

Incidence of cesarean section among parturient women undergoing induced versus spontaneous labour per gestational weeks

Hala Abd El fttah Ali*, Reda Hemida**, Azza Mohamed Hafez***

* Women's Health and Obstetrics Nursing Department, Faculty of Nursing, Kafr El Sheikh University

**Obstetrics and Gynecology Department, Faculty of Medicine-Mansoura University, Egypt

***Maternal and Women Health Department, Faculty of Medicine-Minia University, Egypt

ABSTRACT

Objective: To explore incidence of cesarean section among parturient women undergoing induced versus spontaneous labour per gestational weeks. **Methods:** An exploratory descriptive study was carried out at Labour and Delivery Ward at El Mansoura University Hospitals, Egypt. This study comprised a convenience sample of 100 pregnant women out of 130 randomized women who were admitted to Delivery Ward with induced or spontaneous labour with multi parae, low risk women with no pregnancy or medical complications or prior cesarean section, with 37-42 gestational weeks, singleton pregnancies and in vertex position. They were randomly assigned into two groups; a total of 60 women had an induction of labour and 40 went into spontaneous labour. Two tools were used: A structured interviewing questionnaire sheet was used to collect the maternal and neonatal characteristics such as; maternal age, parity, newborn weight and labour assessment sheet was used to assess vaginal versus cesarean section incidence according to onset of labour per gestational weeks and induction as well as augmentation methods for cesarean section. **Results:** Among 100 pregnancies that fulfilled the inclusion criteria, induced labour had more risk of cesarean section compared with spontaneous labour onset with statistical significant ($p < 0.001$ in χ^2 test; OR 6.00; 95% confidence interval 2.453 – 14.678). The higher caesarean section rate in the induction group was seen from (38-41) weeks. On the other hand, the higher caesarean section rate was seen in the spontaneous group at 37 weeks and cervical ripening was the highest agent used in induced labour as well as oxytocin for spontaneous onset of labour. **Conclusions and recommendation:** In low risk multiparae women, induced labour has an increased risk of cesarean section compared with spontaneous onset labour per gestational weeks particularly when cervical ripening was required. Caesarean section incidence was higher in the induction group than spontaneous labour, it was seen from (38-41) gestational weeks. It should be prompt further and larger studies of the effect of induction of labour and its methods on caesarean section rate per gestational weeks.

Key words: Cesarean section, induction, labour, induction methods.

INTRODUCTION

Induction is a procedure stimulating uterine contractions before labour begins, when medically necessary. Obstetricians typically turn to prostaglandin, oxytocin and

amniotomy to induce their women. Labour is induced in approximately 20 percent of all births for a variety of causes, including preeclampsia, diabetes, premature rupture of the membranes, over duration pregnancy and fetal distress. The two most frequent indications for CS among deliveries with

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induced and spontaneous labour onset were failure to progress and non-reassuring fetal status (Nancy.2014).

Moreover, in modern obstetric practice worldwide induction of labour is a common and increasing intervention. 38% is the induction rate in multi parous women (Nancy.2014). There are reports of associations between induction of labour and cesarean section in multiparae women with a high risk of CS in labour needing cervical ripening for induction (Clark.2009). The incidence of elective induction of labour when there is no medical cause, reported to be one third of the total deliveries (Zhang.2010).

In addition, elective induction can cause CS, and increases the maternal and fetal complications risks, and also increases the usage of health care facilities (Kaufman.2012). While, the effect of induction of labour on CS risk in low risk multiparae women is exactly unknown; some studies stated an increased risk of CS (Jacquemyn.2012). While others reported that the risk of CS is not affected (Kaufman.2012). In nowadays review of induction of labour, no conclusion presented about the effect of induction on CS risk in multiparae women with term gestations (Caughey.2009).

Generally, communication should be obvious between teamwork concerned with induction of labour; nurse, obstetrician and pediatric services to ensure care and support. Parturient women and their delivery partners should be given facts and true information about labour induction. Both medical and nursing staff should discuss issues relating to maternal and fetal conditions such as measurements of maternal pulse rate, blood pressure and temperature during induction of labour as well as spontaneous labour, all are recorded on the partogram. Uterine contractions, fetal well-being, pain assessment and progress of labour should be

observed and recorded by the nurses (www.nursing.com.2011).

