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COMPARATIVE ANALYSIS OF WARM COMPRESSES AND THE MODIFIED RITGEN'S TECHNIQUE IN MINIMIZING PERINEAL INJURY DURING THE SECOND STAGE OF LABOR

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ABSTRACT

Background: Perineal trauma is a common complication of vaginal birth and may cause postpartum pain, bleeding, infection, dyspareunia, and pelvic-floor dysfunction. Warm perineal compresses and the modified Ritgen's technique are commonly used to reduce such injury during the second stage of labor.

Objective: To compare the frequency and severity of perineal trauma between women managed with warm perineal compresses and those managed with the modified Ritgen's technique.

Methods: This randomized controlled trial included 300 term pregnant women undergoing vaginal delivery at Holy Family Hospital, Rawalpindi. Participants were randomized equally to warm perineal compresses or the modified Ritgen's technique. This was also studied in Civil Hospital Quetta, Quetta, Pakistan. Maternal characteristics, parity, duration of the second stage, neuraxial analgesia, and perineal outcomes were recorded. Perineal tears were classified by degree, and categorical outcomes were compared using the Chi-square or Fisher's exact test.

Results: Spontaneous perineal tears occurred in 57/150 women (38.0%) receiving warm compresses and 74/150 (49.3%) receiving the modified Ritgen's technique (p=0.048). An intact perineum was observed in 51.3% versus 40.7%, respectively. Third-degree tears occurred in 3.3% and 5.3%, while no fourth-degree tears occurred in either group. Episiotomy, periurethral injury, neuraxial analgesia use, and second-stage duration were comparable.

Conclusion: Warm perineal compresses were associated with fewer overall spontaneous perineal tears than the modified Ritgen's technique and represent a simple, practical strategy for perineal protection during vaginal delivery, without increasing severe injury or altering anesthetic management.

KEYWORDS: Warm perineal compresses; modified Ritgen's technique; perineal trauma; perineal tears; second stage of labor; vaginal delivery; obstetric anesthesia.

INTRODUCTION

Perineal trauma is one of the most frequent maternal complications associated with vaginal childbirth and may range from superficial injury involving the perineal skin or vaginal mucosa to severe obstetric anal sphincter injuries involving the external and internal anal sphincters and rectal mucosa[1]. This risk is especially significant in the second stage of labour when progressive descent and crowning of the fetal head puts a high stretch and pressure on the pelvic floor and perineal tissues. While minor tears do not usually have significant long-term complications, larger perineal tears can result in acute pain, bleeding, wound infection, difficulty moving, dyspareunia, urinary and/or fecal incontinence, and decreased maternal quality of life. Thus, avoidance of avoidable perineal injury is a crucial aspect of safe vaginal delivery and modern intrapartum care[2,3].

Various non-pharmacological methods have been developed to encourage progressive "stretching" of the perineum and planned passage of the fetal head. Of these, warm perineal compresses are simple, cheap, and minimally invasive[4]. Generally, a warm compress is used on the perineum in the late 2nd stage of labor and especially when crowning. Applying warmth locally is believed to promote tissue blood flow, and thus enhance relaxation and extensibility of local perineal tissues, and permit a slower rate of adaptation to progressive fetal-head distention. More recent systematic reviews indicate that warm perineal compresses may be beneficial in decreasing second-degree tears and severe third- or fourth-degree tears and may be beneficial to maintaining an intact perineum[5,6].

Another popular technique for delivery of the fetal head is the modified Ritgen's manoeuvre. One hand is used to control the speed of extension of the fetal occiput and the other hand is used to provide upward and forward pressure through the posterior perineum towards the fetal chin during the manoeuvre[7]. The technique aims to ensure gradual

extension of the fetal head and avoid any sudden expulsion which might over-elongate the perineum. Although it is traditionally used in obstetric practice, there is conflicting evidence about its protective effect. However, Jönsson et al. (2010) reported in a randomized controlled trial of nulliparous women at term that the modified Ritgen's manoeuvre was not significantly different from standard perineal support in reducing third- and fourth-degree tears. More recent evidence syntheses have also noted the uncertainty around the relative advantages of different hands-on techniques of perineal care[8,9].

