ORIGINAL ARTICLE

# Outcome of the Second Trimester Medical Termination of Pregnancy in Phimai Hospital: Experience from Safety Abortion Program

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**Objective:** To evaluate the efficacy, side effects, and cause of termination of pregnancy (TOP) intent of mifepristone and misoprostol combination (MMC) among participants who attended the TOP program.

**Materials and Methods:** This retrospective study was conducted at the Department of Obstetrics and Gynecology at Phimai Hospital (PH), Nakhon Ratchasima Province, Ministry of Public Health, Thailand and PH affiliated clinic between 2021 and 2024. Participants were pregnant women who attended the TOP with gestational age equal or less than 20 weeks. Forty-eight hours after the first dose of mifepristone, all were evaluated every three hours, and a repeated dose of 400 µg misoprostol was given. Uterine evacuation was performed to complete TOP at 48 hours if ultrasound showed incomplete termination.

**Results:** Four thousand six hundred ninety-one subjects were recruited. There were 3,862 and 829 cases in adult, 18 years and older, and teenage, younger than 18 years, respectively. Teenage group had more gestation age than adult group, while the complication rates were comparable at 17.9 versus 14.4 weeks and 9.0% versus 6.7% (p<0.001). Both groups preferred to undergo TOP at affiliated clinics rather than at the main hospital, at 82.3% and 73.0%, for adult and teenage groups, respectively. Reason for TOP of adult and teenage groups were financial issues at 99.9% and 98.2%, and ongoing education at 10.2% and 58.7% with statistical significance. The complete expulsion rates in the adult and teenage groups were 39.6% and 56.4%, respectively (p<0.001).

**Conclusion:** MMC was safe and effective for TOP in second trimester pregnant women.

**Keywords:** Termination of pregnancy; Mifepristone; Misoprostol; Second trimester; Medical abortion

Received 22 September 2025 | Revised 16 December 2025 | Accepted 18 December 2025

**J Med Assoc Thai 2026;109(1):63-9**

**Website:** http://www.jmatonline.com

In the past, legal termination of pregnancy (TOP) in Thailand was limited to sexual assault victims and life-threatening medical conditions of pregnant women. When the pregnant women did not want to continue pregnancy, TOP was not allowed by Thai criminal code section 301[(1)].

After 2021, Thai criminal code was changed by legal abortion section 301 and 305[(1)]. Major change of Thai criminal code was the permission for Thai pregnant women to terminate their pregnancy upon her personal reason. Legal abortion section 305 was categorized according to gestational age (GA) and authorized by the Medical Council of Thailand[(1)].

TOP consisted of surgical, medical, and combined intervention[(2)]. Surgical method was the procedure of removing the intrauterine conceptus either by sharp uterine curettage or suction by negative pressure apparatus. These two methods were limited to the TOP of less than 12 weeks of gestation, or the incomplete abortion after medical intervention. Surgical evacuation for TOP was the mainstay of treatment for a long time.

Medical treatment was an alternative method, or the chosen method of medical abortion beyond 12 weeks pregnancy size. Prostaglandin analogue, or misoprostol, was introduced by International Federation of Obstetrics and Gynecology (FIGO) for the TOP in 2017[(2)]. Mechanism of misoprostol action was its binding to myometrial cells causing

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**How to cite this article:**

Meevasana V, Manusook S, Pongrojpaw D, Chanthasenanont A, Bhamarapravatana K, Suwannarurk K. Outcome of the Second Trimester Medical Termination of Pregnancy in Phimai Hospital: Experience from Safety Abortion Program. J Med Assoc Thai 2026;109:63-9.
DOI: 10.35755/jmedassocthai.2026.1.03508

strong myometrial contractions. Cervical softening and dilatation were the latter consequences, hence followed by spontaneous expulsion of the conceptus.

Progesterone receptor antagonist (mifepristone), was introduced in obstetrics for termination of intrauterine pregnancy and early tubal pregnancy[2]. Oral administration of mifepristone caused decidual necrosis, detached conceptus, and promoted myometrial excitability. Its mechanism was the increased endogenous prostaglandin production from endometrium, increased sensitivity of gravid uterus to exogenous prostaglandin, increased myometrium contractility, and cervical ripening[2]. Nowadays, the combination of mifepristone and misoprostol (MMC) was introduced and supported by the Ministry of Public Health (MOPH), Thailand for TOP according to Thai criminal code section 305.

