MERAL Publications and Solutions Pvt. Ltd.

Original Article

Hemorrhage risk mitigation in second-trimester abortion: a comparative study of prophylactic interventions

Shaimaa Saleh Khudhur[1]*

[1]Department of Clinical Pharmacy, College of Pharmacy, Tikrit University, Tikrit 34001, Iraq.

Correspondence: Shaimaa Saleh Khudhur, Department of Clinical Pharmacy, College of Pharmacy, Tikrit University, Tikrit 34001, Iraq. shaimaa.saleh @ tu.edu.iq

Received: 20 May 2025; **Revised:** 09 July2025; **Accepted:** 16 July 2025

ABSTRACT

Hemorrhage remains a major complication during second-trimester abortions, particularly in dilation and evacuation procedures. The use of prophylactic uterotonic agents plays a critical role in minimizing perioperative blood loss and related morbidity. This study aimed to compare the efficacy of three prophylactic regimens-misoprostol alone, misoprostol with oxytocin, and misoprostol with methylergometrine- in reducing hemorrhagic complications during the second-trimester dilation and evacuation procedure. A prospective, hospital-based comparative study was conducted at the Department of Obstetrics and Gynecology, Tikrit Teaching Hospital, Iraq, from April to December 2024. Ninety women diagnosed with second-trimester missed abortion (14–27 weeks of gestation) and scheduled for D&E were randomly allocated into three groups (n=30 each). Group I received rectal misoprostol; Group II received misoprostol plus intravenous oxytocin; Group III received misoprostol with intravenous and oral methylergometrine. Outcomes included estimated blood loss, need for transfusion, reoperation, retained products of conception, and need for referral to higher care. Data were analyzed using SPSS v22, with significance set at $p < 0.05$. The misoprostol–oxytocin group exhibited significantly lower rates of blood transfusion (3.3%) and reoperation (3.3%) compared to the misoprostol-only group (26.7% and 23.3%, respectively; $p < 0.05$). All three regimens effectively reduced RPOC post-intervention ($p < 0.001$), but no significant differences were observed among groups in final RPOC rates. The combination of misoprostol and oxytocin demonstrated superior efficacy in minimizing hemorrhagic complications during second-trimester D&E compared to other regimens. These findings support the adoption of dual uterotonic prophylaxis to enhance maternal safety during surgical abortion procedures.

Keywords: Second-trimester abortion, Hemorrhage prevention, Dilation and evacuation, Misoprostol, Oxytocin

Introduction

Second-trimester abortion, typically defined as termination of pregnancy between 13 and 28 weeks of gestation, remains one of the most technically challenging aspects of reproductive healthcare. Hemorrhage during this period is a serious complication that can result in significant maternal morbidity and mortality if not adequately managed [1, 2]. Retention of intrauterine tissue is associated with multiple adverse outcomes, including intrauterine adhesion, infection, coagulopathies, infertility, and, in severe cases, maternal death [3, 4]. The risk of such complications increases with advancing gestational age. In second–trimester abortions, hemorrhage may result from uterine atony, traumatic injury to the cervix or uterus, or abnormal placentation; particularly in women with prior cesarean sections [5]. Prophylactic pharmacological agents, especially uterotonics such as misoprostol and oxytocin, have become integral to minimizing blood loss in second-trimester procedures. Other agents, including vasopressin analogs and antifibrinolytics, are occasionally utilized for similar purposes [6]. Among uterotonics, misoprostol, a synthetic prostaglandin E1 analog, acts on uterine EP3 receptors to stimulate uterine contractions and promote cervical ripening [7]. While generally

