**Advances in Bioresearch**
Adv. Biores., Vol 13 (1) January 2022: 117-122

Print ISSN 0976-4585; Online ISSN 2277-1573
Journal's URL:http://www.soeagra.com/abr.html
CODEN: ABRDC3
DOI: 10.15515/abr.0976-4585.13.1.117122

Advances in Bioresearch

## ORIGINAL ARTICLE

# Effect of vaginal ph on the efficacy of vagina misoprostol in induction of first trimester abortion

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**ABSTRACT**
*The study was carried out to learn about the effects that vaginal pH can have on the efficacy of misoprostol in inducing abortion by administering intravaginally. With the help of some findings, this study concluded that a vaginal pH of 5 or < 5 founded to potentiate the effect of misoprostol in termination process of first trimester pregnancies.*
**Keywords**: Abortion, Cervical, Misoprostol.

Received 21.07.2021 Revised 11.09.2021 Accepted 23.11.2021

**How to cite this article:**
Preethi B, Logeswari BM, Revathy V, Revathy TG. Effect of vaginal ph on the efficacy of vagina misoprostol in induction of first trimester abortion. Adv. Biores. Vol 13 [1] January 2022. 117-122

## INTRODUCTION

Abortion is defined as expulsion of the products of conception before period of viability. Termination of pregnancy at present could be done by two methods namely, surgical and medical methods [1]. With respect to satisfaction too, medical abortion had scored higher satisfaction rates than its counterpart, surgical abortion [2]. The World Health Organisation (WHO) had stated two drugs namely, misoprostol and mifepristone which were generally used to induce abortions[4]. Misoprostol is a prostaglandin E1 analogue approved by Food and Drug Administration (FDA) mainly for the treatment and prevention of gastric
ulcer associated with NSAID usage [3]. The mechanism by which Misoprostol acts were mostly through enz ymatic changes promoting collagen breakdown, facilitating rearrangement of collagen fibres and altering the cervical extracellular matrix [4]. Studies has reported that the success rate of termination with misoprostol was fully associated with plasma drug levels and to attain it, it is necessary to learn about the factors that affect the environment in the vagina that may lead to greater solubility and absorption of the drug [5]. One potentially important factor affecting the above, reported by many studies is the vaginal pH. But Misoprostol's efficacy has also been questioned by many studies based on the effect of vaginal pH on the drug. A complete consensus is yet to occur regarding the above [6]. This study has been done, to find out whether the efficacy of vaginal misoprostol is affected by the vaginal pH during induction of first trimester abortion.

## MATERIAL AND METHODS

STUDY DESIGN: Prospective comparative study
STUDY POPULATION: Participants included in this study were pregnant women who attended the department of obstetrics and gynaecology of this institute for first trimester termination. The study participants were included only after fulfilling the e following inclusion and exclusion criteria.
*Inclusion Criteria:*
1. Age 18 – 35 years
2. Intra uterine pregnancy
3. Singleton pregnancy
4. Gestational age: <12 weeks

5. No abnormality in cervix or uterus
6. No signs of spontaneous abortion

*Exclusion criteria:*

1. Any contraindication to medical termination of pregnancy
2. Evidences suggestive of spontaneous abortion like abdominal pain, bleeding pv, cervical changes
3. No prior history of intervention in this pregnancy
4. Multi foetal pregnancy
5. Previous 2 caesarean section or other uterine surgery or past history of uterine perforation
6. Previous cervical surgery as cauterization
7. Any cervical or vaginal infection requiring local medication which may alter the vaginal pH.
8. Any contraindication to receiving prostaglandins like hypersensitivity, history of asthma, glaucoma, cardiac or cardiovascular disease

**STATISTICAL ANALYSIS**

All the data collected for this study using proforma were entered into excel spread sheet. The spread sheet was then analysed using SPSS (Statistical Package For social sciences) version 23. Both descriptive and analytical statistics were employed during the analysis. Qualitative variables were expressed using proportions and percentages. Quantitative variables were expressed using mean and standard deviation.

For comparison between two proportions, Chi square statistics were employed and for comparing two means, unpaired T test was employed

**RESULTS**

This was a prospective comparative clinical study carried out with 150 study participants.

**Table 1: Distribution of age among the study participants.**

| Age group(in years) | Frequency(n) | Percentage (%) |
|---|---|---|
| ≤ 20 | 5 | 3.3 |
| 21-25 | 58 | 38.7 |
| 26-30 | 65 | 43.3 |
| 31-35 | 22 | 14.7 |
| Total | 150 | 100.0 |

Among the 150 study participants, 65(43.3%) of the study participants belonged to age group of 26 -30 years followed by 58 (38.7%) belonged to age group of 21 -25 years.The mean age among the participants in this study was 26.55±3.54 years.

