

Clinical Outcomes of Mesotherapy for Lateral Epicondylitis: A Retrospective Cohort Study

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Abstract

Introduction: To evaluate the effectiveness of mesotherapy in reducing pain intensity and improving upper limb function in patients with lateral epicondylitis.

Methods: A retrospective cohort study was conducted between January 2024 and February 2025. Adults with lateral epicondylitis who completed a standardized mesotherapy protocol were included. Pain intensity was assessed using the Visual Analog Scale (VAS), and upper limb function was evaluated using the Quick Disabilities of the Arm, Shoulder, and Hand (QuickDASH) questionnaire at baseline, immediately after treatment, and at the one-month follow-up. Nonparametric tests and robust regression analyses were employed to analyze outcome changes and predictors of response.

Results: A total of 222 patients were included (mean age, 49.6±9.8 years; 58% female). Mean VAS scores improved from 7.08±1.13 at baseline to 5.9±1.4 post-treatment and 5.4±1.3 at follow-up ($p<0.001$). QuickDASH scores improved from 64.12±16.53 at baseline to 43.9±14.8 post-treatment and 34.0±13.9 at follow-up ($p<0.001$). Clinically meaningful pain reduction was achieved by 75.7% of patients, and 97.3% achieved functional improvement. Notably, higher body mass index was associated with attenuated response.

Discussion and Conclusion: Mesotherapy was associated with significant and sustained reductions in pain and functional disability among patients with lateral epicondylitis. These results suggest that mesotherapy is a promising minimally invasive therapeutic option, warranting confirmation through future randomized controlled trials.

Keywords: Lateral epicondylitis; mesotherapy; minimally invasive therapy; pain management; tendinopathy.

Lateral epicondylitis, or “tennis elbow,” is a degenerative musculoskeletal disorder marked by pain and dysfunction at the lateral elbow, primarily affecting the extensor carpi radialis brevis tendon. It significantly impairs quality of life by reducing grip strength, limiting daily and occu-

pational activities, and compromising both physical and emotional well-being [1]. Its societal impact is equally substantial, especially among working adults, contributing to absenteeism, reduced productivity, and increased health-care utilization [2]. This condition imposes a measurable

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burden on healthcare systems, requiring long-term conservative care and, in some cases, surgery^[3].

Despite its prevalence and burden, effective management remains challenging. Standard treatments-NSAIDs, physiotherapy, corticosteroids, and surgery-often yield inconsistent, short-lived benefits. Platelet-rich plasma (PRP) has emerged as a biologically active therapy promoting tendon healing, with randomized trials showing superior long-term outcomes compared to corticosteroids in chronic cases^[4,5]. However, variability in PRP protocols and patient response has limited its adoption. Meta-analyses continue to report inconsistent efficacy, highlighting the need for novel, targeted approaches^[6].

Mesotherapy, a minimally invasive technique involving intradermal injection of pharmaceuticals (e.g., NSAIDs, muscle relaxants, anesthetics), targets local pain and inflammation with lower systemic drug exposure^[7]. It has shown promise in various musculoskeletal conditions, including back and neck pain and osteoarthritis^[8,9]. Preliminary findings in chronic lateral epicondylitis report improvements in pain, function, and work capacity^[10]. While further trials are needed, mesotherapy may represent a valuable adjunct treatment.

A mechanistic rationale further supports mesotherapy's role in lateral epicondylitis, which involves tendinosis of the extensor carpi radialis brevis with microtears, collagen degeneration, and neovascularization rather than acute inflammation^[5]. Mesotherapy allows targeted delivery of anti-inflammatory and analgesic agents, modulating nociceptive and inflammatory pathways within peritendinous tissue. Clinical data suggest improvements in pain, function, and work ability in treatment-resistant cases^[10,11]. Although evidence remains limited, the localized therapeutic action provides a compelling rationale for its use in chronic tendinopathies^[12].

Given the limited but promising data, this study aims to address a key gap in knowledge by evaluating the clinical effects of mesotherapy in lateral epicondylitis. Using a retrospective, single-group observational design, it assesses changes in pain and upper limb function at baseline, post-treatment, and at one-month follow-up. Findings from this study may inform future clinical trials, support treatment decisions in tendinopathies, and contribute to evidence-based guidelines for this challenging musculoskeletal condition.

Materials and Methods

Study Design and Setting

This retrospective cohort study aimed to analyze the effectiveness of mesotherapy in patients with lateral epicondyli-

tis (LE). The study was approved by the Institutional Review Board of the University of Health Sciences, Sultan Abdulhamid Han Training and Research Hospital, Traditional and Complementary Medicine Ethics Committee (Approval number: SBUSAH-GETAT 2025-059, Date: 26/03/2025). All procedures were conducted in accordance with the ethical standards of the institutional research committee and the Declaration of Helsinki. A waiver of informed consent was granted due to the retrospective design and the use of anonymized data. Medical records from the outpatient musculoskeletal medicine clinic of the Department of Physical Medicine and Rehabilitation at Sultan Abdulhamid Han Training and Research Hospital were reviewed for the period between January 2024 and February 2025.