Significance of the study:

Induction of labour is a common labour that accounts approximately 9.5 to 33.7 percent of all gestations yearly. In 2005, one from five deliveries in the United Kingdom is undergoing induction of labour. It is extremely indicated in pregnancies with complications to mother and fetus (Pregnancy.lovetoknow.com.2012). For parturient women that were induced at full-term, there was a twelve percent of CS risk, if compared with pregnancies that were with spontaneous onset of labour (Pregnancy.lovetoknow.com.2012). The frequency of induced labour in 2008 is 9.3% of all deliveries in Assiut University Hospital, Egypt, while the admission flow facility is 15000 deliveries annually (WHO.2010).

Cesarean section rates have been increasing in the world, but little reviews presented on incidences of CS delivery for all Arabian countries in the world. In Egypt, a rise statistical significant in CS occurred for all deliveries, from 4 percent by year of 1992 to 10 percent by year of 2000. However, CS deliveries are high in 1988 (14%), increasing to 22 percent by year 2000. Although the cesarean section rate is little higher in some private hospitals, also the incidence increases with induced labour in general hospitals (WHO.2010).

Material and methods:

Objective: To explore incidence of cesarean section among parturient women undergoing induced versus spontaneous labour per gestational weeks.

Research questions:

- 1- Are parturient women with induced labour more likely to undergo cesarean

section than with spontaneous labour per gestational weeks?

2-What are the most frequent methods were used for caesarean section at induced versus spontaneous labour?

Research design: An exploratory descriptive study.

Setting: Labour and Delivery Ward at El Mansoura University Hospitals, Egypt.

Sampling: Participants in this research were assigned with a convenience sample between the periods from the first of March 2015 to the end of June 2015. They were admitted to Delivery Ward with induced or spontaneous labour with:

- Maternal age <35 years or 35 and older
- Multi parous
- Low risk women
- No pregnancy or medical complications or previous CS with 37-42 gestational weeks
- Singleton pregnancies
- In vertex position
- BMI (kg/m²) 18.5 – 24.9 were included in the study.

Pregnancies excluded that included the following criteria:

- Previous CS, stillbirth and breech position.
- Pregnancies excluded with pre-labour rupture of membranes.
- Pregnancies excluded with complications including pregnancies with high blood pressure, preeclampsia, type 1 diabetes and

gestational diabetes, intrauterine growth retardation of fetus, cholestasis of liver, immunization and oligo hydramnios.

A sample size of 100 subjects, were enrolled in this study.

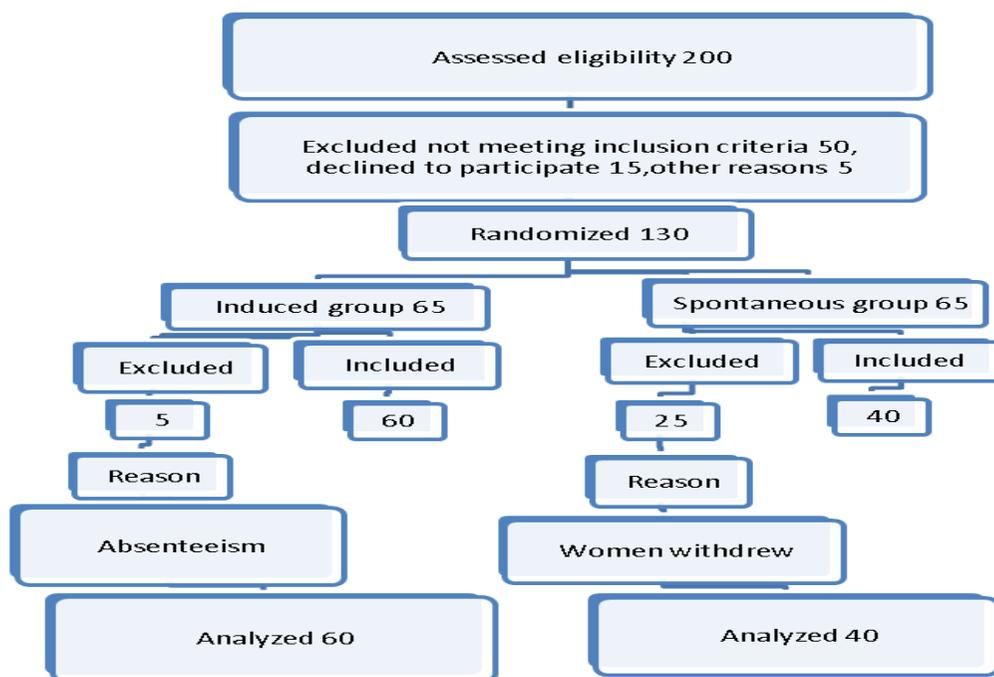
Calculation of sample size based on the following formula:

$n = f(\alpha/2, \beta) \times [p_1 \times (100 - p_1) + p_2 \times (100 - p_2)] / (p_2 - p_1)^2$. Where p_1 and p_2 are the percent 'success' in the control and experimental group respectively, and $f(\alpha, \beta) = [\Phi^{-1}(\alpha) + \Phi^{-1}(\beta)]^2 \Phi^{-1}$ is the cumulative distribution function of a standardized normal deviate. Hence, 63 participants were required per each group in the current study. By assuming that some participants may drop out from the study.

Group Assignments:

In arrangement of study groups, a convenience sample was assigned. A study sample of 100 multi parous women out of 130 randomized women that were randomly divided equal into two groups; 65 women per each group. Randomization was carried out using a numbered women's name list. A total of 65 had an induction of labour takes odd numbers and 65 went into spontaneous onset of labour takes even numbers. Each group was further divided and randomly allocated into two groups; a total of 60 had an induction of labour and 40 went into spontaneous onset of labour. A flow chart of the women's assignment was presented in Frame 1.

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Frame 1. Flow chart of the women's assignment

Data collection tools:

Data collection obtained by using the following tools:

Tool I A structured interviewing questionnaire sheet: It consists of four items that was originally designed to collect the maternal and neonatal characteristics such as; maternal age, parity, gestational length, newborn weight. It was reviewed by supervisors in the field of maternity nursing and it was implemented by researcher.

Tool II Labour assessment sheet: It was originally designed to assess vaginal versus cesarean section rate according to onset of labour per gestational weeks and induction as well as augmentation methods for cesarean section. It was reviewed by supervisors in the field of maternity nursing and it was implemented by researcher.

Validity of the tools:

The three tools used in this study were reviewed by a panel of 3 expertises in the maternity nursing specialty before introducing them to the participants to ensure its validity and their comments were considered.

Ethical consideration:

Permission to carry out the study was obtained from the Supervisor of Maternity and Gynecology of Nursing Department, the Director of El Mansoura University Hospital and the Head of Obstetrics and Gynecology Department. The researcher introduced herself to all health care providers & parturient women and the aim of the study was explained prior their participation to

obtain their acceptance & cooperation as well as their written consent.

Pilot study:

Pilot study was conducted on 10% of total sample. It aimed to assess the required time for each group to perform the task and to assess clarity, feasibility and applicability of the tools. The results of the pilot indicated that the task needs 10 to 20 minutes to be completed and statements of the tools were clear and applicable. The pilot sample was excluded from the study.

Research procedure:

-The researcher introduced herself to eligible women and briefly explained the study nature, and then written consent was obtained from them, the researcher was visiting the Delivery Ward two days /week (Friday and Saturday) for 12hr daily to obtain the study sample. The interview took from 10 to 20 minutes with each woman in intervention groups after admission to Delivery Ward.

-A study sample of 100 multi parous women out of 130 randomized women that were randomly divided into two groups. A total of sixty women had labour induction and 40 went into spontaneous onset of labour.

-Specific issues addressed and documented included: A structured interviewing questionnaire sheet was used to collect the maternal and newborn history such as; maternal age, parity, gestational age /weeks and newborn weight.

- Information was given on the most frequent indications for CS among deliveries with induced and spontaneous onset of labour (non-reassuring fetal condition and failure to progress). Variables were parity, maternal age, gestational length/weeks, birth weight. All variables were identified. Parity was termed as the number of previous deliveries

and classified into 1 – 2 and >2. Maternal age was classified as less than 35 years or 35 and older. Gestational age at birth was 37 - 42 weeks. Gestational age was determined by ultrasound scan, usually about the 17th week of gestation.

Body mass index BMI (kg/m²) 18.5 – 24.9. Birth weight of the newborn was classified into less than 3370 grams, 3370 to 3990 grams and more than 3990 grams.