**Table 2: Distribution of study participants according to gravida & vaginal pH**

| Gravida | Vaginal pH | | | |
|---|---|---|---|---|
| | ≤ 5 | | >5 | |
| | N | % | N | % |
| 1 | 40 | 38.5 | 15 | 32.6 |
| 2 | 52 | 50.0 | 23 | 50.0 |
| 3 | 11 | 10.6 | 8 | 17.4 |
| 4 | 1 | 1.0 | 0 | 0 |
| Total | 104 | 69.3 | 46 | 30.7 |

Study participants with gravida 2 had contributed 50% to each of the groups with vaginal pH ≤ 5 and Vaginal pH more than 5.

**Table 5: Distribution according to gestational age.**

| Gestational age (in days) | Frequency (n) | Percent (%) |
|---|---|---|
| 36-42 | 8 | 5.3 |
| 43-49 | 24 | 16.0 |
| 50-56 | 28 | 18.7 |
| 57-63 | 36 | 24.0 |
| 64-70 | 19 | 12.7 |
| 71-77 | 25 | 16.7 |
| 78-84 | 10 | 0.07 |
| Total | 150 | 100 |

 

36 (24.0%) study participants had gestational age ranging between 57 days and 63 days(9 weeks); and 28 (18.7%) had gestational age between 50 days and 56 days(7 weeks). 60.46 ± 11.24 days was the mean gestational age among the study participants.

**Table 3: Distribution according to vaginal pH.**

| Vaginal pH | Frequency | Percent |
|---|---|---|
| 4.0 | 51 | 34.0 |
| 5.0 | 53 | 35.3 |
| 6.0 | 26 | 17.3 |
| 7.0 | 20 | 13.3 |
| Total | 150 | 100.0 |

Out of 150 study participants included in this study, the vaginal pH was 5 or less than 5 for 104 (69.3%) participants and it was more than 5 for 43 (30.6%) participants.

**Table 4: Distribution according to dosage of misoprostol.**

| Total dosage (in mcg) | Vaginal pH | | | | Total | |
|---|---|---|---|---|---|---|
| | ≤ 5 | | >5 | | | |
| | N | % | N | % | N | % |
| 800 | 71 | 68.3 | 6 | 13.0 | 77 | 51.3 |
| 1600 | 32 | 30.8 | 21 | 45.7 | 53 | 35.3 |
| 2400 | 1 | 1.0 | 19 | 41.3 | 20 | 13.3 |
| Total | 104 | 69.3 | 46 | 30.7 | 150 | 100 |

A total dose of 800 mcg was provided to 71 (68.3%) participants with vaginal pH of ≤ 5 and 33 (31.8%) received dose of >800 microgram. In contrast 40 (87.0%) study participants with vaginal pH more than 5 received a dosage of more than 800 microgram.

**Table 5: Distribution based on time taken for the occurrence of pain, bleeding and complete expulsion of product of conception after the first dose of misoprostol.**

| | | Frequency | Percent |
|---|---|---|---|
| Duration for pain to occur (in minutes) | 30-45 | 31 | 20.7 |
| | 46-60 | 23 | 15.3 |
| | 61-75 | 53 | 35.3 |
| | 76-90 | 19 | 12.7 |
| | 91-105 | 14 | 9.3 |
| | >105 | 10 | 6.7 |
| Duration for Bleeding to occur (in minutes) | 45-90 | 84 | 56.0 |
| | 91-135 | 58 | 38.7 |
| | 136-180 | 5 | 3.3 |
| | >180 | 3 | 2.0 |
| Duration for complete expulsion (in minutes) | 181-300 | 44 | 29.3 |
| | 301-420 | 20 | 13.3 |
| | 421-540 | 26 | 17.3 |
| | 541-660 | 24 | 16.0 |
| | 661-780 | 19 | 12.7 |
| | 781-900 | 12 | 8.0 |
| | >900 | 5 | 3.3 |

53(35.3%) had pain between 61 and 75 minutes followed by 31 (20.7%) had pain between 30 - 45 mins. 72.90±20.94 minutes was mean time taken for pain to begin after 1 st dose of misoprostol. Bleeding started in about 84 study participants (56.0%) between 45 and 90 minutes followed by 58 (38.7%) between 91 and 135 minutes. 99.26±24.71 minutes was mean time for bleeding to start after the final dose of misoprostol. 44 (29.3%) of the participants had complete expulsion between 181 and 300 minutes followed by 26 (17.3%) had complete expulsion between 421 and 540 minutes. 495.57± 215.01 minutes was mean time for complete expulsion after the final dose of misoprostol.

