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# Effect of Nipple and Uterine Stimulation on the Progress of Labor among Primiparous Women

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***Abstract:*** **Nipple and uterine stimulation have been suggested as effective, inexpensive, non-medical and natural ways that induce labor and speed up its progress. Oxytocin is a hormone released from the posterior pituitary gland in a pulsed manner in response to these stimulations. Objective: Determine the effect of nipple and uterine stimulation on the progress of labor among primiparous Women. Setting: Labor unit and delivery of obstetric and gynecologic department at Damanhour National Medical Institute affiliated to Ministry of Health in El-Behira Governorate. Results: The total Bishop Score was highly significantly higher among the study groups (P=0.000) on the 2nd & the 4th hours after intervention. Mean duration of labor was also found to be highly significantly (P=0.000) shorter among the study groups, compared to the control group. In addition, oxytocics was highly significantly (P=0.000) needed by a sizeable proportion (76%) of the control group, compared to only 8% & 12% of the nipple and uterine stimulation groups respectively. Moreover, mode of delivery was found to be highly significantly (P=0.000) normal among all of the latter groups, compared to 80% of the former group, where the remaining 20% of them had CS delivery. Conclusion: induction of labor by nipple and uterine stimulation resulted in better progress of labor. Recommendations: Maternity nurses should teach women about nipple and uterine stimulation techniques during their antenatal visits in late pregnancy to enhance their progress of labor and attain normal vaginal delivery.**

***Keywords:*** **Nipple Stimulation, Uterine Stimulation, Progress of Labor, Primiparous Women.**

## I. INTRODUCTION

Labor is stimulated naturally through the production of oxytocin hormone in a pregnant woman. Once this hormone attains a certain level in a woman's blood stream, uterine contractions increase to the rate that helps the final stages of labor to take place. Where the natural output of oxytocin hormone is insufficient, providing stimulation is a substitute to create its production [(1)]. Labor induction is considered as a method of artificial initiation of uterine contractions after the age of fetal viability and before the spontaneous onset of labor, to achieve the effacement and dilation of the cervix, which leads to vaginal delivery [(2)].

However, the overall rate of labor induction in the United States in 1993 was 134/1,000 live births, or over 527,000 out of the four million births that occur annually [(3, 4)]. The WHO Global Survey in 24 countries reported induction rates of 11.4% in eight Latin American countries, 4.4% in seven African countries, and 12.1% in nine Asian countries [(5, 6)]. Labor induction is indicated when the benefits to the mother or fetus outweigh those of continued pregnancy, such as diabetes mellitus, pregnancy induced hypertension, restricted fetal development, premature rupture of the membranes, and post-dated pregnancy [(7)]. The cervix is normally two centimeters long, firm and closed throughout pregnancy; its maturation is the result of physiological processes that soften, efface, and dilate it prior to the onset of labor. Thus, successful labor induction relies on sufficient uterine contractions that are effective in inducing progressive cervical dilatation [(8)].

Pharmacological induction agents such as prostaglandins and oxytocics are commonly used for cervical ripening. But their use is potentially dangerous to the fetus and the mother, because when the contractions increase in frequency, strength and duration above normal levels, the fetal and placental circulation may be impaired, resulting in fetal distress. Birth injuries may also result from being propelled too rapidly through the birth canal. In addition, tetanic contractions can result in placenta abruption and uterine rupture [(9)]. Moreover, cervical lacerations may occur due to rapid passage of the fetus through the cervix and amniotic fluid embolism may further develop. These dangers can be minimized by carefully monitoring drug administration, character of contractions and condition of the fetus. Overdose of oxytocics, injudicious administration of the drug, as well as poor maternal and fetal assessment result in serious maternal and fetal complications [(10)].

Non-pharmacological methods to induce the production of endogenous oxytocin include herbal compounds, castor oil, hot baths, enemas, sexual intercourse, acupuncture, acupressure, trans-cutaneous nerve stimulation, mechanical and surgical modalities as well as breast and uterine stimulation [(8)]. Although, no studies were found in the literature about uterine stimulation, only two studies were found about nipple stimulation. These two studies worked on a limited number of small groups and failed to establish the reasons for nipple stimulation success or failure [(11)].

In uterine stimulation all the fingers of one hand touched and pulled away from the uterine tissue concurrently and rhythmically for 2–3 minutes, starting from the fundus to the whole uterus [(12)]. During the implementation phase, cervical dilation is evaluated once every 2 hours and the procedure is terminated if a progression of 2 cm was not observed in cervical dilation, while it is continued if such progression was observed. However, labor was expected to start within 8 hours following the onset of the procedure [(13)].

