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**Address for Correspondence:**Editorial Room Andalas Obstetrics and Gynecology Journal, 3<sup>rd</sup> floor of KSM of Obstetrics and Gynecology, RSUP DR. M. Djamil Padang, Jl. Perintis Kemerdekaan Padang, Sumatera Barat 25127**Website:**<http://jurnalobgin.fk.unand.ac.id/index.php/JOE>**RESEARCH**

## Differences of Increased Bishop Scores Between Neutrophil Swab Vaginal $\leq 5$ and $> 5$ in 41 Weeks of Pregnancy Induced With Misoprostol

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**Abstract**

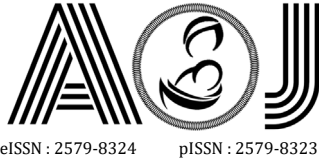
The incidence of labor induction with various indications was to increase. The key to successful labor induction is a ripe cervix. Research shows that the degree of cervical ripening as assessed by the Bishop score is influenced by the level of neutrophils contained in the cervical stroma which can be detected by performing a vaginal swab. Neutrophils will produce collagenase in the form of matrix metalloproteinase - 8 (MMPs - 8) which will degrade cervical collagen fibers, so that the cervix becomes soft and ripe. Misoprostol is the drug most widely used in labor induction today. Purpose: This study was to determine the difference in Bishop score increase between vaginal swab neutrophils  $\leq 5$  and  $> 5$  in pregnancy  $\geq 41$  weeks induced by misoprostol.

**Keywords:** Bishop score, neutrophil, vaginal swab, misoprostol

**INTRODUCTION**

Induction of labor is one of the procedures performed to overcome some complications of labor. Induction of labor is artificial stimulation performed to stimulate uterine contractions both pharmacologically and mechanically before the onset of normal labor. Pharmacologically induction can be done by giving oxytocin and prostaglandins, while the mechanics include insertion of an intracervical balloon catheter, membrane stripping and amniotomy.<sup>1-5</sup>

In Indonesia, WHO found that out of 500,000 mothers giving birth at risk, 200,000 of them underwent labor induction and this figure tends to increase. The results of the Indonesian Demographic Health Survey (IDHS) in 2009 stated that there were 285 cases of induced births out of 1046 deliveries obtained from research results in several hospitals in Indonesia.<sup>2</sup> Salmarini's research at the Regional General Hospital (RSUD) dr. Murjani in 2016 also showed that labor induction has increased from year to year, namely as many as 86 cases (4.43%) in 2013, as many as 154 cases (7.12%) in 2014, and in 2015 as many as 181 cases. (9.15%).<sup>3</sup> Data from monthly reports from several Regional Hospitals in West Sumatra in collaboration with M Jamil Hospital, Padang Panjang Hospital is one of the hospitals with the highest labor induction rates, reaching 30 - 35% of all deliveries.



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One of the most common indications for labor induction is postterm pregnancy or postterm pregnancy where the gestational age reaches at least 41 weeks. WHO recommends induction of labor when gestational age can be accurately identified at 40 6/7 weeks.<sup>4</sup> Other indications include premature rupture of membranes, maternal medical conditions that can endanger pregnancy, chorioamnionitis, placental abruption and Intra Uterine fetal death (IUFD).<sup>5-8</sup>

The pharmacological method of labor induction that is currently receiving more attention is misoprostol. Misoprostol is a synthetic prostaglandin E1, which has many advantages over other prostaglandins, namely low price, stable at room temperature, easy storage and use for cervical ripening and labor induction. Especially in cases where the cervix is immature, the use of misoprostol can provide several advantages so that it can reduce the incidence of cesarean section.<sup>6</sup> Furthermore, other studies have reported that intravaginal misoprostol provides more effective results. Misoprostol works by increasing vascular permeability and stimulating neutrophil influx into the cervical stroma.<sup>7</sup>