Participants and Diagnostic Criteria

Patients were eligible for inclusion if they were between 18 and 70 years of age, had a clinical diagnosis of lateral epicondylitis characterized by lateral epicondylar tenderness and pain during resisted wrist extension or gripping, and had a symptom duration of at least 6 weeks. All included patients had failed initial conservative treatment (e.g., rest, oral nonsteroidal anti-inflammatory drugs, or physical therapy) and received a minimum of three mesotherapy sessions. Complete documentation of baseline and follow-up assessments for pain and function was required.

Exclusion criteria included corticosteroid, platelet-rich plasma, or prolotherapy injections within 3 months prior to mesotherapy; prior surgery or significant trauma to the affected upper extremity; coexisting upper limb disorders such as cervical radiculopathy, radial tunnel syndrome, systemic inflammatory conditions, or neurological diseases; known hypersensitivity to any components of the mesotherapy solution; and bilateral symptoms unless one side was clearly dominant and exclusively treated. Patients with incomplete follow-up data were excluded. All diagnoses and treatment courses were reviewed and confirmed by board-certified physiatrists. The patient selection and eligibility process is summarized in Figure 1.

The diagnosis of LE was established based on clinical history and physical examination findings. Diagnostic criteria included localized tenderness over the lateral epicondyle and pain elicited during resisted wrist extension and gripping. Provocative maneuvers such as Cozen's test and Mill's test were performed to confirm the diagnosis. Cozen's test, characterized by pain reproduction during resisted wrist extension, has demonstrated high sensitivity (84%), whereas Mill's test, involving passive wrist flexion and elbow extension, shows excellent specificity (100%) for lateral epicondylitis^[13]. Additionally, Mill's test has been shown to

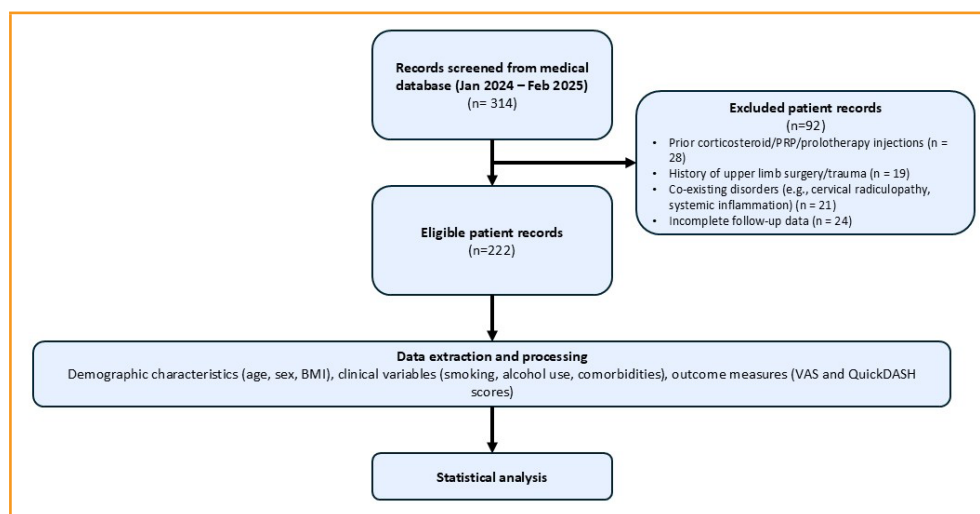


Figure 1. Flowchart of the study.

have excellent inter-test reliability validated by ultrasound imaging [14]. Imaging studies, such as ultrasound or MRI, were reserved for atypical or complex cases. All diagnoses were confirmed by board-certified physiatrists specialized in musculoskeletal medicine.

Mesotherapy Protocol

Solution Preparation

Under aseptic conditions, the mesotherapy solution was prepared using a mixture of three pharmacological agents routinely applied in musculoskeletal pain management: lidocaine 2%, thiocolchicoside, and meloxicam. A 2% lidocaine solution was diluted 1:1 with 0.9% sodium chloride to obtain a 1% solution, from which 1 mL was transferred. Thiocolchicoside (4mg/2mL) was added in a volume of 2mL. Meloxicam (7.5mg/1.5mL) was diluted with 4mL of 0.9% sodium chloride, from which 1 mL was added. All components were transferred into a sterile syringe and gently mixed to obtain a final injectable volume of 4mL. The preparation was based on institutional practice guidelines and dilution methods reported in the literature [15–17]. The use of these agents is supported by evidence favoring combinations of a local anesthetic and NSAID in mesotherapy for localized musculoskeletal pain [8], while thiocolchicoside, a gamma-aminobutyric acid (GABA) and glycinergic receptor agonist, has demonstrated effectiveness as a muscle relaxant and analgesic in musculoskeletal disorders [17,18].