On the other hand, nipple stimulation is a very simple procedure that can be performed without any difficulty by even the uneducated class of women. It promotes uterine contractions, as well as improves bone density, and social behaviors such as trust [(14, 15)]. Many women use nipple stimulation for induction of labor to encourage contractions to begin or strengthen. One study revealed that that 50% of Japanese women used nipple stimulation to induce labor and lower the rates of Cesarean Section birth [(16)]. A study published in 2018 showed that levels of oxytocin was increased 3 days after starting nipple stimulation, with a marked rise 30 minutes after starting. Another study published in 2015 revealed that nipple stimulation influenced labor duration, where it reduced the first stage of labor to an average of 3.8 hours [(17, 18)].

In clinical practice, it was observed that uterine contractions during labor cause physical and emotional suffering to all parturients. Although uterine contractions are a positive signal for the beginning of labor, they give noxious experience to the mother. However, the nursing responsibility is to help parturients face the event of labor as a positive one in their memories. There are many pharmacological methods for inducing uterine contractions, but they may bring more side effects for the mother and her fetus. Thus, uterine and nipple stimulation were suggested as simple and safe non-pharmacological methods, which can be carried by the nurse. Therefore, this study was conducted to investigate the effect of these methods on the progress of labor.

**Research Hypotheses:**

**$H_1$** Women who receive nipple stimulation or uterine stimulation during labor will experience better progress of labor than those who don't receive it.

**Null Hypothesis:**

**$H_0$** Women who receive nipple stimulation or uterine stimulation during labor will experience similar progress of labor as those who don't receive it.

## II. MATERIALS AND METHOD

### MATERIALS

**Research design:**

A comparative quasi-experimental research design was utilized to fulfill the aim of the study.

**Setting**:

This study was conducted in labor and delivery unit of obstetrics and gynecology department in Damanhour National Medical Institute, which is affiliated to the Ministry of Health in El-Behera Governorate.

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**Subjects:**

A convenient sample of 150 laboring women undergoing vaginal delivery were recruited for the study according to the following inclusion criteria: primiparae, full-term (37- 42 weeks of gestation), normal course of pregnancy and labor, vertex presentation, in the active phase of labor, having a Bishop score of 6 or higher and accept to participate in the study.

The sample size of laboring women was estimated by using the Epi-Info 7 program, where the following parameters were applied:

- Population size = 354 per 3 months.
- Expected frequency =50%
- Accepted error =5%
- Confidence coefficient= 90%
- Minimal sample size= 150

Laboring women were randomly assigned into 3 groups: nipple stimulation group (50 women), uterine stimulation group (50 women) and control group (50 women).

**Tools**:

Four tools were used by the researchers to collect the necessary data:

**Tool one:**

**Socio-demographic and clinical data structured interview schedule**

It was developed by the researchers and included age, level of education, occupation, residence, BMI and weeks of gestation.

**Tool two:**

**Bishop scoring system**

This tool was which was developed by Bishop (1964). [19] It was adopted and utilized to evaluate the elective induction of labor, which involves 5 parameters: cervical dilatation by centimeters, degree of cervical effacement by percent, station of fetal head by centimeters, as well as consistency and position of the cervix.

Dilatation of cervix is rated 0 (none), 1(1-2 cm), 2(3-4 cm), 3(5+ cm). Effacement of cervix is rated 0(none-30 %), 1(40% -50 %), 2 (60%-70%), 3(80+ %). Station of fetal head is rated 0 (-3 cm), 1(-2 cm), 2 (-1 or 0), 3 (+1 or +2). Consistency of the cervix is rated 0 (firm), 1 (medium), 2 (soft). Position of the cervix is rated 0(Posterior), 1(mid), 2(Anterior).

**Tool three:**

**Assessment of uterine contractions**

This tool involved two parts:

**Part I:** Characteristics of uterine contractions (duration, interval, No/ 10 minutes and intensity)

**Part II:** Contraction stress test, which was interpreted as:

1. Negative: Absence of any late decelerations with at least 3 uterine contractions (lasting 40 seconds) in 10 minute period.
2. Positive: Presence of late decelerations over several or more contractions (with at least 50% of the contractions).
3. Suspicious: Presence of late decelerations with fewer than 50% of contractions
4. Hyper-Stimulation: late decelerations that occur with contractions of less than two minutes interval or longer than 90 seconds duration.
5. Failed or unsatisfactory: less than 3 contractions/10 minutes or a tracing that cannot be interpreted

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**Tool four:**

**Pattern of labor & delivery**

It was developed by the researchers to evaluate need for oxytocics, mode of delivery, duration of labor, as well as occurrence of complications and their types

**METHOD**

The study was accomplished according to the following steps:

1. **Approvals:**

An official letter clarifying the purpose of the study was obtained from the Faculty of Nursing, Damanhour University and forwarded to the concerned personnel at National Medical Institution in Damanhour, El- Behera Governorate, to take their permission to collect data.

2. **Tools development:**

- Tools one, three & four were developed by the researchers after reviewing of recent and relevant literature, while tool two was adopted.

