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# Comparison of Spontaneous Onset of Labor in Post-date Primigravida Undergoing Sweeping of Membranes versus Expectant Management

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**ABSTRACT**

**OBJECTIVE:** To compare sweeping of membranes versus expectant management in terms of spontaneous onset of labor in post-date primigravida.

**METHODOLOGY:** This randomized controlled trial was conducted in the Department of Obstetrics and Gynecology, CMH Attock, Pakistan, from October 2025 to February 2026. Primigravida women aged 18–40 years with singleton cephalic pregnancies at or beyond 40 weeks were enrolled and randomized equally to membrane sweeping or expectant management. Membrane sweeping was performed digitally and repeated every 48 hours up to three times if labor did not occur. Outcomes included spontaneous onset of labor, time to labor, mode of delivery and neonatal outcomes. Data were analyzed using IBM SPSS 26.0, and $p<0.05$ was considered statistically significant for all inferential statistics.

**RESULTS:** In a total of 132 women, the median age and mean gestational age were 27.8 (24.4-31.0) years and 40.7±0.4 weeks, respectively. Spontaneous labor occurred in 60 (90.9%) women in the membrane-sweeping group, and 48 (72.7%) women in the expectant-management group ($p=0.007$). Median time to labor was significantly shorter with membrane sweeping ($p<0.001$). Frequency of vaginal delivery was significantly higher in the membrane-sweeping group (87.9% vs 69.7%, $p=0.011$). Labor induction was required in 6 (9.1%) women following membrane sweeping and 18 (27.3%) with expectant management ($p=0.021$). The successful outcome was achieved in 56 (84.8%) women in the membrane-sweeping group versus 40 (60.6%) in the expectant-management group ($p=0.002$).

**CONCLUSION:** Membrane sweeping appears to offer meaningful clinical advantages when compared with expectant management in post-date primigravida without compromising neonatal safety.

**KEYWORDS:** Gestational age, induction of labor, labor, pregnancy, primigravida.

***Trial Registration:*** *NCT06949787 (clinicaltrials.gov)*

## INTRODUCTION

Post-date pregnancies, defined as those extending beyond 40 weeks of gestation, are associated with increased risks to both the mother and fetus, including fetal asphyxia, stillbirth, and neonatal complications such as meconium aspiration syndrome and acidemia[1,2]. Perinatal mortality rises sharply with increasing gestation, with stillbirth risks estimated at 1 in 926 at 40 weeks and increasing to 1 in 633 at 43 weeks[3,4]. Maternal risks also escalate with prolonged pregnancy, with higher incidences of obstructed labor, severe perineal lacerations, and increased rates of operative deliveries, including cesarean sections (CS)[5].

In high-income countries, the prevalence of labor induction has reached approximately 25%, largely in response to the risks associated with post-date pregnancies[6,7]. In contrast, induction rates remain comparatively lower in developing countries where traditional birth attendants may conduct a substantial number of deliveries and are less trained in labor induction methods[8]. Global guidelines generally recommend labor induction between 41-42 weeks to prevent post-date complications[9].

Evidence on membrane sweeping, specifically in post-date primigravida women, remains limited. Primigravida women were selected because they have no previous obstetric history that could influence the likelihood of spontaneous labor or vaginal delivery and generally have a greater risk of prolonged labor, formal induction, and caesarean delivery than multiparous women. Restricting enrolment to primigravida could also produce a more clinically homogeneous population. This issue is particularly relevant in Pakistan, where maternity services frequently operate with limited beds, staff, and facilities for prolonged antenatal surveillance and pharmacological induction. Membrane sweeping is a low-cost intervention that requires no medication or additional equipment and may reduce the need for formal induction and hospital admission.

Nevertheless, it remains inconsistently used because of variation in clinical protocols and operator technique, anticipated maternal discomfort, concerns about bleeding, infection, or accidental rupture of membranes, and uncertainty about its effectiveness and acceptability in local practice. Although previous randomized trials have evaluated membrane sweeping, they have included heterogeneous populations with respect to parity, gestational age, sweeping frequency, and induction policies. Consequently, their findings may not be directly applicable to post-date primigravida in resource-constrained Pakistani settings. This study hypothesized that membrane sweeping and expectant management would differ in their effects on spontaneous onset of labor and vaginal delivery. It therefore compared membrane sweeping with expectant management in terms of spontaneous onset of labor among post-date primigravida women.