Injection Technique

Patients were positioned supine with the shoulder adducted, the elbow flexed at 90 degrees, and the wrist in a neutral position, with the forearm resting across the abdomen (Fig. 2A). The skin over the injection area was thoroughly

cleansed using hydrogen peroxide, applied in a circular motion from the center outward, and draped to maintain asepsis. The mesotherapy application site corresponded to the area of maximal tenderness at the origin of the common extensor tendon on the lateral epicondyle (Fig. 2B).

Two mesotherapy methods were employed concomitantly. The point-by-point technique was performed by injecting 0.1–0.2mL of solution into the superficial dermis at 1–2cm intervals using a 27G needle (Fig. 2C). The intradermal injection technique consisted of superficial injections at a shallow angle to form discernible blebs in the superficial dermal layer (Fig. 2D). The injections were administered in three sessions at weekly intervals (Day 1, Day 8, and Day 15). This regimen, described in mesotherapy textbooks and consensus reports, represents a commonly applied schedule for musculoskeletal pain, allowing cumulative local drug effects while minimizing systemic exposure [16].

Outcome Measures

The primary outcome was the change in pain intensity assessed using the Visual Analog Scale (VAS), a validated and widely used tool for measuring subjective pain across musculoskeletal conditions [19]. The VAS consists of a 10cm line anchored by two verbal descriptors: “no pain” (0) and “worst imaginable pain” (10), allowing patients to indicate their perceived pain intensity along a continuous scale.

The secondary outcome was the change in upper limb function, evaluated using the Quick Disabilities of the Arm, Shoulder and Hand (QuickDASH) questionnaire, a shortened and psychometrically validated version of the original DASH instrument. The QuickDASH assesses physical function and symptoms in individuals with upper limb disorders and has demonstrated excellent internal consistency, test–retest reliability, and construct validity across multiple

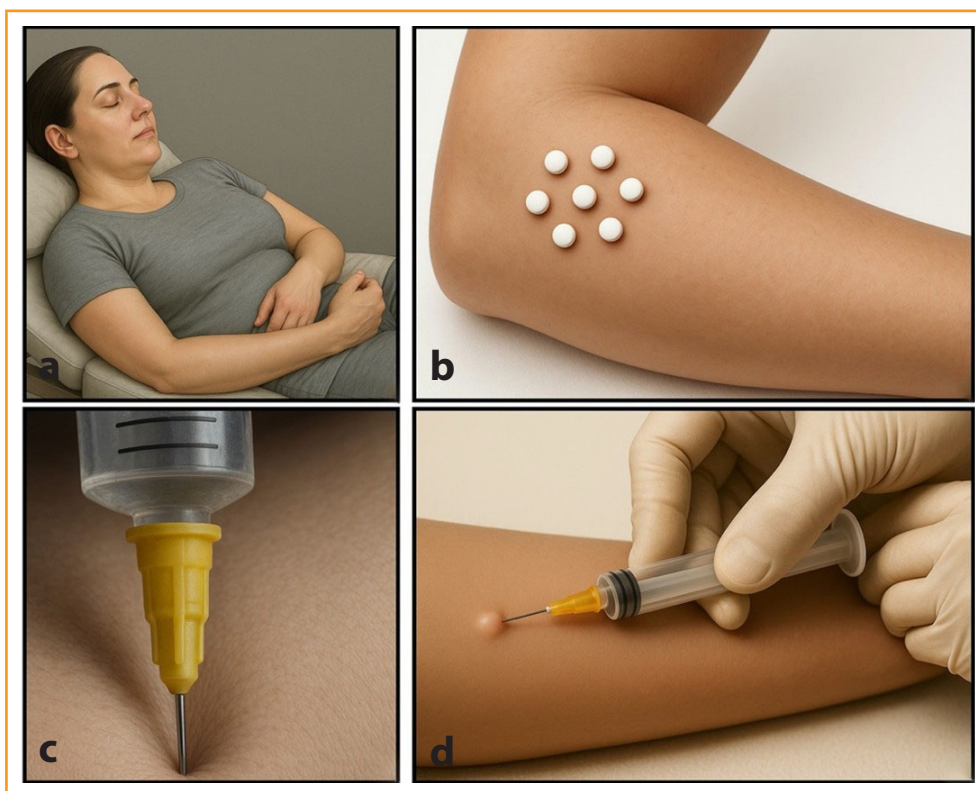


Figure 2. Mesotherapy Procedure for Lateral Epicondylitis. **(a)** The patient is positioned in a supine posture with the elbow flexed to approximately 70 degrees, and the hand resting comfortably over the abdomen to ensure procedural stability. **(b)** The mesotherapy application site is located over the area of maximal tenderness at the origin of the common extensor tendon on the lateral epicondyle. **(c)** Implementation of the point-by-point injection technique, wherein the needle is inserted perpendicularly (90° angle) to the skin surface to deliver the therapeutic agent directly into the targeted tissue. **(d)** Execution of the intradermal injection technique, involving the insertion of the needle at a shallow angle (approximately 10° to 15°) to administer small volumes of the solution into the superficial dermal layer.

musculoskeletal populations [20,21].