3. **Validity and reliability:**

- All tools were tested for content validity by a jury of five experts in the field

- Reliability of tools one, three & four was evaluated by Cronbach's Alpha coefficient test. It consisted of relatively homogeneous items as indicated by the high reliability, where its internal consistency was 0.887. Meanwhile, tool two has standardized reliability.

4. **Pilot study:**

A pilot study was carried out on 15 women (excluded from the study sample) to test the feasibility of the study, ascertain relevance, clarity and the applicability of the tools as well as detect any problem peculiar to the statements as sequence and clarity that might interfere with the process of data collection. After conducting the pilot study, it was found that the sentences of the tool were clear and relevant; however, few words had been modified. Following this pilot study, the tool was revised, reconstructed and made ready for use.

5. **Data collection:**

- Collection of data covered a period of 3 months, starting from the beginning of December 2020 till the end of February 2021.

- For the three groups, data of tool one were collected through an interview schedule, where each parturient was interviewed for 10-15 minutes during the first stage of labor.

- Tool two (Bishop scoring system) was performed by the researchers. For the three groups every 2 hours until the actual birth.

- Tool three (assessment of uterine contractions) was done for the three groups every 2 hours until the actual birth, while contraction stress test is performed once for them.

- Tool four (pattern of labor & delivery) was completed by the researchers in 8 hours.

- ***Nipple stimulation group (NSG)*** was subjected to this intervention once every half an hour after contraction, during the first stage of labor. One nipple of the woman was rolled and gently pulled forward with the thumb and index finger for 2 minutes and the same procedure was then repeated with the other nipple. Cervical dilatation was also evaluated once every 2 hours and the procedure was continued if a progression of 2 cm dilatation was observed, while it was terminated if such progression was not observed. This group was subjected to this intervention once more before delivery.

- ***Uterine stimulation group (USG)*** was subjected to this intervention once every half an hour after contraction, during the first stage of labor. All fingers of one hand touched and pulled away the whole uterus from the uterine tissue concurrently and rhythmically for 2–3 minutes. Cervical dilatation was evaluated and the intervention was continued as for the previous group.

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- ***Control group (CG)*** received the routine hospital care, where oxytocics were used to enhance uterine contractions and progress of labor.

6. **Statistical analysis:**

- The collected data were categorized, coded, computerized, tabulated and analyzed by the researchers, using Statistical Package for Social Sciences (SPSS) version 23 program.

- Cross tabulation was carried out to explore the relationships between variables.

- A descriptive and analytical statistics were used such as percentages; whereas Chi-square-test, Fisher Exact-test and One – Way ANOVA test were used to find out the difference in the results at $\leq 0.05$ level of significance.

**Ethical consideration:**

For each recruited subject the following issues were considered: securing the subjects' written informed consent, keeping their privacy and right to withdraw at any time as well as assuring confidentiality of their data.

## III. RESULTS

**Table (I)** presents the number and percent distribution of laboring primiparae according to their socio-demographic and clinical data. ***Age*** clarified that 64% of the NSG were 20 to less than 30 years old, compared to 54% of the USG and the CG. ***Level of education*** also manifested that 50% of the CG had secondary level or its equivalent, compared to 42 % & 40% of the USG and the NSG respectively. In addition, ***occupation*** revealed that a sizeable proportion of the NSG, USG and the CG (64 %, 72 % &76%) respectively were housewives. Moreover, 68%, 60% & 70%, of the three groups respectively were rural residents. Furthermore, ***the mean BMI*** was 26.76 ± 2.560 for the NSG, 26.28 ± 2.696 for the **USG** & 26.62 ± 2.439 for the CG. Besides, the mean ***weeks of Gestation*** **was** 38.12 ± 1.003, 38.12 ± 0.839 & 37.86 ± 0.670 weeks for the three groups respectively. However, the three groups' socio-demographic and clinical data were almost similar, where no statistically significant differences were found between them.

**Table (II)** illustrates the mean distribution of laboring primiparae according to their total Bishop score. No statistically significant differences were found between the three groups before intervention. However, the relationship between the three groups was highly statistically significant (P=0.000) on the $2^{nd}$ & the $4^{th}$ hours after intervention. Whereas the mean Bishop score on the $2^{nd}$ hour, was 10.44 ± 1.215 & 10.04 ± 0.245 for the NSG & the USG respectively, compared to 9.46 ± 1.232 for the CG. On the $4^{th}$ hour, it was also 12.65 ± 0.566 &12.70 ± 0.553 for the two former groups respectively, compared to 10.82 ± 1.650 for the latter group. In addition, a statistically significant difference was observed between the three groups on the $6^{th}$ hour after intervention, where the mean Bishop score was 13.00 ± 0.000 for NSG & the USG, compared to 12.50 ± 0.845 for the CG.