## METHODOLOGY

This randomized controlled trial (NCT06949787 on ClinicalTrials.gov) was conducted in the Department of Obstetrics and Gynaecology, CMH Attock, Pakistan, from October 2025 to February 2026. We calculated a sample size of 132 (66 per group) using the WHO formula, with a 2-sided significance level of 5%, 80% power (1-beta), and a proportion of spontaneous labour of 91.4% versus 72.9% in the sweeping membranes group versus the expectant management group[10]. Inclusion criteria were primigravida women aged between 18-40 years, with gestational age ≥40 weeks (confirmed by ultrasound or early dating scan), having singleton pregnancies and cephalic presentation. Females having multiple gestation, fetal distress or anomalies (detected on ultrasound), previous uterine scar, or any contraindications to vaginal delivery (e.g. placenta previa, previous uterine surgery) were excluded. Women with high-risk pregnancies, including oligohydramnios, severe pregnancy-induced hypertension or pre-eclampsia, fetal growth restriction, abnormal fetal surveillance, and any maternal or fetal condition requiring delivery, were excluded. We obtained informed written consent from all study participants, explaining the aims and possible risks of the research.

The study was commenced after obtaining approval from the College of Physicians and Surgeons Pakistan (Ref No: CPSP/REU/OBG-2023-418-12949, dated: July 23, 2025), and the institutional Ethical Committee (CMH ATK/EC/02/2025, dated: 10th October 2025). Simple random sampling was used. At the time of enrollment, we recorded age, gestational age, and body mass index (BMI). Presence of known hypertension or diabetes mellitus (as per medical history and record) was also documented. Participants were assigned unique identification numbers and allocated in a 1:1 ratio to either the membrane-sweeping group or the expectant-management group using a computer-generated random allocation sequence prepared through Randomizer.org. The allocation sequence was generated before recruitment, and each participant was assigned to the next available allocation after confirmation of eligibility and provision of informed consent. Due to the nature of the intervention, blinding of participants and attending obstetricians was not feasible.

Participants in the membrane sweeping group received membrane sweeping by an experienced obstetrician, a procedure involving the digital separation of the fetal membranes from the lower uterine segment. The procedure involved inserting a finger into the cervix and gently moving it in a circular motion to release endogenous prostaglandins that aid labor induction. If labor did not initiate within 48 hours, the procedure was repeated up to a maximum of three times at 48-hour intervals. Women in the expectant management group received no mechanical intervention and were monitored according to standard protocol until SPOL induction was deemed necessary. Before membrane sweeping, routine cervical Assessment was performed according to departmental protocols. An on-duty trained obstetrician performed the procedure using the department's standardized digital sweeping technique, and it was repeated every 48 hours, up to three times, if labor did not commence. In the expectant-management group, no membrane sweeping or other intervention intended to initiate labor was performed. In both groups, women with reassuring maternal and fetal assessments were sent home and reviewed after 48 hours. They were instructed to return immediately in case of labor pains, rupture of membranes, vaginal bleeding, reduced fetal movements, or any other concern. Admission occurred upon spontaneous onset of labor or development of a maternal or fetal indication for delivery. Women who remained undelivered underwent formal induction at 41 completed weeks.

Outcomes were recorded of successful SOL. Neonatal outcomes included documentation of Apgar scores at 1 and 5 minutes, birth weight, and need for NICU admission. Post-date pregnancy was defined as pregnancy lasting beyond 40 weeks of gestation. SOL was labeled as natural initiation of regular, painful uterine contractions (≥3 contractions per 10 minutes)

leading to cervical dilatation of ≥4 cm and ≥80% effacement without the use of any pharmacologic or mechanical induction methods.[11] Successful Outcome was defined as the SOL followed by vaginal delivery before the 42nd week of gestation without the need for pharmacologic or surgical induction or CS[12]. Time to onset of labor was calculated in hours (rounded off to the nearest hour) as the difference between the recorded time of membrane sweeping (for the intervention group) or enrollment time (for the expectant group) and the documented time of SOL. Birth weight (grams) was measured at the time of delivery using a calibrated newborn weighing scale. We placed the scale on a stable surface and weighed the newborn without clothing to ensure accuracy.