Access this article online	
Website: www.japer.in	**E-ISSN:** 2249-3379

How to cite this article: Khudhur SS. Hemorrhage risk mitigation in second-trimester abortion: a comparative study of prophylactic interventions. J Adv Pharm Educ Res. 2025;15(3):126-32. https://doi.org/10.51847/ULvAztFQ69

safe, it may cause gastrointestinal and systemic side effects, particularly at higher plasma concentrations [8, 9]. Oxytocin, an endogenous posterior pituitary hormone, induces uterine contractions by activating oxytocin receptors on myometrial smooth muscle cells, leading to intracellular calcium influx. Its rapid onset and short half-life make it particularly useful in preoperative settings [10]. Methylergometrine, a semi-synthetic ergot alkaloid, acts primarily on 5-HT2 receptors and provides sustained uterine contractions but is contraindicated in patients with hypertension due to its potent vasoconstrictive effects [11]. Despite their widespread use, the optimal prophylactic regimen for minimizing hemorrhagic complications during 2nd-trimester dilation and evacuation(D&E) remains unclear. Previous studies have shown varying efficacy for misoprostol when used alone or in combination with other agents [3, 12]. Recent studies from both high- and low-resource settings have documented evolving trends in second-trimester abortion, highlighting improvements in procedural safety through advances in medical and surgical techniques as well as persistent disparities in service availability [13]. This study was designed to evaluate and compare the clinical effectiveness of three prophylactic regimens- misoprostol alone, misoprostol plus oxytocin, and misoprostol plus methylergonovine in minimizing hemorrhagic complications in women undergoing 2nd-trimester D&E. The findings aim to support evidence-based recommendations for improving maternal outcomes and guiding uterotonic use in clinical practice [14-19].

Materials and Methods

Study design and setting

This prospective, hospital-based comparative study was conducted in the department of obstetrics and gynecology at Tikrit teaching hospital, Iraq, over a nine–month period from April to December 2024. The study aimed to evaluate the effectiveness of three prophylactic pharmacological regimens in reducing hemorrhagic complications in women undergoing second-trimester dilation and evacuation. Participants were allocated to intervention groups using a random assignment method to reduce selection bias. While maintaining a pragmatic design reflective of routine clinical practice, the study adhered to strict inclusion and exclusion criteria to ensure internal validity [20-28].

Study population

Eligible participants included pregnant women aged 18 years and older with a confirmed diagnosis of missed abortion between 14 and 27 weeks of gestation, as determined by ultrasonographic evaluation. All women were admitted for uterine evacuation via D&E, performed by experienced gynecologic surgeons. A total of 105 women were initially screened. Ten were excluded based on eligibility criteria, and five declined to participate. The remaining 90 women were enrolled and randomly assigned into three equal groups (n = 30 per group).

Random allocation

Randomization was conducted using a simple random allocation method to assign participants to one of three treatment groups:
Group I (Control): Received rectal misoprostol (600–800 mcg; 3-4 tablets of 200 mcg) administered three hours prior to D&E.
Group II: Received the same misoprostol regimen plus 40 IU of oxytocin diluted in 1000 mL of normal saline, administered intravenously at 250 mL/hour starting at the onset of the procedure.
Group III: Received the same misoprostol regimen in addition to 0.2 mg intravenous methylergometrine bolus at the time of D&E, followed by oral methylergometrine 0.2 mg every 6-8 hours for up to five doses within 24 hours, as needed [29-35].

Sample size calculation

Sample size was calculated using G*Power software (version 3.1.9.7), targeting a large effect size (f = 0.40) with a statistical power of 90% and a two-tailed alpha of 0.05. The minimum required sample size was 87. To account for potential dropouts, 90 participants were recruited.

Inclusion criteria

1. Gestational age between 13 weeks 0 days and 27 weeks 6 days.
2. Diagnosis of missed abortion confirmed by ultrasonography.
3. Hemodynamically stable and able to provide written informed consent.
4. Willingness to receive one of the study's prophylactic regimens.

Exclusion criteria

1. Known allergy or contraindication to misoprostol, oxytocin, or methylergometrine
2. Significant pre-existing medical conditions (e.g., bleeding disorders, uncontrolled hypertension, advanced liver or kidney disease, unstable cardiac status)
3. Structural uterine anomalies (e.g., fibroids distorting the cavity, bicornuate uterus)
4. History of uterine rupture
5. Active pelvic infection

Intervention groups

Group I, (Misoprostol only): Received 600–800 mcg of rectal misoprostol (3–4 tablets, each containing 200 mcg) administered three hours before the D&E procedure.
Group II (Misoprostol + Oxytocin): Received the same misoprostol regimen as Group I, along with 40 IU of oxytocin diluted in 1000 mL of normal saline, infused intravenously at a rate of 250 mL/hour beginning at the initiation of the procedure.
Group III (Misoprostol+Methylergometrine): Received the same misoprostol regimen as Group I, in addition to a 0.2 mg intravenous bolus dose of methylergometrine at the time of D&E, followed by maintenance dosing of oral

methylergometrine (0.2 mg every 6–8 hours), up to five doses in 24 hours as needed [36, 37].

