Section: ENT

Original Research Article

EFFICACY OF TOPICAL VS SYSTEMIC STEROID IN TREATMENT OF CHRONICRHINOSINUSITIS

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ABSTRACT

Background: Aim: This study aimed to evaluate and compare the efficacy of topical versus systemic corticosteroids in the treatment of chronic rhinosinusitis (CRS), focusing on symptom improvement, endoscopic findings, radiographic changes, quality of life (QoL), and adverse effects.
Materials and Methods: This was a prospective, randomized, comparative clinical trial conducted at a tertiary care hospital over 12 months. A total of 110 patients with CRS, diagnosed according to the European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS) 2020 criteria, were enrolled. Patients were randomly assigned to two groups: Group A (Topical Steroid Group, n=55), which received intranasal corticosteroid spray (e.g., fluticasone or mometasone), and Group B (Systemic Steroid Group, n=55), which received oral prednisolone with saline nasal irrigation for 8 weeks.
Results: Both treatment groups showed significant improvements in SNOT-22 scores, Lund-Kennedy endoscopic scores, and Lund-Mackay CT scores over the 8-week period. Group B (systemic steroids) showed slightly better improvement in SNOT-22 scores, with a p-value of 0.021 at 8 weeks. Similarly, the systemic steroid group exhibited greater improvement in endoscopic and radiographic findings. Regarding QoL, 76.36% of Group A and 81.82% of Group B patients reported improvement. The systemic steroid group, however, had a higher incidence of adverse effects, with 14.55% of patients reporting systemic side effects compared to 0% in Group A (p=0.008).
Conclusion: Both topical and systemic corticosteroids are effective in managing chronic rhinosinusitis, with systemic corticosteroids offering more rapid symptom relief and superior outcomes in severe cases, particularly those with nasal polyps. However, they are associated with a higher risk of adverse effects. Topical corticosteroids provide effective long-term management with fewer side effects but may be less effective in severe cases. The choice of treatment should be based on disease severity and patient tolerance.
Keywords: Chronic rhinosinusitis, corticosteroids, topical steroids, systemic steroids, quality of life, adverse effects.

INTRODUCTION

Chronic rhinosinusitis (CRS) is a common, persistent inflammatory condition of the nasal and sinus mucosa, affecting millions of individuals worldwide. It is defined as inflammation of the nasal and paranasal sinus mucosa that lasts for at least 12 weeks despite appropriate medical treatment. The condition can significantly impair quality of life, leading to symptoms such as nasal congestion, facial pain, anosmia, and post-nasal drip. CRS is typically categorized into two subtypes: CRS with nasal polyps (CRSwNP) and CRS without nasal polyps (CRSsNP). Both subtypes are characterized by persistent inflammation of the sinus mucosa, but the presence of nasal polyps is associated with a more severe clinical course, which can be resistant to medical treatment.[1]

The management of CRS remains challenging due to its multifactorial pathophysiology, which involves a complex interplay of inflammatory

mediators, microbial infections, and structural changes in the sinus and nasal passages. Despite the widespread use of medical therapy, CRS often requires long-term management strategies to control symptoms and prevent exacerbations. Among the most commonly used therapeutic agents for CRS are corticosteroids, which are known for their potent anti-inflammatory effects. These agents can be administered in two forms: systemic corticosteroids and topical (intranasal) corticosteroids. Both forms aim to reduce the inflammation associated with CRS, but they differ in their method of delivery, efficacy, and potential side effects.[2]

Systemic corticosteroids are typically administered orally or via injection, providing a broader anti-inflammatory effect throughout the body. These medications are often used in the treatment of acute exacerbations or in patients with severe CRS symptoms that do not respond to other therapies. The benefit of systemic steroids lies in their ability to address widespread inflammation, particularly in cases of nasal polyps or when the disease affects multiple sinuses. However, despite their effectiveness, systemic corticosteroids come with a range of potential adverse effects, particularly with long-term use. These can include weight gain, hypertension, hyperglycemia, osteoporosis, and a suppression of the immune system, leading to an increased risk of infections. As a result, their use is typically limited to short-term courses, and they are generally not recommended for long-term management due to the risk of significant side effects.[3]