**Table (III)** demonstrates the mean distribution of laboring primiparae according to their characteristics of uterine contractions. ***Duration*** showed no statistically significant differences between the three groups before intervention and on the $6^{th}$ hour after intervention. But, it was highly statistically significant (P=0.000) between them on the $2^{nd}$ & the $4^{th}$ hours after intervention. On the $2^{nd}$ hour, it was 41.720 ± 7.706 & 42.600 ± 7.643 seconds for the NSG & the USG respectively, compared to 36.900 ± 6.218 seconds for the CG. On the $4^{th}$ hour, it was also 58.260 ± 6.255 & 58.520 ± 6.060 seconds for the two former groups respectively, compared to 45.400 ± 11.012 seconds for the latter group.

***Interval*** also displayed no statistically significant differences between the three groups before intervention and on the $6^{th}$ hour after intervention. Yet, it was statistically significant (P=0.018) between them on the $2^{nd}$ hour after intervention and highly statistically significant (P=0.000) between them on the $4^{th}$ hours after intervention. On the $2^{nd}$ hour, it was 4.000 ± 0.571 & 4.180 ± 0.388 minutes for the NSG & the CG respectively, compared to 3.880 ± 0.594 minutes for the USG. On the $4^{th}$ hour, it was 2.700 ± 0.553& 2.640 ± 0.487 minutes for the NSG & the USG respectively, compared to 3.500 ± 0.763 minutes for the CG.

In addition, ***No /10 minutes*** manifested that there are no statistically significant differences between the three groups before intervention and on the $6^{th}$ hour after intervention. Nevertheless, it was highly statistically significant (P=0.000) between them on the $2^{nd}$ & the $4^{th}$ hours after intervention. On the $2^{nd}$ hour, it was 3.160 ± 0.681 & 2.800 ± 0.926 contractions for the NSG & the USG respectively, compared to 2.200 ± 0.926 contractions for the CG. On the $4^{th}$ hour, it

was also 4.350 ± 0.640 & 4.090 ± 0.640 contractions for the two former groups respectively, compared to 2.900 ± 1.199 contractions for the latter group.

**Table (IV)** clarifies the number and percent distribution of laboring primiparae according to their intensity of uterine contractions. No statistically significant differences were found between the three groups before intervention. Meanwhile, the relationship between the three groups was highly statistically significant (P=0.000) on the 2nd, & the 4th hours after intervention. On the 2nd hour, intensity was strong among 60% & 66% of the NSG & the USG respectively, compared to 24% of the CG. On the 4th hour, it was also strong among all (100%) of the two former groups, compared to 76% of the latter group. However, on the 6th hour, intensity was strong among all (100%) of the three groups.

**Table (V)** elucidates the number and percent distribution of laboring primiparae according to their contraction stress test. A highly statistically significant difference (P=0.000) was noted between the three groups, where negative result was recognized among 92% & 88% of the NSG & the USG groups respectively, compared to 68% of the CG.

**Table (VI)** exhibits the number, percent and mean distribution of laboring primiparae according to their pattern of labor & delivery. ***Oxytocics*** was needed by a sizeable proportion of the CG, compared to only (8% & 12%) of the NSG & USG respectively. ***Mode of delivery*** was also normal among all (100%) of the NSG & the USG, compared to 80% of the CG, where the remaining 20% of them had CS delivery. In addition, ***mean duration of labor*** was found to be shorter among the study groups than the control group, where the mean duration of the 1st stage was 4.435 ± 0.834 & 4.500 ± 0.876 hours among the NSG and the USG respectively, compared to 6.300 ± 1.159 hours among the CG. The mean duration of the 2nd stage was 18.652 ± 4.138 & 20.772 ± 1.461 minutes among the two former groups respectively, compared to 24.550 ± 4.966 minutes among the latter group. The mean duration of the 3rd stage was 6.435 ± 1.858 & 6.386 ± 0.618 minutes among the NSG and the USG respectively, compared to 7.600 ± 1.374 minutes among the CG. Finally, **labor complications** occurred among 25% of the CG, compared to none of the NSG & the USG, where prolonged 1st stage was the main complication happened among the former group. However, highly statistically significant differences (P=0.000) were found between the three groups in relation to all items of their pattern of labor & delivery.

## IV. DISCUSSION

Induction of labor is widely practiced in order to prevent problems such as caesarean section birth, prolonged labor, postpartum hemorrhage, and traumatic birth as well as to improve health outcomes for women and their infants. A rigid and immature cervix increases the possibility of a failed induction or a lengthy and difficult birth as well as the rate of Caesarean section birth and maternal and fetal morbidity. Breast and uterine stimulation is a non-pharmacological method, which can be used for cervical ripening and increasing chances of labor onset as well as hence avoidance of labor induction for postdates [20] **(Cunningham, et al., 2018)**. However, the goal of this study is to determine the effect of nipple and uterine stimulation on the progress of labor among primiparae.

The results of the present study revealed no significant differences between the three group's socio-demographic characteristics, and clinical data (Table I). This means that they are homogenous and any differences in progress of labor may be due to breast and uterine stimulation.