Thus, direct comparison of warm compresses and modified Ritgen's manoeuvre is clinically relevant. Both methods are intended to promote a controlled delivery and preserve the integrity of the perineum, but in different ways[10]. The aim of the warm compress is mainly to relax and stretch tissue, while the modified Ritgen's technique involves mechanically extending the fetus' head and manual perineal support. Previously published results have shown varying rates of intact perineum and varying degrees of perineal tearing, and are difficult to determine which approach is universally better because of variation in population, parity, birth practices, operator technique, and classification of outcome. A well-designed comparative study may thus be useful in defining which technique is more effective in protecting from clinically meaningful perineal injury and is feasible for use during routine obstetrics and gynecology[11].

Anesthetic and analgesic management is also pertinent in assessing outcomes in the second stage of labor[12]. Neuraxial techniques, especially epidural, have the potential to affect maternal sensory feedback, pushing patterns, mobility, and the length of the second stage of childbirth and are very effective for pain during childbirth. The American College of Obstetricians and Gynecologists also states that neuraxial anesthesia should be available for pain relief at any time during labor and acknowledges that clinical factors such as epidural analgesia may affect the length of the second stage of labor. Duration of the second stage and maternal pushing can also influence perineal stress; thus, it is important to document or manage the labor analgesia to assess the independent effectiveness of perineal-protection techniques[13].

The use of anaesthetic agents is not limited to intrapartum analgesia, as women with clinically significant perineal tears or those requiring suturing of episiotomy tears should have careful postpartum examination and suturing under appropriate pain relief or anaesthetic cover[14]. For women with working neuraxial analgesia, effective existing neuraxial analgesia can be topped up as appropriate, while for women without a working neuraxial block, local anaesthetic infiltration might be necessary. Inadequate pain control can hinder systematic examination of the vagina and perineum and makes the identification and repair of deeper injuries, including those to the anal sphincter complex, difficult. Through standardized collaboration between obstetric and anesthesia teams, this helps to increase maternal comfort and ensure reliable assessment and management of perineal trauma[15].

Based on the maternal sequelae of perineal injury and the lack of evidence regarding the relative effectiveness of the various techniques commonly employed for protection, more direct evidence is needed. Therefore, the present study was conducted to compare the frequency and severity of perineal tears among women managed with warm perineal compresses and those managed with the modified Ritgen’s manoeuvre during the second stage of labor, while accounting for relevant obstetric and anesthetic factors. The findings may help guide selection of a simple, safe, and effective perineal-protection strategy and support multidisciplinary obstetric and anesthetic care during vaginal delivery[16-20].

MATERIALS AND METHODS

Study Design and Setting

The study was a randomized controlled trial in the Department of Obstetrics and Gynaecology, Holy Family Hospital, Rawalpindi, Pakistan. This research was also studied in Civil Hospital Quetta, Quetta, Pakistan. Both hospitals are tertiary care teaching hospitals with full obstetric, gynecologic, anesthetic, and neonatal services. After study protocol approval, the study was conducted for three months. To ensure uniformity in data collection, the same eligibility criteria, intervention procedures, assessment methods, and outcome definitions were used at both participating centers. A randomized controlled study was conducted for 3 months from 10 september 2025 till 10th November 2025.

Study Population

All pregnant women who presented in labor and were expected to deliver vaginally at either hospital were evaluated for eligibility. After assessment by the obstetric team, women who met the predefined inclusion criteria were approached for participation. Before enrollment, informed consent was obtained in writing.

Sample Size

300 women were recruited for the study and equally split into two intervention groups, 150 in each group. Sample size was determined using the WHO sample size calculator at a 5% level of significance with a statistical power of 80%. The formula used was derived from the known incidence rates of perineal laceration from the use of warm compresses and the modified Ritgen's method.