The present study aimed to evaluate the efficacy, side effects, and cause of TOP intent of MMC among participants who attended the TOP program in the second trimester at Phimai Hospital (PH) and affiliated clinics.

## Materials and Methods

The present study was a retrospective study conducted at the Department of Obstetrics and Gynecology, PH, Nakhon Ratchasima Province, MOPH, Thailand between 2021 and 2024. Ethics approval had been obtained from PH Ethical Committee (IRB NRPH 027) on February 27, 2025. All data came from electronic medical records from hospital's computer system. Demographic and general data were thoroughly checked for accurate data for sending to MOPH.

Pregnant women with gestations of 20 weeks or less who needed legal abortion at PH were registered to attend safety abortion program at PH and affiliated clinics. All participants underwent ultrasonography to confirm the exact GA before being recruited in the present study. Participants were counseled about the process of pregnancy termination in detail. Written consents were obtained from all participants. All subjects received an oral dose of 200 mg mifepristone. After 48 hours, the patient was appointed for evaluation, and 800 µg misoprostol (Medabon®, Ranbaxy, Gujarat, India) was prescribed in two separate doses. The first 400 µg dose of misoprostol was administered sublingually for 30 minutes, followed by the second 400 µg dose administered in the same manner after three hours. The participants were clinically observed for 48 hours until spontaneous expulsion of the conceptus occurred. If there was no expulsion of the conceptus or incomplete within 48 hours, a surgical removal procedure such as manual vacuum aspiration (MVA) or dilatation and evacuation would be performed.

During the observation period, if there was any heavy vaginal bleeding or the passing of conceptus then pelvic examination and transvaginal ultrasonography (TVS) would be performed. After the expulsion of conceptus, subjects were evaluated by pelvic examination and using TVS to evaluate the completeness of the abortion process. MVA was performed under the condition of either incomplete conceptus expulsion (ICE) or heavy vaginal bleeding for the completion of pregnancy termination. ICE was defined as the endometrial thickness (ET) greater than 15 mm from TVS[2]. Complete abortion was defined as a complete expulsion of the conceptive product by gross specimen examination and ET of equal or less than 15 mm from TVS. All products of conceptus were sent for histopathological examination. TVS was repeated after the completion of MVA for the confirming of the complete evacuation.

Participants received routine standard gynecological care according to abortion care guidelines[2]. One tablet of 500 mg acetaminophen was offered as an analgesic to all patients as requested. Demographic and clinical data of participants were recorded. Long-acting reversible contraception (LARC) was offered for all participants before their discharge from the clinics. LARC in the safety abortion program was subdermal insertion of 68 mg etonogestrel implant (Implanon NXT®, Organon pharma, Ireland).

Category data were calculated using Pearson's chi-square or Fisher's exact test as appropriate. An independent t-test was used for the evaluation of continuous data. The statistical was used IBM SPSS Statistics, version 27.0 (IBM Corp., Armonk, NY, USA). The statistic significant value was set at the p-value less than 0.05.

## Results

During the period of the present study, there were 4,691 cases who underwent TOP. After counselling, 432 cases with gestation age under 12 weeks underwent immediate MVA for TOP. Figure 1 shows the flowchart of participant enrollment. There were 3,490 and 769 cases of adults, aged more than 18 years old or older, and teenagers, aged less than 18 years old, respectively. Adult group had higher body mass index (BMI) than teenage group with statistical significance at 22.96 versus 20.66 kg/m².

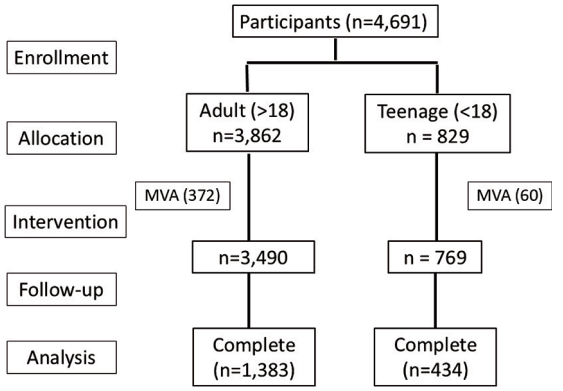


**Figure 1.** Flow of participant who underwent termination of pregnancy.

MVA: manual vacuum aspiration in subjects who refused medical treatment, Adult: age more than 18 years old, Teenage: age less than 18 years old, Intervention: medical intervention by oral combination of mifepristone (200 mg) and misoprostol (800 µg) and wait for 48 hours then followed by sublingual misoprostol (200 µg) every 3 hours, Complete: complete expulsion of conceptus without surgical intervention

