**Original Article**

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# Multimodal Pain Management Strategies for in Office Cervical Biopsy in Women with Recurrent Cervicitis

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Author`s Contribution

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**ABSTRACT**

Objective: To compare the effectiveness of multimodal analgesia with single-modality and standard care in reducing pain and anxiety and improving patient satisfaction among women undergoing colposcopy-directed cervical biopsy.

Methodology: A randomized controlled trial was conducted at the Department of Obstetrics and Gynecology, Chitral Scouts Hospital, from October 2023 to July 2024. A total of 370 women aged 18–50 years with recurrent cervicitis were randomized into three groups: Control (standard care, n = 123), Single-modality (local infiltration with 2% lidocaine, n = 123), and Multimodal (oral etoricoxib 120 mg one hour before procedure + local lidocaine infiltration + non-pharmacological support including forced cough and verbal reassurance, n = 124). Pain intensity was assessed using a Visual Analogue Scale (VAS, 0–10) before, during, and 15 minutes after biopsy. Anxiety was measured using the State-Trait Anxiety Inventory (STAI), and satisfaction was rated on a 5-point Likert scale. Data were analyzed using SPSS version 26.0, with ANOVA and Chi-square tests; $p < 0.05$ was considered significant.

Results: Baseline characteristics were comparable among groups ($p > 0.05$). Intra-procedural pain scores were significantly lower in the Multimodal group (2.3 ± 0.9) than in Single-modality (4.5 ± 1.2) and Control groups (6.8 ± 1.4) ($p < 0.001$). Post-procedure pain showed a similar pattern (1.5 ± 0.7 vs. 2.9 ± 0.8 and 4.1 ± 1.0, $p < 0.001$). The Multimodal group also reported lower anxiety scores (34.2 ± 6.5, $p = 0.004$), higher satisfaction (91.9%, $p < 0.001$), and greater willingness for repeat biopsy (87.9%, $p < 0.001$). Mild adverse effects were comparable across groups ($p = 0.65$).

Conclusion: Multimodal analgesia significantly reduced pain and anxiety while improving satisfaction without increasing side effects. It is a safe and effective approach for outpatient cervical biopsies in women with recurrent cervicitis.

Keywords: Multimodal analgesia, Cervical biopsy, Pain, Anxiety, Patient satisfaction

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## Introduction

Cervical biopsy is a foundation of diagnostic interventions within gynecology, which is often done to assess the presence of inflammation, dysplasia, and possible neoplasia in the cervix. Repeat biopsies may be necessary in women with recurring cervicitis to rule out persistent infection or precancerous lesions but such interventions are often linked to a lot of pain and anxiety.[1] A number of factors determine the perception of pain during colposcopy-guided cervical biopsy, and these factors include patient anxiety, cervical sensitivity, and anesthetic or analgesic measures. The difficulty of delivering the best analgesic to the office-based practice has been the impetus to investigate the multimodal pain management model, which comprises the use of local anesthetics, systemic analgesics, and non-pharmacological methods.[2]

Uncontrolled pain does not only negatively impact on the immediate comfort of the patient but can also negatively impact adherence to post-operative procedures, which leads to underdiagnosis or late diagnosis of cervical pathology. Over 60% of women who had cervical biopsy in a large observational cohort reported moderate-severe pain when no analgesic interventions were used.[3] This is where the necessity of effective interventions is critical and especially among women with recurrent cervicitis where they may experience several procedures over a short period of time. A variety of pharmacological measures have been experimented to lessen pain when performing cervical biopsy. Local anesthesia with

lidocaine has also shown effectiveness in randomized studies, which reduce pain scores significantly as compared to placebo.[4]