We analyzed data using IBM SPSS Statistics, version 26.0. Continuous variables were represented as mean and standard deviation (SD), or median and interquartile range (IQR) (as per normality distribution). We controlled for effect modifiers such as age, gestational age, BMI, and the presence of hypertension or diabetes mellitus through stratification. Post-stratification, the chi-square test of Fisher's exact test were applied to see the effect of these effect modifiers on successful SOL (yes/no), taking $p<0.05$ as statistically significant.

## RESULTS

Figure 1 shows the CONSORT flow diagram for the 132 post-date primigravida women.

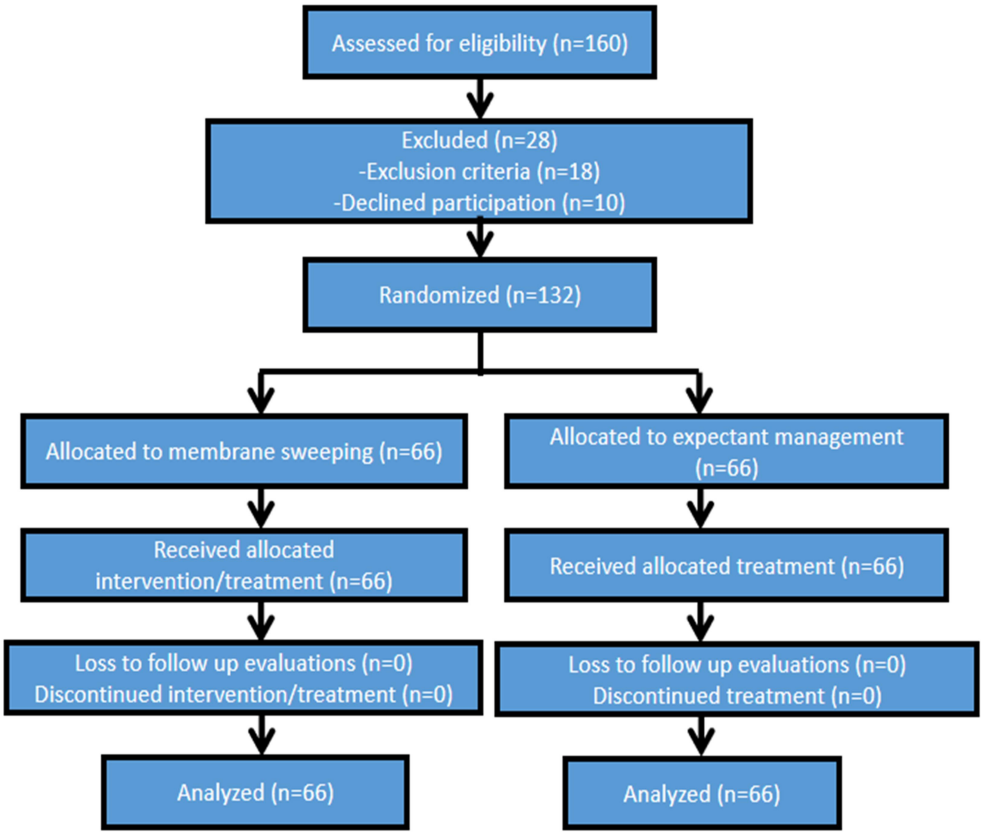


**Figure 1: CONSORT Flow Diagram**

The median age was 27.2 years (24.4–30.6) in the membrane-sweeping group and 28.5 years (24.3–31.3) in the expectant-management group (p=0.492). The mean gestational age at enrolment was 40.6±0.3 weeks in the membrane-sweeping group and 40.7±0.4 weeks in the expectant-management group (p=0.384). The median BMI was 28.4 (26.1–30.5) kg/m² in the membrane-sweeping group, and 28.7 (26.3–30.9) kg/m² in the expectant management group (p=0.745). Overall, hypertension and diabetes mellitus were reported in 19 (14.4%) and 15 (11.4%) women, respectively, without any significant differences across groups (**Table I**).