**Table 1.** Demographic characters of participants among age more (n=3,862) and less (n=829) than 18 years old

| | Adult (>18) | Teenage (≤18) | p-value |
|---|---|---|---|
| Age (years); mean±SD | 28.8±7.5 | 16.2±1.6 | <0.001 |
| BW (kg); mean±SD | 58.4±11.71 | 52.46±9.48 | <0.001 |
| Height (cm); mean±SD | 159.44±5.57 | 159.22±5.91 | 0.316 |
| BMI (kg/m$^2$); mean±SD | 22.96±4.33 | 20.66±3.35 | <0.001 |
| Occupation; n (%) | | | <0.001 |
| Student | 647 (16.8) | 710 (85.6) | |
| Employee | 189 (4.9) | 0 (0.0) | |
| Daily worker | 1,865 (48.3) | 46 (5.5) | |
| No job | 498 (12.9) | 60 (7.2) | |
| Merchant | 485 (12.6) | 10 (1.2) | |
| Agriculture | 179 (4.6) | 3 (0.4) | |
| Payment; n (%) | | | 0.094 |
| Self-payment | 3,246 (84.0) | 716 (86.4) | |
| Third party support | 616 (16.0) | 113 (13.6) | |
| Education level; n (%) | | | <0.001 |
| Primary school or lower | 990 (25.7) | 385 (46.4) | |
| Secondary/diploma | 1,822 (47.2) | 431 (52.0) | |
| Bachelor or higher | 1,050 (27.2) | 13 (1.5) | |
| Marital status; n (%) | | | <0.001 |
| Couple | 1,481 (38.3) | 87 (10.5) | |
| Single, separate, divorce | 2,381 (61.0) | 742 (89.5) | |

SD=standard deviation; BW=body weight; BMI=body mass index

Most participants in the teenage group (710 out of 829) listed themselves as students. Higher number of participants in adult group lived with their partners compared to those of teenage group, at 38.3% versus 10.5% (p<0.001). Adult and teenage groups paid for the procedure themselves at 84.0% and 86.4%, respectively without statistical significance, as shown in Table 1.

**Table 2.** Clinical and legal characters of participants among age more (n=3,862) and less (n=829) than 18 years old who underwent termination of pregnancy (TOP)

| | Adult (>18) | Teenage (≤18) | p-value |
|---|---|---|---|
| Morbid obesity; n (%) | 1,617 (41.9) | 253 (30.5) | <0.001 |
| Hx C/S; n (%) | 725 (18.8) | 5 (0.6) | <0.001 |
| Code 305#; n (%) | | | <0.001 |
| 1 | 707 (18.3) | 220 (26.5) | |
| 2 | 1 (0) | 0 (0) | |
| 3 | 16 (0.4) | 135 (16.3) | |
| 4 | 1,570 (40.6) | 183 (22.1) | |
| 5 | 1,568 (40.6) | 291 (35.1) | |
| Nulliparity; n (%) | 1,384 (35.8) | 800 (96.5) | <0.001 |
| GA (weeks); median (IQR) | 14.4 (8.1, 19) | 17.9 (12, 21.1) | <0.001 |
| Conceptus (g); median (IQR) | 89 (0, 270) | 200 (0, 406) | <0.001 |
| Method TOP (cases); n (%) | | | 0.03 |
| MVA | 372 (9.6) | 60 (7.2) | |
| Financial issues; n (%) | 3,857 (99.9) | 814 (98.2) | <0.001 |
| Relationship dissolution; n (%) | 1,086 (28.1) | 249 (30.0) | 0.267 |
| Ongoing education; n (%) | 393 (10.2) | 487 (58.7) | <0.001 |
| After mifepristone; n (%) | | | <0.001 |
| Spontaneous | 1,383 (39.6) | 434 (56.4) | |
| SR | 2,107 (60.4) | 335 (43.6) | |
| Site; n (%) | | | <0.001 |
| Affiliated clinic | 3,179 (82.3) | 605 (73.0) | |
| Main hospital | 683 (17.7) | 224 (27.0) | |
| Complications; n (%) | 259 (6.7) | 75 (9.0) | 0.236 |
| Retained placenta | 251(6.5) | 74 (8.9) | |
| Bleeding/uterine atony | 7 (0.18) | 1 (0.1) | |
| Uterine perforation | 1 (0.02) | 0 (0.0) | |

