

Comparative Efficacy and Clinical Outcomes of 5% Phenol in Almond Oil versus 3% Sodium Tetradecyl Sulphate for the Sclerotherapy of Grade I and II Hemorrhoids: A Prospective Comparative Interventional Study

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Abstract

Background: Injection sclerotherapy is an established minimally invasive treatment for Grade I and II internal hemorrhoids. This study compared 5% phenol in almond oil with 3% sodium tetradecyl sulphate (STS), focusing on the timing of symptomatic recovery and safety.

Subjects and Methods: A prospective interventional study was conducted at TMMC&RC, Moradabad, from June 2024 to December 2025. Sixty patients with Grade I or II internal hemorrhoids were allocated into two groups of 30. Patients received either 5% phenol in almond oil or 3% STS and were assessed at Weeks 1, 3, 6, 12 and 18. Symptomatic recovery was the principal outcome.

Results: At Week 1, 19/30 (63.3%) patients in the phenol group had recovered compared with 0/30 in the STS group ($p < 0.001$). By Week 3, 11 of the 12 phenol patients remaining under follow-up had recovered; no STS patient had recovered. STS showed progressive recovery thereafter: 10/30 (33.3%) at Week 6, 9/20 (45%) at Week 12 and 10/11 (90.9%) at Week 18. One STS patient (9.09%) remained unrecovered. No major procedure-related complications were documented. **Conclusion:** Phenol in almond oil produced a substantially faster early symptomatic response, whereas STS showed a delayed but progressive response. Both agents were well tolerated in this study, and sclerosant selection may be individualized according to the desired speed of symptom relief and feasibility of follow-up.

Keywords: Hemorrhoids, Injection sclerotherapy, Sodium tetradecyl sulphate, Proctology.

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Introduction

Hemorrhoids are specialized vascular cushions of the anal canal that contribute to fecal continence. Hemorrhoidal disease becomes symptomatic when vascular engorgement, thrombosis, mucosal descent or loss of supporting tissue produces bleeding, discomfort or prolapse. Predisposing factors include constipation, straining, physical inactivity, obesity, pregnancy, advancing age, hereditary susceptibility and sustained increases in intra-abdominal pressure.

Diagnosis is primarily clinical, using history, digital rectal examination and anoscopy/proctoscopy. Early internal hemorrhoids, particularly Grades I and II, are commonly managed with conservative measures and minimally invasive procedures. Injection sclerotherapy remains useful in outpatient practice because it is technically simple, economical and associated with limited morbidity.

Sclerotherapy involves submucosal deposition of a sclerosant into the hemorrhoidal cushion. The local

inflammatory response is followed by thrombosis, fibroblastic proliferation and fibrosis, promoting mucosal fixation and reducing vascular channels. Phenol in almond oil is a conventional sclerosant, whereas STS is a detergent sclerosant that produces endothelial disruption followed by thrombosis and fibrosis.

Although both agents are used clinically, the available comparative evidence is limited, particularly regarding the temporal pattern of symptomatic improvement. The present study therefore compared 5% phenol in almond oil and 3% STS in Grade I and II internal hemorrhoids, with emphasis on symptom resolution and safety.

Subjects and Methods

The study was conducted at Teerthanker Mahaveer Medical College & Research Centre, Moradabad, over 18 months from June 2024 to December 2025. Patients presenting to outpatient or emergency services with suspected

hemorrhoidal disease underwent clinical examination, digital rectal examination and proctoscopic assessment. Grade, number and anatomical distribution of hemorrhoidal cushions were recorded.

Sixty patients of either sex aged 20–80 years with Grade I or II internal hemorrhoids who consented to sclerotherapy were included. Exclusion criteria were intolerance to sclerosants, pregnancy, severe cardiac disorders, recent thrombotic episodes, inflammatory anorectal disease, acutely prolapsed or thrombosed piles, bleeding diathesis, Grade III/IV hemorrhoids, chronic liver disease or portal hypertension.

Participants were allocated by an odd–even method into two groups of 30. The study protocol used 3% STS at 1 mL per hemorrhoidal mass, with a maximum of 3 mL per sitting for up to three hemorrhoids, and 5% phenol in almond oil at 3 mL per hemorrhoid, with a maximum of 9 mL per session. Follow-up was scheduled at Weeks 1, 3, 6, 12 and 18. Week 1 assessed early complications; subsequent visits assessed symptoms and need for further treatment.

The primary outcome was symptomatic recovery, particularly improvement in bleeding and prolapse. Statistical analysis used chi-square and independent-samples t-tests.

Results

The study included 60 patients, with 30 in each treatment arm. Mean age was 37.2 ± 5.32 years in the phenol group and 38.3 ± 4.71 years in the STS group. All participants were male. Rural residence predominated in both groups (86.67% phenol; 90% STS). Baseline systolic and diastolic blood pressure and pulse rate were broadly comparable between groups.

At Week 1, 19 patients (63.33%) in the phenol group demonstrated symptomatic recovery, while none of the 30 STS patients had recovered ($p < 0.001$). At Week 3, among the 12 phenol patients remaining under follow-up, 11 (91.67%) had recovered and one remained unrecovered; no STS patient had recovered ($p < 0.001$).

The STS group demonstrated progressive recovery during

later follow-up. At Week 6, 10 patients (33.33%) had recovered and 20 (66.67%) remained unrecovered. At Week 12, 9 patients (45%) had recovered and 11 (55%) remained unrecovered. At Week 18, 10 of 11 patients available for final assessment (90.91%) had recovered, while one (9.09%) remained unrecovered. At the later visits, only one phenol patient remained under follow-up, limiting direct statistical comparison.