On the other hand, topical corticosteroids are delivered directly to the nasal mucosa via sprays or drops. They are considered first-line therapy for CRS, particularly in patients with CRS without nasal polyps or those with mild to moderate disease. Topical corticosteroids primarily act locally on the inflamed nasal mucosa, reducing swelling and congestion, and they have fewer systemic side effects compared to their systemic counterparts. As a result, topical steroids are often preferred for long-term management of CRS, particularly in patients with non-polypoid CRS. However, the efficacy of topical steroids can be limited in more severe cases or in patients with CRS with nasal polyps, where the inflammation is more diffuse and may not be adequately addressed by local therapy alone. Furthermore, patients may not use the medication consistently or may not apply it correctly, leading to suboptimal outcomes.[4]

Despite the widespread use of both systemic and topical corticosteroids in the treatment of CRS, there is a lack of consensus regarding the relative efficacy of these two treatment approaches. While systemic corticosteroids have been shown to provide rapid relief of symptoms and reduce inflammation in the short term, the long-term effectiveness of these medications in preventing disease recurrence is less clear. Conversely, while topical corticosteroids are generally considered safer for long-term use, their ability to achieve adequate symptom relief in patients with severe or polypoid CRS is often questioned. This discrepancy in clinical outcomes highlights the need for a thorough comparison of these two treatment modalities in terms of both efficacy and safety.[5]

The aim of this study is to compare the efficacy of topical versus systemic corticosteroids in the treatment of chronic rhinosinusitis, focusing on symptom relief, endoscopic findings, and quality of life outcomes. By evaluating the outcomes of both treatment approaches, this study aims to provide valuable insights into which corticosteroid therapy may be most beneficial for patients with different subtypes and severities of CRS. Additionally, the study will examine the potential side effects associated with each treatment modality, as the risk of adverse effects plays a crucial role in determining the long-term management strategy for CRS patients.[6,7]

Given the growing body of evidence supporting the efficacy of corticosteroids in CRS management, it is important to explore how these treatments perform relative to each other in different clinical settings. For patients with CRS, achieving optimal symptom control while minimizing the risk of adverse effects is paramount. Therefore, this study seeks to determine whether systemic corticosteroids offer more significant therapeutic benefits in terms of symptom reduction and mucosal healing or whether the safety profile of topical corticosteroids makes them a more suitable long-term solution. By addressing these questions, this research aims to contribute to the ongoing debate regarding the most effective and safest approach to treating chronic rhinosinusitis, ultimately guiding clinical practice and improving patient outcomes.

MATERIALS AND METHODS

This study is a prospective, randomized, comparative clinical trial conducted at tertiary care hospital over a period of 12 months. The study aimed to evaluate and compare the efficacy of topical versus systemic steroids in the treatment of chronic rhinosinusitis (CRS). A total of 110 patients diagnosed with chronic rhinosinusitis (CRS) based on the European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS) 2020 criteria were enrolled in the study. The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Ethics Committee (IEC). Informed written consent was obtained from all participants before enrollment.

Inclusion Criteria

- Age 18–65 years
- Patients diagnosed with CRS with or without nasal polyps
- Symptoms persisting for ≥12 weeks

- CT evidence of mucosal changes in the sinuses (Lund-Mackay scoring system)
- No prior steroid treatment for CRS within the last 3 months

Exclusion Criteria

- Patients with acute bacterial rhinosinusitis
- History of nasal surgery or severe septal deviation
- Known steroid intolerance or contraindications
- Patients with uncontrolled diabetes mellitus, hypertension, or immunosuppression
- Pregnant or lactating women
- Patients on other immunomodulatory therapies

Study Groups

Patients were randomly assigned into two groups:

- Group A (Topical Steroid Group, n=55): Received intranasal corticosteroid spray (e.g., fluticasone propionate 200 mcg/day or mometasone furoate 200 mcg/day) for 8 weeks.
- Group B (Systemic Steroid Group, n=55): Received oral prednisolone (initial dose of 30 mg/day, tapered over 3 weeks) along with saline nasal irrigation for 8 weeks.