**Table I: Comparison of baseline maternal characteristics of post-date primigravida women among study groups (N=132)**

| Characteristics | Total (N=132) | Membrane sweeping (n=66) | Expectant management (n=66) | P-value |
|---|---|---|---|---|
| Age (years) | 27.8 (24.4-31.0) | 27.2 (24.4-30.6) | 28.5 (24.3-31.3) | 0.492* |
| Gestational age (weeks) | 40.7±0.4 | 40.6±0.3 | 40.7±0.4 | 0.384^ |
| Body mass index (kg/m$^2$) | 28.5 (26.2-30.7) | 28.4 (26.1-30.5) | 28.7 (26.3-30.9) | 0.745* |
| Hypertension | 19 (14.4%) | 9 (13.6%) | 10 (15.2%) | 0.819$^{\#}$ |
| Diabetes mellitus | 15 (11.4%) | 7 (10.6%) | 8 (12.1%) | 0.780$^{\#}$ |

**Mann-Whitney U test; ^Independent sample t-test; $^{\#}$chi-square test*

SOL occurred in 60 (90.9%) women in the membrane-sweeping group compared with 48 (72.7%) women in the expectant-management group (p=0.007). The median time to SOL was 24.2 (16.7–40.6) hours in the membrane-sweeping group and 48.1 (32.9–72.0) hours with expectant management (p<0.001). Vaginal delivery occurred significantly more frequently among the membrane-sweeping group as compared to expectant management (87.9% vs 69.7%, p=0.011). Labor induction was required in 6 (9.1%) women in the membrane-sweeping group and 18 (27.3%) women in the expectant-management group (p=0.021). The predefined successful outcome occurred in 56 (84.8%) women in the membrane-sweeping group and 40 (60.6%) women in the expectant-management group (p=0.002). **Table II** shows details of the comparison of maternal outcomes between study groups.

**Table II: Maternal outcomes in membrane sweeping versus expectant management groups (N=132)**

| Outcomes | | Total (N=132) | Membrane sweeping (n=66) | Expectant management (n=66) | P-value |
|---|---|---|---|---|---|
| Spontaneous onset of labor | | 108 (81.8%) | 60 (90.9%) | 48 (72.7%) | 0.007# |
| Time to onset of labor (hours) | | 36.4 (21.2-58.3) | 24.2 (16.7-40.6) | 48.1 (32.9-72.0) | <0.001* |
| Mode of delivery | Vaginal delivery | 104 (78.8%) | 58 (87.9%) | 46 (69.7%) | 0.011# |
| | Cesarean section | 28 (21.2%) | 8 (12.1%) | 20 (30.3%) | |
| Induction required | | 24 (18.2%) | 6 (9.1%) | 18 (27.3%) | 0.021# |
| Successful outcome | | 96 (72.7%) | 56 (84.8%) | 40 (60.6%) | 0.002# |

**Mann-Whitney U test; #chi-square test*

The overall median birth weight was 2987.0 (2790.5-3280.6) grams, with no significant difference among study groups (p=0.574). Apgar scores at 1 minute (p=0.931) and at 5 minutes (p=0.878) remained statistically comparable across study groups. NICU admission was required in 12 (9.1%) neonates (4 cases of respiratory distress, 3 meconium aspiration syndrome, 2 transient tachypnea of newborns, 2 cases with maternal intrapartum fever or suspected chorioamnionitis, and 1 case of birth asphyxia) without any significant differences across study groups (p=0.545). Early neonatal complications occurred in 4 (6.1%) neonates in the membrane sweeping group and 5 (7.6%) neonates in the expectant management group (p=0.730). No perinatal mortality was documented during this study. **Table III** shows details of the comparison of neonatal outcomes between study groups.