Both VAS and QuickDASH scores were collected at three standardized time points. Baseline measurements were recorded prior to the initiation of mesotherapy, immediately before the first injection. The second assessment was performed immediately after completion of treatment, following the third mesotherapy session. The final evaluation was conducted at the one-month follow-up.

Blinding

To reduce assessment bias, two independent reviewers who were unaware of patient identity and treatment timing extracted outcome data. Both VAS and QuickDASH scores were recorded using a standardized data abstraction form. Reviewers were blinded to whether values corresponded to pre-treatment or post-treatment assessments. Discrepancies were resolved by consensus or adjudicated by a third reviewer.

Statistical Analysis

Statistical analyses were performed using R software version 4.2.2 (R Foundation for Statistical Computing, Vienna, Austria). The distribution of continuous variables was assessed using the Shapiro–Wilk test. Continuous variables were summarized as mean±standard deviation or median (interquartile range), depending on normality, and categorical variables were presented as frequencies and percentages.

Nonparametric methods were used for longitudinal and cross-sectional comparisons due to the non-normal distribution of primary outcomes. Changes over time were analyzed using the Friedman test, with post hoc pairwise comparisons conducted using the Wilcoxon signed-rank test with Bonferroni correction. Cross-sectional comparisons across sociodemographic and behavioral variables were evaluated using the Mann–Whitney U test for two-group comparisons and the Kruskal–Wallis test for multiple-group comparisons, followed by Dunn’s test with Bon-

ferroni adjustment where appropriate.

To identify predictors of clinical improvement, robust linear regression models with HC3 standard errors were applied after detecting heteroscedasticity and non-normal residual distributions. Effect sizes for Wilcoxon comparisons were calculated as *r* values. Statistical significance was defined as a two-tailed *p*<0.05 unless adjusted for multiple comparisons. Minimal clinically important difference (MCID) thresholds were applied, defining meaningful improvement as a 1.5-point reduction in VAS and a 5.3-point reduction in QuickDASH scores based on validated benchmarks [22,23].

Results

The flowchart of the study is presented in Figure 1. A total of 314 patient records were screened between January 2024 and February 2025. Of these, 92 patients were excluded based on predefined criteria: 28 due to prior corticosteroid, platelet-rich plasma, or prolotherapy injections within 3 months before mesotherapy; 19 due to a history of upper limb surgery or significant trauma; 21 due to coexisting disorders such as cervical radiculopathy or systemic inflammatory disease; and 24 due to incomplete follow-up data. After exclusions, 222 patients met all eligibility criteria and were included in the final analysis.

Descriptive Statistics

Data from 222 patients with lateral epicondylitis were analyzed. Table 1 summarizes the descriptive statistics for age, BMI, and baseline scores. The mean age of participants was 53.97±12.85 years, and the mean BMI was 28.38±4.06kg/m². At baseline, the mean VAS pain score was 7.08±1.13, and the mean QuickDASH score was 64.12±16.53.

Pain intensity over time (VAS scores)

Temporal changes and score distributions for VAS and QuickDASH are presented in Figure 3 (panels A–D). Due to violations of normality as confirmed by the Shapiro–Wilk test (*p*<0.05), non-parametric tests were applied to VAS score comparisons. A Friedman test revealed a significant difference across the three time points ($\chi^2(2)=164.37$,

p<0.001). Post hoc Wilcoxon signed-rank tests with Bonferroni correction ($\alpha=0.017$) showed a significant reduction in VAS scores from T0 to T1 (mean difference=–1.03, 95% CI: –1.21 to –0.85, *Z*=–8.0, *p*<0.001, *r*=0.537). A greater reduction was observed from T0 to T2 (mean difference=–1.81, 95% CI: –2.01 to –1.61, *Z*=–10.5, *p*<0.001, *r*=0.705), and continued improvement occurred between T1 and T2 (mean difference=–0.78, 95% CI: –0.96 to –0.60, *Z*=–6.7, *p*<0.001, *r*=0.450). These changes are visualized in Figure 3B and 3C.