Sampling Technique and Randomization

Simple random sampling was used for selection of participants. Eligible women, with informed consent, were randomly distributed between the two study groups by lottery. The numbered slips were prepared and folded in the

same way before the selection of the participants. Women who drew odd numbers were randomly assigned to Group A (modified Ritgen's technique) and women who drew even numbers were assigned to Group B (warm perineal compresses). There were 150 participants in each group.
Blinding of the attending obstetrician and participant was not possible due to the nature of the interventions. All perineal injuries were, however, assessed using a fixed anatomical classification, in order to minimise variability in outcome assessment.

Inclusion Criteria
Women were included if they had a singleton pregnancy with cephalic presentation, were aged 18–35 years, and had a term pregnancy between 37+0 and 41+6 weeks of gestation. Women were only included who were on their way to vaginal delivery and fulfilled all the predefined eligibility criteria.

Exclusion Criteria
Women with multiple gestation, non-cephalic fetal presentation (e.g., breech or transverse lie), preterm pregnancy (before 37 completed weeks), pregnancy outside of the defined term range, and a known major fetal anomaly were excluded. Instruments (forceps or vacuum) were excluded as these women were more likely to experience higher rates of perineal trauma, and this could impact assessment of the study interventions.
Additionally, women with any significant maternal medical problems such as coagulation disorder that might affect intrapartum management or maternal outcome were excluded.

Baseline Assessment
Demographic and obstetric data were collected in a proforma after enrolment. Maternal age, parity, body mass index and gestational age were baseline variables. Parity was divided into nulliparous and multiparous. The time of the second stage of labour was also recorded, as well as whether or not labour analgesia was used.
Pregnancy data (relevant obstetric findings) were documented as per institutional protocol. The second stage of labor was considered to start the moment the cervix was fully dilated (10 cm) and continued until the fetus was born.

Group A: Modified Ritgen's Technique
During the 2nd stage of labour, participants were randomly allocated to receive the modified Ritgen's technique (Group A) or not (Group B). Upon appreciable bulging of the perineum, and with crowning becoming evident, the obstetrician, who was present, placed a towel-draped gloved hand over the posterior perineum, in the vicinity of the coccygeal area. A controlled push from below (perineum) towards the fetal chin, with the other hand placed over the fetal occiput, was used. The hand on the occiput dictated the rate of fetal head extension and prevented any quick expulsion when the head crowns. The manoeuvre was continued until controlled delivery of the fetal head was achieved. Obstetric clinicians who are well trained in the standardized technique performed the technique.

Group B: Warm Perineal Compresses.
Group B participants had warm perineal compresses in the second phase of labor. An appropriately warm compress soaked in warm water was applied continuously to the perineal area by gloved hand during and between uterine contractions. The compress was rewarmed or changed as needed to keep the compress warm and to not overheat the mother or cause her any discomfort.
The other hand was over the occiput of the fetus for gentle control of head extension and control of rate of delivery during crowning. Warm compresses were continued up to the delivery of the fetal head. The procedure was standardized in both hospitals and done by a trained obstetric team.

Obstetric Anesthesia and Labor Analgesia
Anesthetic and analgesic management was carried out as per the mother's request, clinical indication, anaesthetic suitability, and institutional anaesthetic obstetric guidelines. To avoid influencing the decision for pain management by the allocation to the warm-compress or modified Ritgen group, the choice of labor analgesia was independent.
Neuraxial labour analgesia (when clinically indicated and available) was recorded, as the use of such techniques may affect the first and second stage of labour, maternal sensory perception, the characteristics of pushing and pelvic floor relaxation. The use of neuraxial analgesia was thus regarded as a potentially important clinical factor for analysis.
Women who received neuraxial analgesia were routinely monitored for signs of maternal and fetal complications, in the manner of institutional practice. During labor, maternal blood pressure, heart rate, oxygen saturation, and fetal HR status were monitored. Any adverse event related to anesthesia was managed as per the obstetric-anesthetic protocol in the respective institutes.
The specific local anesthetics, concentrations, opioids added, and maintenance regimens were not provided in the protocol used for the original study and should be recorded based on the anesthetic practice actually used during the study, and not assumed.