Bishop's score is a good indicator of pre-induction of cervical status and vaginal delivery. The results of the current study showed significantly higher Bishop's score among the breast and uterine stimulation groups after two, four & six hours of intervention, compared to the control group (Table II). This can be partly interpreted as breast massage and nipple stimulation have been shown to facilitate the release of oxytocin from the posterior pituitary gland, and in turn, softens the cervix, enhances its dilation and even promotes labor. Uterine stimulation also results in a local release of prostaglandins, which are responsible for cervical ripening.

The present finding is partly consistent with a study conducted in Sivas, Turkey, where the average Bishop scores were significantly increased among nipple and uterine stimulation groups at the second, fourth and sixth hour of intervention, compared to the control group [21] **(Demirel & Guler, 2015).** It was also partly in line with a study performed in Tamil Nadu, India, where it was concluded that intermittent manual breast and nipple stimulation was effective in promoting the cervical ripening. [22] **(Ramya & Abirami 2016).** In addition, the current study is partly in harmony with a study fulfilled in Jabalpur, India also indicated that nipple stimulation was effective in early effacement and dilatation of cervix during the first stage of labor in active phase among primiparae [23] **(Suresh & Soni, 2019).**

The results of the present study also illustrated that the study groups had significantly longer duration, shorter interval, increased number of uterine contractions/10 minutes and strong intensity after two & four hours of intervention, compared to the control group (Tables III & IV). This can be explained as uterine and nipple stimulation promotes the production and release of oxytocin, which is considered to cause uterine contraction, leading to spontaneous labor. The present finding partly and relatively agrees with a theses achieved in Tamil Nadu, India, where it was demonstrated that nipple stimulation had good effect in developing strong uterine contractions and increased cervical dilatation in the experimental group [25] **(Suja, 2015)**. Unfortunately, no studies were found about the effect of uterine stimulation on uterine contractions.

Fetal health is evaluated, in part, by assessment of FHR patterns, using non-stress test (NST) and contraction stress test (CST) to identify those at risk of hypoxic injury or death and intervene to prevent these adverse outcomes, if possible as well as to identify normally oxygenated fetuses so that unnecessary intervention can be avoided [24]**.** On evaluating contraction stress test in the current study, it was found to be statistically normal (negative) among the study groups, compared to the control group (Table V). This means that the baby stayed healthy during labor contractions, as the FHR does not get slower (decelerate) and stay slow after the contraction (late decelerations). Nipple stimulation help the release of natural oxytocin, which causes uterine contractions, during which the blood and oxygen supply to the fetus drops for a short time, causing no problem for most fetuses, while the heart rate of some fetuses gets slower.

The current finding partly conforms to a theses performed in Tamil Nadu, India, where nipple stimulation was found to have an influence on the contraction stress test, as 50% of mothers had a successful test [25] **(Suja, 2015)**. It also partly and relatively corresponds with a retrospective medical records review conducted in Palestine, where it was concluded that nipple stimulation is a convenient, inexpensive, noninvasive and an effective method for inducing labor in pregnant women with risk factors for uterine rupture [26] **(Orrelle & Bornstein, 2020).**

On assessing pattern of labor and delivery in the current study, it was found that oxytocics was highly significantly needed by the control group and incidence of CS delivery was also highly significantly higher among them, compared to the study groups (Table VI). This was not expected, since oxytocics stimulate the uterine muscles to contract and also increases production of prostaglandins, which increase the contractions further; causing more intense or more frequent contractions that induce normal vaginal delivery.

The present finding is partly similar to a study carried out in north India, where it was reported that CS birth was 3.63 times more common in the control group, who received oxytocics than in breast stimulation group [9] **(Singh, et al., 2014)**. It is also congruent with a study fulfilled in Sivas, Turkey, where statistically significant differences were established between the three groups in terms of the average durations of the first, the second and the third stages of labor, as they were shorter for the nipple and uterine stimulation groups, when compared to the control group [21] **(Demirel & Guler, 2015).** In addition, the present finding matches a study executed in Spain, where it was revealed that labor stimulation with oxytocin increases the rates of CS in primiparous and multiparous women [27] **(Hidalgo-Lopezosa, et al., 2016).**

On examining the duration of labor in the current study, it was observed that the duration of the first, the second, and the third stage of labor was highly significantly shorter among the study groups, compared to the control group (Table VI). This was expected since nipple and uterine stimulation helps initiate labor and makes contractions longer and stronger as mentioned before (Tables III & IV). They trigger the release of endogenous oxytocin, which is more effective in shortening the duration of labor, when compared to a synthetic oxytocin.

The present finding relatively suits a study conducted in Sivas, Turkey, where the application of labor induction and delivery by C-section were significantly established among the control group, compared to the nipple and uterine stimulation groups. Whereas these procedures reduce the frequency of elective labor induction, and support normal vaginal birth by providing endogenous labor induction.