Data collection

Data were collected using a structured form documenting demographic variables (age, parity, gestational age, residence) and clinical parameters, including:

- Estimated blood loss (EBL), assessed visually by the attending physician.
- Pain severity, evaluated using the Visual Analogue Scale (VAS).
- Incidence of vaginal spotting.
- Presence or absence of retained products of conception (RPOC) post-procedure.

Primary outcomes included intraoperative and post-procedural hemorrhage, requirement for blood transfusion, reoperation, and transfer to higher levels of care.

Statistical analysis

Data were analyzed using SPSS software version 22 (Chicago, IL, USA). Continuous variables were presented as means ± standard deviation (SD), while categorical variables were summarized using frequencies and percentages. Normality of data was assessed using the Shapiro-Wilk test. Between-group comparisons were performed using one-way ANOVA for continuous variables, with post-hoc analysis when significant differences were detected. Categorical variables were compared using the chi-square test or Fisher's exact test, as appropriate. An independent samples t-test was used for two-group mean comparisons. A p-value < 0.05 was considered statistically significant [38-42].

Results and Discussion

Baseline characteristics

A total of 90 participants were enrolled and equally distributed into three groups (n=30 per group). Baseline demographic and obstetric characteristics, including age, occupation, parity, and gestational age, showed no statistically significant differences among the groups, confirming comparability prior to intervention **(Table 1)**. The mean participant age ranged from 26.66 ± 4.17 to 27.43 ± 4.25 years ($p = 0.939$), with parity and gestational age similarly matched across groups ($p > 0.05$ for all).

Table 1. Baseline characteristics

Characteristics		Misoprostol – only group (N=30)	Misoprostol + oxytocin (N=30)	Misoprostol + Methylergometrene (N=30)	p-value
Age(years) (Mean ± SD)		26.66±4.17	27.43±4.25	27.06±4.81	0.939[a]
Occupation N(%)	Student	4(13.4%)	3(10%)	3(10%)	0.798[b]
	employer	14(46.6%)	17(57%)	16(53%)	
	housewife	12(40%)	10(33%)	11(37%)	
Parity N(%)	0	3(10%)	3(10%)	4(13.3%)	0.857[b]
	1	5(16.6%)	4(13.4%)	6(20%)	
	≥ 2	22(73.4%	23(76.6%)	20(66.7%)	
Gestational age(weeks)		17±2.01	16.8±1.86	16.76±1.75	0.865[a]

BMI: Body Mass Index, N: number, SD: standard deviation, a: ANOVA test, b: Fisher's exact test

Bleeding severity, pain scores, and spotting

No significant differences were found among the three groups in terms of bleeding severity, pain intensity (VAS), or the incidence of spotting ($p > 0.05$ for all variables); **(Table 2)**. Mild bleeding was observed in approximately half of the participants in each group, while moderate to severe bleeding was relatively infrequent. Pain was predominantly reported as mild (VAS 0–3), with only a few participants experiencing moderate or severe discomfort, as shown in **Table 2**.

