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Comparative Analysis of Clinical Outcomes of Triamcinolone and Dextrose Injection Therapy in Carpal Tunnel Syndrome Patients: A Quasi-Experimental Study

Aslan Tonapa[1] , Audry Devisanty Wuysang [1,2,3,4] , Nurussyariah Hammado [1,2,4] , Firdaus Hamid [1,4] , Abdul Muis[1,3,4] , Citra Rosyidah [1,5]

[1]Department of Neurology, Faculty of Medicine, Hasanuddin University, Makassar, South Sulawesi, Indonesia

[2]Division of Pain and Headache, Department of Neurology, Faculty of Medicine, Hasanuddin University, Makassar, South Sulawesi, Indonesi

[3]Brain Center, Dr. Wahidin Sudirohusodo General Hospital, Makassar, South Sulawesi, Indonesia

[4]Hasanuddin University Teaching Hospital, Makassar, South Sulawesi, Indonesia.

[5]Department of Physiology, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia

Correspondence:

Audry Devisanty Wuysang, Division of Pain and Headache, Department of Neurology, Faculty of Medicine, Hasanuddin University, Jl. Perintis Kemerdekaan Km. 10, Tamalanrea, Makassar City 90245, Makassar, South Sulawesi, Indonesia

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KEYWORDS

Carpal Tunnel Syndrome; Dextrose; Hand Function; Clinical Outcome; Triamcinolone

ABSTRACT:

Background: Carpal Tunnel Syndrome (CTS) occurs due to compression of the median nerve at the wrist, causing pain, numbness, and paresthesia.

Objective: This study aims to compare the clinical outcomes between dextrose 5% hydrodissection injection and Triamcinolone 10 mg injection in patients with CTS to change the pain scale

Methods: A quasi-experimental research design, with a two-group pretest-posttest design. This study involved 36 CTS patients who were divided equally into two intervention groups: hydrodissection using dextrose 5% and triamcinolone 10 mg injection, each consisting of 18 patients. Prior to the intervention, each subject was assessed using the Numeric Pain Rating Scale (NPRS) and the Boston Carpal Tunnel Questionnaire (BCTQ). The NPRS and BCTQ were re-evaluated 30 days after the intervention. The study analysis used the Wilcoxon and Mann Whitney tests.

Results: Overall, both dextrose 5% and triamcinolone 10mg can decrease NPRS and increase BCTQ. However, dextrose 5% is superior in increasing BCTQ compared to triamcinolone 10mg and is statistically significant (ΔSSS: -1.37 (-2.09- -0.91) vs. -1.05 (-2.99 - -0.55), p=0.006; ΔFSS: -1.37 (-2.50 - -0.28) vs. -0.92 (-1.88- -0.50), p=0.023). The decrease in NPRS was not significantly different between the 5% dextrose and 10mg triamcinolone groups (ΔNPS: -3.00 (-4.00- -2.00) vs. -3.00 (-4.00- -2.00), p=0.114).

Conclusion: Dextrose 5% showed better results in improving SSS and FSS scores.

INTRODUCTION

Carpal Tunnel Syndrome (CTS) arises from the compression of the median nerve within the carpal tunnel, resulting from elevated pressure in the tunnel. Initial manifestations of carpal tunnel syndrome encompass discomfort, numbness, and paraesthesia in the first three digits and the radial aspect of the fourth digit. Symptoms may advance to discomfort that radiates to the hand and forearm, excluding the neck. In severe stages, one may have hand weakness, diminished fine motor coordination, and atrophy of the thenar muscles [1].

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Symptoms frequently manifest at night but may exacerbate with repetitive tasks, such as typing or painting [2] The prevalence of CTS in the general population ranges from 1% to 5%, with women being more susceptible than men (3:1). The risk of CTS increases in obese individuals, and the condition generally occurs in people aged 40–60 years [2]. In Indonesia, the prevalence of joint disease in 2018 was 7.3%, with injuries to the upper limbs reaching 32.7% [3]. Conservative therapy constitutes the principal treatment for mild to moderate carpal tunnel syndrome, with nocturnal splinting and glucocorticoid injections as the key modalities. Glucocorticoid injections yield prompt enhancement; however, long-term results do not markedly differ from splinting. Combination therapy may be contemplated if monotherapy is ineffective. Injections should be restricted to two annually to mitigate negative effects [2]. Moreover, treatment by a hand therapist and short-term oral prednisone have demonstrated efficacy, although nonsteroidal anti-inflammatory medications have not proven to be more effective than placebo [2].

