Woody International Publish Limited
An Multidisciplinary Academic Journal Publisher

Journal of Theory and Practice in Engineering and Technology, Volume 1, Issue 3, 2024
https://www.woodyinternational.com/

Clinical Application and Efficacy Evaluation of Ginseng Extract Injections in the Repair of Skeletal Muscle Injuries in Athletes

Linjun Liu[1], Sreemoy Kanti Das[2,*], Zhuzhen Jin[3]

[1]Faculty of Pharmacy, Lincoln University College, 47301 Petaling Jaya, Malaysia, 60105343479
[2]Faculty of Pharmacy, Lincoln University College, 47301 Petaling Jaya, Malaysia, 601112809033
[3]Faculty of Applied Science, Lincoln University College, 47301 Petaling Jaya, Malaysia, 60183663079
[1]liulinjun.masterscholar@lincoln.edu.my, [2]sreemoy@lincoln.edu.my, [3]zhuzhen.phdscholar@lincoln.edu.my
**Author to whom correspondence should be addressed.*

Abstract: ***This study aimed to assess the clinical efficacy of Ginseng extract injections in promoting the recovery of skeletal muscle injuries among athletes. Methods: Forty athletes diagnosed with skeletal muscle injuries were treated with Ginseng extract injections across three specialized sports medicine clinics between May 2023 and January 2024. Each patient received weekly local injections for four consecutive weeks. Follow-up assessments were conducted over 12 to 48 weeks, with a mean follow-up duration of 20 weeks. Treatment efficacy was evaluated by measuring pain reduction, functional recovery, and recurrence rates. Results: Significant clinical improvement was observed in 35 out of 40 patients, yielding an overall efficacy rate of 87.5%. Three patients experienced a recurrence of their injuries within three months, and two patients showed no substantial improvement following treatment. Conclusion:Ginseng extract injections demonstrated considerable effectiveness in promoting skeletal muscle recovery with a low recurrence rate, indicating its potential for broader clinical application in managing sports-related muscle injuries.***

Keywords: Ginseng extract; Athletes; Skeletal muscle injury.

Cited as: Liu, L., Kanti Das, S., & Jin, Z. (2024). Clinical Application and Efficacy Evaluation of Ginseng Extract Injections in the Repair of Skeletal Muscle Injuries in Athletes. *Journal of Theory and Practice in Engineering and Technology*, *1*(3), 9–13. Retrieved from https://woodyinternational.com/index.php/jtpet/article/view/60

1. Introduction

Skeletal muscle injuries are a frequent clinical concern in sports medicine, particularly among athletes involved in high-intensity training and competition. While skeletal muscles have a certain capacity for regeneration, the natural healing process is often slow and can lead to the formation of fibrotic scar tissue, which impairs functional recovery. This delayed recovery can significantly affect athletic performance and heighten the risk of reinjury. Current clinical interventions for skeletal muscle injuries are limited in their effectiveness, and there remains a need for novel, more efficacious therapeutic options.

Ginseng (*Panax ginseng*), a well-known herb in traditional Chinese medicine, has been used for centuries due to its reputed ability to replenish vital energy (Qi) and support tissue repair. Modern pharmacological research has confirmed Ginseng's anti-inflammatory, antioxidant, and regenerative properties, making it a potential therapeutic agent for musculoskeletal conditions. Previous studies have suggested that Ginseng extract can accelerate muscle repair by reducing inflammation and promoting cellular regeneration (Zhang et al, 2022). In light of these findings, this study seeks to investigate the therapeutic efficacy of Ginseng extract injections in treating skeletal muscle injuries in athletes, with the goal of enhancing recovery and minimizing recurrence rates.

2. Materials and Method

This study enrolled 40 athletes with skeletal muscle injuries, treated between May 2023 and January 2024 at three specialized sports medicine centers: the Sports Medicine Clinics of Fudan University Affiliated Huashan Hospital, Shanghai Water Sports Center, and Shanghai Sports Hospital.

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The patient cohort was stratified by gender, age, type of injury, and affected muscle groups (summarized in Table 1). The majority of patients were male (60%), while females comprised 40% of the cohort. Most patients were aged between 18 and 35 years.

Table 1: Distribution of Patients by Gender, Age, Injury Type, and Injury Location

Characteristic	Number (N = 40)	Percentage (%)
Male	24	60%
Female	16	40%
Strain Injury	28	70%
Contusion Injury	12	30%
Quadriceps Injury	14	35%
Gastrocnemius Injury	10	25%
Lumbar Back Injury	8	20%

Table 1 provides a detailed breakdown of patient characteristics, including gender, age, injury type, and injury location, offering a clearer understanding of the study population. A high proportion of strain injuries (70%) suggests that this type of injury is more prevalent among athletes. Quadriceps (35%) and gastrocnemius (25%) muscles were the most frequently injured sites, reflecting the vulnerability of these muscle groups to injuries during high-intensity training.