[21] **(Demirel & Guler, 2015).** It also partly and relatively accords with a theses performed in Tamil Nadu, India, where it was shown that nipple stimulation was effective for improving the progress of labor among primigravidae, as the duration of the first stage of labor was reduced among the experimental group [25] **(Suja, 2015)**. On the other hand, the current finding doesn't partly and relatively conformable with a study done in Ahvaz, Iran, where it was illustrated that there is no differences between breast stimulation and oxytocin administration regarding the duration of the third stage of labor [28] **(Dashtinejad, et al. 2018).**

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Finally, the results of the current study manifested that labor complications, particularly prolonged first stage of labor, were highly significantly more likely to be observed among the control group, compared to the study groups (Table VI). This may be due to hyper-stimulation of the uterus by exogenous oxytocics that results in hyper-contractibility, which in turn may cause complications.

The present finding is in line with a study implemented in Sivas, Turkey, where it was concluded that nipple and uterine stimulation reduces the rate of relevant complications [21] **(Demirel & Guler, 2015).** It is also similar to an article, where it was reported that the use of oxytocics leads to rapid labor and birth, causing lacerations of the cervix, vagina, and perineum, as well as uterine atony or rupture in addition to fetal hypoxia and trauma [29] **(Sarathi & Semmalar, 2015).** On the contrary, the current finding doesn't partly and relatively tally with a study executed in Ahvaz, Iran, where it was demonstrated that there are no differences between breast stimulation and oxytocin administration regarding the occurrence of postpartum hemorrhage, anemia, and after-birth pain [28] **(Dashtinejad, et al. 2018).**

## V. CONCLUSION

Based on the findings of the present study, it can be concluded that induction of labor by nipple and uterine stimulation resulted in better progress of labor in terms of higher bishop score, as well as longer duration, shorter interval, increased number /10 minutes and strong intensity of uterine contractions. These methods also resulted in normal (negative) contraction stress test, shorter duration of the three stages of labor, normal vaginal deliveries with inconsiderable use of oxytocics and no complications.

## VI. RECOMMENDATIONS

Based on the findings of the present study, the following recommendations are suggested:

1. Maternity nursing curricula should include induction of labor with nipple and uterine stimulation methods to achieve better progress of labor
2. In-service education programs should be offered to maternity nurses about nipple and uterine stimulation methods to increase their ability to use them for induction of labor.
3. Health education programs should be organized using different mass media to improve pregnant women's awareness about utilization of nipple and uterine stimulation to obtain better progress of labor.
4. Maternity nurses should teach women about nipple and uterine stimulation techniques during their antenatal visits in late pregnancy to enhance their progress of labor and attain normal vaginal delivery.
5. Reapplication of the present study should be carried out on a larger sample size and different settings to verify the findings of this study as well as for the purpose of better generalization.

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## APPENDICES – A

**List of Table**

**Table (I): Number, percent and mean distribution of laboring primiparae according to their socio-demographic and clinical data**

| Socio-demographic & clinical data | Nipple stimulation group (NSG) (50) | | Uterine stimulation group (USG) (50) | | Control group (CG) (50) | | F / $\chi^2$ (P) |
|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | |
| **Age:** | | | | | | | |
| 20- | 32 | 64.00 | 27 | 54.00 | 27 | 54.00 | 1.363 (0.506) |
| 30-35 | 18 | 36.00 | 23 | 46.00 | 23 | 46.00 | |
| **Level of education:** | | | | | | | |
| - Illiterate/Read & Write | 10 | 20.00 | 12 | 24.00 | 12 | 24.00 | 2.852 (0.827) |
| - Basic | 10 | 20.00 | 10 | 20.00 | 6 | 12.00 | |
| - Secondary/equivalent | 20 | 40.00 | 21 | 42.00 | 25 | 50.00 | |
| - University | 10 | 20.00 | 7 | 14.00 | 7 | 14.00 | |
| **Occupation:** | | | | | | | |
| - Housewife | 32 | 64.00 | 36 | 72.00 | 38 | 76.00 | 1.801 (0.406) |
| - Working | 18 | 36.00 | 14 | 28.00 | 12 | 24.00 | |
| **Residence:** | | | | | | | |
| - Rural | 34 | 68.00 | 30 | 60.00 | 35 | 70.00 | 1.248 (0.536) |
| - Urban | 16 | 32.00 | 20 | 40.00 | 15 | 30.00 | |
| **BMI (Mean & SD):** | 26.76 ± 2.560 | | 26.28 ± 2.696 | | 26.62 ±2.439 | | **F (P)** 0.462 (0.631) |
| **Weeks of Gestation (Mean & SD):** | 38.12 ± 1.003 | | 38.12 ± 0.839 | | 37.86 ± 0.670 | | **F (P)** 1.566 (0.212) |