Triamcinolone, a synthetic glucocorticoid, reduces inflammation by decreasing local edema in the carpal canal, helping to reduce pain [4]. Several studies have shown the effectiveness of triamcinolone injections in relieving CTS symptoms [5]. Dextrose 5%, utilised in prolotherapy or hydrodissection, exerts its osmotic impact to promote tissue regeneration and has demonstrated efficacy in enhancing neuropathic pain and nerve function in carpal tunnel syndrome (CTS) [6, 7]. A comparative analysis of triamcinolone and dextrose 5% demonstrated that both yielded comparable therapeutic outcomes in the short term, with no significant disparities in pain, hand function, and electrophysiological results after three months [8]. Other studies also support the effectiveness of dextrose 5% as an alternative to corticosteroids with fewer side effects and greater improvement in hand function [9] In Indonesia, studies by Santoso et al.[10] and Sugiharto et al.[11] also evaluated the comparison of triamcinolone and dextrose 5% in the treatment of CTS, but further studies are still needed to strengthen the clinical evidence and methodology used in each study . This study aims to compare the clinical outcomes of therapy between hydrodissection using dextrose 5% and Triamcinolone 10 mg injection under ultrasound guidance in CTS patients.

Triamcinolone exerts its effects by directly inhibiting inflammatory processes. The clinical efficacy is predominantly influenced by the delivered dose and drug concentration, rather than the volume of injection. The volume of injection mostly influences the distribution of the medicine in adjacent target tissues and does not significantly augment its anti-inflammatory efficacy. Thus, both low and high volume injections can yield similar clinical relief in carpal tunnel syndrome, contingent upon the administration of an appropriate dosage and precise localisation at the target area. Triamcinolone is utilised in the management of carpal tunnel syndrome to diminish inflammation of the transverse carpal ligament and flexor tendons, thereby relieving compressive pressure on the median nerve. The injection volume is modified based on the drug concentration; for instance, a 10 mg/mL suspension necessitates 1–2 mL to administer a dosage of 10–20 mg, but a 40 mg/mL solution takes merely 0.25–1 mL to provide an equivalent dose [4]

Dextrose 5% produces its therapeutic effects via mechanical and biological mechanisms. The injection volume is essential for enabling tissue separation through hydrodissection, creating osmotic pressure, and promoting fibroblast activity, which aids in collagen remodelling and structural reinforcement within the carpal tunnel. An inadequate injection volume may fail to relieve tissue adhesions, whereas a proper volume can improve structural restoration and yield more enduring therapeutic results, albeit perhaps accompanied by temporary local pain or swelling. The treatment is conducted with ultrasound guidance to guarantee precise perineural needle positioning while preventing intraneural penetration. The typical volume of dextrose 5% injected varies from 5 to 10 mL, especially in instances of considerable perineural or soft tissue adhesions [4].

MATERIAL AND METHODS

Study Design and Settings

This type of research is quantitative research using a quasi-experimental research design conducted with a Two-Group Pretest-Posttest design. The study was conducted at Wahidin Sudirohusodo Hospital in Makassar and its network hospitals from September to December 2025, with a total sample of 36 patients who met the inclusion and exclusion criteria. Ethical approval

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was granted by the biomedical research ethics committee at the Faculty of Medicine, Hasanuddin University, Makassar, under the number 882/UN4.6.4.5.31/PP36/2025.

Participants

The study population consisted of patients who showed clinical signs and symptoms of CTS. Samples were taken by consecutive sampling and the samples had met the inclusion and exclusion criteria and were then grouped into two intervention groups. The inclusion criteria: Patients diagnosed with carpal tunnel syndrome who are willing to participate in this study and provide informed consent. The exclusion criteria encompass: Individuals with a prior surgical history involving the wrist or carpal region, wrist fractures or deformities, those with systemic conditions impacting peripheral nerves such as diabetes mellitus, hypothyroidism, and rheumatoid arthritis, pregnant individuals, and patients who have undergone perineural injection therapy or received systemic medications for carpal tunnel syndrome within the past three months. Identified atrophy, motor weakness, and grade 5 carpal tunnel syndrome in individuals under 18 years and over 50 years, as well as patients who were unable to comply with follow-up or were recalcitrant during the study period.

