so the treatment plan in this study only provides a framework and ideas, and cannot perfectly treat each patient's injury. In addition, there is no internationally agreed standard for the accurate evaluation of post-treatment effectiveness. It is hoped that in the future, a standard will be introduced to help every patient judge their own cause and injury degree faster and more accurately, and a standard for judging the global treatment effect will be unified.

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