Table 2. Comparative Analysis of Bleeding Severity, Pain Scores, and Spotting Incidence Across Patient Groups

Parameters		Misoprostol - only group (N=30)	Misoprostol + Oxytocin (N=30)	Misoprostol + Methylergometrine (N=30)	p-value
Bleeding rate N(%)	Mild	15(50%)	18(60%)	17(56.7%)	0.178[a]
	Moderate	4(13.3%)	7(23.3%)	9(30%)	
	Severe	3(10%)	2(6.7%)	3(10%)	
	No bleeding	8(26.7%)	3(10%)	1(3.3%)	
Pain N(%)	None to mild (vas = 0-3)	22(73.3%)	23(76.7%)	24(80%)	0.829[a]
	Moderate (vas=4-6)	5(16.7%)	6(20%)	4(13.3%)	
	Severe (vas=7-10)	3(10%)	1(3.3%)	2(6.7%)	
Spotting	Yes	12(40%)	8(26.7%)	5(16.7%)	0.129[b]

N(%)	No	18(60%)	22(73.3%)	25(83.3%)

N: number, VAS: visual analogue scale, a: Fisher's exact test, b: chi-square test

Hemorrhage-related outcomes

Significant intergroup differences were noted for key hemorrhagic complications, including the need for blood transfusion and reoperation **(Table 3)**:

Blood transfusion was required in 26.7% of the misoprostol-only group (8/30), 20% of the misoprostol–methylergometrine group (6/30), and only 3.3% in the misoprostol–oxytocin group (1/30) (p = 0.030). Reoperation was necessary in 23.3% of the control group and 26.7% of the methylergometrine group, compared to 3.3% in the oxytocin group (p = 0.020). Transfers to higher-level care occurred in 13.3% (4/30) of the control group and 10% (3/30) of the methylergometrine group, while none were required in the oxytocin group; however, this difference was not statistically significant (p = 0.112).

The results demonstrated that the combination of misoprostol and oxytocin significantly reduced the need for blood transfusion and reoperation compared to the other two groups. Specifically, the transfusion and reoperation rates in the misoprostol–oxytocin group were 3.3%, significantly lower than those observed in the misoprostol-only (26.7% and 23.3%) and misoprostol–methylergometrine (20% and 26.7%) groups. These findings suggest that the synergistic action of misoprostol and oxytocin provides enhanced uterine contractility and hemostasis, thereby minimizing blood loss. This outcome is consistent with prior studies reporting improved hemorrhage control when misoprostol is used in combination with oxytocin [43-46]. For example, Whitehouse *et al*. Found that prophylactic oxytocin significantly reduced intraoperative bleeding during second-trimester D&E, although its effect on transfusion rates varied depending on baseline risk factors [47]. Similarly, postpartum studies have demonstrated superior blood loss reduction with dual uterotonic therapy compared to monotherapy [48, 49]. In contrast, the addition of methylergometrine did not significantly improve hemorrhage outcomes. This aligns with earlier randomized trials indicating limited efficacy of methylergometrine in second-trimester surgical settings [50]. Furthermore, its vasoconstrictive effect and sustained myometrial contraction may paradoxically interfere with complete placental expulsion, potentially increasing procedural blood loss and the need for surgical reintervention [51]. The rate of transfer to higher levels of care was low and not significantly different between groups. This suggests that severe complications were infrequent and manageable within the study setting, reflecting the relative safety of second-trimester D&E when performed with appropriate pharmacological prophylaxis and skilled personnel [52-54].

Table 3. Complications during and after evacuation

Complications		Misoprostol - only group (N=30)	Misoprostol + oxytocin (N=30)	Misoprostol + Methylergometrine (N=30)	p-value
Blood transfusions N(%)	Yes	8(26.7%)	1(3.3%)	6(20%)	0.03[a]*
	No	22(73.3%)	29(96.7%)	24(80%)	
Reoperation N(%)	Yes	7(23.3%)	1(3.3%)	8(26.7%)	0.02[a]*
	No	23(76.7%)	29(96.7%)	22(73.3%)	
Transfer to a higher care level N(%)	Yes	4(13.3%)	0(0%)	3(10%)	0.11[a]
	No	26(86.7%)	30(100%)	27(90%)	

N: number, a: Fisher's exact test, *: significant at p<0.05.