$\chi^2$ (P): Chi-Square Test & P for $\chi^2$ Test

F (P): Fisher Exact test & P for F Test

F (P): F for One – Way ANOVA test & (P) for F test

*: Significant at P ≤0.05

**Table (II): Mean distribution of laboring primiparae according to their total Bishop score**

| Total Bishop score | Nipple stimulation group (NSG) | | Uterine stimulation group (USG) | | Control group (CG) | | F (P) |
|---|---|---|---|---|---|---|---|
| | No | Mean & SD | No | Mean & SD | No | Mean & SD | |
| **Before intervention** | 50 | 8.04 ± 0.968 | 50 | 7.96 ± 0.807 | 50 | 7.94 ± 0.890 | 0.176 (0.838) |
| **2nd hour after intervention** | 50 | 10.44 ± 1.215 | 50 | 10.04 ± 0.245 | 50 | 9.46 ± 1.232 | 22.425 (0.000)** |
| **4th hour after intervention** | 46 | 12.65 ± 0.566 | 44 | 12.70 ± 0.553 | 50 | 10.82 ± 1.650 | 47.063 (0.000)** |
| **6th hour after intervention** | 10 | 13.00 ± 0.000 | 11 | 13.00 ± 0.000 | 36 | 12. 50 ± 0.845 | 3.582 (0.035)* |
| **8th hour after intervention** | 0 | - | - | - | 10 | 12.80 ± 0.422 | - |

F (P): F for One – Way ANOVA test & (P) for F test

*: Significant at P ≤0.05

**: Highly Significant at P ≤0.05

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**Table (III): Mean distribution of laboring primiparae according to their characteristics of uterine contractions**

| Characteristics of uterine contractions | Nipple stimulation group (NSG) | | Uterine stimulation group (USG) | | Control group (CG) | | F (P) |
|---|---|---|---|---|---|---|---|
| | No | Mean & SD | No | Mean & SD | No | Mean & SD | |
| **Duration (seconds ):** | | | | | | | |
| - Before intervention | 50 | 28.480 ± 5.614 | 50 | 27.520 ± 3.196 | 50 | 27.100 ± 2.873 | 1.502 (0.226) |
| - 2nd hour after intervention | 50 | 41.720 ± 7.706 | 50 | 42.600 ± 7.643 | 50 | 36.900 ± 6.218 | 9.027 (0.000)** |
| - 4th hour after intervention | 46 | 58.260 ± 6.255 | 44 | 58.520 ± 6.060 | 50 | 45.400 ± 11.012 | 40.022 (0.000)** |
| - 6th hour after intervention | 10 | 60.000 ± 3.333 | 11 | 64.090 ± 3.754 | 36 | 61.390 ± 4.871 | 2.398 (0.101) |
| - 8th hour after intervention | 0 | - | 0 | - | 10 | 70.000 ± 13.333 | - |
| **Interval (minutes):** | | | | | | | |
| - Before intervention | 50 | 5.000 ± 0.404 | 50 | 5.000 ± 0.300 | 50 | 5.020 ± 0.141 | 0.073 (0.929) |
| - 2nd hour after intervention | 50 | 4.000 ± 0.571 | 50 | 3.880 ± 0.594 | 50 | 4.180 ± 0.388 | 4.123 (0.018)* |
| - 4th hour after intervention | 46 | 2.700 ± 0.553 | 44 | 2.640 ± 0.487 | 50 | 3.500 ± 0.763 | 28.959 (0.000)** |
| - 6th hour after intervention | 10 | 2.400 ± 0.516 | 11 | 2.000 ± 0.000 | 36 | 2.280 ± 0.454 | 2.653 (0.080) |
| - 8th hour after intervention | 0 | - | 0 | - | 10 | 1.600 ± 0.516 | - |
| **No /10 minutes:** | | | | | | | |
| - Before intervention | 50 | 1.840 ± 0.521 | 50 | 1.800 ± 0.452 | 50 | 1.820 ± 0.613 | 1.566 (0.212) |
| - 2nd hour after intervention | 50 | 3.160 ± 0.681 | 50 | 2.800 ± 0.926 | 50 | 2.200 ± 0.926 | 16.193 (0.000)** |
| - 4th hour after intervention | 46 | 4.350 ± 0.640 | 44 | 4.090 ± 0.640 | 50 | 2.900 ± 1.199 | 37.163 (0.000)** |
| - 6th hour after intervention | 10 | 4.600 ± 0.516 | 11 | 4.450 ± 0.820 | 36 | 4.250 ± 0.732 | 1.061 (0.353) |
| - 8th hour after intervention | 0 | - | 0 | - | 10 | 4.600 ± 0.516 | - |