-The final study sample included one hundred term 37-42 weeks births in low-risk multiparae women and with total information on all women. Failed induction Criteria should be considered and well defined. The American College of Obstetrics and Gynecology documented that at least 12-18 hours of latent labour was allowed before failed induction was diagnosed and that will reduce the CS risk in induced labour(4).

-Inductions of labour were reported as use of cervical ripening methods such as (prostaglandin E₂ or intracervical catheter) when cervix is closed followed by amniotomy and oxytocin or combined. While augmentation methods were recorded as use of amniotomy followed by oxytocin or combined when cervix is 4 cm dilated. Generally, cervical ripening is applied only if the Bishop score is less than six while amniotomy is performed with a Bishop score of six or more. Augmentation used only for spontaneous labour.

-Oxytocin 10 IU in 1 L normal saline was performed when membranes were ruptured. The infusion of oxytocin rate started at 2 mU/min and was doubled every 30 minutes until effective regular uterine contractions were achieved (3 uterine contraction/10 minutes lasting 40-50 seconds), the maximum rate of oxytocin is 32 mU/min. While spontaneous labour was augmented by use of oxytocin and amniotomy.

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-Measurements of maternal pulse rate, blood pressure and temperature were plotted on the partogram. Uterine contractions, fetal well being, assessment of pain and progress were observed and recorded by the researcher and nurses. Finally, labour assessment sheet was used to assess labour progress by Bishop score which used to follow up the labour progress and any problems.

Main outcomes were:

-Caesarean section incidence related to induced versus spontaneous labour per gestational weeks.

-The most frequent methods were used for caesarean section at induced versus spontaneous labour.

Strengths and difficulties of the study: The difference between induction of labour and augmentation and control for many factors such as maternal body mass index BMI which may be associated with an increased risk of CS in induced labour were sometimes difficult. Births with missing values on birth weight were excluded from the study. The availability of sample size was from the strengths of the current study. Also all deliveries have the same delivery place as well as management.

Statistical analysis:

Caesarean section risk for delivery was calculated for deliveries presented for induction of labour using spontaneous onset of labour as reference. Odds ratios are presented with 95% confidence intervals using estimating equation logistic regression model. A correlation was used to control for the dependence between deliveries by the same woman. The Statistical Package for Social Sciences (SPSS) for windows version 20.0 was used.

Results:

Concerning maternal and neonatal characteristics of table 1 showed that when induced women compared with spontaneous onset of labour, women who undergo an induced labour had a lower rate with statistical significant related to parity >2 , ($p=0.096$). On the other hand, induced labour had higher gestational length, had more age, 35 years and older and had a higher rate related to newborn weight (3370–3990 and >3990 g) with high statistical significant ($p<0.001$) for newborn weight).

Table 2 specified vaginal versus cesarean incidence according to onset of labour per gestational weeks. One hundred women who fulfilled the criteria, a total of 60 had an induction of labour and 40 had spontaneous labour. In the induced group, 40 (66.7%) resulted in caesarean section, as compared to 10 (25%) in the spontaneous labour $p < 0.001$ in χ^2 test; OR 6.00; 95% confidence interval 2.453 – 14.678. The higher caesarean section rate in the induction group was seen from (38-41) gestational weeks. On the other hand, the higher caesarean section rate was seen in the spontaneous group at 37 weeks with OR 0.333, 95% confidence interval 0.017–6.655. There was statistical significant differences between two groups at (39-41) weeks.

Figure 1 showed vaginal versus cesarean incidence according to onset of labour. In the induced group, (66.7%) resulted in caesarean section, as compared to (25%) in the spontaneous labour group.

Table 3 illustrated risks of CS by methods of induction or augmentation related to onset of labour, women induced by amniotomy were (12.5 versus 20%), IV infusion of oxytocin was used in (37.5 versus 80%) and a cervical ripening was used in (50 versus 0 %) respectively for induced and spontaneous labour. A cervical ripening was the highest agent used in induced labour

p=0.004 as well as oxytocin for spontaneous labour p=0.016, OR 6.667 and 95% confidence interval 1.247 – 35.647.

Table 1. Distribution of onset of labour regarding to maternal and neonatal characteristics.