**Table III: Neonatal outcomes in membrane sweeping versus expectant management groups (N=132)**

| Outcomes | | Total (N=132) | Membrane sweeping (n=66) | Expectant management (n=66) | P-value |
|---|---|---|---|---|---|
| Birth weight (grams) | | 2987.0 (2790.5-3280.6) | 3000.6 (2800.0-3250.4) | 2974.5 (2782.2-3310.8) | 0.574* |
| Apgar score | 1 minute | 8.0 (7.0-8.0) | 8.0 (7.0-8.0) | 8.0 (7.0-8.0) | 0.931* |
| | 5 minutes | 9.0 (9.0-10.0) | 9.0 (9.0-10.0) | 9.0 (9.0-10.0) | 0.878* |
| NICU admission | | 12 (9.1%) | 5 (7.6%) | 7 (10.6%) | 0.545# |
| Early neonatal complications | | 9 (6.8%) | 4 (6.1%) | 5 (7.6%) | 0.730# |

**Mann-Whitney U test; #chi-square test*

## DISCUSSION

This study found a markedly higher frequency of SOL in women undergoing membrane sweeping, with 90.9% achieving SOL compared with 72.7% managed expectantly. Zamzami TY 2014[13] reported a similar trend, with SOL in 90% of women undergoing membrane sweeping and 75% without sweeping. This direction of association also aligns with Ehikioya E 2024[10], in which 91.4% of women who received membrane sweeping developed SOL, compared with 72.9% in the comparison group. The pattern supports the physiological premise that mechanical separation of the membranes stimulates endogenous prostaglandins and increases cervical readiness. The concordance between these studies and the present findings reinforces a consistent biological response across diverse populations.

In contrast, the quasi-experimental study by Pirzada H et al.[14] reported SOL in 24.8% of swept women and 15.2% without sweeping. The lower absolute frequencies may reflect differences in gestational age at intervention, study design, or practitioner technique. Differences in parity distribution or cervical favourability before sweeping may also account for the lower success in that setting.

Various non-pharmacologic methods for cervical ripening and labor initiation, such as castor oil, sexual intercourse, and acupuncture, have been explored. Still, only mechanical methods, specifically membrane sweeping, have demonstrated consistent efficacy[15,16]. Membrane sweeping involves gently detaching the fetal membranes from the lower uterine segment by sweeping a finger through the internal cervical os, inducing cervical ripening through increased prostaglandin release and hormonal responses that promote uterine contractions[17]. A local study found the frequency of onset of labor to be 69.4% in the conservative group versus 87.1% in the sweeping membranes group (p=0.005)[18]. Regarding mode of delivery, 20.0% of women in the conservative group underwent CS versus 16.5% in the sweeping membranes group (p=0.550)[15]. Despite existing literature, most studies have mixed populations (primigravida and multigravida) and originated from high-resource settings[13,19].

The reduction in time to labor onset demonstrated in this study, where median time was 24.2 hours in the membrane sweeping group and 48.1 hours in the expectant management group, aligns with Ehikioya E 2024[10] where the swept group had markedly shorter recruitment-to-delivery intervals. Regional data reported fewer days to delivery in swept women, reporting a median of 4 days compared with 7 days with expectant management[20]. These observations collectively support membrane sweeping as an intervention that accelerates cervical change and reduces latency to labor. The mechanism likely relates to local inflammatory cascades and prostaglandin release triggered by the mechanical manoeuvre[17].

In this study, vaginal delivery occurred in 87.9% of the membrane-sweeping group and 69.7% of the expectant-management group. Saeed F et al.[18] found that vaginal delivery occurred in 83.5% with membrane sweeping, and 80% with expectant management. Zamzami TY 2014[13] have also reported a higher rate of vaginal delivery with membrane sweeping, reinforcing the possibility that sweeping facilitates cervical readiness and reduces the need for operative delivery. Ferdaushi Z 2022[21] found that caesarean section was more frequent in the induction group than in the SOL group, suggesting that interventions that increase SOL may indirectly reduce CS by reducing the need for formal induction. Membrane sweeping may provide an advantage by preventing the cascade of interventions associated with formal induction. The lower need for labor induction in the sweeping group in this study, with induction required in 9.1% versus 27.3% with expectant management, parallels Ehikioya E 2024[10] who demonstrated a reduction in elective induction from 27.1% to 9.0% with membrane sweeping. Zamzami TY 2014[13] documented a reduction in induction from 25% to 10%, while another study[20] also reported lower induction rates in the sweeping group. These findings suggest that

membrane sweeping could reduce the burden on maternity units by lowering the number of women requiring pharmacological or mechanical induction.