Sample Size and Randomization

The sample size was obtained using the formula for the difference in means between two independent groups, with $Z\alpha = 5\%$ and $Z\beta = 10\%$. The determined minimum sample size was 17.53, which was then rounded to 18 patients. All study subjects who met the research criteria were divided into two groups: the 5% dextrose group and the 10 mg triamcinolone group, with a 1:1 ratio. This trial did not employ blinding; both the patients and researchers were cognisant of the intervention administered.

Research Procedures

Data were collected based on demographic (age, gender, occupation, and hand) and clinical characteristics of CTS patients upon admission. After identification and informed consent, patients underwent an initial assessment using the Numeric Pain Rating Scale (NPRS) and the Boston Carpal Tunnel Questionnaire (BCTQ). BCTQ consists of Symptom Severity Scale (SSS) assessing pain, tingling numbness and night symptoms, Functional Status Scale (FSS) to assess the patient's ability to perform daily activities that require hand assistance. For injection procedures: Triamcinolone 10 mg injection was prepared by mixing 1 cc of triamcinolone and 1 cc of lidocaine, then injected perineurally into the median nerve. For dextrose 5% Hydrodissection: Dextrose 5% produced by PT Satoria Aneka Industri was used for 10 cc hydrodissection of the median nerve. Both injection procedures were performed under ultrasound guidance. After injection, NPRS and BCTQ assessments were repeated 30 days post-injection.

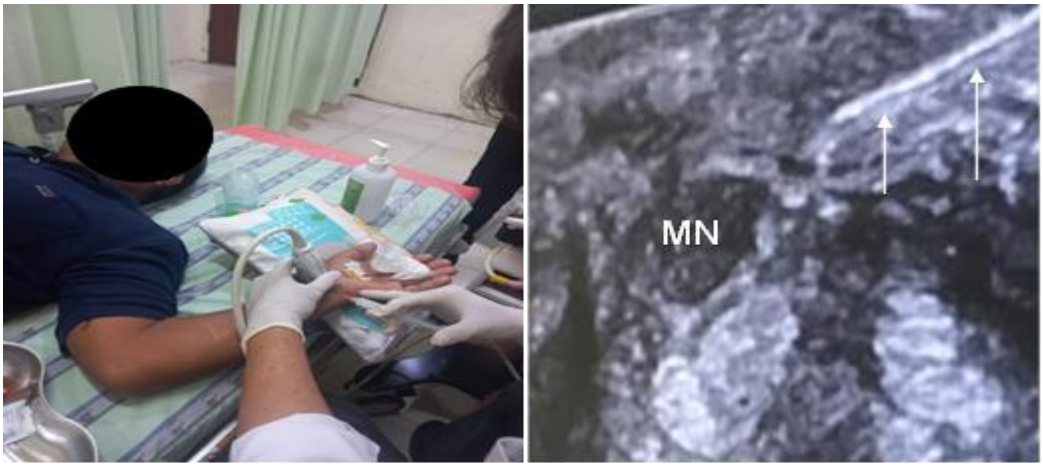

Figure 1. Triamcinolone 10 mg Injection in a Patient with CTS

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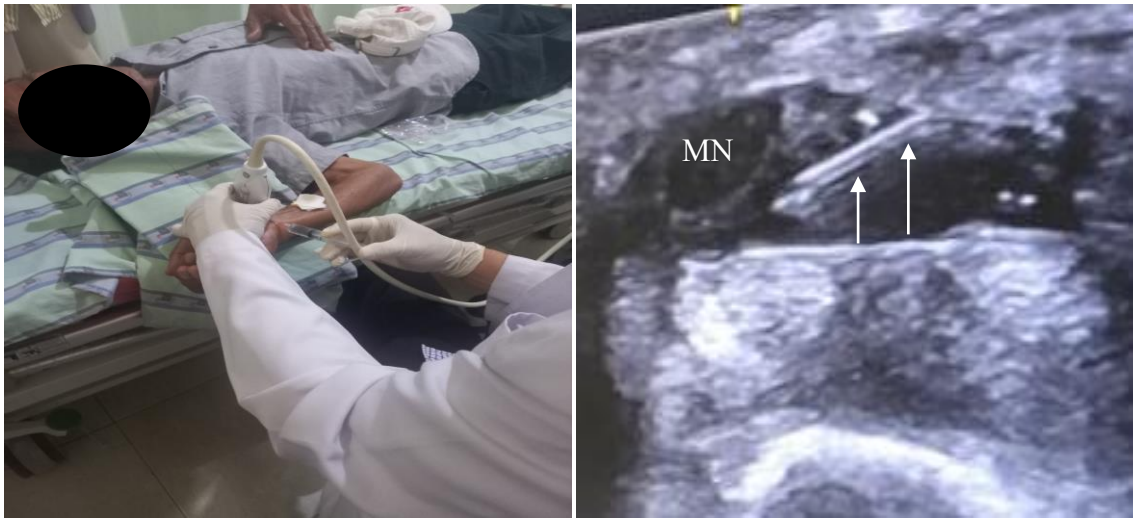