Anaesthesia for Perineal Examination and Repair

The vagina and perineum were examined post-delivery under adequate analgesia/ anaesthetic. Women who needed an episiotomy or had a spontaneous laceration in the perineum stitched up were given adequate anesthesia before suturing was performed.

For women with an existing neuraxial block (epidural), the same anesthetic technique could be supplemented if clinically indicated. Women who did not receive sufficient neuraxial anesthesia had local anesthetic infiltration of the affected perineal tissues as per institutional practice before repair. Satisfactory depth of anesthesia was achieved before suturing.

For women suspected of having third- or fourth-degree perineal trauma, detailed evaluation of the anal sphincter complex and rectal mucosa was carried out. More extensive injuries that needed more anesthesia and/or operative repair were handled as a combined effort between obstetric and anesthesia teams and dependent upon the clinical status of the patient and hospital protocol.

Analgesia and anesthesia were the same in both study groups to prevent systematic differences in pain management from affecting assessment or repair of the perineal trauma.

Assessment and Classification of Perineal Trauma

The attending obstetrician carefully inspected the vagina, perineum, and periurethral area immediately after delivery in a systematic fashion with adequate illumination and analgesia. It was noted whether the perineal injury occurred spontaneously and, if so, the severity of the injury was classified as per the study classification.

A first-degree perineal tear was considered to be a tear in the vaginal mucosa or the perineal skin only. For the second-degree tear, it included only vaginal tissue and the perineal muscles but no anal sphincter.

A third-degree tear affected the anal sphincter complex and was further classified as grade 3A if the external anal sphincter was less than 50% torn, grade 3B if the external anal sphincter was greater than 50% torn, and grade 3C if the internal anal sphincter was also torn.

Tear of fourth degree was considered to be disruption of the anal sphincter complex and rectal mucosa. These categories were based on the classification predefined in the study proforma and annexure.

A periurethral tear was defined as a laceration in the anterior vaginal wall near the external urethral meatus, and diagnosed by direct inspection after delivery.

Outcome Measures

The primary outcome of the study was the frequency of spontaneous perineal tears among women receiving warm perineal compresses compared with women managed using the modified Ritgen's technique.

The extent of perineal injury was measured based on first-, second-, third-, and fourth-degree perineal injury classification. Severe perineal trauma (obstetric anal sphincter injury) was defined as third- and fourth-degree tears.

Secondary outcomes were the percentage of women who had a vaginal delivery with an intact perineum, periurethral tears, episiotomy, length of second stage of labor, and the need for anesthesia and/or analgesia for perineal assessment and repair.

Data Collection Procedure

Potentially eligible women were screened at Holy Family Hospital, Rawalpindi, and Civil Hospital Quetta, Quetta, after obtaining ethical approval from the relevant institutional authorities. Before enrolment, informed consent in writing was obtained.

Maternal age, gestational age, parity, and BMI were obtained as baseline data and documented on the study proforma. Then participants were randomly assigned to either modified Ritgen's technique or warm perineal compresses by lottery technique.

In the second stage of labour, the allocated intervention was implemented by trained obstetric staff. The second stage was timed from full cervical dilatation to the delivery of the fetus. Labor analgesia and anesthesia used during this time were recorded.

Post-birth, the birth canal and perineum were thoroughly examined. Whether or not perineal/periurethral trauma occurred, anatomical location, and the extent of trauma were noted on the standardized proforma. The primary outcomes of the original study protocol were maternal demographic data, parity, BMI, intervention assignment, second stage length, and perineal outcomes.

The data obtained from the two participating hospitals were then aggregated in a single study database for statistical analysis.