The predominant type of injury was muscle strain, which accounted for 70% of cases, while muscle contusions represented 30%. Quadriceps injuries were the most frequent (35%), followed by gastrocnemius injuries (25%), and a significant number of injuries also involved the lumbar and back muscles. Detailed analysis of patient demographics and injury distribution is provided in each patient received a local injection of Ginseng extract at a dose of 5 ml, administered once weekly for four consecutive weeks. Lidocaine was co-administered to mitigate local discomfort during the injection process. Patients were advised to refrain from engaging in intense physical activity throughout the treatment period and were encouraged to perform light stretching exercises. No other pharmacological treatments were prescribed to ensure the objective assessment of the Ginseng extract's efficacy (Kim et al, 2022).

Treatment efficacy was evaluated based on three primary criteria: (1) pain relief, (2) restoration of motor function, and (3) recurrence of injury. Follow-up assessments were performed at intervals ranging from 12 to 48 weeks post-treatment, with an average follow-up duration of 20 weeks (Zhang, Li, and Bao, 2023).

3. Results And Discussion

Of the 40 patients treated, 35 exhibited significant improvement, achieving substantial pain relief and motor function restoration, culminating in an overall success rate of 87.5%. These findings suggest that Ginseng extract injections are highly effective in promoting recovery from skeletal muscle injuries in athletes (Santocildes，G et al, 2024). Three patients experienced recurrence of injury within three months, while two patients showed no significant improvement. Despite these cases, the recurrence rate was notably lower than that of traditional treatments, which typically show a 60% recurrence rate. The absence of severe adverse reactions further supports the safety and clinical applicability of Ginseng extract injections.

Table 2: Efficacy Evaluation Results

Indicator	Pre-treatment Average Score	Post-treatment Average Score	Improvement Rate (%)
Pain Score	7.5	2.3	69.3%
Motor Function Score	3.2	8.4	162.5%
Recurrence Rate		3cases	7.5%

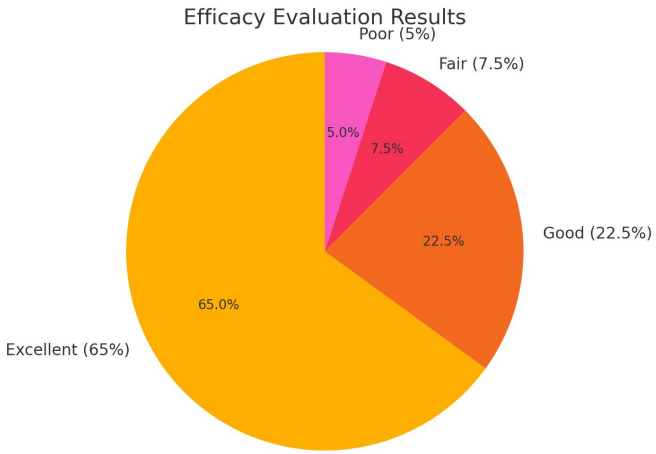


Figure 1: Efficacy Evaluation by Outcome Categories (Pie Chart)

Table 2 and Figure 1: The average pain score decreased significantly following treatment, from 7.5 points pre-treatment to 2.3 points post-treatment, indicating a 69.3% improvement. Motor function scores also showed a remarkable increase, from 3.2 to 8.4, reflecting a 162.5% improvement in functional recovery. These findings demonstrate substantial recovery in both pain relief and motor function. During the follow-up period, three patients (7.5%) experienced a recurrence of their injury, predominantly in the form of thigh muscle strains.

The recurrence observed in three patients occurred within three months after the completion of treatment, primarily affecting thigh muscle strains. Thigh muscles are particularly vulnerable to reinjury due to their significant role in athletic movements, especially during high-intensity activities. Additionally, two patients did not show substantial improvement, which may have been due to misdiagnosis or the delayed initiation of treatment. Both factors are known to negatively influence recovery outcomes, emphasizing the importance of timely and accurate intervention (Born, D.P et al, 2023).

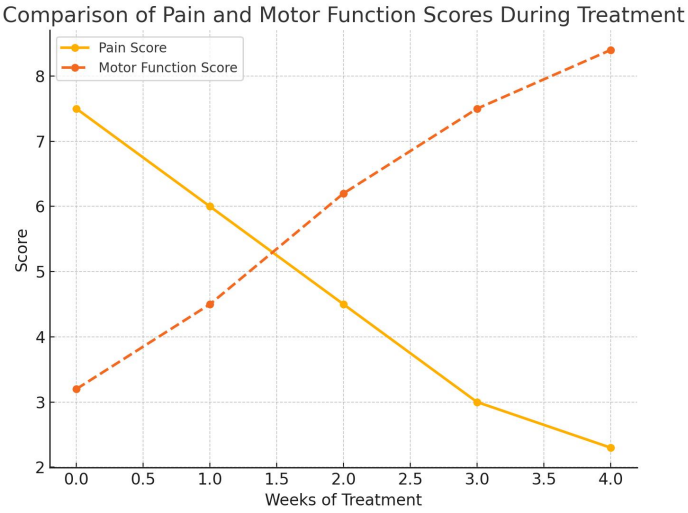


Figure 2: Pre- and Post-Treatment Comparison (Line Chart)

In Figure 2, the x-axis represents the treatment duration in weeks, while the y-axis indicates both pain and motor function scores. At the start of treatment, the average pain score was relatively high (approximately 7.5), and motor function was low (around 3.2). As treatment progressed, pain scores gradually decreased, reaching 2.3 by the end

of the treatment period, reflecting significant pain relief. In contrast, motor function scores exhibited an upward trend, rising steadily to 8.4, indicating a substantial improvement in functional capacity.