Figure 2. Dextrose 5% Hydrodissection in a Patient with CTS

Data and Statistics Analysis

Statistical data analysis was performed to assess changes in clinical outcomes after the intervention. Data distribution was tested for normality using the Shapiro-Wilk test (for samples <50). Since all data were declared non-normally distributed, analysis of differences in pre-test and post-test scores on SSS, FSS, and NPRS was performed using the Wilcoxon test. Intergroup comparison analysis was performed to assess differences in effectiveness between dextrose 5% hydrodissection and Triamcinolone 10 mg injection. Demographic data, clinical characteristics, and research findings were summarized using descriptive statistics, and inferential statistical tests were used to determine differences before and after the intervention and to compare the effects between interventions.

RESULTS

Characteristics of Research Subjects

The characteristics of the research subjects in this study are presented to provide a general overview of the distribution of research subjects based on the variables of gender, age, hand and occupation, details of the characteristics of the research subjects are shown in Table 1. In Dextrose group, based on gender, there were 9 man patients (50.0%) and 9 woman patients (50.0%), showing a balanced distribution. The mean age of patients in this group was 35.11 ± 7.69 years. The majority of patients were aged ≤35 years, namely 10 patients (55.6%), while 8 patients (44.4%) were aged >35 years. Looking at the affected hand, most patients experienced CTS on the right hand, namely 16 patients (88.9%), while 2 patients (11.1%) experienced CTS on the left hand. Based on occupation, the most common type of work found was construction workers, with 2 patients (11.1%). Housewives (IRT) were also evenly distributed, with 3 patients (16.7%) in this group. In the trader group, there were 3 patients (50.0%) who received 5% dextrose, while 1 patient (16.7%) was in the Triamcinolone 10 mg group. Office workers and civil servants (PNS) showed a balanced distribution, with 2 patients (11.1%) in each group (Table 1)

In triamcinolone group, based on gender, there were 9 man patients (50.0%) and 9 woman patients (50.0%), with a balanced distribution. The mean age of patients in this group was 35.11 ± 8.89 years, with a similar age distribution to the dextrose 5% group, namely the majority of patients were aged ≤35 years, as many as 10 patients (55.6%) and 8 patients (44.4%) were aged >35 years. In the Triamcinolone 10 mg group, the right hand was more affected by CTS, as many as 15 patients (83.3%), while 3 patients (16.7%) experienced CTS in the left hand. In terms of occupation, the most common type of work found was construction workers, with 2 patients (11.1%). Housewives (IRT) were also evenly distributed, with 3 patients (16.7%). The trader group had 1 patient (16.7%) who received 10 mg of triamcinolone, while 3 patients (16.7%) in the self-employed group received more 10 mg of triamcinolone. In the farmer

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group, more patients received 10 mg of triamcinolone, namely 4 civil servants also showed a similar balance between the two groups. The analysis results showed a p value for gender, age, hand and occupation > 0.05 which means there was no significant difference between the two groups (Table 1)

Table 1. Characteristics Subject Study

Variables	Category	n (%)		Total	P value
		Dextrose 5%	Triamcinolone 10 mg		
Gender	Man	9 (50.0%)	9 (50.0%)	18	0.630
	Woman	9 (50.0%)	9 (50.0%)	18	
Age *(year)*	≤ 35 years	10 (50.0%)	10 (50.0%)	20	0.130
	> 35 years	8 (50.0%)	8 (50.0%)	16	
Hand	Right	16 (88.9%)	15 (83.3%)	31	0.500
	Left	2 (11.1%)	3 (16.7%)	5	
Work	Laborer Building	2 (11.1%)	2 (11.1%)	4	0.983
	housewife	3 (16.7%)	3 (16.7%)	6	
	Trader	3 (16.7%)	1 (5.6%)	4	
	Worker Office	2 (11.1%)	2 (11.1%)	4	
	Farmer	3 (16.7%)	4 (22.2%)	7	
	civil servant	3 (16.7%)	3 (16.7%)	6	
	Self-employed	2 (11.1%)	3 (16.7%)	5	
Total		18 (50.0%)	18 (50.0)	36	