Onset of labour							
Parameters	Total	Spontaneous (N=40)		Induced (N=60)		Qui square test	
		N	%	N	%	X ²	P value
			Maternal age				
<35 years	80	35	87.5%	45	75%	2.344	0.126
35 or >35 years	20	5	12.5%	15	25%		
Gestational weeks							
(mean ±SD)		39±1.5		39±4.65		0.2601	0.795
Parity							
Parity: 1- 2	60	20	50%	40	66.7%	2.778	0.096*
Parity >2	40	20	50%	20	33.3%		
Newborn weight							
< 3370 g	55	35	87.5%	20	33.3%	28.617	<0.001**
3370– 3990 g	21	3	7.5%	18	30%		
> 3990 g	24	2	5%	22	36.7%		

*p < 0.05 **p < 0.001

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Table2: Distribution of vaginal versus cesarean section incidence according to onset of labour per gestational weeks.

Gestational weeks	Spontaneous labour (N=40)				Induced labour (N=60)				P value	OR	95% CI
	Vaginal		Cesarean section		Vaginal		Cesarean section				
	N	%	N	%	N	%	N	%			
37	1	2.5	2	5	3	5	2	3.3	0.465	0.333	0.017 – 6.655
38	3	7.5	1	2.5	6	10	10	16.7	0.178	5.00	0.419 – 59.660
39	4	10	2	5	1	1.7	10	16.7	0.013*	20.00	1.391 – 287.614
40	5	12.5	1	2.5	5	8.3	10	16.7	0.038*	10.00	0.907 – 110.287
41	9	22.5	2	5	3	5	5	8.3	0.048*	7.5	0.921 – 61.05
42	8	20	2	5	2	3.3	3	5	0.121	6.00	0.563 – 63.987
Total	30	75	10	25	20	33.3	40	66.7	<0.001**	6.00	2.453 – 14.678

*p < 0.05 **p < 0.001

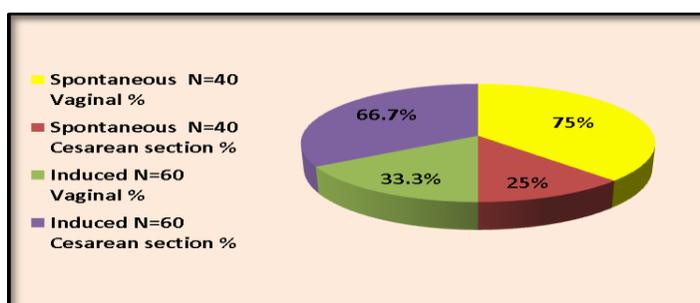


Figure 1: Distribution of vaginal versus cesarean section incidence according to onset of labour.

Table 3. Distribution of induction as well as augmentation methods for cesarean section according to onset of labour.

Cesarean section N, 50							
Induction methods	Spontaneous labour N, 10		Induced labour N, 40		P value	OR	95% CI
	N	%	N	%			
Cervical ripening	0	0	20	50	0.004*	0	Infinity
Amniotomy	2	20	5	12.5	0.541	1.75	0.286 – 10.702
Oxytocin	8	80	15	37.5	0.016*	6.667	1.247 – 35.647

*p < 0.05 **p < 0.001

Discussion:

This study aimed to explore incidence of cesarean section among parturient women undergoing induced versus spontaneous labour per gestational weeks. To fulfill the aim of this study, research questions were answered: These study findings revealed that:

1- Parturient women with induced labour were more likely to undergo cesarean section per high gestational weeks than with spontaneous labour.

2- A method of cervical ripening for induced labour was more likely to induce cesarean section as well as oxytocin for spontaneous labour accordingly the study questions were answered.

These study findings were consistent with prior research studies, from these a single study revealed that the researcher was found that for pregnancies that were induced at full-term. There was a 12% higher risk of CS delivery, compared with pregnancies that were with spontaneous onset. This finding was paralleled with past randomized controlled trials, systematic reviews and

meta-analysis which were carried out at United Kingdom, in which induction of labour had indicated that women who had induced labour were more likely to need CS as well as more likely to use induction methods (**Jacquemyn.2012**). The similarities between the present and other studies might explained by control of maternal BMI that might be associated with an increased risk of CS in induced labour.