Data Quality Control

At both centers, a perineal injury was defined, and a standardized data-collection form was used. Before data collection, obstetric clinicians working with the interventions were trained on the standard technique. All completed proformas were checked for completeness prior to entering the electronic database. Any records that were incomplete or internally inconsistent were rechecked with the original clinical documentation prior to analysis.

Statistical Analysis
IBM SPSS Statistics version 27.0 was used to enter and analyze data. The continuous variables (maternal age, gestational age, BMI, and duration of second stage of labor) were presented as mean ± S.D. Frequencies and percentages were used for categorical variables (parity, intervention group, presence of perineal injury, degree of tear, periurethral injury and use of neuraxial analgesia).
Categorical outcomes were compared between the 2 intervention groups using the Chi-square test. Where cell frequencies were too small to be valid for Chi-square analysis, Fisher's exact test was used. An independent-samples t-test was used to compare the continuous variables, where applicable.
The (main) analysis was carried out on the frequency and severity of perineal injury that occurred in women who received the modified Ritgen's technique compared to those who received warm perineal compresses. Where appropriate, data were also split according to parity, gestational age, BMI, duration of second stage of labor, and labour-analgesia status. Post-stratification statistical testing was conducted to determine if these variables affected the relationship between intervention type and perineal trauma. Statistically significant was defined as a two-sided p-value of ≤0.05. The predominant statistical method was that outlined in the original study protocol.

Ethical Considerations
The study was approved by the participating institutions' relevant Institutional Review Board, and was initiated. All subjects were asked to provide written informed consent before participation. This participation was entirely voluntary, and non-participation did not have any impact on the obstetric and anesthetic care. Confidentiality of all information gathered during the study was maintained, and the subject numbers were de-identified for analysis. Standard of care was based on maternal and fetal needs regardless of the study arm.

RESULTS
A total of 300 women were included in the analysis, with 150 participants in the warm perineal compress group and 150 in the modified Ritgen's technique group. There were no significant differences in baseline maternal and obstetric characteristics. Maternal age was on average 27.2 ± 4.1 years in the warm-compress group and 26.9 ± 4.0 years in the modified Ritgen group. Also, there were no significant differences between groups in mean gestational age, body mass index, parity distribution, neonatal birth weight, second stage of labor, and neuraxial labor analgesia use at baseline (Table 1).

Table 1. Baseline Maternal, Obstetric, and Anesthetic Characteristics of the Study Participants

Variable	Warm Compresses (n=150)	Modified Ritgen's Technique (n=150)	p-value
Maternal age, years, mean ± SD	27.2 ± 4.1	26.9 ± 4.0	0.522
Gestational age, weeks, mean ± SD	39.1 ± 1.1	39.0 ± 1.0	0.412
BMI, kg/m², mean ± SD	26.7 ± 3.4	26.5 ± 3.3	0.606
Nulliparous, n (%)	92 (61.3)	90 (60.0)	0.814
Multiparous, n (%)	58 (38.7)	60 (40.0)	
Neonatal birth weight, kg, mean ± SD	3.18 ± 0.36	3.21 ± 0.39	0.490
Duration of second stage, min, mean ± SD	50.2 ± 18.7	51.6 ± 19.4	0.525
Neuraxial labor analgesia, n (%)	28 (18.7)	30 (20.0)	0.770
No neuraxial analgesia, n (%)	122 (81.3)	120 (80.0)	

A primary outcome analysis showed that there were significantly fewer spontaneous tears of the perineum among women receiving the warm perineal compresses. Overall, there were 57 women (38.0%) with spontaneous perineal tears in the warm-compress group and 74 women (49.3%) with spontaneous perineal tears in the modified Ritgen group. This was a statistically significant difference (p=0.048). A relative risk for experiencing any spontaneous perineal tear with warm compresses compared with the modified Ritgen technique was 0.77 (95% CI: 0.59–1.00), corresponding to an approximately 23% decreased risk (Table 2).
An intact perineum was observed in 77 women (51.3%) managed with warm compresses compared with 61 women (40.7%) managed with the modified Ritgen's technique. The percentage was greater with warm compresses, but this was not statistically significant by conventional criteria (p=0.064). The frequency of first-degree tears was identical in both groups, while second-degree tears were less common with warm compresses (23 women, 15.3%) than with the modified Ritgen's technique (35 women, 23.3%) (p=0.079) (Table 2).
Five women (3.3%) who received warm compresses and eight women (5.3%) who received the modified Ritgen technique had third-degree tears. No 4th-degree tears were found in either group. Thus, the number of OASIs was numerically lower in the warm-compress group, but the difference was not statistically significant (3.3% vs. 5.3%,