Source: Primary Data, 2025

Table 2 presents results analysis difference CTS scores between two groups intervention based on the pre-test, namely receiving group Dextrose 5% and the group receiving Triamcinolone 10 mg. Analysis This covers three scale measurements , namely the SSS, FSS, and NPRS, all of which analyzed using the Mann-Whitney test. On the SSS, the dextrose 5% group had a median score of 3.04 with a range of 2.18 to 4.00, while the Triamcinolone 10 mg group had a median score of 3.09 with a range of 2.18 to 3.80. The resulting P-value was 0.456 which is greater than 0.05, indicating that there was no significant difference between the two groups in terms of SSS. For the FSS, the dextrose 5% group showed a median score of 2.81 with a range of values between 1.62 and 3.75, while the Triamcinolone 10 mg group had a median score of 2.50 with a range between 1.87 and 3.75. The p-value in this analysis was 0.357, which is greater than 0.05, indicating no significant difference between the two groups in terms of FSS. On the NPRS, the dextrose 5% group had a median score of 4.00 with a range of 3.00 to 5.00, while the Triamcinolone 10 mg group had a median score of 5.00 with a range of 3.00 to 5.00. The resulting P-value was 0.458, which is greater than 0.05, indicating that there was no significant difference between the two groups in terms of NPRS.

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Table 2. Comparative Analysis of BCTQ and NPRS Pre-Injection Scores in the dextrose 5% and Triamcinolone 10 mg Groups

Assessment Results	Median (Min – Max)		P value
	Dextrose 5%	Triamcinolone 10 mg	
Symptom Severity Scale (SSS)	3.04 (2.18–4.00)	3.09 (2.18–3.80)	0.456
Functional Status Scale (FSS)	2.81 (1.62–3.75)	2.50 (1.87–3.75)	0.357
Numerical Pain Rating Scale (NPRS)	4.00 (3.00–5.00)	5.00 (3.00–5.00)	0.458

*Mann Whitney Test Analysis, Source: Primary Data, 2025

Bases on table 3, in the dextrose 5% group, results analysis show existence significant improvement based on pre-test and post-test assessments on all measured scale. On the SSS assessment, the median pre-test score for the dextrose 5% group was 3.05 (2.18–4.00), which decreased to 1.75 (1.18–2.27) in the post-test. This decrease indicates a significant improvement in CTS symptom severity after the intervention. The Wilcoxon test results showed a p value of 0.001, indicating a significant difference between before and after the intervention. On the FSS assessment, the dextrose 5% group showed a median pre-test score of 2.81 (1.62–3.75) which decreased to 1.37 (1.12–2.25) in the post-test. This decrease in score indicates an improvement in the patients' functional status after the intervention. The Wilcoxon test with a p value of 0.001 showed a significant difference in the patients' functional status between before and after the administration of 5% dextrose. On the NPRS assessment, the dextrose 5% group experienced a significant reduction in pain scores. The median pre-test score was 4.00 (3.00–5.00), which was a decrease to 1.50 (0.00–3.00) in the post-test. This decrease indicates a significant reduction in pain intensity in patients after the intervention. The Wilcoxon test results with a p-value of 0.001 also indicate a statistically significant decrease in patient pain levels. Overall, the dextrose 5% group showed significant improvements in SSS, FSS, and NPRS of CTS patients after being given hydrodissection intervention using 5% dextrose.