Topical lidocaine spray, when sprayed directly on the cervix, has also been reported to be effective and is easy to administer. A meta-analysis has demonstrated that the use of lidocaine-based regimens is uniformly effective in preventing procedural discomfort though there is variability in the extent of effect based on the concentration and the route of administration.[5] NSAIDs and selective COX-2 inhibitors in particular etoricoxib have been considered as premedication to colposcopy-guided biopsy. In a recent randomized controlled trial, oral etoricoxib 120 mg given an hour before the procedure had a significant decrease in intra-procedural pain scores as compared to placebo.[6]

Likewise, the tramadol as an atypical centrally acting analgesic was demonstrated to reduce intra-procedural pain, as well post-procedural cramping, when given orally before biopsy. Nevertheless, side-effects profile of systemic agents needs to be re-evaluated against their advantages, particularly when the patient is at home.[7] There is a growing body of evidence that indicates that non pharmacological intervention can also help in mitigating pain. Even basic actions like forced coughing during biopsy has been demonstrated to temporarily suppress pain sensations presumably by means of distraction and stimulation of spinal reflexes. Moreover, patient-centered communication, relaxation methods, and expectation management have shown significant changes in patient comfort during the operation of a gynecologist.[8]

Multimodal pain management Multimodal pain management is an offering that involves administering pharmacological and non-pharmacological treatment at the same time in order to achieve the best pain treatment and reduce any adverse drug treatment effects. Practically, pre-procedural oral NSAIDs and supplementary methods of distraction combined with local anesthesia might prove to be more effective than uni-modal interventions.[9] Recently, the American College of Obstetricians and Gynecologists (ACO) stressed the relevance of multimodal pain control approaches to office-based cervical and uterine surgeries and the need to use a multimodal approach, tailored to the clinical scenario and to the individual's preference. Although there is an increasing evidence, no universal protocol on pain management during cervical biopsy has been agreed upon. The majority of research has tested individual interventions alone with limited studies actually comparing combination strategies. [10]

In addition, most clinical trials do not consider women with recurrent cervicitis, although this group of patients is a unique population at risk of repeated procedures and augmented experience of pain. To close this evidence gap is essential in enhancing the tolerability of cervical biopsies as well as the diagnostic yield of cervical biopsies in this susceptible cohort. Thus, the current research examines the usefulness of multimodal pain management initiatives in women with recurrent cervicitis exposed to office-based cervical biopsy. This study will combine pharmacological and non-pharmacological interventions to develop an evidence-based protocol that improves patient comfort, increases diagnostic compliance, and follows modern recommendations of patient-centered care.

# Methodology

This randomized controlled trial was carried out in the Department of Obstetrics and Gynecology at Chitral Scouts Hospital from January to October 2024. The study followed CONSORT guidelines for randomized trials and received ethical approval from the Institutional Review Board. Written informed consent was obtained from every participant after explaining the study's purpose, procedures, and potential risks.

A total of 370 women aged between 18 and 50 years, all with a history of recurrent cervicitis (defined as three or more episodes within a year) and scheduled for outpatient colposcopy-guided cervical biopsy, were enrolled. Women were eligible if they had a confirmed diagnosis of recurrent cervicitis and were willing to undergo the procedure under local anesthesia. Those with allergies to lidocaine, NSAIDs, or tramadol; who were pregnant or breastfeeding; had a history of chronic pelvic pain, psychiatric illness, or bleeding disorders; or had taken opioids or sedatives within 48 hours before the procedure were excluded.

The sample size of 370 participants provided more than 90% power to detect a meaningful difference in mean pain scores between the treatment groups at a 5% significance level. Participants were randomly assigned using a computer-generated sequence, and group allocation was concealed in sealed opaque envelopes to maintain blinding. They were divided into three groups. Group A (Control) received standard care without any analgesia. Group B (Single-modality) received local

cervical infiltration with 2% lidocaine (3–5 mL). Group C (Multimodal) received a combination of oral etoricoxib (120 mg taken one hour before the procedure), local infiltration with lidocaine, and simple non-drug techniques, including a forced cough during biopsy and continuous verbal reassurance from the clinician.