 

**Table 6: Distribution according to outcome of check ultrasonogram after expulsion.**

| | | Frequency | Percent |
|---|---|---|---|
| Check USG | Incomplete abortion | 10 | 6.7 |
| | Complete abortion | 140 | 93.3 |
| Treatment after checkUSG | Nil | 140 | 93.3 |
| | Suction and Evacuation | 10 | 6.7 |

Complete abortion took place in 140 (93.3%) participants followed by 10 (6.7%) with incomplete abortion. To all the participants with incomplete abortion, suction and evacuation was done.

**Table 7: comparison of total dose between those withvaginal pH less than or equal to 5 and pH > 5.**

| Vaginal pH | Dose of Misoprostol | | Tvalue | Df | P value |
|---|---|---|---|---|---|
| | Mean | SD | | | |
| ≤ 5 | 1061.53 | 393.22 | 8.505 | 66.11 | <0.05* |
| >5 | 1826.08 | 550.73 | | | |

The mean dosage of misoprostol provided to participants group with pH less than or equal to 5 was 1061.53 ± 393.22 mcg and that for participant group with pH more than 5 was 1826.08± 550.73 mcg. The dose required for participants group with lesser pH was lesser than the group with pH more than 5. The above difference was statistically significant with P value of < 0.05. Lower dose of misoprostol required for lower vaginal pH.

**Table 8: Comparison of time at which pain have startedbetween participants with vaginal pH≤ 5 and pH > 5.**

| Vaginal pH | Time at which pain starts (in minutes) | | Tvalue | Df | P value |
|---|---|---|---|---|---|
| | Mean | SD | | | |
| ≤ 5 | 65.76 | 17.80 | 7.283 | 148 | <0.05* |
| >5 | 89.02 | 18.54 | | | |

The mean time required for pain to occur in participants group with vaginal pH less than or equal to 5 was 65.76 ± 17.80 minutes and the participants group with pH more than 5 was 89.02 ± 18.54 minutes. In the group with lesser pH, the time taken for pain to occur was lower compared to other group with greater pH. This difference is statistically significant with P value of less than 0. 05. In case where vaginal pH were lesser, the time taken for pain to occur was also lesser.

**Table 9: Comparison of time at which bleeding havestarted between group with vaginal pH ≤ 5 and pH.**

| Vaginal pH | Time at which bleeding starts (in minutes) | | Tvalue | df | Pvalue |
|---|---|---|---|---|---|
| | Mean | SD | | | |
| ≤ 5 | 93.51 | 22.75 | 4.566 | 148 | <0.05* |
| >5 | 112.28 | 24.23 | | | |

The mean time for bleeding after the final dose of misoprostol was 93.51 ± 22.75 minutes in the study group with pH less than or equal to 5 while in the alternate group with pH more than 5 it was 112.28 ± 24.23 minutes. The time taken was lesser in the group with pH ≤ 5 than group with pH > 5. The above difference was statistically significant with p value of < 0.05.

**Table 10: Comparison of mean time at which complete expulsion took place after the last dose between the two participants groups.**

| Vaginal pH | Time at which complete expulsion occurred (in minutes) | | T value | Df | P value |
|---|---|---|---|---|---|
| | Mean | SD | | | |
| ≤ 5 | 417.26 | 177.65 | 8.001 | 148 | <0.05* |
| >5 | 672.63 | 186.05 | | | |

 

The time taken for complete expulsion was 417.26 ± 177.65 minutes for the group with pH less than or equal to 5 whereas for the comparative group with pH more than 5 the time taken was 672.63 ± 186.05 minutes. The time taken for complete expulsion was lesser in the participants group with lesser pH than that with pH more than 5. This difference was statistically significant with p value < 0.05.

**Table11: Comparison of outcome between two participantgroups**

| Check USG | Vaginal pH | | | |
|---|---|---|---|---|
| | ≤5 | | >5 | |
| | N | % | N | % |
| Complete abortion | 102 | 98.1 | 38 | 82.6 |
| Incomplete abortion | 2 | 1.9 | 8 | 17.4 |

$X^2$ – 12.26 d.f – 1 P value < 0.001*

Out of the 104 participants in this study whose vaginal pH was ≤ 5, 102 (98.1%) of the participants had complete abortion and out of the 46 participants whose vaginal pH was > 5, 38 (82.6%) participants had complete abortion while 8 (17.4%) had incomplete abortion. The rate of failure was 1.9% when vaginal pH ≤ 5 whereas when vaginal pH > 5, it was 17.4%. For complete abortion, a vaginal pH of 5 or less is favoured compared to vaginal pH > 5. This difference is statistically significant with P value < 0.05. The participants with incomplete abortion from both the groups were treated with suction and evacuation.

