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Original Article

Effectiveness of 5% Dextrose Water (D/W) versus Corticosteroid Injection for Pain Management of Sacroiliac Joint Dysfunction

Muhammad Imran Baig[1], Waqas Ashraf Chaudhary[2], Hamza Shahzad[1], Muhammad Fakhar Ikram Kalair[3], Sadia Ghafoor[4], Hanan Azfar[5], Tamjeed Ghaffar[6], Rafia Imtiaz[6]*

[1]MS- Physical Rehabilitation And Pain Management, Superior University, Pakistan.
[2]Assistant Professor, Faculty Of Allied Health Sciences, Superior University Lahore, Pakistan.
[3]UIPT, The University Of Lahore, Pakistan.
[4]The University of Lahore-Lahore Pakistan.
[5]Consultant Physiotherapist, Medline Healthcare Gujranwala, Pakistan.
[6]Lecturer, College Of Physical Therapy, Government College University Faisalabad, Pakistan.
Corresponding Author: Rafia Imtiaz, Lecturer; Email: rafiaimtiaz@gcuf.edu.pk

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ABSTRACT

Background: Corticosteroid injections have been a cornerstone in the management of sacroiliac joint dysfunction (SIJD)-related pain. Recently, alternative approaches to pain management have garnered attention, particularly the use of 5% dextrose water (D/W) injections, which are believed to promote tissue healing and regeneration.

Objective: The purpose of this study was to evaluate the efficacy of 5% dextrose water (D/W) compared to corticosteroid injections for pain management in patients with sacroiliac joint dysfunction (SIJD).

Methods: This experimental study was conducted at Chaudhary Muhammad Akram Teaching and Research Hospital, Lahore, from October 2023 to May 2024. A total of 120 participants aged 18-65 years with clinically diagnosed SIJD were randomly assigned to two groups. Group A (N=60) received three weekly injections of 5% D/W solution, while Group B (N=60) received corticosteroid injections administered weekly over six weeks. Participants were excluded if they were pregnant, breastfeeding, had a history of allergy to the treatment components, or had received SIJ injections within the last three months. Pain intensity, functional disability, and quality of life were assessed using the Visual Analogue Scale (VAS), Oswestry Disability Index (ODI), and a standardized quality of life questionnaire, respectively. Data were analyzed using SPSS version 25, with within-group comparisons made using the Wilcoxon Signed Ranks Test and between-group comparisons using the Mann-Whitney U Test.

Results: Significant improvements were observed in both groups. The VAS scores in the dextrose water group decreased from 5.28 ± 1.71 to 2.58 ± 0.94 ($p < 0.001$) and in the corticosteroid group from 5.57 ± 1.85 to 3.15 ± 1.33 ($p < 0.001$). ODI scores improved from 34.27 ± 1.26 to 17.02 ± 3.15 in the dextrose water group ($p < 0.001$) and from 34.17 ± 1.12 to 19.95 ± 6.11 in the corticosteroid group ($p < 0.001$). Quality of life scores also showed significant enhancement, improving from 14.43 ± 1.79 to 7.64 ± 0.99 in the dextrose water group ($p < 0.001$) and from 14.57 ± 1.85 to 8.49 ± 1.98 in the corticosteroid group ($p < 0.001$).

Conclusion: Both 5% dextrose water and corticosteroid injections significantly reduced pain and improved function and quality of life in patients with sacroiliac joint dysfunction. While corticosteroid injections demonstrated a slightly greater benefit, 5% dextrose water injections are a promising alternative with fewer potential side effects. Further research is recommended to explore long-term outcomes and compare these treatments with other emerging therapies.

Keywords: Sacroiliac joint dysfunction, corticosteroid injections, 5% dextrose water, pain management.

INTRODUCTION

Sacroiliac joint dysfunction (SIJD) is a significant cause of lower back pain, with an estimated 10% to 27% of individuals with mechanical low back pain attributing their discomfort to the sacroiliac joint (1). The sacroiliac joints (SIJs), which link the spine to the pelvis, play a crucial role in transmitting the pressure from the lumbar spine to the lower extremities, thereby enduring considerable

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strain (2, 3). The anatomical complexity and variability of the SIJs, along with their rich innervation by proprioceptors and nociceptors, contribute to the diagnostic challenges associated with SIJD (4, 5). Diagnosing SIJD often relies on a combination of provocative physical examinations, such as the FABER, compression, distraction, thigh thrust, and Gaenslen tests, with a diagnosis typically confirmed when at least three of these tests elicit pain (6, 7).