IQR=interquartile range; Hx C/S=history of cesarean delivery; GA=gestation age; MVA=manual vacuum aspiration; SR=surgical removal

# Code 305: Thai penal code for termination of pregnancy, section 1: life threatening from pregnancy, section 2: severe intrauterine fetal anomaly, section 3: pregnancy from sexual assault, section 4: unwilling to continue pregnancy with GA less than 12 weeks, section 5: unwilling to continue pregnancy with GA between 18 and 20 weeks

Subjects in the adult group had more morbid obesity, previous cesarean delivery, and parity than those in teenage group with statistical significance as presented in Table 2. However, participants in teenage group had higher gestation age than adult group at 17.9 versus 14.4 weeks (p<0.001), but complication in each group was comparable at 17.9 versus 14.4 weeks (p<0.001 and 9.0% versus 6.7%. Both adult and teenage groups preferred to undergo TOP at the affiliated clinics rather than at the main hospital at 82.3% and 73.0%, respectively.

Main reasons for TOP in both adult and teenage groups were due to financial issues, at 99.9%

**Table 3.** Comparison of termination of pregnancy with mifepristone and misoprostol with the previous literatures

| | Present | Burton[5] | Tamang[6] | Kapp[7] | Choobun[8] | Endler[4] | Kelesidou[9] |
|---|---|---|---|---|---|---|---|
| Year | 2025 | 2025 | 2025 | 2023 | 2023 | 2024 | 2025 |
| Country | Thailand | USA | Nepal | Cambodia | Thailand | Multi* | Greece |
| Study | Retro | Pros | Pros | Pros | Pros | Pros | Pros |
| Diagnosis | VP | VEP | VP | VP | VP | VP | VP |
| GA (week) | <20 | <6 | 13 to 18 | <9 | ≤9 | 9-20 | ≤9 |
| Cases (n) | 4,691 | 423 | 120 | 910 | 39 | 724/540 | |
| First doses | | | | | | | |
| Mifepristone (mg) | 200, O | 200, O | 400, O | 200, O | 200, O | 200, O | 200, O |
| Misoprostol (µg) | 800, O | | | 800, O | | | |
| Interval (hours) | 48 | 24 | 24 to 48 | | 48 | 24/48 | 48 |
| Second dose | | | | | | | |
| Mifepristone (mg) | | | | | | | |
| Misoprostol (µg) | 400/SL | 800/B | 400/B | | 800, Vg | 400/SL | 800/Vg |
| Evaluation (days) | 2 | 2 | 2 | 10/30 | 10 | 0.5 | 21 |
| CER (%) | 39.6 | 87.9 | 82.0 | 82.5 | 92.3 | 89/94 | 96.9 |

GA=gestation age; Retro=retrospective study; Pros=prospective study; VP=viable pregnancy; VEP=very early pregnancy; O=oral route; SL=sublingual route; B=buccal route; Vg=vaginal suppository route; CER=complete expulsion rate

* Multi: India, Sweden, Thailand, and Vietnam

versus 98.2%, and interfere with being student, at 10.2% versus 58.7%, with statistical significances. Relationship dissolution gained only 28.1% versus 30.0% without statistical significance as the reason for TOP among adult and teenage groups, respectively. Higher number of participants in the teenage group required medical treatment and spontaneous expulsion rate was more than in the adult group at 92.8% versus 90.4% and 56.4% versus 39.6%, respectively with statistical significance as shown in Table 2. Overall complete expulsion rate was 42.7% (1,817 out of 4,259) in both groups. Overall complication namely bleeding, uterine atony, retained placenta, and uterine perforation of the adult and the teenage groups were 6.7% (259 out of 3,862) and 9.0% (75 out of 829) without statistical significance. There was only one case of suspected uterine perforation in the adult group. This case successfully received conservative treatment.