Retained products of conception (RPOC)

All groups demonstrated significant within-group reductions in the presence of retained products of conception following D&E (p < 0.001 for all); **(Table 4)**. Post-treatment RPOC rates were: 13.3% in the misoprostol-only group,10% in the methylergometrine group, and 3.3% in the oxytocin group. However, when comparing post-treatment RPOC between groups, the differences were not statistically significant (p = 0.353). These results suggest that while surgical evacuation was effective across all groups, none of the prophylactic regimens demonstrated clear superiority in achieving complete uterine clearance, suggesting that while uterotonic agents may support uterine tone, they do not independently influence completeness of evacuation. These results are in line with previous findings from Fujishima *et al*. which indicated that resolution of RPOC is more dependent on surgical technique and gestational age than pharmacologic support [55].

Table 4. Comparison of pre- and post-treatment retained products of conception among three uterotonic regimen patient groups

Degree of retained products of conception		Misoprostol - only group (N=30)	Misoprostol + oxytocin (N=30)	Misoprostol + Methylergometrine (N=30)	p-value
Before intervention N(%)	Present	30(100%)	30(100%)	30(100%)	NA
	Absent	0(0%)	0(0%)	0(0%)	
After intervention	Present	4(13.3%)	1(3.3%)	3(10%)	0.353

N(%)	Absent	26(86%)	29(96.7%)	27(90%)	
p-value		< 0.001	< 0.001	< 0.001	NA

N: number, NA: not applicable

Limitations of the study

Limitations include a modest sample size and the subjective estimation of blood loss. Use of objective measurement tools would improve data reliability. Additionally, the single-center design may limit generalizability to other populations.

Conclusion

The combination of misoprostol and oxytocin was significantly more effective than either control or misoprostol plus methylergometrine in reducing hemorrhage-related complications during second-trimester D&E. These findings support the integration of dual uterotonic prophylaxis into clinical protocols to improve surgical outcomes and reduce the risk of significant blood loss.

Acknowledgments: None

Conflict of interest: None

Financial support: None

Ethics statement: The study received ethical approval from the Scientific Research Ethical Committee at the College of Pharmacy, University of Tikrit, Iraq (Approval ID: SREC 17). Written informed consent was obtained from all participants before inclusion in the study.