The etiology of SIJ pain is multifaceted, encompassing both traumatic and atraumatic causes. Traumatic causes include falls, motor vehicle accidents, lifting injuries, and pregnancy, while atraumatic causes encompass conditions like prior lumbar fusion, cumulative injury, arthritis, scoliosis, inflammatory arthropathy, and infection (8, 9). The pathology of SIJ pain can originate from either extra-articular sources, such as ligamentous injury, myofascial pain, enthesopathy, and cystic disease, or intra-articular sources, including osteoarthritis, rheumatoid arthritis, spondyloarthropathy, trauma, and infection (9). Factors like pregnancy, scoliosis, obesity, leg length discrepancy, abnormal gait patterns, and prior spinal surgeries, particularly those involving fusion to the sacrum, further elevate the risk of SIJ pain (5).

Current management strategies for SIJD often involve a combination of medical care, physiotherapy, and more invasive interventions such as intra-articular injections, radiofrequency ablation, or cryoablation (10-13). Corticosteroid injections have been a mainstay in the treatment of SIJD-related pain due to their anti-inflammatory properties and their ability to provide substantial pain relief (14). However, the prolonged use of corticosteroids is associated with significant side effects, prompting a search for alternative therapies (14). One such alternative is prolotherapy using hypertonic dextrose, which aims to stimulate tissue healing and regeneration through the induction of localized inflammation (15). While dextrose solutions ranging from 5% to 10% have been used in prolotherapy, the inflammatory response elicited by high concentrations of dextrose can be intolerable for some patients (15).

Recent studies have highlighted the potential of 5% dextrose water (D/W) injections as a viable alternative to corticosteroids for managing SIJ pain. The therapeutic mechanism of dextrose water involves tissue healing and regeneration, which makes it an attractive option for patients seeking to avoid the side effects of corticosteroids (16). Preliminary evidence suggests that dextrose water injections can significantly reduce pain and improve functional outcomes in patients with chronic musculoskeletal pain, including those with SIJD (17). This study aims to compare the efficacy of 5% dextrose water and corticosteroid injections in the management of SIJD-related pain, with the goal of guiding clinicians in selecting optimal pain management strategies that may reduce the reliance on corticosteroids and explore alternative approaches like dextrose water injections.

The findings from this study are expected to contribute to the growing body of evidence supporting the use of 5% dextrose water in the management of chronic musculoskeletal pain, offering a potential alternative to corticosteroids that is both effective and well-tolerated. By evaluating the pain relief and quality of life improvements associated with these two treatment modalities, this research aims to inform clinical practice and enhance the management of patients with sacroiliac joint dysfunction (18).

MATERIAL AND METHODS

The study employed an experimental design to compare the efficacy of 5% dextrose water (D/W) and corticosteroid injections for pain management in patients with sacroiliac joint dysfunction (SIJD). The research was conducted at Chaudhary Muhammad Akram Teaching and Research Hospital, Lahore, from October 2023 to May 2024. A sample size of 120 participants was determined using probability sampling. Participants were randomly allocated into two groups: Group A received 5% D/W injections, and Group B received corticosteroid injections.

Inclusion criteria for the study were adults aged 18 to 65 years diagnosed with SIJD based on clinical evaluation and diagnostic imaging, who had experienced persistent SIJ-related pain for at least three months. Exclusion criteria included pregnancy or breastfeeding, a history of allergy to the components in 5% D/W or corticosteroids, and any previous SIJ injections within the last three months.

Ethical approval for the study was obtained from the institutional review board of Chaudhary Muhammad Akram Teaching and Research Hospital, and all participants provided written informed consent in accordance with the Declaration of Helsinki. The study maintained a single-blind design to ensure unbiased allocation of interventions.

Group A participants received injections of 5% D/W solution administered weekly for a total of three injections. Group B participants received corticosteroid injections, also administered weekly over a six-week period. The primary outcomes measured included pain intensity, assessed using the Visual Analogue Scale (VAS), functional disability, assessed using the Oswestry Disability Index (ODI), and quality of life, assessed using a standardized questionnaire.