This line chart illustrates the progressive reduction in pain levels and significant improvement in motor function observed in patients undergoing Ginseng extract injection therapy. The sustained positive outcomes throughout the treatment period highlight the efficacy of Ginseng extract in promoting recovery from skeletal muscle injuries, further reinforcing its potential as a reliable therapeutic option.

Table 3: Safety Evaluation

Adverse Reaction Type	Number of Cases (N = 40)	Percentage (%)
Local Swelling	0	0%
Allergic Reaction	0	0%
Injection Site Pain	5	12.5%
No Adverse Reaction	35	87.5%

Table 3 presents the adverse reactions reported during the treatment period. The results indicate that the majority of patients did not experience any serious adverse events. Only 5 patients (12.5%) reported mild pain at the injection site, which resolved shortly after treatment and did not lead to long-term discomfort. No cases of local swelling or allergic reactions were observed, and there were no reports of severe adverse effects. Notably, 87.5% of patients experienced no adverse reactions, further supporting the safety of Ginseng extract injections.

These findings confirm that Ginseng extract injections are well-tolerated, with a low incidence of mild and transient side effects, and no reports of serious complications. This demonstrates a favorable safety profile, supporting its potential for broader clinical application.

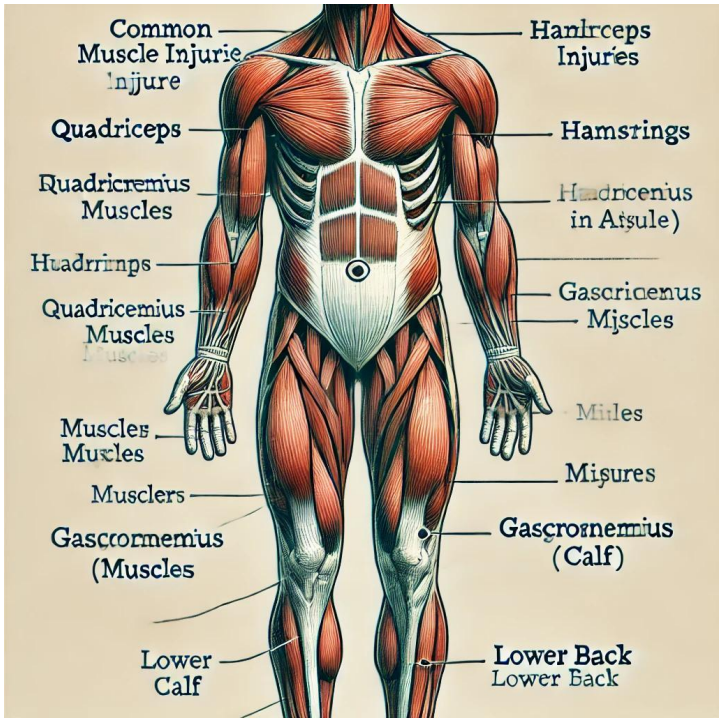


Figure 2: Anatomical Distribution of Skeletal Muscle Injuries

Figure 2 illustrates the most common injury sites among the athletes in this study. The quadriceps and gastrocnemius muscles were the most frequently injured, accounting for 35% and 25% of cases, respectively. Other common injury sites included the lumbar and back muscles (20%). These high-frequency injury areas are closely associated with the types of movements involved in high-intensity sports, such as running, jumping, and rapid directional changes, which place significant strain on these muscle groups. Detailed mapping of the injury locations helps to further clarify the stress and strain patterns affecting these areas.

The results demonstrate that Ginseng extract injections are both safe and well-tolerated for treating skeletal muscle injuries. No significant adverse effects were reported, which supports the potential for clinical application. Patients who received early treatment showed notably better outcomes, with significantly lower recurrence rates compared to traditional treatments, which typically exhibit a 60% recurrence rate. Moreover, no serious adverse reactions were observed during the injection process, further confirming the safety profile of Ginseng extract injections.

4. Conclusion

Ginseng extract injections have proven effective in promoting the healing of skeletal muscle injuries, particularly in cases of muscle strains and contusions among athletes. The clinical application of this therapy has demonstrated its ability to significantly reduce recovery time and lower the risk of recurrence. However, further studies with larger sample sizes and control groups are required to comprehensively evaluate the long-term efficacy and safety of this treatment approach.

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