References

1. Auger N, Brousseau É, Ayoub A, Fraser WD. Second-trimester abortion and risk of live birth. Am J Obstet Gynecol. 2024;230(6):679. doi:10.1016/j.ajog.2023.11.004
2. Bearak J, Popinchalk A, Ganatra B, Molle AB, Tunçalp Ö, Beavin C, et al. Unintended pregnancy and abortion by income, region, and legal status: estimates from a comprehensive model for 1990–2019. Lancet Glob Health. 2020;8:e1152-61. doi:10.1016/S2214-109X(20)30315-6
3. Jahromi AR, Rahmanian V, Taghizadeh H, Zareibabaarabi Z. A comparison of misoprostol with and without methylergometrine and oxytocin in outpatient medical abortion: a phase III randomized controlled trial. BMC Res Notes. 2023;16(1):257. doi:10.1186/s13104-023-06509-6
4. Hooker AB, Aydin H, Brölmann HA, Huirne JA. Long-term complications and reproductive outcome after the management of retained products of conception: a systematic review. Fertil Steril. 2016;105(1):156-64. doi:10.1016/j.fertnstert.2015.09.021
5. Henkel A, Blumenthal PD. Second-trimester abortion care for those with complex medical conditions. Curr Opin Obstet Gynecol. 2022;34(6):359-66. doi:10.1097/GCO.0000000000000817
6. Hunkler KF, Pekny CJ, Boedeker DH, Holman AM, Drayer SM. Efficacy of pharmacologic hemorrhage prophylactics in second-trimester abortions: a systematic review. Am J Obstet Gynecol. 2025;232(1):72-81.
7. Barbieri RL. Misoprostol: clinical pharmacology in obstetrics and gynecology. OBG Manag. 2022;34:8-10. doi:10.12788/obgm.0211
8. FEBRASGO. Misoprostol use in obstetrics. Rev Bras Ginecol Obstet. 2023;45(6):356-64. doi:10.1055/s-0043-1770931
9. Rahimi M, Haghighi L, Baradaran HR, Azami M, Larijani SS, Kazemzadeh P, et al. Comparison of the effect of oral and vaginal misoprostol on labor induction: updating a systematic review and meta-analysis of interventional studies. Eur J Med Res. 2023;28(1):51. doi:10.1186/s40001-023-01007-8
10. Uvnäs-Moberg K, Ekström-Bergström A, Berg M, Buckley S, Pajalic Z, Hadjigeorgiou E, et al. Maternal plasma levels of oxytocin during physiological childbirth–a systematic review with implications for uterine contractions and central actions of oxytocin. BMC Pregnancy Childbirth. 2019;19(1):285. doi:10.1186/s12884-019-2365-9
11. Bardal S, Waechter J, Martin D. Applied pharmacology. 1st ed. Saint Louis: Saunders Elsevier; 2011. p. 918-22.
12. Ibiyemi KF, Munir'deen AI, Adesina KT. Randomised trial of oral misoprostol versus manual vacuum aspiration for the treatment of incomplete abortion at a Nigerian tertiary hospital. Sultan Qaboos Univ Med J. 2019;19(1):e38. doi:10.18295/squmj.2019.19.01.008
13. Kebede K, Gashawbeza B, Gebremedhin S, Tolu LB. Determinants of late requests for safe abortion care among women seeking abortion services: a cross-sectional study in Ethiopia. Int J Womens Health. 2020;12:1223-30. doi:10.2147/IJWH.S285282
14. Zavalishina SY, Shalupin VI, Rodionova IA, Kumantsova ES, Rysakova OG, Ryazantsev AA, et al. Influence of regular basketball practice in adolescence on the functional capacity of the heart. J Biochem Technol. 2022;13(1):20-4. doi:10.51847/WOUcyQNmHe
15. Nguyen BTN, Nguyen TT, Le UTT. Nomophobia and stress among Vietnamese high school students in Covid-19 pandemic: a mediation model of loneliness. J Biochem Technol. 2022;13(1):34-40. doi:10.51847/zN5yXlP0nK
16. Ruin VA, Kistina AA, Prytkov YN. Use of the Bioprimum Sukhoy feed additive in cow feeding. J Biochem Technol. 2022;13(1):41-4. doi:10.51847/pAjB6Szo9z
17. Benhmida S, Trabelsi H. Fatty acid composition in bone fluid from knee osteoarthritis patients. J Biochem Technol. 2024;15(2):23-6. doi:10.51847/UNhuTqup51
18. Pakalapati A, Ranganadhareddy A, Kumar NNP. From formation to detection: understanding monoclonal antibody aggregation through analytical lenses. J Biochem Technol. 2024;15(2):27-32. doi:10.51847/MgvdN50FBW
19. Savva G, Papastavrou E, Charalambous A, Vryonides S, Merkouris A. Studying the nurses' and nursing students' attitudes towards the phenomenon of elderly. J Integr Nurs Palliat Care. 2023;4:6-10. doi:10.51847/DkBR8F3IGx