Table 1. Analysis of Differences in BCTQ and NPRS Pre-Post Scores In the Dextrose 5% Group

Assessment Results	Median (Min – Max)		P value
	Pre-Test	Post Test	
Symptom Severity Scale (SSS)	3.05 (2.18–4.00)	1.75 (1.18–2.27)	0.001
Functional Status Scale (FSS)	2.81 (1.62–3.75)	1.37 (1.12–2.25)	0.001
Numerical Pain Rating Scale (NPRS)	4.00 (3.00–5.00)	1.50 (0.00–3.00)	0.001

*Wilcoxon test analysis, Source: Primary Data, 2025

Based on Table 4, in the Triamcinolone 10 mg group, results analysis showed the existence significant improvement based on pre-test and post-test assessments on all measured scale. In the SSS evaluation, the median pre-test score for the triamcinolone 10 mg group was 3.09 (2.18–3.80), which subsequently fell to 1.90 (1.36–2.36) in the post-test. This reduction signifies a notable enhancement in the severity of CTS symptoms following the intervention. The Wilcoxon test yielded a p-value of 0.001, signifying a significant difference between the pre- and post-intervention measurements in this group. In the FSS assessment, the Triamcinolone 10 mg cohort exhibited a median pre-test score of 2.50 (1.87–3.75), which diminished to 1.81 (1.25–2.12) in the post-test. The reduction in score signifies an enhancement in the patients' functional condition following triamcinolone injection. The Wilcoxon test revealed a p-value of 0.001, signifying a substantial difference in the patients' functional state pre- and post-intervention. The Triamcinolone 10 mg group had a notable decrease in pain scores on the NPRS. The median pre-test score was 5.00 (range 3.00–5.00), which decreased to 1.00 (range

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1.00–2.00) in the post-test. This reduction signifies a notable decrease in pain intensity among individuals following triamcinolone injection. The Wilcoxon test results, with a p-value of 0.001, suggest a statistically significant reduction in the patient's pain level. The Triamcinolone 10 mg group shown notable enhancements in symptom severity, functional status, and pain intensity in individuals with Carpal Tunnel Syndrome following a Triamcinolone 10 mg injectable intervention. According to Tables 3 and 4, the study of alterations in BCTQ and NPRS scores from pre-test to post-test assessments revealed substantial changes in both intervention groups: the dextrose 5% hydrodissection group and the Triamcinolone 10 mg injection group.

Table 2. Analysis of Differences in BCTQ and NPRS Pre-Post Scores in the Triamcinolone 10 mg Group

Assessment Results	Median (Min – Max)		P value
	Pre-Test	Post Test	
Symptom Severity Scale (SSS)	3.09 (2.18–3.80)	1.90 (1.36–2.36)	0.001
Functional Status Scale (FSS)	2.50 (1.87–3.75)	1.81 (1.25–2.12)	0.001
Numerical Pain Rating Scale (NPRS)	5.00 (3.00–5.00)	1.00 (1.00–2.00)	0.001

*Wilcoxon test analysis, Source: Primary Data, 2025

Based on Table 5, on the SSS, the dextrose 5% group had a median of 1.75 with a range of 1.18 to 2.27, while the Triamcinolone 10 mg group had a median of 1.90 with a range of 1.36 to 2.36. The p-value for this analysis was 0.009, which is less than 0.05, suggesting a substantial difference between the two groups in terms of symptom severity following the intervention. The dextrose 5% group exhibited a median of 1.37 with a range of 1.12 to 2.25 for the FSS, whereas the Triamcinolone 10 mg group had a median of 1.81 with a range of 1.25 to 2.12. A significant difference in functional status between the two groups after the intervention was indicated by the p-value of 0.001, which is also less than 0.05. The dextrose 5% group had a median of 1.50 with a range of 0.00 to 3.00 on the NPRS, whereas the Triamcinolone 10 mg group had a median of 1.00 with a range of 1.00 to 2.00. The p-value for this analysis was 0.387, which is greater than 0.05, suggesting that there was no significant difference in pain levels between the two groups following the intervention. In general, the findings of this analysis suggest that there were substantial differences between the two groups in SSS and FSS following the intervention, whereas no significant differences were observed in NPRS. The dextrose 5% group exhibited lower SSS and FSS values, suggesting that it was more efficacious than the Triamcinolone 10 mg group.