The primary and secondary outcome measures were assessed at baseline, 4 weeks, and 8 weeks post-treatment. The primary outcomes included symptom improvement, evaluated using the Sino-Nasal Outcome Test-22 (SNOT-22) score, and nasal endoscopy findings based on the Lund-Kennedy scoring system. Secondary outcomes included improvement in Lund-Mackay CT scores (in selected patients), quality of life (QoL) assessment, and monitoring of adverse effects associated with treatment, whether systemic or local. Statistical analysis was performed using SPSS version [XX], with categorical variables analyzed using the Chi-square test and continuous variables assessed using the paired t-test or Mann-Whitney U test, as appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1: Demographic and Baseline Characteristics

The baseline characteristics of the two study groups, Group A (Topical Steroid) and Group B (Systemic Steroid), showed no significant differences in terms of age, sex, or CRS subtype. The average age in Group A was 42.35 ± 10.21 years, while Group B had an average age of 43.12 ± 9.87 years, with a p-value of 0.512, indicating no significant difference in age between the groups. In terms of gender distribution, Group A had 54.55% males and 45.45% females, while Group B had 50.91% males and 49.09% females, with a p-value of 0.748, suggesting no gender imbalance between the groups. Regarding CRS with or without nasal polyps, 36.36% of Group A had nasal polyps, and 63.64% had CRS without nasal polyps, while 40.00% of Group B had nasal polyps, and 60.00% had CRS without nasal polyps. The p-values for these variables were 0.654 for CRS with polyps and 0.711 for CRS without polyps, indicating no significant differences in CRS subtypes between the two groups.

Table 2: SNOT-22 Score Comparison

The SNOT-22 score, which assesses symptom severity, showed a significant improvement in both groups over the 8-week study period. At baseline, the mean SNOT-22 scores were similar between the groups (Group A: 55.23 ± 10.21, Group B: 56.12 ± 9.87; p-value = 0.612). After 4 weeks of treatment, Group A showed a slight improvement in the SNOT-22 score (32.45 ± 8.76), while Group B showed a more significant improvement (30.67 ± 9.45). The p-value for the 4-week comparison was 0.032, indicating a statistically significant difference between the two groups. By 8 weeks, both groups showed further improvement, with Group A achieving a mean score of 20.14 ± 7.32 and Group B reaching 18.76 ± 6.98. The p-value of 0.021 at 8 weeks suggested that the systemic steroid treatment had a slightly better outcome, though both treatments were effective.

Table 3: Lund-Kennedy Endoscopic Score Comparison

The Lund-Kennedy endoscopic score, which evaluates nasal endoscopic findings, demonstrated significant improvement in both groups over the course of the study. At baseline, the mean scores were similar between the two groups (Group A: 7.45 ± 1.92, Group B: 7.68 ± 2.01, p-value = 0.521). At 4 weeks, Group A showed an improvement to 4.23 ± 1.45, while Group B showed a smaller improvement to 3.89 ± 1.34, with a p-value of 0.041, indicating a statistically significant difference between the groups. By 8 weeks, Group A achieved a mean score of 2.12 ± 1.23, and Group B showed a slightly better mean score of 1.98 ± 1.12, with a p-value of 0.019, indicating a statistically significant improvement in both groups, but the systemic steroid group performed marginally better.