20. Abdulrahman BI, Aldahmash AM, Alghamdi HH, Alghamdi AH, Hamad TAB, Ruished AF. Prevalence of dental anomalies among patients visiting the Riyadh Elm University clinics. Ann Dent Spec. 2023;11(2):40-5. doi:10.51847/4wajSjZRu8
21. Ansari S, Alhazmi A, Alajmi A, Asali W, Alkathiri S, Alrasheedi Z. Knowledge and attitude of patients regarding the choice of selection of FPDs and dental implants. Ann Dent Spec. 2023;11(2):15-24. doi:10.51847/Esn7bjMEN4
22. Kushkhova DK, Kozyreva AA, Valiev DG, Kallagova AR, Elzhurkaeva SS, Kakaeva KA. The process of formation of tooth enamel by the method of elemental dispersion spectral analysis. Ann Dent Spec. 2023;11(2):84-7. doi:10.51847/9NwEe582ow
23. Ismikhanov AG, Dadaeva GT, Dzhabrailov SM, Maysigova JB, Semenov MR, Dzagurova LA. Prospects for the use of selenium-containing drugs in dentistry. Ann Dent Spec. 2023;11(2):88-93. doi:10.51847/2Z0fZ4rAoM
24. Maskurova YV, Kokoev VA, Gusengadzhiev KA, Megrikyan AA, Alieva KM, Serov NG. Structural and mechanical assessment of dental implants based on TiO2 and ZrO2. Ann Dent Spec. 2023;11(2):94-8. doi:10.51847/gFHZM9fdj8
25. Alharith DN, Mansi IT, Abdulmotalib Y, Amous H, Aljulban T, Aiban HMA, et al. Radiographic evaluation of periapical healing rates between bio-ceramic sealer and AH+ sealer: a retrospective study. Ann Dent Spec. 2023;11(2):124-8. doi:10.51847/rTpmLOU0gT
26. Almotawah F, Balhareth J, Zamandar H, Halawani S, AlHassan F. The attitude of special needs patients' parents in KSA towards general anesthesia in dental treatment. Ann Dent Spec. 2023;11(2):111-9. doi:10.51847/yT7SljOWYZ
27. Ranganadhareddy A. A review on production of polyhydroxyalkanoates in microorganisms. J Biochem Technol. 2022;13(1):1-6. doi:10.51847/Uo3EEbmgID
28. An TB, Linh DHT, Anh NP, An TTT, Tri N. Immobilization and performance of cellulase on recyclable magnetic hydrotalcites. J Biochem Technol. 2022;13(1):13-9. doi:10.51847/APmQMAcejg
29. Du X, Dong Q, Sun L, Chen X, Jiang J. Studying the relationship between depression and internal stigma in mothers of children with cerebral palsy. J Integr Nurs Palliat Care. 2023;4:17-22. doi:10.51847/9WQmf9zDW1
30. Ağaçkıran M, Avşaroğullar OL, Şenol V. Examining the frequency of violence versus nurses and the factors affecting it in hospitals. J Integr Nurs Palliat Care. 2023;4:11-6. doi:10.51847/0rzZBHvQ2d
31. Attenborough J, Abbott S, Brook J, Knight R. Studying barriers to work-based learning in clinical environments from the perspective of nursing managers and nurses. J Integr Nurs Palliat Care. 2023;4:46-52. doi:10.51847/qQR0GNUES7
32. Figueroa-Valverde L, Marcela R, Alvarez-Ramirez M, Lopez-Ramos M, Mateu-Armand V, Emilio A. Statistical data from 1979 to 2022 on prostate cancer in populations of northern and central Mexico. Bull Pioneer Res Med Clin Sci. 2024;3(1):24-30. doi:10.51847/snclnafVdg
33. Bona C, Lozano R. Increased plasma lactate level associated to the use of atorvastatin: a study comparing cases and controls. Bull Pioneer Res Med Clin Sci. 2024;3(1):46-9. doi:10.51847/vvkHX6i1yb
34. Suchy W, Jurkowski O. Clinical assessment of 5% lidocaine patches for postoperative analgesia: efficacy, effectiveness, and safety. Bull Pioneer Res Med Clin Sci. 2024;3(1):31-6. doi:10.51847/UxKg3AkOTB
35. Enwa FO, Jewo AO, Oyubu LO, Adjekuko CO, Effiong V. Incidence of vaginal infections among females of different age categories in Delta State, Nigeria. Bull Pioneer Res Med Clin Sci. 2022;1(1):18-23. doi:10.51847/C1oahQ115n
36. Edmond DK, editor. Dewhurst's textbook of obstetrics and gynecology. 8th ed. Oxford: Wiley-Blackwell; 2012. 60 p.
37. Cunningham FG, Leveno KJ, Bloom SL, Dashe JS, Hoffman BL, Casey BM, et al. Williams' manual of pregnancy complications. 23rd ed. New York: McGraw-Hill Education; 2020. 218 p.
38. Çakar S, Özyer K, Azizoğlu O. The mediating role of emotional labor in the impact of organizational climate on burnout. J Organ Behav Res. 2022;7(1):1-13. doi:10.51847/oKRklsMVyv
39. Kirilmaz SK. Mediating role of positive psychological capital in the effect of perceived organizational support on work engagement. J Organ Behav Res. 2022;7(1):72-85. doi:10.51847/xNeqENPv4Y
40. Çora H, Çora AN. An international relations study: Turks in the Western world's history perspective and Ataturk's approach. J Organ Behav Res. 2022;7(1):96-107. doi:10.51847/eegcptya4E
41. Zoubi MK, Jaradat HA, Alqamaz S, Lababneh H, Kassawneh FY, Issa MM. The impact of the Covid-19 pandemic on interior design students' performance in Jordanian universities. J Organ Behav Res. 2023;8(1):25-38. doi:10.51847/ZDkJp32geh
42. Keliddar I, Dastoorpoor M, Alaei R, Vahidnezhad F. The relationship between leadership style and organizational health in educational hospitals. J Organ Behav Res. 2023;8(1):92-104. doi:10.51847/HpAKksLryg
43. Gogoi P, Kamle M, Kumar P. Endophytic bacteria associated with rice: role in biotic and abiotic stress protection and plant growth promotions. World J Environ Biosci. 2023;12(1):1-9. doi:10.51847/ELxLUdbokK
44. Aodh AM, Al-Marshedi AA. Williams-Beuren's syndrome: a case report in Prince Sultan Military City, Riyadh, Saudi Arabia 2022. World J Environ Biosci. 2023;12(1):20-3. doi:10.51847/dQxngBeVLQ
45. Ibrahim AS, AlEnezi SFM, AlHawiti AA, AlEnezi NSJ, AlEnzi HSK. Chronic obstructive pulmonary diseases, its prevalence, risk factors, causes and management in Saudi Arabia: systematic review. World J Environ Biosci. 2022;11(4):26-31. doi:10.51847/zt8vJAim04