No major procedure-related complications were documented in either group.

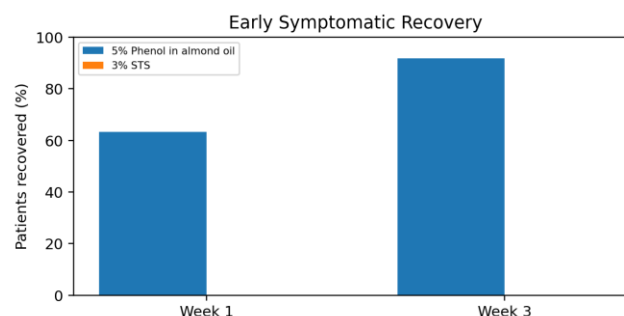


Figure 1: Early symptomatic recovery after sclerotherapy. Percentages are based on patients available at each stated follow-up in the source data

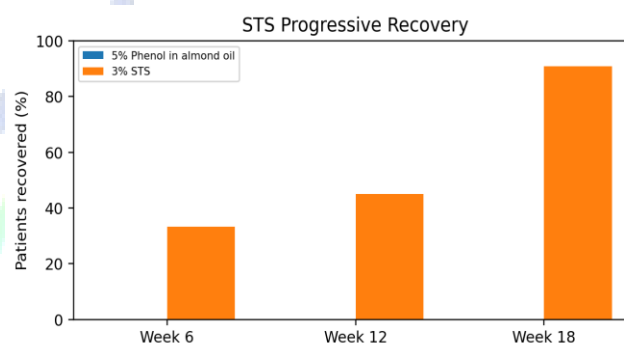


Figure 2: Progressive symptomatic recovery in the 3% STS group during later follow-up

Table 1: Symptomatic recovery reported at follow-up

Follow-up	5% Phenol	3% STS
Week 1	19/30 (63.3%)	0/30 (0%)
Week 3	11/12 (91.7%)	0/30 (0%)
Week 6	0/1*	10/30 (33.3%)
Week 12	0/1*	9/20 (45.0%)
Week 18	Not available*	10/11 (90.9%)

*Only one phenol patient remained under follow-up at Weeks 6 and 12; no phenol patients were available at Week 18, as reported in the source manuscript.

Discussion

The principal finding was a difference in the timing rather than the overall pattern of therapeutic response. Phenol in almond oil produced rapid symptomatic improvement, with 63.3% recovery at Week 1 and near-complete recovery

among those remaining under follow-up by Week 3. STS showed no early recovery but a progressive response from Week 6 onward, reaching 90.9% among patients available at Week 18.

The early response to phenol is consistent with the established clinical use of phenol-based sclerosants for low-grade hemorrhoidal disease. The delayed response observed with STS may reflect the sequence of endothelial disruption,

thrombosis, inflammation and progressive fibroblastic remodeling associated with detergent sclerosants. Thus, lack of early improvement after STS should not automatically be interpreted as treatment failure when follow-up is adequate. The study findings broadly agree with the literature cited in the original manuscript. Previous reports have described rapid symptomatic relief with phenol-based treatment and favourable medium-term outcomes with STS. Differences in formulation, injection technique, sclerosant volume, patient characteristics and follow-up protocols may influence the observed response.

An important limitation in interpreting the present data is differential availability of patients at later follow-up. Patients who had recovered early with phenol did not continue to contribute observations at the later time points, while STS patients remained under assessment because of their delayed response. Therefore, the later cumulative figures should not be interpreted as evidence that STS is superior or inferior in ultimate efficacy. The study more strongly supports a difference in therapeutic kinetics.

Clinically, phenol may be advantageous when rapid relief is desired or prolonged follow-up is difficult. STS may remain useful when a gradual response is acceptable and reliable longitudinal follow-up is feasible. Both agents were well tolerated in this cohort, with no major complications documented.

Clinical Implications

For Grade I and II internal hemorrhoids, sclerosant choice can be individualized. 5% phenol in almond oil may be preferred when rapid symptomatic relief and early return to routine activities are priorities, particularly when repeated follow-up is difficult. 3% STS may be considered when structured follow-up is available and a gradual therapeutic response is acceptable. Selection should consider clinical circumstances, patient preference, procedural feasibility and the likelihood of completing follow-up.

Limitations

The study had a small sample size of 60 patients, included only males, was not blinded and did not use a standardized symptom-scoring instrument. Later follow-up was limited for the phenol group because most patients had already recovered. Long-term recurrence and patient-reported outcome measures were not assessed. These factors limit generalizability and direct comparison of late outcomes.

Future Directions

Larger multicentric randomized studies should include female participants, standardized symptom scores and patient-reported outcome measures. Longer follow-up should evaluate recurrence, durability of response and retreatment requirements. Comparative cost-effectiveness and technique-specific analyses may further clarify the practical role of each sclerosant.

Conclusion

Both 5% phenol in almond oil and 3% STS provided useful symptomatic outcomes in Grade I and II internal

hemorrhoids and no major procedure-related complications were observed. Phenol was associated with a substantially faster early response, whereas STS demonstrated a delayed but progressive therapeutic response. The main distinction between the agents in this study therefore appears to be the rapidity of symptom resolution rather than a clearly demonstrated difference in eventual effectiveness. Sclerosant selection should be individualized according to the need for rapid relief, patient-specific factors and feasibility of longitudinal follow-up.

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