In the multimodal approach, etoricoxib was given orally one hour before the biopsy to minimize discomfort, followed by local anesthesia with 2% lidocaine injected at the 3 and 9 o'clock positions of the cervix. The addition of the forced cough technique and gentle verbal support aimed to ease anxiety and reduce pain perception during tissue sampling.

Data were collected using a structured questionnaire. Baseline information included age, parity, recurrence history, and previous biopsy experience. Pain was assessed using a Visual Analogue Scale (VAS) ranging from 0 (no pain) to 10 (worst pain) at three stages, before the procedure, during biopsy, and 15 minutes afterward. Anxiety and satisfaction were measured using the State-Trait Anxiety Inventory (STAI) and a 5-point Likert scale, respectively. Participants were also asked about their willingness to undergo the procedure again if needed. Any side effects, such as dizziness, nausea, bleeding, or vasovagal episodes, were carefully noted.

The main outcome of interest was the average pain score during the biopsy. Secondary outcomes included post-procedure pain, anxiety levels, patient satisfaction, adverse effects, and compliance with follow-up visits after three months. Data analysis was performed using SPSS version 26.0. Continuous variables were expressed as mean ± standard deviation and compared using one-way ANOVA with Tukey's post hoc test. Categorical variables were analyzed using the Chi-square or Fisher's exact test as appropriate. An intention-to-treat approach was used, and a p-value of less than 0.05 was considered statistically significant.

# Results

The baseline characteristics of participants are summarized in Table I. The three study groups, Control, Single-modality, and Multimodal, were comparable at the start of the trial. The mean age was approximately 34 to 35 years across all groups, with no significant difference observed ($p = 0.84$). Similarly, parity, prior biopsy exposure, and baseline anxiety scores (measured by the State-Trait Anxiety Inventory, STAI) showed no statistically significant variation (p-values 0.72, 0.89, and 0.76, respectively). This indicates that randomization was effective and that all groups were demographically and clinically balanced before the intervention.

Pain intensity at different time points is presented in Table II and illustrated in Figure 1. Before the procedure, mean pain scores were minimal and nearly identical among groups (around 1.2–1.3, $p = 0.71$). During the biopsy, however, a striking difference emerged. Participants in the control group, who received no analgesia, reported the highest mean pain score ($6.8 \pm 1.4$). Pain levels were significantly lower in the single-modality group, which received local infiltration with lidocaine ($4.5 \pm 1.2$). The lowest pain scores were recorded in the multimodal group ($2.3 \pm 0.9$), where oral NSAID, local lidocaine, and non-pharmacological techniques were combined. The difference between groups was highly significant ($p < 0.001$). Fifteen minutes after the biopsy, pain subsided in all groups but remained significantly lower in the multimodal group ($1.5 \pm 0.7$) compared to the single-modality ($2.9 \pm 0.8$) and control groups ($4.1 \pm 1.0$), again with $p < 0.001$. Figure 1 visually demonstrates these trends, showing a clear downward curve in pain scores for the multimodal group compared to the other two groups.

**Table II: Comparison of Pain Scores (VAS 0–10)**

| Time Point | Control (n = 123) | Single-modality (n = 123) | Multimodal (n = 124) | p-value |
|---|---|---|---|---|
| Pre-procedure | 1.2 ± 0.6 | 1.3 ± 0.7 | 1.3 ± 0.6 | 0.710 |
| During biopsy | 6.8 ± 1.4 | 4.5 ± 1.2 | 2.3 ± 0.9 | <0.001 |
| 15-min post-procedure | 4.1 ± 1.0 | 2.9 ± 0.8 | 1.5 ± 0.7 | <0.001 |

The secondary outcomes, summarized in Table 3, further highlight the benefits of the multimodal approach. Post-procedure anxiety levels were lowest in the multimodal