Conversely with the present study, a new study presented in the Journal of Canadian Medical Association suggested that evidence to support this was "very weak" and women who undergo spontaneous onset of labour close clinical monitoring of the process - might be at increased risk of CS. Recent studies showed there were fewer CS deliveries with induced labour than without it (**EkaterinaMishanina.2014**). The last study was in contrast with the current study. The discrepancies between two studies might explained by the distinction between induction of labour and augmentation.

In Egypt, CS rate was higher in private as well as public hospitals (**WHO.2010**).

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Two prospective studies conducted at three large Ohio State hospitals. Of the sample, 216 low-risk multiparous women with spontaneous onset of labour at term gestation stated that inducing labour lowered the rate of CS in low-risk pregnancies (**Nancy.2014**). Also these findings in contrast with the present study which had more CS with induced labour. The investigators stated that induction of labour was criticized for increasing the risk of CS. In addition, there were thirty seven Randomized Controlled Trials. There were 27 trials that included pregnancies without complications (37-42 gestational weeks). Only three studies reported that statistical differences found in CS rates between induction of labour and spontaneous labour onset, while two trials showed decreases and one study illustrated an increase in risk. While the residual studies reported no statistical significant differences in CS rates, the researchers suggested that overall CS risk was lower by approximately seventeen percent with labour induction (**Nancy.2014, EkaterinaMishanina.2014**).

The previous studies did not support the current study. The discrepancies between two studies might explained by the small sample size of the present study or as a result of implementation an induction with a low risk women.

While another study was reported that induction of labour in low risk women that had prior vaginal delivery were accompanied with more risk of CS if induction of labour performed before 41 gestational weeks (**Wood.2013**). These findings were in contrast with the findings by the current study which found that a total of sixty women had an labour induction as well as forty women had spontaneous labour. In induced group, (66.7%) resulted in caesarean section, as compared to (25%) in the spontaneous group. The higher CS rate in the induction group was seen from (38-41) weeks as well as the higher CS rate was seen in the spontaneous group at 37 weeks.

Furthermore, Washington conducted a population-based case-control study which was allocated randomly, the study sample consisted of forty three thousand of pregnant women that had single pregnancy and vaginal births was supported by retrospective cohort study carried out at California (n=532,088) and included all pregnant women who delivered between thirty seven and forty gestational weeks. These studies showed that labour induction with low risk multiparae women with maternal age more than 35 years is accompanied with a higher risk of CS if compared with spontaneous labour and that risk was higher when cervical ripening was used. Compared with previous studies (**Jacquemyn.2012**) which were reported a little higher risk of CS in multiparae women that have induction. This was possibly explained by the high percentage of induction used ripening of cervix.

On the other hand, records of 1135 randomized Canadian women in a systemic review and meta analysis research with low risk 38-41 gestational weeks, singleton, vertex pregnancies and who were randomized for vaginal birth and induction of labour reported that, both the induction and the CS rate in multiparae women were lower than in prior studies. Many prior studies did not report a relation between labour induction and CS (**Nielsen.2005**). Also these previous studies were in discrepancies with the current study which might be resulted from low risk parturient that included in the present study.

One hundred and sixteen parous women were randomized to clinical trial at United States of America involving women with 39 weeks gestation, included only women with suitable cervical status (**Nielsen.2005**). Three hundred four case-control pairs at USA were studied in a retrospective, case-control assessment of the risk of CS in multiparas with no medical or obstetric complications and vertex presentations. Case women were matched with controls in spontaneous labour (**Heinberg.2002**). In addition, two previous researches of the same sample failed to report

any relation between CS risk and induction of labour that need cervical ripening (**Battista.2007, Hoffman.2006**). These findings were in contrast with the findings by the current study which might be explained by management practices differences.

Hoffman and others reported that labour induced by cervical ripening compared with spontaneous labour was more likely to undergo a CS (**Hoffman.2006**). The risk of CS in low risk multiparous women differed from whom undergoing induction by cervical ripening and from those induced by amniotomy. Amniotomy was associated with an increased risk of CS if used with women with spontaneous labour and this risk was increased in labour induced by cervical ripening. In addition, a retrospective study at United Kingdom with low risk pregnancies that had a CS delivery after 37 gestational weeks. There was higher CS birth. In this study, the CS rate was affected by cervical ripening in multiparae women with labour induction at full term (**Wood.2013**).