The success of labor induction depends on the condition of the cervix before induction. The condition of the cervix is classified into two, namely ripe (ripe) and immature (unripe) obtained from internal examination. Cervical ripening is an inflammatory process. Physiologically, the cervix produces inflammatory cytokines, especially IL-8.<sup>8</sup> Activation of the interleukin cascade is induced by functional progesterone withdrawal in term labor and ascendent infection in preterm labor. Activation of this cascade will stimulate IL-8 to attract neutrophils to the cervix. Neutrophils produce matrix metalloproteases (MMPs) or collagenases that will lyse cervical collagen fibers.<sup>9,10</sup>

Based on the background description above, the authors feel it is necessary to conduct a study to see the difference in the increase in Bishop's score between vaginal swab neutrophils 5 and > 5 in pregnancies kehamilan 41 weeks induced by misoprostol.

## METHODS

This study uses a cross sectional study design, where the research object is only observed once and measurements are made on the status or variable of the object at the time of examination by approaching and collecting data at the same time. This research was conducted during September 2020 - March 2021 which was carried out at the Padang Panjang Hospital. The study population was all patients with gestational age 41 weeks who gave birth by misoprostol induction in the delivery room of RSUD Kota Padang Panjang. The research sample is the research population that meets the inclusion criteria; (1) Willing to be research subjects, (2) single live intrauterine fetus with head presentation, (3) gestational age 41 weeks, (4) membranes intact, (5) primigravida, (6) BMI within normal limits (18, 5 - 24.9 Kg/M<sup>2</sup>). And there are no exclusion criteria; (1) Macrosomia, (2) Placental abruption, (3) Placenta



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previa, (4) IUFD, (5) Malpresentation, (6) Having comorbid diseases (cancer, lupus erythematosus and other auto immune diseases, aplastic anemia, mental illness) , (7) Receiving long-term corticosteroid treatment, and (8) Chorioamnionitis and genital infections. Calculation of sample size based on the two-side test formula for hypothesis testing, the minimum sample obtained was 25.87 patients, rounded up to 26 patients. The sampling technique was consecutive sampling, namely the selection of samples by determining subjects who met the inclusion criteria and there were no exclusion criteria entered into the study until the required number of subjects was met. Basic data obtained by taking a history and direct examination of the patient. Samples were selected according to inclusion and exclusion criteria. After all the data is collected, then data processing is carried out, through the process of editing, coding and data entry. Data analysis in this study was univariate categorical variables presented in the form of frequency distribution (frequency and percentage) and bivariate analysis to assess the difference in the increase in Bishop's score between vaginal swab neutrophils 5 and > 5 at pada 41 weeks gestation induced with misoprostol using an independent T test. For data with normal distribution, Mann Whitney test is used for data with abnormal distribution.

**RESULTS****Table 1.** Respondents Characteristics

Characteristic	Positive Neutrophils (Mean ± SD)	Negative Neutrophils (Mean ± SD)
Age (year)	23,08 ± 2,30	23,65 ± 1,88

Based on Table 1, it is known that the average age of the respondents in the two groups is relatively the same where the average age for positive neutrophils is 23.08 ± 2.30 years while for negative neutrophils 23.65 ± 1.88 years.

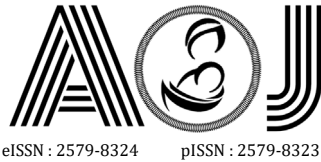
**Table 2.** Bishop Score Increase with Negative Vaginal Neutrophil Swab

Characteristic	Negative Neutrophils (Mean ± SD)
Bishop's Score Increase	1,27 ± 0,92

Based on Table 2, it is known that the increase in the bishop score in the group with negative neutrophils was 1.27 ± 0.92.

**Table 3.** Bishop Score Increase with Positive Vaginal Neutrophil Swab

Characteristic	Positive Neutrophils (Mean ± SD)
Bishop's Score Increase	5,77 ± 1,21



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Based on Table 3, it is known that the increase in the bishop score in the group with positive neutrophils was  $5.77 \pm 1.21$ .