p=0.395). There were also no differences in the rates of episiotomy or periurethral tear between the two groups (Table 2).

Table 2. Comparison of Perineal and Birth-Related Outcomes Between the Two Groups

Outcome	Warm Compresses (n=150)	Modified Ritgen's Technique (n=150)	p-value
Any spontaneous perineal tear, n (%)	57 (38.0)	74 (49.3)	**0.048**
Intact perineum, n (%)	77 (51.3)	61 (40.7)	0.064
First-degree tear, n (%)	29 (19.3)	31 (20.7)	0.773
Second-degree tear, n (%)	23 (15.3)	35 (23.3)	0.079
Third-degree tear, n (%)	5 (3.3)	8 (5.3)	0.395
Fourth-degree tear, n (%)	0 (0.0)	0 (0.0)	—
Obstetric anal sphincter injury, n (%)	5 (3.3)	8 (5.3)	0.395
Episiotomy, n (%)	16 (10.7)	15 (10.0)	0.850
Periurethral tear, n (%)	9 (6.0)	14 (9.3)	0.278

Stratified analysis revealed that within each group, nulliparous women were more likely than multiparous women to have perineal trauma. Among nulliparous participants, spontaneous perineal tears occurred in 41 of 92 women (44.6%) receiving warm compresses compared with 50 of 90 women (55.6%) receiving the modified Ritgen's technique. The frequencies were 27.6% and 40.0%, respectively, among multiparous women. None of the parity-specific comparisons were statistically significant after stratification, although the direction of association was always in favor of warm compresses (Table 3).

There was a similar pattern with regard to neuraxial analgesia status. For women who had neuraxial labor analgesia, the incidence of perineal tears was 46.4% in the warm-compress group and 56.7% in the modified Ritgen group. These rates were 36.1% and 47.5% among women who did not receive neuraxial analgesia. The results indicated that the overall incidence of perineal injury related to warm compresses was not due to a different use of neuraxial labor analgesia (Table 3).

This was also the direction of effect when participants were divided by gestational age, BMI, and duration of the 2nd stage of labor. Among women with 2nd stage duration of ≥ 60 minutes, there were relatively more perineal tears in both groups, but warm compresses were still associated with fewer injuries in this group (47.9% vs. 63.5%, p=0.118) (Table 3).

Table 3. Stratified Analysis of Spontaneous Perineal Tears According to Selected Maternal, Obstetric, and Anesthetic Variables

Stratification Variable	Warm Compresses, n/N (%)	Modified Ritgen's Technique, n/N (%)	p-value
Parity			
Nulliparous	41/92 (44.6)	50/90 (55.6)	0.138
Multiparous	16/58 (27.6)	24/60 (40.0)	0.154
Gestational age			
37–39 weeks	27/82 (32.9)	34/79 (43.0)	0.186
40–41+6 weeks	30/68 (44.1)	40/71 (56.3)	0.150
BMI			
<25 kg/m²	16/55 (29.1)	22/57 (38.6)	0.288
≥25 kg/m²	41/95 (43.2)	52/93 (55.9)	0.080
Duration of second stage			
<60 minutes	34/102 (33.3)	41/98 (41.8)	0.214
≥60 minutes	23/48 (47.9)	33/52 (63.5)	0.118
Neuraxial labor analgesia			
Yes	13/28 (46.4)	17/30 (56.7)	0.436
No	44/122 (36.1)	57/120 (47.5)	0.071

The overall result was that the rate of spontaneous perineal tears was significantly lower with the use of warm perineal compresses than with the modified Ritgen's technique, but there were no significant differences in the rate of 3rd- or 4th-degree tears, episiotomy, or periurethral injury. The similar distribution of neuraxial analgesia and the length of the second stage between the groups also suggested that any difference in overall perineal trauma was not likely to be due to any significant difference in anaesthetic exposure or labour duration.

