

Comparative Analysis of Pregnancy Outcome in Pregnant Women in Active and Latent Phase of Pregnancy; A Study from a Referral Center in Northwestern Iran

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Abstract: Admission and hospitalization time for labor can have an important effect on outcome of labor and if we investigate these factors, a lot of problems concerning mothers and baby will diminish. This study is conducted to analyze the comparison between outcome of pregnancy in hospitalized women in latent and active phases of pregnancy in Tabriz Taleghani Hospital. This descriptive-analytic study is carried out in Tabriz Taleghani Hospital. Pregnant women who had inclusion criteria were included in study and then they were separated in 2 groups (active and latent) they were selected in random. First group (mothers in latent phase (n=250)) and second group (mothers in active phase of delivering (n=250)) were hospitalized and total sample size was 500 (N=500). Required information was collected according to delivery process observation, interviewing with mothers and reading their medical profiles. A questionnaire including research unit features, partograph form, check list for second, third and fourth and results of physical examination was used to collect information. SPSS (Ver. 13) was used to analyze data. In first group, 64% had 3cm dilatation and 67.3% of second group had 5.6cm dilatation. There was a statistically significant difference between Oxytocin use and labor induction ($p < 0.001$); also between oxytocin use and anatomy ($p < 0.021$). Ampicillin, Hyocine, Pethidine, and Promethazine administration was more in latent phase group than those in active phase. In second stage of pregnancy, applying pressure on uterine fundus in labor, first minute APGAR, umbilical artery blood pH and approaches to neonates there were a significant difference between 2 groups. There were statistical differences in amount of Hemoglobin level ($P < 0.007$) and Hematocrit ($P < 0.008$) before being discharged and in duration of hospitalization in gynecology ward between 2 groups. Although duration of second and third stage of labor in latent phase group was more than those in active phase, there wasn't any significant statistical difference between them. Results indicate that hospitalizing women in latent phase of labor is accompanied by increase in duration of hospitalization in postpartum ward and labor duration; also more complications and intervention on mothers and baby. Hence it's suggested to teach pregnant women about initiation of active phase and its symptoms in prenatal care. In order to prevent the complication of early hospitalization it's better to urge them if they don't have any particular problem, it would be better to be hospitalized only in their active phase of labor.

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Comparative Analysis of Pregnancy Outcome in Pregnant Women in Active and Latent Phase of Pregnancy; A Study from a Referral Center in Northwestern Iran. *Life Sci J* 2013; 10(2): 2095-2101]. (ISSN: 1097-8135).

<http://www.lifesciencesite.com>. 294

Key words: pregnancy outcome, latent phase of pregnancy, active phase of pregnancy.

1. Introduction:

Labor is defined as "uterus contraction which has adequate quantity, duration and intensity which causes cervical dilation and effacement" (1). Accurate definition of labor can't help to determine timing of labor initiation. The biggest obstacle in understanding normal labor, is determining labor initiation. There are some methods used to overcome this obstacle. In the first method, start point is considered as the initiation of regular painful contractions. In the second method, Initiation of labor is defined as the time which pregnant women have been hospitalized in labor. In "National hospital of mothers" in Dublin

hospitalization criteria have been defined. Based on these criteria, painful uteri contractions at term labor accompany by each of the followings are admitted to be hospitalized: 1) rupture of membranes 2) bloody show 3) complete cervical effacement. In United States, to hospitalization of women in labor unit is basically based on cervical dilatation (3-4 cm or more) with painful spasm (2).

According to "Friedman" definition (1972), Initiation of latent labor is the time which mother feels regular contractions. Latent phase is ended in 3-5 cm of dilatation in most of women. If latent phase is prolonged over 20 hours in nulliparous women and

over 14 hours in multiparous ones, it's called "prolonged latent phase". 3-5cm or more cervical dilatation associated with uterus contraction is confidently considered as threshold of active labor. Friedman defined delayed active phase in this way: slow rate of cervix dilatation or descent which is less than 1.2 cm dilatation per hour or less than 1 cm descent per hour in nulliparous women. Delayed cervical dilation in nulliparous women is defined as less than 1.5 cm dilatation per hour or less than 2 cm descent per hour. Withdrawal of active phase is defined as dilation stop (no changes in cervix for 2hours) and descent stop(at least 1 hour).

There is vigorous tempting in hospitalizing mothers mostly to decrease pain and fear among pregnant women (3). Hospitalizing parturient women in latent phase can have risks such as increasing chance of cesarean(4). Gifford et al. carried out a study on 2447 pregnant women; they concluded that prolonged latent phase is the one reason of irregular cesarean. This study showed that lack of progress in labor is the key cause of Cesarean (68%)(5).