Upper Limb Function Over Time (QuickDASH Scores)

As with VAS, QuickDASH scores also violated normality assumptions (*p*<0.05), justifying the use of nonparametric methods. The Friedman test indicated a significant change over time ($\chi^2(2)=423.06$, *p*<0.001). Pairwise comparisons revealed significant improvement from T0 to T1 (mean difference=–14.26, 95% CI: –17.30 to –11.21, *Z*= –9.5, *p*<0.001, *r*=0.638), greater improvement from T0 to T2 (mean difference=–24.05, 95% CI: –27.10 to –21.01, *Z*=–11.3, *p*<0.001, *r*=0.758), and further functional improvement from T1 to T2 (mean difference=–9.80, 95% CI: –12.84 to –6.75, *Z*=–7.2, *p*<0.001, *r*=0.483). These temporal trends and score distributions are shown in Figure 3A and Figure 3D.

Baseline differences by sociodemographic and behavioral variables

Cross-sectional comparisons at baseline revealed several notable differences (Table 2). No significant difference in baseline VAS pain scores was found between males and females (*p*=0.608) or between alcohol consumers and abstainers (*p*=0.797). However, current smokers reported significantly higher pain (*p*<0.001).

Pain intensity varied significantly by education level (*H*=37.21, *p*<0.001), with higher scores among those with no formal education or only basic literacy. Participants with no formal education reported more pain than those with university (*p*=0.003) or postgraduate education (*p*=0.002), and similar differences were found for those with basic literacy (*p*=0.012). Marital status was also a significant factor (*H*=14.93, *p*=0.002), with divorced individuals reporting

Table 1. Descriptive statistics of patient characteristics and baseline scores

Variable	n	Minimum	Maximum	Mean	Standard deviation
Age (years)	222	20	72	53.97	12.85
Body mass index (kg/m ²)	222	19.57	35.76	28.38	4.06
Q-DASH score (before treatment)	222	37.50	100.00	64.12	16.53
Visual analog scale (before treatment)	222	5.00	9.00	7.08	1.13

Q-DASH: Quick disabilities of the arm, Shoulder, and hand.