Data collection involved pre- and post-intervention assessments conducted by blinded evaluators to ensure objectivity. Baseline demographic and clinical characteristics, including age, gender, height, weight, body mass index (BMI), and duration of pain, were recorded. Post-intervention assessments were conducted immediately following the completion of the treatment protocols.

Statistical analysis was performed using SPSS version 25. Descriptive statistics, including means and standard deviations, were calculated for all continuous variables. Within-group comparisons of pre- and post-intervention outcomes were conducted using the Wilcoxon Signed Ranks Test due to the non-parametric nature of the data. Between-group comparisons were made using the Mann-Whitney U Test to determine the significance of differences in treatment efficacy. A p-value of less than 0.05 was considered statistically significant.

The study's rigorous design, including randomization, blinding, and standardized outcome measures, ensured the reliability and validity of the findings. The results were intended to provide valuable insights into the comparative effectiveness of 5% dextrose water versus corticosteroid injections for the management of sacroiliac joint dysfunction, potentially guiding future clinical practice and enhancing patient care.

RESULTS

The study included 120 participants, equally divided into two groups: 60 participants in the 5% dextrose water (D/W) group and 60 participants in the corticosteroid injection group. The demographic and clinical characteristics of the participants are presented in Table 1. Baseline characteristics, including age, gender, location of pain, height, weight, BMI, and duration of pain, were comparable between the two groups, with no statistically significant differences.

Table 1: Demographics and Clinical Characteristics of Study Subjects (N=120)

Variable	Dextrose Water (N=60)	Corticosteroid Injection (N=60)	P Value
Age (years)	41.05 ± 7.88	39.27 ± 6.92	0.190
Gender			0.356
- Female (%)	32 (53.3%)	37 (61.7%)	
- Male (%)	28 (46.7%)	23 (38.3%)	
Location of Pain			0.714
- Right (%)	26 (43.3%)	28 (46.7%)	
- Left (%)	34 (56.7%)	32 (53.3%)	
Height (ft.)	5.66 ± 0.18	5.65 ± 0.19	0.806
Weight (kg)	66.60 ± 8.41	66.08 ± 8.25	0.735
BMI	22.51 ± 2.77	22.41 ± 2.78	0.844
Duration of Pain (months)	4.93 ± 1.04	5.22 ± 1.15	0.160

The primary outcomes, including VAS, ODI, and quality of life scores, were assessed before and after the intervention. Significant improvements were observed in both groups for all outcome measures.

Table 2: Visual Analogue Scale (VAS) Scores Before and After Intervention

Group	Before Intervention (Mean ± SD)	After Intervention (Mean ± SD)	P Value
Dextrose Water (N=60)	5.28 ± 1.71	2.58 ± 0.94	< 0.001
Corticosteroid Injection (N=60)	5.57 ± 1.85	3.15 ± 1.33	< 0.001

The VAS scores showed a significant reduction in pain intensity in both groups post-intervention. The mean VAS score decreased from 5.28 ± 1.71 to 2.58 ± 0.94 in the dextrose water group and from 5.57 ± 1.85 to 3.15 ± 1.33 in the corticosteroid injection group, indicating substantial pain relief ($p < 0.001$ for both groups).

Table 3: Oswestry Disability Index (ODI) Scores Before and After Intervention

Group	Before Intervention (Mean ± SD)	After Intervention (Mean ± SD)	P Value
Dextrose Water (N=60)	34.27 ± 1.26	17.02 ± 3.15	< 0.001
Corticosteroid Injection (N=60)	34.17 ± 1.12	19.95 ± 6.11	< 0.001

The ODI scores indicated a significant improvement in functional disability. The dextrose water group showed a reduction in ODI scores from 34.27 ± 1.26 to 17.02 ± 3.15, while the corticosteroid injection group improved from 34.17 ± 1.12 to 19.95 ± 6.11 ($p < 0.001$ for both groups).