Table 5. Comparative Analysis of BCTQ and NPRS Scores Post-Injection in the dextrose 5% and Triamcinolone 10 mg Groups

Assessment Results	Median (Min – Max)		P value
	Dextrose 5%	Triamcinolone 10 mg	
Symptom Severity Scale (SSS)	1.75 (1.18–2.27)	1.90 (1.36–2.36)	0.009
Functional Status Scale (FSS)	1.37 (1.12–2.25)	1.81 (1.25–2.12)	0.001
Numerical Pain Rating Scale (NPRS)	1.50 (0.00–3.00)	1.00 (1.00–2.00)	0.387

*Mann Whitney Test Analysis, Source: Primary Data, 2025

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Table 6. Comparative Analysis of the Effectiveness of dextrose 5% and Triamcinolone 10 mg

*Mann Whitney test analysis, Source: Primary Data, 2025

Variables	Median (Min – Max)		P Value
	Dextrose 5%	Triamcinolone 10 mg	
Δ SSS	−1.37 (−2.09 – −0.91)	−1.05 (−2.99 – −0.55)	0.006
Δ FSS	−1.37 (−2.50 – −0.28)	−0.92 (−1.88 – −0.50)	0.023
Δ NPRS	−3.00 (−4.00 – −2.00)	−3.00 (−4.00 – −2.00)	0.114

Table 6 presents the results of the comparative analysis of the effectiveness between Dextrose 5% and Triamcinolone 10 mg in three measured variables, namely Δ SSS (Functional Limitation Scale), Δ FSS (Subjective Function Scale), and Δ NPRS (Pain Scale). The field results show that for the Δ SSS variable, Dextrose 5% has a median value of -1.37 with a range (min – max) between -2.09 to -0.91, while Triamcinolone 10 mg has a median value of -1.05 with a range (min – max) between -2.99 to -0.55. The p-value for the comparison of these two groups is 0.006, which indicates a significant difference between the two. For the ΔFSS variable , Dextrose 5% had a median value of -1.37 with a range (min – max) between -2.50 to -0.28, while Triamcinolone 10 mg had a median value of -0.92 with a range (min – max) between -1.88 to -0.50. The p-value for this variable was 0.023, which also indicated a significant difference between the two groups. However, for the ΔNPRS variable , although the median value of both was -3.00 with a range (min – max) between -4.00 to -2.00, for both Dextrose 5% and Triamcinolone 10 mg, the p-value obtained was 0.114, which meant there was no significant difference between the two.

DISCUSSION

The objective of this study is to compare the clinical outcomes of dextrose 5% hydrodissection injection and Triamcinolone 10 mg injection in patients with CTS. The study will concentrate on the changes in pain scale using the NPRS and the BCTQ, which incorporates the SSS and FSS. The study comprised 36 CTS patients who were randomly assigned to two intervention groups: hydrodissection with dextrose 5% and triamcinolone injection 10 mg, each of which contained 18 patients. The two groups exhibited a proportionate distribution of baseline demographic and clinical characteristics among the study subjects. The mean age of both groups was 35.11 years, and the distribution of ages ≤35 years and >35 years was equal, as illustrated in Table 1. Additionally, the number of male and female patients was equal (9 each). The distribution of occupations was also quite varied and comparable, ensuring that comparisons between treatment groups could be made validly without significant bias from these factors. Additionally, the majority of patients in both groups had CTS on the right hand.

Before the intervention, the distribution of SSS, FSS, and NPRS scores was preliminary evaluated (Table 2), and it was determined that the symptom severity, functional status, and pain intensity were relatively comparable in both groups. Both groups exhibited consistent improvements on all three measures following the intervention. The proportion of patients experiencing mild pain on the SSS and FSS increased, while the proportion of patients in the moderate and severe pain categories decreased significantly in both groups. In the short term, both dextrose 5% hydrodissection and Triamcinolone 10 mg injection have beneficial therapeutic effects in alleviating CTS symptoms. This is particularly evident on the NPRS, where all patients in both groups experienced a decrease in pain intensity from moderate to minor.

The results of this study indicate that both dextrose 5% hydrodissection and Triamcinolone 10 mg injection significantly improved the severity of symptoms, functional status, and pain intensity in CTS patients. The effectiveness of each intervention in the short term (30 days post-intervention) was demonstrated by the decrease in median pre-test and post-test scores for SSS, FSS, and NPRS in both groups (Tables 3 and 4).

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This substantiates the fact that both therapies offer substantial therapeutic advantages in the treatment of CTS symptoms. Despite the fact that both interventions demonstrated substantial improvements, the intergroup comparison analysis (Table 4) demonstrated that dextrose 5% hydrodissection was significantly more effective than Triamcinolone 10 mg injection in enhancing the Symptom Severity Scale (Δ SSS, p=0.006) and Functional Status Scale (Δ FSS, p=0.023). These results suggest that dextrose 5% is more effective in the short term in reducing symptom severity and improving the functional status of the hand in CTS patients. Nevertheless, there was no significant difference between the two groups in terms of changes in the pain scale determined by the NPRS (median Δ NPRS -3.00 for both groups; p=0.114). This suggests that the two therapies offer similar pain relief effects during the 30-day observation period.