**Table I: Baseline Demographic and Clinical Characteristics**

| Variable | Control (n = 123) | Single-modality (n = 123) | Multimodal (n = 124) | p-value |
|---|---|---|---|---|
| Mean age (years) ± SD | 34.6 ± 6.3 | 34.8 ± 6.1 | 34.7 ± 6.2 | 0.836 |
| Parity (mean ± SD) | 2.4 ± 1.1 | 2.5 ± 1.0 | 2.3 ± 1.2 | 0.721 |
| Prior biopsy exposure (%) | 25.2% | 27.6% | 26.6% | 0.890 |
| Baseline STAI score (mean ± SD) | 42.3 ± 7.8 | 41.7 ± 8.1 | 41.9 ± 7.9 | 0.758 |

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**Table II: Secondary Outcomes.**

| Outcome | Control (n = 123) | Single-modality (n = 123) | Multimodal (n = 124) | p-value |
|---|---|---|---|---|
| Mean post-procedure STAI score | 39.5 ± 7.2 | 36.8 ± 6.9 | 34.2 ± 6.5 | 0.004 |
| Satisfaction (Likert ≥ 4) | 39.8% | 68.3% | 91.9% | <0.001 |
| Willingness for repeat biopsy | 35.0% | 64.2% | 87.9% | <0.001 |
| Adverse effects | 9.7% | 7.3% | 6.4% | 0.650 |

group (mean STAI 34.2 ± 6.5), followed by the single-modality group (36.8 ± 6.9) and the control group (39.5 ± 7.2), with a statistically significant difference (p = 0.004). Satisfaction scores also showed a strong positive trend toward multimodal management: 91.9% of participants in this group rated their experience as satisfactory or highly satisfactory, compared to 68.3% in the single-modality and only 39.8% in the control group (p < 0.001). Willingness to undergo a repeat biopsy showed a similar pattern, with 87.9% of women in the multimodal group expressing willingness compared to 64.2% in the single-modality and 35.0% in the control group (p < 0.001). These findings are depicted in Figure 2, which shows nearly double the satisfaction and willingness rates in the multimodal group compared to the control.

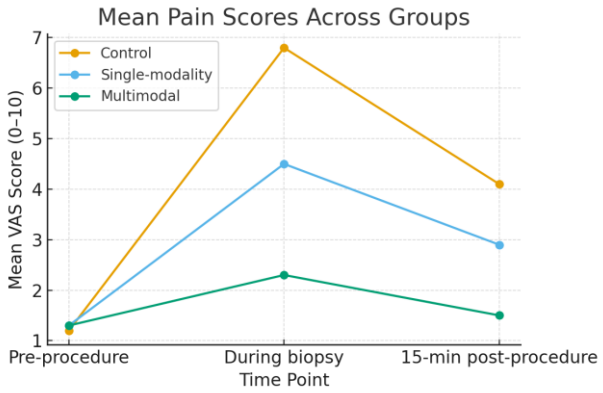


Figure 1. Mean Pain Scores Across Groups.

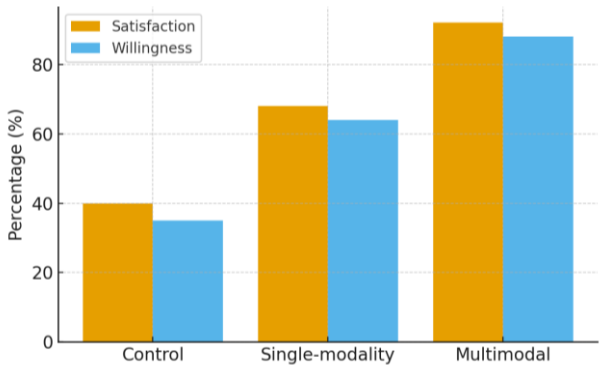


Figure 2. Patient Satisfaction and Willingness for Repeat Biopsy.