**Table 4.** Normality Test Results

Characteristic	N	Mean $\pm$ SD	p-Value
Bishop Score Increase with Positive Vaginal Neutrophil Swab	26	1,27 $\pm$ 0,92	0,0001
Bishop Score Increase with Negative Vaginal Neutrophil Swab	26	5,77 $\pm$ 1,21	0,013

Based on Table 4, it is known that the increase in the negative neutrophil bishop score is not normally distributed, so it is necessary to transform the data. The results of data transformation can be seen in Table 5 below:

**Table 5.** Data Transformation Results

Characteristic	N	Mean $\pm$ SD	p-Value
Bishop Score Increase with Positive Vaginal Neutrophil Swab	26	1,27 $\pm$ 0,92	0,0001
Bishop Score Increase with Negative Vaginal Neutrophil Swab	26	5,77 $\pm$ 1,21	0,013

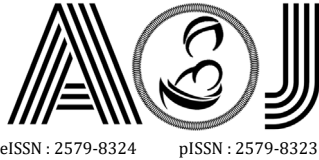
Based on Table 5, it is known that after data transformation, the distribution of the data is still not normal, so non-parametric statistical tests are used.

The difference in the increase in the Bishop score between negative and positive vaginal swab neutrophils in pregnancy  $\geq 41$  weeks induced by misoprostol can be seen in Table 6 below:

**Table 6.** Differences in Bishop's Score Increase between Negative and Positive Vaginal Swab Neutrophils

Characteristic	Negative Neutrophils (median $\pm$ SD)	Positive Neutrophils (median $\pm$ SD)	p-Value
Bishop's Score Increase	1,50 $\pm$ 0,92	6 $\pm$ 1,21	0,0001

Based on Table 6, it can be concluded that the median increase in Bishop's score for positive neutrophils was higher at  $6 \pm 1.21$  while that for negative neutrophils was  $1.50 \pm 0.92$ . The results of statistical tests showed that there was a difference in the mean increase in Bishop's score between negative and positive vaginal swab neutrophils ( $p < 0.05$ ).



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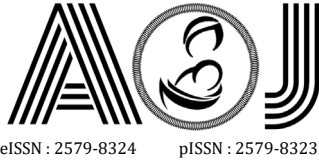
Vaginal Swab Neutrophils	Vaginal Parturition f (%)	Additional Misoprostol f (%)	p-Value	OR
Positive neutrophils	26 (100)	0 (0)	0,0001	6,5 (2,64 – 16,01)
Negative neutrophils	4 (15,4)	22 (84,6)		

Based on Table 7, it is known that as many as 26 (100%) respondents with positive neutrophils experienced vaginal delivery and as many as 22 (84.6%) respondents with negative neutrophils with additional misoprostol. Statistical test results showed that there was a relationship between vaginal swab neutrophils with successful vaginal delivery ( $p < 0.05$ ) and patients with positive neutrophils had a 6.5 times risk (2.64-16.01) for vaginal delivery.

## DISCUSSION

The results showed that the average age of respondents in the negative and positive neutrophil groups was almost the same. Neutrophils were not affected by the age of the patient. The results showed that the mean increase in Bishop's score in patients with negative neutrophils, vaginal neutrophil swab 5, induced by misoprostol was  $1.27 \pm 0.92$ . Of the 26 samples with vaginal swab neutrophils 5, where all samples had relatively the same initial Bishop score, there were 4 samples that showed a significant increase in Bishop score resulting in cervical ripening. This can be caused by the presence of other factors that affect cervical maturity that were not measured in this study, namely the level of estrogen in the mother's blood circulation and the level of nitric oxide contained in the cervix. This is in accordance with previous studies which stated that cervical neutrophils have estradiol receptors and that estradiol plays a direct role in influencing neutrophil function in the cervical ripening process.