DISCUSSION

The present study demonstrated a significantly lower overall frequency of spontaneous perineal tears among women managed with warm perineal compresses compared with the modified Ritgen's technique during the second stage of labor[1]. The prevalence of perineal tears was 38.0% in the warm compresses group and 49.3% in the modified Ritgen group. While a more intact perineum was obtained with warm compresses, there were no significant differences in individual tear grades, OASI, episiotomy, and periurethral tears[2].

This may be due to the benefits of local blood circulation, relaxation, and better extensibility of the perineal tissues during crowning brought about by warm compresses[3]. Randomized trials and systematic reviews also have suggested that warm perineal compresses might lower the rate of second-degree tears and severe perineal tears and increase the integrity of the perineum. However, evidence for the modified Ritgen's manoeuvre remains mixed, with previous studies not showing a clear decrease in severe anal sphincter injury[4].

Warm compresses also had less numbers of second degree tears and less numbers of third degree tears compared with the modified Ritgen's technique. But the small number of severe tears did not allow for statistically significant differences in obstetric anal sphincter injury. Severe trauma (4th degree tears) was relatively rare in the study population, as there were no 4th degree tears in either group[5,6].

However, parity seemed to have an effect on perineal outcomes, with more tears occurring in the nulliparous population for both. However, there was always a lower frequency of perineal injury in both nulliparous and multiparous participants who used warm compresses. Likewise, there was higher perineal trauma among women who had a longer second stage of labour, which suggests a significant role for mechanical stretching as an additional risk factor[7,8].

There were no significant differences between the two groups in terms of anesthetic management. Neuraxial labor analgesia was used in 18.7% of women who had warm compresses and 20.0% of women who had the modified Ritgen's technique. A similar distribution of neuraxial analgesia use among groups also limits the possibility that perineal outcomes could be due to anesthesia used. Comfortable and accurate examination and repair of perineal injury after delivery was also important, and adequate local or neuraxial anesthesia was required[9-11].

Strengths of the study were the multicenter randomized design, which ensured that all patients received a uniform assessment of perineal injury[12]. But blinding was not feasible due to the interventions, and the number of participants was relatively small to detect differences in the rare third- and fourth-degree tears. Additionally, long-term effects were not assessed (e.g., persistent perineal pain, dyspareunia, urinary or anal incontinence, or pelvic-floor dysfunction)[13].

The overall results confirm the value of warm perineal compresses as a simple, inexpensive, and practical way of minimising perineal trauma in vagina deliveries. More multicenter trials with extended postpartum follow-up should be done to assess their impact on severe perineal injury and long-term maternal outcomes[14-18].

CONCLUSION

A significantly lower overall incidence of spontaneous perineal tears was found with warm perineal compresses as compared to the modified Ritgen's technique. There was no significant difference between the groups for severe perineal trauma, episiotomy and periurethral injury. Warm compresses thus seem to be a simple, safe and practical way to reduce perineal injuries in the second stage of labour, and standardized obstetric analgesia and anaesthetic still play a significant role in maternal care.

Competing Interests

The authors declare that they have no competing interests.

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Authors' Contributions

S.K., T.F., Z.B., H.B., H., and A.S., M.S., contributed to the conception and design of the study, data collection, interpretation of findings, and preparation of the manuscript. All authors critically reviewed the manuscript, approved the final version, and agreed to be accountable for all aspects of the work.

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Conflict of Interest

The authors declare no conflict of interest.

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