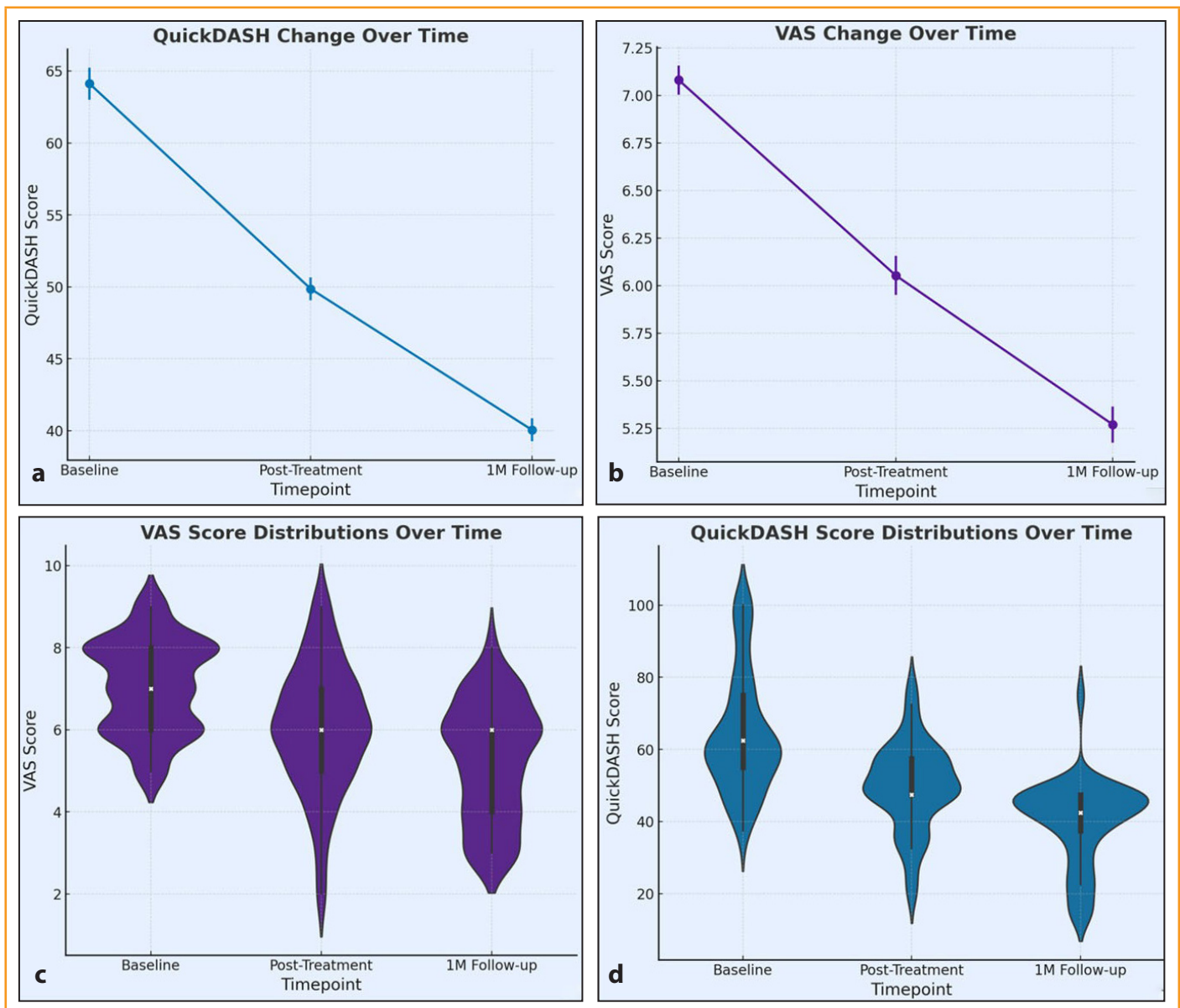


Figure 3. Temporal Changes and Score Distributions for VAS and QuickDASH. **(a)** Line plot showing the mean QuickDASH scores across baseline, post-treatment, and one-month follow-up timepoints with standard error bars. **(b)** Line plot showing the mean VAS scores across the same timepoints with standard error bars. **(c)** Violin plot illustrating the distribution of VAS scores at baseline, post-treatment, and one-month follow-up, with embedded boxplots depicting interquartile ranges. **(d)** Violin plot illustrating the distribution of QuickDASH scores at each timepoint, similarly annotated with boxplots.

more pain than married ($p=0.007$) or widowed participants ($p=0.014$). Occupational status was not significantly associated with pain ($p=0.118$).

Baseline QuickDASH scores showed significant differences by education ($H=29.84$, $p<0.001$), with lower education levels associated with higher disability. Marital status ($H=10.22$, $p=0.017$) and occupation ($H=12.89$, $p=0.025$) were also significant, with housewives reporting greater disability than employed participants. Gender was significant, with females reporting higher disability ($p<0.001$), while smok-

ing ($p=0.504$) and alcohol consumption ($p=0.314$) were not associated with functional scores.

Regression Analysis of Pain Improvement

Regression coefficients, within-subject effect sizes, and responder rates are summarized in Figure 4 (panels A–D). To identify predictors of change in VAS scores from T0 to T2, robust linear regression using HC3 standard errors was performed due to heteroscedasticity (Breusch–Pagan $p=0.0010$) and non-normal residuals (Shapiro–Wilk $p=0.0012$). The model ($R^2=0.277$, $F=52.31$, $p<0.001$) iden-