## Discussion

Upadhyay et al. reported in year 2024 that unintended pregnancy rate in South-East Asia declined to 21% concurrent with increasing rate of medical abortion[3]. Thailand was one of the countries in South-East Asia that had comprehensive abortion care guidelines for safe abortion[3].

The present study was conducted in a government general hospital in North-Eastern part of Thailand after the change of legal abortion section 301 and 305 in 2021. The use of mifepristone was permitted thus starting the launch for TOP program for reducing illegal termination of unwanted pregnancy. This work presented data from one of the pioneer-center of TOP programs between 2021 and 2024.

Participants who had GA less than 12 weeks underwent MVA. The teenage group had more complete expulsion rate than the adult group with statistical significance even though they had higher GA at the beginning of TOP. More of teenage group preferred to undergo TOP at affiliated clinics rather than at the hospital. This character of TOP treatment was similar to Endler's study that young participants found it more convenient to receive MMC from affiliated drug store[4].

Studies of viable pregnancy medical termination from Greece, Sweden, USA, Nepal, India, Cambodia, Vietnam, and Thailand between 2023 and 2025 were summarized and are presented in Table 3[4-9]. The mean GA range was between less than 6 weeks to 20 weeks. Mifepristone, at 200 or 400 mg, was given orally followed by different doses of intrabuccal, sublingual, or intravaginal misoprostol within the next 24 to 48 hours in different studies.

Complete evaluation of current study was done at two days after the last dose of medication. Most of the previous studies determined the complete expulsion of conceptive product from 12 hours to 21 days after medical application[4-9]. The waiting time for complete expulsion was too long for pregnant women. Emotional distress or post-loss stress was markedly elevated in these pregnant women[10,11].

Kelesidou et al. reported the efficacy of a misoprostol and mifepristone combination from Greece in 2025[9]. Eight hundred microgram of vaginal suppository misoprostol was administered within 48 hours after mifepristone administration. The expulsion rate in Kelesidou's literature was 96.9% at three weeks evaluation date[9]. The evaluation period of three weeks seemed too long for the patient's standpoint, not knowing for sure that the termination was completed but the total expulsion rate was excellent. Spontaneous conceptus expulsion rate in the current study was 42.7%, which is lower than in the Kelesidou's study[9]. Longer times of bleeding during abortion period disturbed participants' emotion. This might drive the hospital personnel to push for rapid termination.

In 2025, Tamang et al. conducted a prospective study in Nepal[6]. Tamang's regimen was the administration of 400 mg orally mifepristone followed by 400 µg misoprostol intrabuccal administered within the following 48 hours[6]. The complete expulsion rate was good at 82% at the evaluation time of two days. The evaluation period seemed appropriate, and the expulsion rate was good.

Choobun et al. and Burton et al. reported prospective studies in Thailand and U.S.A. in 2023 and 2025[5,8]. The method of TOP in the present study resembled Kelesidou's study[9] but with the use of misoprostol at 600 µg at vaginal suppository and intrabuccal routes, respectively. Excellent expulsion rate of 92.3% and 87.9%, was reported at the evaluation time of two and ten days in Burton's and Choobun's studies[5,8]. The shorter GA might have contributed to the excellent result in Kelesidou's work[9].

Kapp et al. reported their works from Cambodia 2023[7]. The method for pregnancy termination was the use of 200 mg oral mifepristone and 800 µg misoprostol simultaneously (Medabon®). Kapp's study recruited the cases with GA in less than nine weeks with 10 and 30 days from Medabon ingestion[7]. Complete expulsion rate was 82.5%[7]. The current study was conducted in Thailand between 2021 and 2024 with the same medication as Kapp's study[7]. The two doses of 400 µg misoprostol sublingually were administered within the following 48 hours. Average GA of Kapp's and current study were less than nine and twenty weeks, respectively. The completed expulsion rate in Kapp's and current study were 82% and 42.7%, respectively. The complete expulsion rate of current study was low compared to previous studies. The GA of the current study was affected by the longer period of waiting for complete expulsion. Evacuation procedure for stopping the TOP process after 48 hours might be from factors such as prolonged pain, bleeding, and hospital admission. Emotionally devastating experience of subjects forced or aggravated the attending health personals to rapid removal of the conceptus[11].