F (P): F for One – Way ANOVA test & (P) for F test

*: Significant at P ≤0.05

**: Highly Significant at P ≤0.05

**Table (IV): Number and percent distribution of laboring primiparae according to their intensity of uterine contractions**

| Intensity of uterine contractions | Nipple stimulation group (NSG) (50) | | Uterine stimulation group (USG) (50) | | Control group (CG) (50) | | F / $\chi^2$ (P) |
|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | |
| **Before intervention:** | | | | | | | |
| - Moderate | 48 | 96.00 | 50 | 100.00 | 50 | 100.00 | 4.054 (0.132) |
| - Strong | 2 | 04.00 | 0 | 00.00 | 0 | 00.00 | |
| **2nd hour after intervention:** | | | | | | | |
| - Moderate | 20 | 40.00 | 17 | 34.00 | 38 | 76.00 | 20.64 (0.000)** |
| - Strong | 30 | 60.00 | 33 | 66.00 | 12 | 24.00 | |
| **4th hour after intervention:** | **(n=46)** | | **(n=44)** | | | | 23.625 (0.000)** |
| - Moderate | 0 | 00.00 | 0 | 00.00 | 12 | 24.00 | |
| - Strong | 46 | 100.00 | 44 | 100.00 | 38 | 76.00 | |
| **6th hour after intervention:** | **(n=10)** | | **(n=11)** | | **(n=36)** | | |
| - Moderate | 0 | 00.00 | 0 | 00.00 | 0 | 00.00 | - |
| - Strong | 10 | 100.00 | 11 | 100.00 | 36 | 100.00 | |
| **8th hour after intervention:** | **(n=0)** | | **(n=0)** | | **(n=10)** | | |
| - Moderate | 0 | 00.00 | 0 | 00.00 | 0 | 00.00 | - |
| - Strong | 0 | 00.00 | 0 | 00.00 | 10 | 100.00 | |

$\chi^2$ (P): Chi-Square Test & P for $\chi^2$ Test

F (P): Fisher Exact test & P for F Test

*: Significant at P ≤0.05

**: Highly Significant at P ≤0.05

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**Table (V): Number and percent distribution of laboring primiparae according to their contraction stress test**

| Contraction stress test | Nipple stimulation group (NSG) (50) | | Uterine stimulation group (USG) (50) | | Control group (CG) (50) | | F / $\chi^2$ (P) |
|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | |
| - Negative | 46 | 92.00 | 44 | 88.00 | 34 | 68 | |
| - Positive | 0 | 00.00 | 0 | 00.00 | 8 | 16.00 | |
| - Suspicious | 0 | 00.00 | 0 | 00.00 | 4 | 08.00 | 46.236 (0.000)** |
| - Hyper-Stimulation | 0 | 00.00 | 0 | 00.00 | 4 | 08.00 | |
| - Failed or unsatisfactory | 4 | 08.00 | 6 | 12.00 | 0 | 00.00 | |

$\chi^2$ (P): Chi-Square Test & P for $\chi^2$ Test

F (P): Fisher Exact test & P for F Test

*: Significant at P ≤0.05

**Table (VI): Number, percent and mean distribution of laboring primiparae according to their pattern of labor & delivery**

| Pattern of labor & delivery | Nipple stimulation group (NSG) (50) | | Uterine stimulation group (USG) (50) | | Control group (CG) (50) | | F / $\chi^2$ (P) |
|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | |
| **Need for oxytocics:** | | | | | | | |
| - Yes | 4 | 08.00 | 6 | 12.00 | 38 | 76.00 | 66.912 (0.000)** |
| - No | 46 | 92.00 | 44 | 88.00 | 12 | 24.00 | |
| **Mode of delivery:** | **(n=46)** | | **(n=44)** | | | | |
| - Normal | 46 | 100.00 | 44 | 100.00 | 40 | 80.00 | 19.385(0.000)** |
| - CS | 0 | 00.00 | 0 | 00.00 | 10 | 20.00 | |
| **Mean duration of labor:** | **(n=46)** | | **(n=44)** | | **(n=40)** | | **F (P)** |
| - The 1st Stage (hrs) | 4.435 ± 0.834 | | 4.500 ± 0.876 | | 6.300 ± 1.159 | | 50.698 (0.000)** |
| - The 2nd Stage (min) | 18.652 ± 4.138 | | 20.772 ± 1.461 | | 24.550 ± 4.966 | | 26.303 (0.000)** |
| - The 3rd Stage (min) | 6.435 ± 1.858 | | 6.386 ± 0.618 | | 7.600 ± 1.374 | | 10.144 (0.000)** |
| **Occurrence of complications:** | **(n=46)** | | **(n=44)** | | **(n=40)** | | |
| - Yes | 0 | 00.00 | 0 | 00.00 | 10 | 25.00 | 24.375 (0.000)** |
| - No | 46 | 100.00 | 44 | 88.00 | 30 | 75.00 | |
| **Type of complications:** | **(n=0)** | | **(n=0)** | | **(n=10)** | | |
| - Prolonged 1st stage | 0 | 00.00 | 0 | 00.00 | 10 | 100.00 | 20 (0.000)** |

$\chi^2$ (P): Chi-Square Test & P for $\chi^2$ Test

F (P): Fisher Exact test & P for F Test

F (P): F for One – Way ANOVA test & (P) for F test

*: Significant at P ≤0.05