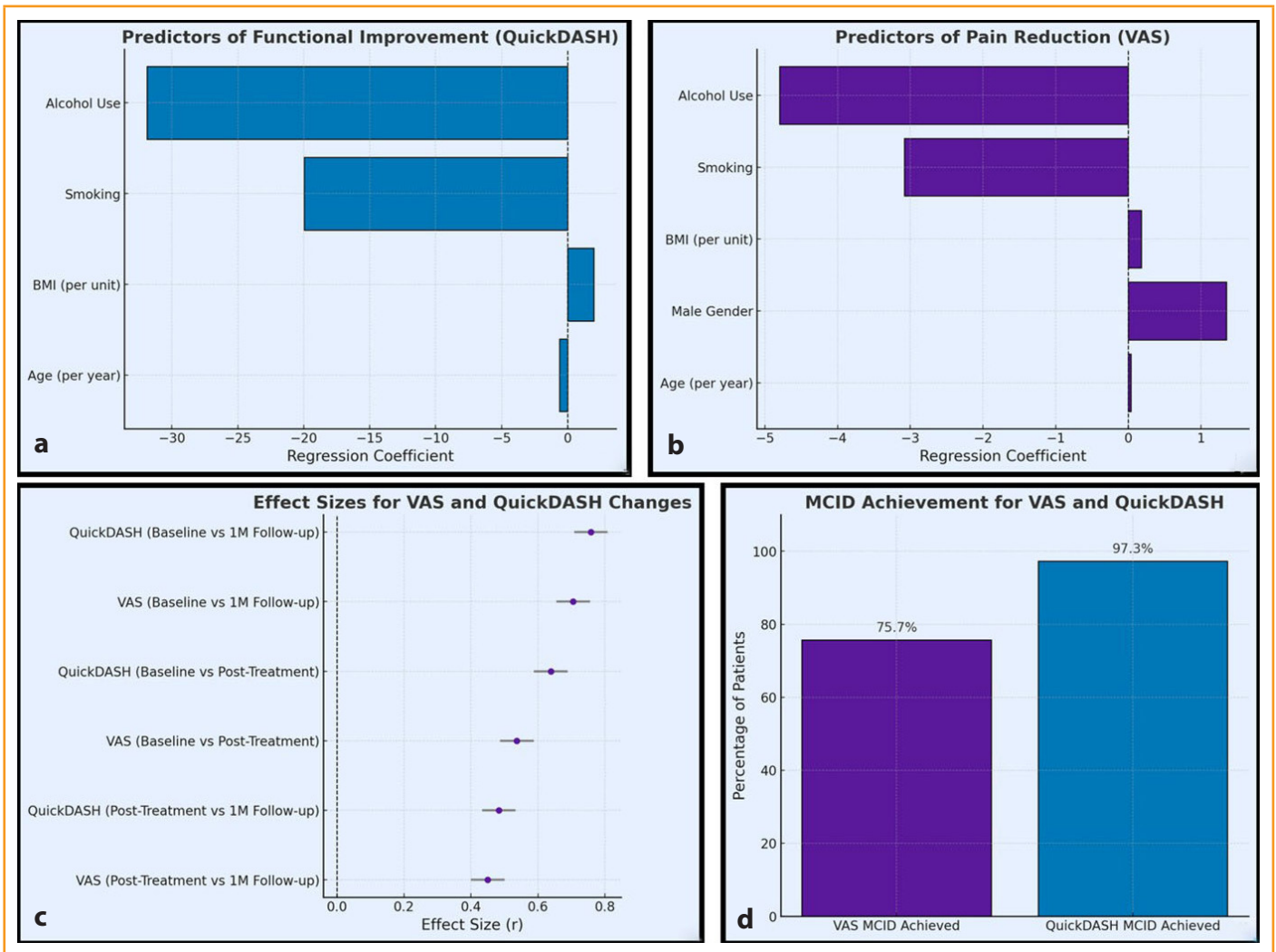


Figure 4. Changes in Upper Limb Pain and Function Following Mesotherapy. **(a)** Horizontal bar plot displaying regression coefficients for predictors of functional improvement (QuickDASH) at one-month follow-up. **(b)** Horizontal bar plot displaying regression coefficients for predictors of pain reduction (VAS) at one-month follow-up. **(c)** Forest plot depicting within-subject effect sizes (*r*) for changes in VAS and QuickDASH scores from baseline to post-treatment and from baseline to one-month follow-up. **(d)** Bar plot showing the proportion of patients achieving minimal clinically important difference (MCID) thresholds for VAS (≥ 1.0 -point reduction) and QuickDASH (≥ 5.3 -point reduction).

tified older age ($\beta=0.032$, $p<0.001$), male gender ($\beta=1.35$, $p<0.001$) and higher BMI ($\beta=0.18$, $p<0.001$) as predictors of greater VAS reduction. In contrast, alcohol use ($\beta=-4.80$, $p<0.001$) and smoking ($\beta=-3.08$, $p<0.001$) predicted less improvement. Regression coefficients are visualized in Figure 4B.

Regression Analysis of Functional Improvement

A separate robust regression model assessed predictors of change in QuickDASH scores. The model ($R^2=0.322$, $F=20.85$, $p<0.001$) showed that older age ($\beta=-0.62$, $p<0.001$) predicted smaller improvements, whereas higher BMI ($\beta=1.99$, $p<0.001$) was associated with greater gains. Smoking ($\beta=-19.96$, $p<0.001$) and alcohol use ($\beta=-31.89$, $p<0.001$) were linked to diminished functional improvement. Gender was

not a significant predictor ($p=0.221$). These predictors are displayed in Figure 4A.

Responder Analysis

Based on MCID thresholds—a 1.5-point reduction in VAS and a 5.3-point reduction in QuickDASH [22,23], 75.7% of participants achieved clinically meaningful reductions in pain, and 97.3% demonstrated clinically significant functional gains (Fig. 4D). Within-subject effect sizes across time points for both outcomes are summarized in Figure 4C.

Discussion

This study demonstrated that mesotherapy led to statistically significant and clinically meaningful reductions in pain and improvements in upper extremity function in patients

Table 2. Demographic and behavioral characteristics of participants

Variable	Category	Frequency (n)	Percent (%)
Gender	Male	30	13.5
	Female	192	86.5
Marital status	Married	156	70.3
	Single	36	16.2
	Divorced	12	5.4
	Widowed	18	8.1
Occupation	Unemployed	54	24.3
	Housewife	138	62.2
	Worker	6	2.7
	Self-employed	24	10.8
Education level	No formal education	12	5.4
	Primary school	84	37.8
	Middle school	36	16.2
	High school	60	27.0
	University	30	13.5
Alcohol consumption	Yes	12	5.4
	No	210	94.6
Smoking	Yes	36	16.2
	No	186	83.8

with lateral epicondylitis. Most participants achieved MCID thresholds for both outcomes, indicating a strong therapeutic effect. Benefits were evident at the one-month follow-up, suggesting sustained efficacy. Additionally, demographic and behavioral factors significantly influenced treatment response, offering important insights for future patient stratification. To our knowledge, this is the first study to assess mesotherapy response specifically in lateral epicondylitis.