The results showed that the mean increase in Bishop's score in patients with positive neutrophils, vaginal neutrophil swabs  $> 5$ , induced by misoprostol was  $5.77 \pm 1.21$ . The results of this study showed that the cervix which was initially at an immature Bishop score gave an accelerated increase in the high score after being given 25  $\mu\text{g}$  of misoprostol vaginally, resulting in a cervix with a mature Bishop score. Misoprostol will attract as many neutrophils as possible and synergize with IL-8 to activate these neutrophils. Active neutrophils will produce MMPs that will degrade cervical collagen fibers. The more the number of neutrophils, the more levels of MMPs are produced so that the cervix becomes very soft and ripe. It can be concluded that there are other factors that can affect the speed of cervical maturity and in this case neutrophils. Neutrophils are a very influential indicator of cervical



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ripening. This supports the results of the research I did, more neutrophils gave a higher Bishop score change.<sup>9-12</sup>

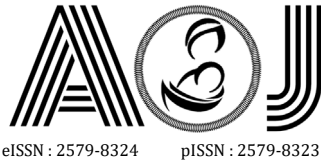
The results of the analysis showed that there was a significant difference in the increase in Bishop's score between negative and positive neutrophils at 41 weeks' gestation induced by misoprostol with a P value of <0.05. In this study, the drug misoprostol was used. Misoprostol is a synthetic prostaglandin analog that can trigger cervical ripening. Prostaglandins mediate the migration of neutrophils and macrophages into the cervical stroma. Prostaglandins will also cause increased capillary permeability. This makes it easier for neutrophils to infiltrate into the cervical stroma. Misoprostol synergizes with IL-8 in triggering the activation and degranulation of neutrophils to produce matrix metalloproteinases (MMPs-8). MMPs will degrade cervical collagen fibers. In this study, the sample group with positive vaginal swab neutrophils, vaginal swab neutrophils > 5 will produce more MMPs which will make it easier for the cervix to dilate and thin so that the resulting Bishop score is higher than the negative vaginal swab neutrophil sample group.<sup>11-13</sup>

The expected pregnancy outcome from the induction of labor is vaginal delivery. Pregnancy outcomes in this study were divided into two groups, namely vaginal delivery and additional misoprostol. This study gave different results in the two groups regarding vaginal delivery. The vaginal delivery rate in the group with positive neutrophils, vaginal swab neutrophils > 5 after 2 doses of misoprostol 25 g vaginally with an interval of 6 hours was 100%. In the negative neutrophil group, vaginal swab neutrophils 5, the vaginal delivery rate after 2 doses of misoprostol 25 g vaginally with an interval of 6 hours was 15.4% while the rest required additional misoprostol to get to vaginal delivery.<sup>14-18</sup>

Other factors that could inhibit vaginal delivery in this study were excluded from the exclusion criteria. In this study, all samples had a wide pelvic size and birth weight < 4000 grams with cephalic presentation. Data analysis to assess the relationship of vaginal swab neutrophils with the success of vaginal parturition obtained a p value <0.05. It can be concluded that there is a significant relationship between vaginal swab neutrophils and the success of vaginal delivery. The odd ratio value obtained in this study was 6.5. It can be concluded, vaginal swab neutrophils > 5 have a 6.5 times greater chance of successful vaginal delivery compared to vaginal swab neutrophils 5.<sup>16-20</sup>

## CONCLUSIONS

From the research, it was concluded that there was an increase in Bishop's score with vaginal neutrophil swab 5 in pregnancy 41 weeks induced with misoprostol. There was an increase in Bishop's score with vaginal neutrophil swab > 5 at 41 weeks' gestation induced with misoprostol. There was a difference in the increase in Bishop's score between vaginal swab neutrophils 5 and > 5 at 41 weeks' gestation induced by misoprostol (p<0.05). There is



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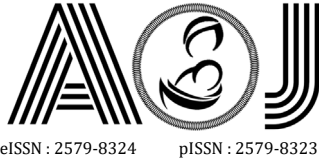
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a relationship between vaginal swab neutrophils with successful vaginal delivery. ( $p < 0.05$ ) Copy and paste the conclusion in this column. The font type and size will automatically adjust. The conclusion section contains research findings which are answers to research questions or in the form of a summary of the discussion of research results. Conclusions are presented in paragraph form, not in bullet points.

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