These findings are corroborated by recent literature. According to a systematic review and meta-analysis conducted by Oh et al., dextrose 5% injection was more effective in enhancing functional status and had a lower incidence of adverse effects than corticosteroids. Additionally, it demonstrated comparable pain relief and symptom severity scores [9]. This study demonstrated that dextrose 5% was preferable in FSS and SSS, and that it was equivalent in NPRS. These results are consistent with this. Jha and Jha conducted a study that demonstrated that dextrose 5% injection was more effective than triamcinolone in terms of functional improvement and pain alleviation at a follow-up of 4-6 months [12]. Additionally, Zhou et al. conducted a network meta-analysis that demonstrated that dextrose 5% in conjunction with splinting was one of the most effective interventions for reducing symptom severity and pain intensity at six and three months [13]. Azizi et al., in a systematic review and meta-analysis, explicitly concluded that dextrose injections exhibited a significant reduction in pain and superior functional improvement compared to corticosteroids over the medium term (one to six months) [14]. Karimzadeh et al. in their randomized clinical trial also compared dextrose 5% prolotherapy with corticosteroid injections, finding similar efficacy in improving pain intensity and functional limitations, although with slightly different findings depending on the duration of follow-up [8]. This results reinforces the notion that hydrodissection dextrose 5% is a promising alternative to CTS treatment, and may even be more effective.

In general, the investigation was externally clinically evaluated. This study, which encompasses severity symptoms, functional status, and intensity of pain, demonstrates a substantial difference between the hydrodissection dextrose 5% group and the triamcinolone 10 mg group for SSS and FSS. The dextrose 5% group has a superiority. In the meantime, both therapies demonstrated comparable enhancements in pain relief at 30 days following the intervention for NPRS. This implies that dextrose 5% may have a more extensive mechanism of action or regenerative effects that contribute to functional improvement and improved symptoms. This is supported by the consistency of the relevant literature. Oh et al. reported that Dextrose 5 injection was more effective in improving functional status and was associated with fewer adverse effects than corticosteroids, which supports the finding of the superiority of dextrose on FSS in this study [9]. A study by Yang et al. in their network meta-analysis also indicated that injection of dextrose solution can provide better symptom and functional improvement in both short and long term [15]. This confirms that dextrose can offer a more comprehensive improvement in clinical aspects beyond pain relief.

In addition, Azizi et al. discovered that dextrose injections not only significantly reduced pain but also substantially improved function in the medium term when compared to corticosteroids, with low heterogeneity between studies [14]. Aghaei et al. also conducted a study comparing dextrose 5% injection with triamcinolone, by measuring the BCTQ (including SSS and FSS) and visual analog scale for pain and paresthesia, indicating that these two modalities were the main focus in evaluating clinical outcomes [16]. Ho et al. reported that the effect of dextrose injection in reducing pain and disability, as well as increasing electrophysiological improvement, was superior to corticosteroid injection at 4 and 6 months post-injection [17]. These results demonstrate that whereas corticosteroids provide quick repair, injections of dextrose are frequently linked to more thorough improvements in both functional and clinical features in the long medium.

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This study has several limitations, including: 1) The small sample size, making statistical assessment less accurate and possibly not reflecting the characteristics of CTS patients in general; 2) The follow-up in this study was relatively short, namely 30 days after the intervention; 3) We used a non-randomized and unblinded design, which may lead to reporting bias. However, in general, this study can still show that dextrose 5% provides better SSS and FSS improvements on the BCTQ compared to triamcinolone 10mg, so it can be considered for the management of CTS patients in reducing the clinical symptoms that appear. However, regarding changes in NPRS, both dextrose 5% and triamcinolone 10mg are comparable in reducing NPRS.

CONCLUSION

This study showed that both Triamcinolone 10 mg injection and dextrose 5% hydrodissection provided significant improvement in patients with CTS. However, dextrose 5% hydrodissection was superior in several clinical aspects, while both therapies had a significant impact on pain reduction and functional status improvement .

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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