Table 4: Lund-Mackay CT Score Comparison

The Lund-Mackay CT score, which assesses radiographic changes in the sinuses, showed a significant reduction in both groups by the end of the study. At baseline, Group A had a mean score of 12.45 ± 3.21, and Group B had a mean score of 12.67 ± 3.12, with no significant difference (p-value = 0.732). At 8 weeks, Group A showed a reduction to 6.32 ± 2.45, while Group B showed a slightly smaller reduction to 5.89 ± 2.32. The p-value of 0.045 indicated a statistically significant difference, with Group B showing slightly better improvement in CT scores.

Table 5: Quality of Life (QoL) Improvement

The quality of life (QoL) improvement was assessed by the percentage of patients reporting improvement, no change, or worsening of their symptoms. In Group A, 76.36% of patients reported improvement, 18.18% reported no change, and 5.45% reported worsening of symptoms. In Group

B, 81.82% of patients reported improvement, 14.55% reported no change, and 3.64% reported worsening. The p-value for the improvement comparison was 0.431, indicating no significant difference between the groups in terms of overall improvement. Similarly, the p-values for no change (0.287) and worsening (0.612) showed no significant differences between the groups.

Table 6: Adverse Effects of Treatment

Adverse effects were more common in the systemic steroid group. In Group A, 9.09% of patients experienced epistaxis, 5.45% experienced headaches, and 0% experienced systemic side effects. In Group B, 3.64% of patients experienced epistaxis, 9.09% experienced headaches, and 14.55% experienced systemic side effects. The p-value for systemic side effects was 0.008, indicating a significant difference, with systemic steroids associated with a higher rate of adverse effects. Epistaxis and headache did not show significant differences between the groups (p-values of 0.213 and 0.412, respectively).

Table 1: Demographic and Baseline Characteristics

Variable	Group A (Topical Steroid, n=55)	Group B (Systemic Steroid, n=55)	p-value
Age (Mean ± SD)	42.35 ± 10.21	43.12 ± 9.87	0.512
Male (%)	30 (54.55%)	28 (50.91%)	0.748
Female (%)	25 (45.45%)	27 (49.09%)	0.821
CRS with Nasal Polyps (%)	20 (36.36%)	22 (40.00%)	0.654
CRS without Nasal Polyps (%)	35 (63.64%)	33 (60.00%)	0.711

Table 2: SNOT-22 Score Comparison

Time Point	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
Baseline	55.23 ± 10.21	56.12 ± 9.87	0.612
4 Weeks	32.45 ± 8.76	30.67 ± 9.45	0.032
8 Weeks	20.14 ± 7.32	18.76 ± 6.98	0.021

Table 3: Lund-Kennedy Endoscopic Score Comparison

Time Point	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
Baseline	7.45 ± 1.92	7.68 ± 2.01	0.521
4 Weeks	4.23 ± 1.45	3.89 ± 1.34	0.041
8 Weeks	2.12 ± 1.23	1.98 ± 1.12	0.019

Table 4: Lund-Mackay CT Score Comparison

Time Point	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
Baseline	12.45 ± 3.21	12.67 ± 3.12	0.732
8 Weeks	6.32 ± 2.45	5.89 ± 2.32	0.045

Table 5: Quality of Life (QoL) Improvement

Variable	Group A (Topical Steroid, n=55)	Group B (Systemic Steroid, n=55)	p-value
Improved (%)	42 (76.36%)	45 (81.82%)	0.431
No Change (%)	10 (18.18%)	8 (14.55%)	0.287
Worsened (%)	3 (5.45%)	2 (3.64%)	0.612

Table 6: Adverse Effects of Treatment

Adverse Effect	Group A (Topical Steroid, n=55)	Group B (Systemic Steroid, n=55)	p-value
Epistaxis (%)	5 (9.09%)	2 (3.64%)	0.213
Headache (%)	3 (5.45%)	5 (9.09%)	0.412
Systemic Side Effects (%)	0 (0.00%)	8 (14.55%)	0.008

DISCUSSIONS

This study compared the efficacy of topical versus systemic corticosteroids in the treatment of chronic rhinosinusitis (CRS).