These previous findings were paralleled with the current study which found that compared women with spontaneous onset of labour, women who had an induced labour, a cervical ripening was the highest agent was used as well as oxytocin for spontaneous onset of labour. The very much higher rate of CS in induced labour in the present study may be affected by information deficient during labour from the health team.

Conclusions:

Based on the results which were revealed by the present study, it could be concluded that induced labour was more likely to undergo cesarean section per high gestational weeks than spontaneous labour. Caesarean section rate was higher in the induced labour group than in spontaneous labour, it was seen from (38-41) gestational weeks. There were statistical significant differences between two groups at (39-41) weeks.

Induced labour was more likely to undergo cesarean section with a method of cervical ripening as well as oxytocin for spontaneous labour.

Recommendations:

The following recommendations could be inferred from the study findings. Women that are requested induction of labour should be educated about increasing risk of CS. The best solution to prevent induction failure is possible to avoid e cervical ripeness and to prepare the women for a prolonged latent period. It should prompt further and larger studies of the effect of induction of labour and its methods on caesarean section rate per gestational weeks.

References:

- Battista L, Chung JH, Lagrew DC, Wing DA.(2007):Complications of labour induction among multiparous women in a community-based hospital system. *Am J Obstet Gynecol.* Sep 197(9):241 e241-247; discussion 322-243, e241-244.
- Caughey AB, Sundaram V, Kaimal AJ, et al.(2009):Systematic review: induction of labour versus expectant management of pregnancy. *Ann Intern Med.* 151(8):252-263, 253-263.
- Clark SL, Miller DD, Belfort MA, Dildy GA, Frye DK, Meyers JA.(2009): Neonatal and maternal outcomes associated with term delivery. *Am J Obstet Gynecol.* Feb 200(2):156 e151-154
- EkaterinaMishanina,EwelinaRogozinska, Tej Thatthi, Rehan Uddin-Khan, Khalid S. Khan, Catherine Meads.(2014): Use of labour induction and risk of cesarean delivery: a systematic review and meta-analysis. *CMAJ.*April 28(4): cmaj.130925.

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- Heinberg EM, Wood RA, Chambers RB.(2002):Induction of labour in multiparous women. Does it increase the risk of cesarean section? J Reprod Med. May 47(5):399-403.
- Hoffman MK, Vahratian A, Sciscione AC, Troendle JF, Zhang J.(2006): Comparison of labour progression between induced and non-induced multiparous women. Obstet Gynecol. May 107(5):1029-1034.
- Jacquemyn Y, Michiels I, Martens G.(2012):Induction of labour increases caesarean section rate in low risk multiparous women. J Obstet Gynaecol. Apr; 32 (4): 257-9.
- Kaufman KE, Bailit JL, Grobman W.(2012):Induction: an analysis of economic and health consequences. Am J Obstet Gynecol. 187(4):858-863.
- Nancy j.(2014):Labour Induction May Lower C-Section Risk by 12 Percent. Jan 115 (1): 306-309.
- Nielsen PE, Howard BC, Hill CC, Larson PL, Holland RH, Smith PN.(2005):Comparison of induction of labour with favorable Bishop scores versus expectant management: a randomized clinical trial. J Matern Fetal Neonatal Med. Jul 18(7):59-64.
- [Http://pregnancy.lovetoknow.com/wiki/Inducing_Labour](http://pregnancy.lovetoknow.com/wiki/Inducing_Labour)©.(2012): Induction of Labour by Foley's Catheter. Love To Know Corp.9/2/2012.
- WHO Global Survey on Maternal and Perinatal Health.(2010): Induction of labour data. Geneva, World health Organization, (available at: http://www.who.int/reproductivehealth/topics/best_practices/global_survey).
- Wood S, Cooper S, Ross S. (2013): Does induction of labour increase the risk of caesarean section? A systematic review and meta-analysis of trials in women with intact membranes. BJOG. DOI: 10.1111/1471-0528.12328.
- [Http://www.nursing.com/2011/03/accelerationandinductionoflabour.html](http://www.nursing.com/2011/03/accelerationandinductionoflabour.html).19/2/2012
- Zhang J, Troendle J, Reddy UM, et al.(2010): Contemporary cesarean delivery practice in the United States. Am J Obstet Gynecol. 203(4):326 e321-326 e310