Endler et al. conducted multi-centric open label trial in India, Sweden, Thailand, and Vietnam in 2024[4]. Endler's protocol in pregnancy termination was the use of 200 mg oral mifepristone and 400 µg misoprostol sublingual 24 and 48 hours later. The complete expulsion rates were 89% and 94% after 24- and 48-hours interval of mifepristone and misoprostol with significance difference in non-inferior trial[4].

Misoprostol and mifepristone combination was introduced for the use of TOP since 2015[12]. The evaluation time to determine complete expulsion in the given protocol was ten to fourteen days. At the time, studies preferred to use shorter evaluation, of two days, than work done in earlier years[4-6]. Most subjects were not willing to come back and wait for evaluation time at 14 days. The current research protocol was designed to evaluate the efficacy and allow subjects to have a clear cut on the state of pregnancy in the shortest amount of time. The GA of the current study was more than those in the previous studies[4-9]. The complete expulsion rate of the current study was lower than those in other studies but with very few complications. After the completion of TOP, subjects could then proceed with a grieving period and recovering their health[13,14].

The low complete expulsion result in current investigation, at 42.7%, might be from the short waiting time of 48 hours as the evaluation point, and higher gestation age than previous studies[4-9]. The waiting time in the current study was shorter than in the previous studies[7-9]. The longer waiting time in previous investigation led to higher rate of complete abortion with minimal rate of uterine evacuation procedure. The short time of 48 hours, during admission for waiting the completion of TOP allowed anxious pregnant women to come to terms with their loss quickly. All participants in the current study were satisfied with the protocol and were willing to have MVA if total expulsion was not achieved at 48 hours.

The current study was the real-life use of MMC. It gave an effective TOP with high satisfaction of subjects and very few manageable complications. The combination of oral MMC and sublingual misoprostol were proven as an effective method for TOP with the new permission of Thai penal code 301 and 305.

Comparison between current and previous studies is summarized and shown in Table 3.

The strength of the present study was the first large report by using mifepristone in Thailand with high gestation age up to 20 weeks. The limitation of the present study was the perception of pregnant woman who felt grief, depression, anxiety, and stress to terminate her healthy fetus who did not want to wait long time as in the previous study. The decision of evacuation procedure might be influenced by the subject.

In conclusion, a regimen of 200 mg oral mifepristone followed by repeated doses of sublingual misoprostol is safe and effective for second-trimester medical termination up to 20 weeks. Although complete expulsion within 48 hours was lower than previous studies with longer observation periods, complication rates remained low and acceptable. This protocol offers a practical, patient-acceptable alternative in real-world settings.

## What is already know about this topic?

Previously, abortion in Thailand was only allowed for sexual assault or life-threatening maternal conditions. In 2021, the law changed to allow women to decide on pregnancy termination under medical guidelines. Methods include surgical evacuation for early gestation and medical treatment with misoprostol, often combined with mifepristone.

## What does this study add?

This study assessed the efficacy, side effects, and reasons for termination using this combination at PH and affiliated clinics. Overall, teenage pregnancies presented with a higher GA compared to adult pregnancies, which was associated with a high rate of spontaneous abortion. Medical management using a combination of misoprostol and mifepristone for second-trimester abortion demonstrates a high success rate with minimal complications. Moreover, pregnancies at higher GAs can safely undergo this termination method. Shorter procedural durations are also associated with a reduced risk of abortion-related complications.

## Acknowledgement

The authors would like to express their sincere appreciation to the PH director and all staff for their support in making this research possible. I am also grateful to Yanwadee Chitkoolsamphan for her assistance in the preparation of the manuscript during the submission process.

## Authors' contributions

VM, SM, and DP: Conceptualization and methodology; VM, SM, and DP: Investigation; VM, SM, and AC: Analysis; VM, SM, and AC: Visualization and writing-original draft; SM, KB, and KS: Writing-review and editing; DP and KS: Supervision. All authors have read and agreed to the final version of manuscript.

## Conflicts of interest

The authors declare no conflict of interest.

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