Adverse effects were infrequent and mild across all groups, occurring in 9.7% of the control group, 7.3% of the single-modality group, and 6.4% of the multimodal group (p = 0.65). No serious complications were reported. This demonstrates that while multimodal analgesia significantly improved pain control, anxiety reduction, satisfaction, and acceptance of the procedure, it did not increase the risk of side effects.

# Discussion

The present randomized controlled trial demonstrated that a multimodal pain management strategy markedly reduced pain and anxiety while improving overall satisfaction and procedural acceptance among women undergoing in-office cervical biopsy for recurrent cervicitis. Compared with single-modality and control groups, the multimodal group reported significantly lower intra-procedural pain (2.3 ± 0.9 vs. 4.5 ± 1.2 and 6.8 ± 1.4, p < 0.001), lower post-procedure pain (1.5 ± 0.7 vs. 2.9 ± 0.8 and 4.1 ± 1.0, p < 0.001), and reduced anxiety (34.2 ± 6.5, p = 0.004). Patient satisfaction and willingness for repeat biopsy were also significantly higher (91.9% and 87.9%, respectively). These findings highlight the benefit of integrating both pharmacological and non-pharmacological interventions to optimize patient comfort during minor gynecologic procedures.

Pain during cervical biopsy arises from cervical manipulation, needle puncture, and psychological anticipation of discomfort. Previous studies have reported moderate to severe pain in 60–80% of women when no analgesia is provided.[11] In our study, women who received no intervention (control group) showed the highest mean pain scores, consistent with data from previous literature in which showed higher pain during biopsy without anesthesia.[12] Local infiltration with lidocaine significantly reduced pain in the single-modality group, supporting earlier randomized trials where paracervical or intrastromal lidocaine achieved meaningful reductions in pain perception compared with placebo.[13]

The addition of oral etoricoxib before the procedure provided effective pre-emptive analgesia and further

improved patient outcomes. COX-2 inhibitors have been shown to reduce prostaglandin-mediated pain sensitization and to prolong analgesic effects post-procedure.[14] A recent study by Sivapornpan S, et al. demonstrated that etoricoxib 120 mg given preoperatively significantly lowered pain scores during colposcopy-directed biopsies without additional adverse effects.[15] In our trial, this combination proved both effective and well tolerated, with no serious complications reported across groups ($p = 0.65$).

Non-pharmacological interventions such as forced coughing and verbal reassurance played an additional role in modulating pain and anxiety. Distraction techniques like coughing may stimulate spinal inhibitory reflexes that temporarily suppress pain transmission [16]. Moreover, calm communication and reassurance from the clinician have been associated with measurable reductions in anxiety and pain perception during outpatient gynecologic procedures.[17] The lower post-procedural anxiety and higher satisfaction in our multimodal group reinforce the importance of holistic, patient-centered approaches rather than reliance on pharmacologic methods alone.

The significant improvement in satisfaction (91.9%) and willingness for repeat biopsy (87.9%) in the multimodal group mirrors global findings where comprehensive pain control improves adherence to follow-up and diagnostic accuracy. In Pakistan, where patient apprehension and limited access to anesthesia services can hinder procedural compliance, such an approach is particularly valuable for outpatient gynecologic practice.[18]

Our results also confirm that multimodal analgesia can be implemented safely, with adverse events comparable across groups. These findings are consistent with the American College of Obstetricians and Gynecologists' recommendation that individualized multimodal pain control be considered standard for office-based gynecologic interventions.[19] Future multicenter studies could assess variations using other non-steroidal or adjuvant analgesics and explore cost-effectiveness to support broader implementation in low-resource settings.

# Conclusion

In conclusion, multimodal pain management, combining oral etoricoxib, local lidocaine, and supportive non-pharmacological techniques; significantly improves patient comfort, reduces anxiety, and increases satisfaction during cervical biopsy. The approach is safe, inexpensive, and feasible for integration into outpatient gynecology in Pakistan, offering a practical framework for patient-centered procedural care.

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