The significant VAS score reductions align with prior studies on mesotherapy's analgesic potential in musculoskeletal conditions. Paolucci et al.^[8] and Faetani et al.^[9] reported similar results, attributing efficacy to localized drug action. Specifically, Chesnakov et al.^[12] observed VAS score improvements in lateral epicondylitis following mesotherapy. These findings support mesotherapy as a promising intervention, although longer-term trials are needed to confirm durability. Functional improvements, as indicated by decreased QuickDASH scores, are also consistent with earlier studies. Mammucari et al.^[7] and Paolucci et al.^[8] reported similar recovery in musculoskeletal disorders, and Chesnakov et al.^[12] observed functional gains in chronic epicondylitis. While these findings reinforce the benefits of mesotherapy, larger randomized trials are needed to validate its role in functional rehabilitation.

The study also identified significant sociodemographic predictors of baseline pain and disability. Lower education correlated with greater impairment, consistent with evidence linking educational attainment to musculoskeletal health^[24]. Women and divorced individuals reported higher disability and pain, consistent with literature on gender disparities and the impact of social disruption^[25,26]. Housewives showed greater impairment than employed individuals, aligning with data linking repetitive domestic tasks to musculoskeletal pain^[27]. These factors underscore the need for tailored rehabilitation strategies.

Behavioral and demographic factors also influenced treatment response. Smoking impaired tendon healing, consistent with earlier research^[28,29], and alcohol use negatively affected recovery^[30]. However, some studies suggest that these effects vary by disease duration and treatment type^[31], highlighting the importance of personalized, life-style-informed approaches.

Despite identifying significant predictors through regression analysis, several limitations should be considered. The retrospective design precludes causal inference and may involve residual confounding. Robust regression addressed heteroscedasticity and non-normality, but model overfitting is possible due to the covariate-to-sample ratio. Unexplored interactions between predictors may also have affected the results. Larger prospective studies using pre-defined models are needed for validation.

Notably, 75.7% of participants surpassed the VAS MCID threshold and 97.3% exceeded the QuickDASH MCID, underscoring both statistical and clinical effectiveness. These results support mesotherapy as a practical and effective option for lateral epicondylitis.

A novel finding was the association between higher BMI and greater improvements in pain and function, contrary to prior studies linking obesity with poorer outcomes^[32]. A potential explanation is enhanced local drug retention in adipose tissue, which may amplify mesotherapy's effects^[33,34]. Future studies should explore how tissue composition influences local pharmacokinetics.

Mechanistically, intradermal injections enable high local drug concentrations, modulating nociceptive pathways and inflammatory mediators with minimal systemic exposure^[8]. Mechanical dermal stimulation and increased microcirculation may further relieve symptoms^[35]. Local activation of opioid systems and cytokine release may also contribute^[36]. These mechanisms may synergistically promote recovery in chronic tendinopathies.

Clinically, these results are relevant. Mesotherapy offers targeted symptom relief with low systemic risk and may reduce reliance on more costly interventions such as PRP or surgery^[8,9]. Its simplicity and affordability support broad-

er integration into rehabilitation programs. Nonetheless, standardized protocols and careful patient selection are essential for optimal outcomes.

This study has several important limitations. First, the retrospective design precludes causal inference and may introduce residual confounding despite statistical adjustments. Second, the follow-up period was limited to one month, preventing conclusions regarding the long-term durability of mesotherapy's effects. Third, the absence of a control group restricts comparative interpretation against placebo, standard conservative care, or other injectable therapies such as corticosteroids or platelet-rich plasma. In addition, reliance on patient-reported outcomes may have introduced recall bias, and recruitment from a single tertiary care center may limit generalizability. Although assessors were blinded, inter-rater reliability was not formally assessed, which represents another methodological limitation. Future prospective, randomized controlled trials with larger, multicenter cohorts and extended follow-up are necessary to validate these findings and establish the role of mesotherapy in evidence-based management of LE.

Conclusion

In conclusion, the present findings indicate that mesotherapy provides substantial and clinically significant reductions in pain severity, along with improvements in upper extremity function, in patients with lateral epicondylitis. The influence of demographic and lifestyle variables further emphasizes the importance of individualized care strategies. Interestingly, the observed association between higher BMI and superior clinical outcomes suggests that patient-specific tissue characteristics may modulate the effects of mesotherapy and warrant further investigation. Although these findings are encouraging, they should be confirmed through prospective, controlled trials using standardized methodologies to determine the precise role of mesotherapy in the management of tendinopathy.

Ethics Committee Approval: This study was approved by the Institutional Review Board of the University of Health Sciences, Sultan Abdulhamid Han Training and Research Hospital, Traditional and Complementary Medicine Ethics Committee (Approval number: SBUSAH-GETAT 2025-059, Date: 26/03/2025).

Informed Consent: Due to the retrospective nature of the study and use of anonymized data, patient consent was waived by the Institutional Review Board.

Conflict of Interest: The authors declare that there is no conflict of interest.

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