Neonatal outcomes did not differ between groups, including birth weight, Apgar scores, and NICU admissions, a pattern also reported in several other trials. Swathi S 2020[20] reported no differences in neonatal parameters, including Apgar scores and NICU admissions, between swept and non-swept groups. Zamzami TY 2014[13] reported no significant differences in neonatal morbidity across groups. Hassan AM 2023[22] from Sudan also reported reassuring neonatal outcomes with membrane sweeping, including stable Apgar scores and low NICU admission rates.

The clinical implications of these findings are considerable. Membrane sweeping is a low-cost, low-technology procedure that can be performed in outpatient settings without pharmacological agents or prolonged monitoring[23]. The increased likelihood of SOL and reduced need for induction may reduce healthcare resource utilization, particularly in settings with limited induction capacity. Increased SOL also tends to align with higher maternal satisfaction and reduced exposure to medical interventions. The consistent neonatal safety profile supports the potential suitability of membrane sweeping as a first-line strategy before considering more invasive methods. Avoiding pregnancy beyond 41 weeks may also reduce meconium aspiration syndrome and other late-term complications, as noted in Mohammed MA 2019[24] where expectant management beyond 41 weeks was associated with higher meconium aspiration syndrome.

The study was conducted in a single centre, limiting broader generalizability. A multicentre design would strengthen external validity. Blinding was not feasible given the nature of the intervention, but future research may minimize detection bias by using independent assessors for outcome documentation. Long term neonatal outcomes were not assessed, and future longitudinal studies could address this gap by including follow-up assessments of early childhood development.

## CONCLUSION

Membrane sweeping appears to offer meaningful clinical advantages when compared with expectant management in post-date primigravida without compromising neonatal safety.

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## AUTHOR CONTRIBUTION

Ashraf A: Data collection, drafting, responsible for data integrity, approved for final publication.
Riaz T: Conception, data analysis, critical revisions, approved for publication.
Jahanzeb A: Literature review, drafting, proofreading, critical revisions, approved for publication.
Shahid R: Drafting, proofreading, critical revisions, approved for final publication.

## REFERENCES


1. Pfleiderer M, Gilman E, Grüttner B, Ratiu J, Mallmann P, Baek S et al. Maternal and Perinatal Outcome After Induction of Labor Versus Expectant Management in Low-risk Pregnancies Beyond Term. In Vivo. 2024; 38(1): 299-307.
2. Qadir M, Tabassum S, Khan N, Jadoon SMK. Late term and post term pregnancies: still an obstetrician's dilemma. Khyber J Med Sci. 2021; 14(3): 185-9.
3. Hilder L, Costeloe K, Thilaganathan B. Prolonged pregnancy: evaluating gestation-specific risks of fetal and infant mortality. Br J Obstet Gynaecol. 1998; 105(2): 169-73.
4. Flenady V, Frøen JF, Pinar H, Torabi R, Saastad E, Guyon G et al. An evaluation of classification systems for stillbirth. BMC Pregnancy Childbirth. 2009; 9: 24.
5. Ranjbar A, Mehrnoush V, Darsareh F, Pariafsay F, Shirzadfardjahromi M, Shekari M. The Incidence and Outcomes of Late-Term Pregnancy. Cureus. 2023; 15(1): e33550. doi: 10.7759/cureus.33550.
6. Namutosi E, Akankwasa P, Matokota JB, Ssempanyi DD, Katongole J, Kakooza J et al. Induction of Labor: A Narrative Review for Clinical Use. Cureus. 2025; 17(10): e94205. doi: 10.7759/cureus.94205.
7. Alkmark M, Keulen JKJ, Kortekaas JC, Bergh C, van Dillen J, Duijnhoven RG et al. Induction of labor at 41 weeks or expectant management until 42 weeks: A systematic review and an individual participant data meta-analysis of randomized trials. PLoS Med. 2020; 17(12): e1003436.
8. WHO recommendations on induction of labor, at or beyond term. Geneva: World Health Organization; 2022. 3, Assessment. Available from: https://www.ncbi.nlm.nih.gov/books/NBK585300/
9. National Guideline Alliance (UK). Evidence review for labor after 42 weeks of pregnancy: Intrapartum care for women with existing medical conditions or obstetric complications and their babies: Evidence review T. London: National Institute for Health and Care Excellence (NICE); 2019 Mar. (NICE Guideline, No. 121.) Available from: https://www.ncbi.nlm.nih.gov/books/NBK576697/
10. Ehikioya E, Nwachukwu OB, Okobi OE. Effectiveness of Single Fetal Membrane Sweeping in Reducing Elective Labor Induction for Postdate Pregnancies (38+0 to 40+6 Weeks): A Randomized Controlled Trial. Cureus. 2024; 16(4): e58030.
11. Saumya S, Singh BK, Khatik N. Association of cervical effacement with spontaneous labor progression in low risk pregnant females. Int J Health Sci. 2022; 6(S6): 7487–92.
12. Sultan S, Qazi Q, Sofia, Khan N. Efficacy of Membrane Sweeping in Primigravida and Effect on the Duration of Pregnancy: Membrane Sweeping in Primigravida and Effect on the Pregnancy Duration. Pak J Health Sci. 2024; 5(12): 270-4.
13. Zamzami TY, Al Senani NS. The Efficacy of Membrane Sweeping at Term and Effect on the Duration of Pregnancy: A Randomized Controlled Trial. J Clin Gynecol Obstet. 2014; 3(1): 30-4.
14. Pirzada H, Shabir R, Ehsan A, Tahir N, Saifuddin Z, Fatima A. Sweeping of Membranes for Induction of Labor in Low Risk Term Pregnancy. Pak Armed Forces Med J. 2022; 72(2): 658-661. doi: 10.51253/pafmj.v72i2.6644.
15. Rattanakanokchai S, Gallos ID, Kietpeerakool C, Eamudomkarn N, Alfirevic Z, Oladapo OT et al. Methods of induction of labor: a network meta-analysis. Cochrane Database Syst Rev. 2023; 2023(1): CD015234.