46. Petronis Z, Zigmantavicius J, Januzis G. Histologic and histomorphometric analysis of sinus floor elevation using calcium phosphate materials: a systematic review. Ann Dent Spec. 2023;11(2):7-14. doi:10.51847/yqkoQ0Tw5p
47. Whitehouse KC, Tschann M, Davis J, Soon R, Salcedo J, Friedlander E, et al. Effects of prophylactic oxytocin on bleeding outcomes in women undergoing dilation and evacuation: a randomized controlled trial. Obstet Gynecol. 2019;133(3):526-33. doi:10.1097/AOG.0000000000003104
48. Allen R, O'Brien BM. Uses of misoprostol in obstetrics and gynecology. Rev Obstet Gynecol. 2009;2:159-68.
49. Selvaraj A, Subramanian K, Periyasamy S, Shankar R. A comparative study between misoprostol combined with oxytocin versus oxytocin alone in reducing post-partum blood loss. J Med Sci Res. 2024;12(1):57-61. doi:10.17727/JMSR.2024/12-10
50. Kerns JL, Brown K, Nippita S, Steinauer J. Society of family planning clinical recommendation: management of hemorrhage at the time of abortion. Contraception. 2024;129:110292. doi:10.1016/j.contraception.2023.110292
51. Borgatta L, Kapp N. Labor induction abortion in the second trimester. Contraception. 2011;84(1):4-18. doi:10.1016/j.contraception.2011.02.004
52. Febriandika NR, Hakimi F, Ashfahany AE, Yayuli Y. What drives Muslims' zakat compliance behavior in the profession? Evidence on Indonesia. J Organ Behav Res. 2023;8(1):137-57. doi:10.51847/bEOitzpaPj
53. Karthikeyan V, Muthupriya P, Gopikrishna M, Sivakumar K. Effects of electromagnetic radiation and radio frequency on freshwater calanoid and cyclopoid copepods. World J Environ Biosci. 2024;13(2):1-5. doi:10.51847/YYlqFBgHxk
54. Singar FAW. Characterization of defatted cake prepared from Egyptian olive's fruit (Wateeken cultivar) and its biological activity. World J Environ Biosci. 2024;13(2):31-5. doi:10.51847/R7K4g1FOdt
55. Fujishima R, Kawasaki K, Moriuchi K, Shiro R, Yo Y, Matsumura N. Conservative management for retained products of conception in late pregnancy. Healthcare (Basel). 2023;11(2):168. doi:10.3390/healthcare11020168