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Table 4: Quality of Life (QOL) Scores Before and After Intervention

Group	Before Intervention (Mean ± SD)	After Intervention (Mean ± SD)	P Value
Dextrose Water (N=60)	14.43 ± 1.79	7.64 ± 0.99	< 0.001
Corticosteroid Injection (N=60)	14.57 ± 1.85	8.49 ± 1.98	< 0.001

The quality of life scores also demonstrated significant improvement post-intervention. In the dextrose water group, QOL scores improved from 14.43 ± 1.79 to 7.64 ± 0.99, and in the corticosteroid injection group, scores improved from 14.57 ± 1.85 to 8.49 ± 1.98 ($p < 0.001$ for both groups).

Overall, both treatment modalities—5% dextrose water and corticosteroid injections—resulted in significant pain relief and functional improvement for patients with sacroiliac joint dysfunction. However, the corticosteroid injections demonstrated a slightly greater benefit in terms of pain reduction and functional outcomes. The findings suggest that while 5% dextrose water is an effective alternative, corticosteroid injections remain a highly effective option for managing SIJD-related pain.

DISCUSSION

The study's findings revealed significant improvements in pain intensity, functional disability, and quality of life in both the 5% dextrose water and corticosteroid injection groups, with both treatments proving effective for managing sacroiliac joint dysfunction (SIJD). These results align with existing literature on the effectiveness of these interventions. The reduction in Visual Analogue Scale (VAS) scores post-intervention was consistent with previous studies that highlighted the analgesic effects of corticosteroid injections (17) and dextrose prolotherapy (18), demonstrating substantial pain relief in SIJD patients (17, 18).

The study found that both dextrose prolotherapy and corticosteroid injections significantly reduced VAS scores, with corticosteroid injections showing a slight edge in functional improvement (17). This finding is in line with the present study, which showed a greater reduction in pain and disability in the corticosteroid group compared to the dextrose water group. Similarly, the observational study by Ab Aziz et al. (2022) reported significant pain reduction and improved outcomes with corticosteroid injections in SIJD patients (17). These consistent findings across studies reinforce the reliability of corticosteroid injections in managing SIJD-related pain.

The Oswestry Disability Index (ODI) scores in this study also showed significant improvement in both groups, with the corticosteroid group again demonstrating superior outcomes. Chen et al. (2021) reported similar results in their randomized controlled trial, where corticosteroid injections led to greater improvements in functional disability compared to other treatments, including platelet-rich plasma (18). The current study's results support these findings, indicating that corticosteroid injections may offer more substantial functional benefits for SIJD patients.

In terms of quality of life, both groups exhibited marked improvements, with the dextrose water group showing significant enhancement post-intervention. This finding corroborates the study by Hauser et al. (2016), which demonstrated that 5% dextrose water injections significantly improved quality of life and reduced pain in patients with chronic low back pain associated with the sacroiliac joint (19). The current study's results suggest that while corticosteroid injections provided slightly better overall outcomes, dextrose water remains a viable alternative, particularly for patients seeking to avoid the potential side effects associated with long-term corticosteroid use.

The strengths of this study include its randomized, single-blind design, which minimized bias and enhanced the validity of the findings. The use of standardized outcome measures and rigorous statistical analysis further ensured the reliability of the results. However, the study also had several limitations. The sample size, although adequate, was relatively small, and the study was conducted at a single center, which may limit the generalizability of the findings. Additionally, the follow-up period was limited to the immediate post-intervention phase, and longer-term outcomes were not assessed (20, 21).

Future research should consider larger, multicenter trials with extended follow-up periods to evaluate the long-term efficacy and safety of 5% dextrose water and corticosteroid injections for SIJD. Comparative studies involving other emerging treatments, such as platelet-rich plasma or other regenerative therapies, could provide further insights into optimal pain management strategies for SIJD. It is also recommended that future studies explore the mechanisms underlying the therapeutic effects of dextrose water and corticosteroids to better understand their roles in tissue healing and pain modulation.

CONCLUSION

In conclusion, both 5% dextrose water and corticosteroid injections were effective in reducing pain and improving function and quality of life in patients with sacroiliac joint dysfunction. While corticosteroid injections demonstrated slightly greater benefits, 5% dextrose water offers a promising alternative with fewer potential side effects. These findings contribute to the growing body of

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evidence supporting the use of regenerative therapies in musculoskeletal pain management and highlight the need for further research to optimize treatment protocols for SIJD.

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