16. Sanchez-Ramos L, Levine LD, Sciscione AC, Mozurkewich EL, Ramsey PS, Adair CD et al. Methods for the induction of labor: efficacy and safety. Am J Obstet Gynecol. 2024; 230(3S): S669-S695.
17. Finucane EM, Murphy DJ, Biesty LM, Gyte GM, Cotter AM, Ryan EM et al. Membrane sweeping for induction of labor. Cochrane Database Syst Rev. 2020; 2(2): CD000451.
18. Saeed F, Abbasi SE, Bano N, Khan S, Jabeen K, Faraz F. Comparison between expectant management and sweeping of membranes for spontaneous onset of labor and subsequent mode of delivery. J Soc Obstet Gynaecol Pak. 2023; 13(4): 355-9.
19. Adams R, Lichorad A, Simmons J. Membrane Sweeping to Decrease Rates of Postdate Induction. Am Fam Physician. 2017; 95(1): 35-6.
20. Swathi S. Efficacy of Membrane Sweeping at Term Pregnancy and Its Effect on Pregnancy Duration. Int J Life Sci Biotechnol Pharm Res. 2020; 9(1): 473-478. Available from: https://ijlbpr.com/uploadfiles/92vol9issue1pp473-478.20250920040547.pdf.
21. Ferdaushi Z, Alam MZ, Lail K. Outcome of Spontaneous Vaginal Delivery and Elective Induction of Labor in Postdated Pregnancy. J Bangladesh Coll Phys Surg. 2022; 40(3): 175-182. doi: 10.3329/jbcps.v40i3.60300.
22. Hassan AM. Membrane Sweeping to Induce Labor in Post-term Pregnant Women: Success Rate and Outcomes. Cureus. 2023; 15(3): e36942. doi: 10.7759/cureus.36942.
23. Danilack VA, Triche EW, Dore DD, Muri JH, Phipps MG, Savitz DA. Comparing expectant management and spontaneous labor approaches in studying the effect of labor induction on cesarean delivery. Ann Epidemiol. 2016; 26(6): 405-411.e1. doi: 10.1016/j.annepidem.2016.04.009.
24. Mohammed MA, Hassan FI, Taha WS, Ali RM. Comparison between Induction of Labor and Expectant Management in Post-Date Pregnancy. Med J Cairo Univ. 2019;87(5):3375-3380. Available from: https://journals.ekb.eg/article_65633_e6bac50dfd0a1878ea1c8fade3921fe8.pdf.