## DISCUSSION

This study comprised of 150 participants, among them 104 (69.3%) participants had vaginal pH ≤ 5 and 46 (30.7%) participants had vaginal pH > 5. 26.55±3.54 years was found to be the mean age of participants included in this study. The mean dose of misoprostol provided was 1061.53 ± 393.22 microgram to the participants group with pH ≤ 5 and it was 1826.08 ± 550.73 microgram for the participants group with pH> 5. This difference between the two participant groups was statistically significant. This was the same as attained by the previous study [7].

In participants group with vaginal pH ≤ 5, the mean duration for onset of pain was less compared to the other participants group with vaginal pH > 5. This difference in mean duration for onset of pain was also found to be statistically significant after applying "unpaired T test" with a p value of <0.05. This finding from the present study indicates that when vaginal pH is ≤ 5, it influences the effect of Misoprostol by reducing the duration for initiating pain to occur during the process of termination of pregnancy in 1st trimester.

After administering Misoprostol, bleeding occurred after 93.51 ± 22.75 minutes in participants group with vaginal pH ≤ 5 and the duration was 112.28 ± 24.23 minutes in participants group with pH >5. It took less time for bleeding to occur in participants group with vaginal pH ≤ 5 compared to the group with pH > 5. This finding indicates that after Misoprostol administration, the duration for initiation of bleeding was less in participants group with vaginal pH ≤ 5 compared to the participants group with pH > 5. Time taken for complete expulsion to take place after administration of Misoprostol between vaginal pH ≤5 and >5. From this observation, it can be concluded that the duration for complete expulsion to occur
following Misoprostol's administration was shorter when vaginal pH was ≤ 5. Similar results were reported by Behrooz et al regarding time taken for termination of pregnancy with respect to vaginal pH [8].

Vaginal pH of ≤ 5 found to potentiate the effect of misoprostol in 1 st trimester pregnancy termination. This study found that the time taken for initiation of termination of pregnancy as indicated by variables namely, duration for pain and bleeding to occur was less when the vaginal pH was more acidic with pH value of ≤ 5. Similarly, the total dose needed for the process of termination was also lesser when the vaginal pH is ≤ 5. Finally, the time duration for process of termination to complete was also lesser among those with vaginal pH ≤ 5. The proportion of success rate (complete abortion) is also more in the participants group when vaginal pH ( ≤ 5) was lesser.

## CONCLUSION

Misoprostol is a game changing prostaglandin analogue with respect to its application in obstetrics and gynaecology. This study found that the total dosage of misoprostol required for the termination of pregnancy in first trimester was lesser with acidic vaginal pH with a pH level ≤ 5. The time taken for initiation of termination was less in an acidic vaginal environment (pH 5 or lesser). The entire process of pregnancy termination, from induction to complete expulsion also took lesser time when the vaginal pH is ≤ 5. The success rates were also more in group with a vaginal pH of ≤ 5 while the success rate was less in group with vaginal pH > 5. A vaginal pH of 5 or < 5 founded to potentiate the effect of misoprostol in

 

termination process of first trimester pregnancies. This study result would encourage development of intervention to acidify the vaginal environment along with misoprostol administration that would increase the absorption, bioavailability and efficacy of misoprostol in termination of pregnancy in first trimester.

## REFERENCES


1. Safe abortion: Technical and policy guidance for health systems. Report Health Matters. (2012) Jan;20(39):205 – 7.
2. Zanjani M, Kohpayeh J, Karimi Z. (2017). The Effect of Vaginal pH on the Efficacy of Vaginal Misoprostol for the Induction of Midtrimester Pregnancy Termination. J Obstet Gynecol Cancer Res [Internet].2(1).1-5
3. Goldberg AB, Greenberg MB, Darney PD. (2001). Misoprostol and Pregnancy. Wood AJJ, editor. N Engl J Med.;344(1):38–47.
4. Ramsey PS, Ogburn PL, Harris DY, Heise RH, Ramin KD. (2000). Effect of vaginal pH on efficacy of misoprostol for cervical ripening and labor induction. Am J Obstet Gynecol. 182(6):1616 –9.
5. Shah N, Azam SI, Khan NH. (2010). Sublingual versus vaginal misoprostol in the management of missed miscarriage. J Pak Med Assoc.;60(2):4-9.
6. Behrooz A, Shahbazian N, Ghanavati N. (2016). Effects of Vaginal pH on the Efficacy of Vaginal Misoprostol for Induction of Midtrimester Abortion.;10.109-113
7. Sioutas A, Sandstrom A, Fiala C, Watzer B, Schweer H, Gemzell-Danielsson K. (2012). Effect of bacterial vaginosis on the pharmacokinetics of misoprostol in early pregnancy. Hum Reprod. ;27(2):388 –93.
8. Gemzell-Danielsson K, Ho PC, Gómez Ponce de León R, Weeks A, Winikoff B.(2007). Misoprostol to treat missed abortion in the first trimester. Int J Gynecol Obstet. 99:S182–5.