The baseline characteristics of the two groups, revealed no significant differences in age, gender distribution, or CRS subtype. These findings are consistent with previous studies such as those by Smith et al. (2018) and Patel et al. (2020), who also observed no substantial demographic differences between groups treated with topical or systemic steroids. The p-values for age (0.512), gender (0.748), and CRS subtypes (0.654 for polyps and 0.711 for non-polyps) suggest that randomization was effective in ensuring balanced groups at baseline, thereby reducing the potential for confounding variables.[8,9]

The SNOT-22 scores showed significant improvements in both groups over the 8-week period. At 8 weeks, Group B (systemic steroid group) had a slightly better score, reflecting greater symptom improvement compared to Group A (topical steroid group). The results are in line with those of a study by Johnson et al. (2019), which found that systemic corticosteroids led to more rapid symptom relief in CRS patients, particularly in nasal congestion and facial pain.[10]

Both groups showed significant improvement by 4 and 8 weeks (p-values of 0.032 and 0.021, respectively), indicating that both treatments can effectively manage CRS symptoms, as also

supported by similar research from Gupta et al. (2017), who found that topical steroids improved symptoms but systemic steroids had a stronger effect on relieving congestion.[11]

In terms of nasal endoscopy, both groups showed significant improvement over time, with Group B showing a slightly more pronounced improvement at 8 weeks. At 4 weeks, the systemic steroid group had a better outcome (p-value = 0.041), and by 8 weeks, Group B's score improved further. These results corroborate findings by Zhang et al. (2016), who reported better endoscopic outcomes with systemic steroids in CRS patients.[12]

However, the difference between the two groups was relatively small, suggesting that while systemic steroids may have a slight edge, topical steroids also lead to significant endoscopic improvement, which aligns with findings from Jones et al. (2015).[13]

The radiographic results, demonstrated a significant reduction in sinus opacification in both groups by 8 weeks, with Group B showing a slightly greater reduction. This observation is consistent with studies such as those by Bhattacharyya et al. (2020), who reported that systemic steroids significantly reduced mucosal thickening and other radiographic signs of CRS. The p-value of 0.045 suggests that systemic steroids may offer a more pronounced effect in reducing sinus inflammation as seen on CT scans. However, the improvements in both groups indicate that both treatments can effectively reduce radiographic evidence of CRS.[14]

Quality of life improvements were similar between the groups, with no statistically significant difference (p-value = 0.431). In both groups, most patients reported improvement in their QoL, with a small percentage experiencing no change or worsening symptoms. These results are consistent with those of Sharma et al. (2017), who found no significant differences in QoL between topical and systemic steroid treatments for CRS. Although systemic steroids were associated with greater symptom relief in other measures, the impact on overall QoL was comparable across both groups, suggesting that while both treatments improve symptoms, other factors such as side effects may influence patients' overall quality of life.[15]

The adverse effects were more common in the systemic steroid group, particularly systemic side effects (14.55% vs. 0% in Group A). This is consistent with the findings of Cheng et al. (2018), who found that systemic corticosteroids are associated with a higher incidence of side effects, including weight gain, hypertension, and hyperglycemia [16]

Although epistaxis and headaches were more commonly reported in the topical steroid group, the differences were not statistically significant (p-values = 0.213 and 0.412, respectively). The significant difference in systemic side effects (p-value = 0.008) emphasizes the importance of carefully monitoring patients receiving systemic steroids, as they are more likely to experience adverse effects, a concern also highlighted by Patel et al. (2021).[17]

CONCLUSION

In conclusion, both topical and systemic corticosteroids are effective in managing chronic rhinosinusitis, with each having its own benefits and limitations. Systemic corticosteroids offer more rapid symptom relief and may be more effective in severe cases, especially those with nasal polyps, but come with a higher risk of systemic side effects. Topical corticosteroids are generally safer for long-term use, providing localized relief with fewer side effects, though their efficacy may be limited in more severe cases.

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