Hospitalization in latent phase according to long period of latent phase and prolonged time of hospitalization might have unpleasant effects on patient and her families, also this issue causes a great economic burden on patients and national health systems; besides, in this situation physicians are under lots of pressures so chance of operating a cesarean procedure will be increased (6).

However most of experts and health centers believe that it's acceptable to prolong hospitalization parturient woman in order to prevent early admission and unnecessary interferences in labor and decrease expenses if latent phase isn't accompanied by important complications such as premature rupture of membrane, fetal distress or vaginal bleeding(6-8).

Gharoro et al. in a study carried out on 3130 women in labor period concluded that early hospitalization and long latent phase are main problems of labor and suggested that preliminary vaginal examination by experts should be done to hospitalize patient (9).

Bailit et al. in a study in subway medical center in Ohio compared labor outcome in 6121 patient in active phase with 2697 patients in latent phase. Most of patients in latent phase were nulliparous. Among nulliparous patients in latent phase compared with nulliparous patients in active phase rate of cesarean were significantly high (14.2% compared with 6.7%). Besides it's observed with parity control that patients in latent phase had more chance to stop active phase, Oxytocin administration, assessing fetal scalp pH, applying intra-uterine pressure catheter, fetal heart monitoring and amnionitis, but there isn't any meaningful difference between these 2 groups in terms

of cesarean, labor with forceps, vacuum neonate intubation, bleeding and infection after labor(3). current studies don't determine exact policy to control latent phase. Deciding definitely about initiation of labor and duration of latent phase is difficult and it might be the reason for various approaches to latent phase(10).

Rahnama et al. conducted a study about "Impact of early admission in labor on method of delivery". IN this study 466 of nulliparous women in latent phase (1st group) and 329 of them in active phase (2nd group) were admitted to labor unit to determine type of labor. Results show that rate of Cesarean in the 1st group was more than the 2nd one (65% compared with 24.3%). The most important reason of cesarean in both groups was fetal distress however there wasn't any meaningful statistic difference between time of admission with lack of labor progress (11).

It's not exactly clear that those women admitted in latent phase whether because of uterine dysfunction (they suffer for a long time before admission) or because of high risk of this stage or hospitalizing women in this stage, extended hospital stay, Obstetric interventions have an adverse outcome on mother and baby(12-14).

Greulich et al. believe that prolonged latent phase is complex and not completely understood by modern science. studies often ignore evaluation of this phase of labor because determination of onset is subjective(15).

According to reasons given above current study was conducted to compare outcome of pregnancy in hospitalized women in both latent and active phases in Taleghani hospital of Tabriz, so we can determine the pattern of admission time in labor ward to decrease delivery risks and risks of postpartum on mothers and neonates.

2. Material and Methods:

This descriptive-analytic study was performed in Taleghani hospital of Tabriz. The study groups were composed of parturient women hospitalized in this hospital for vaginal delivery.

To calculate sample size in this study it's used 2 mean estimate formula in which $z=1.96$ CI= 95% and d value is variable based on researcher selection and it's considered $d=0.05$. According to mean estimated formula, sample size for each group was $n=225$ and if considered 10% decrease is considered, sample size would be $n=250$. So the study group was composed of 500 parturient women, divided randomly in to two groups of 250 parturient women in latent and active phases. Determination of active phase was based on regular and painful uterus contractions in admission time and 4 cm dilation or more, also diagnosis of latent phase was based on regular uterus contractions and less than 4 cm cervical dilation.

Required information was collected with observing delivery process, interviewing with mothers and medical profiles. Data was collected with a questionnaire. questionnaire included 5 parts: features of research centers(midwifery history, test results at time of admission, vaginal examination results, uterus contraction investigation and vital signs), partograph form (duration of first stage,FHR, dilation,asetasion, number of contractions, oxytocin administration,membrane status and medications), check list for assessing 2nd stage(duration, type of labor, pressure on fundus through labor, neonate APGAR, umbilical artery blood pH, meconium – stained, actions taken on neonates, weight of neonates, duration of hospitalizing neonates in maternity ward), 3rd stage (duration and placental removal method) and 4th stage(complications and method in 4th stage of labor and vital signs when transferring to post-partum ward), and 4th & 5th parts of questionnaire are related to examination before discharge(duration of hospitalization in post-partum ward, vital signs, hemoglobin and hematocrit level, vulva and perineum hematoma, vaginal bleeding after labor and urinary problems) and examination of the first 10 days after labor (episiotomy infection, endometritis, bleeding after labor, urinary infection, and deep vein thrombosis), respectively. Validity of questionnaire was determined by content validity method. In order to evaluate the validity, edited questionnaire was evaluated by 10 professors of Tabriz University of Medical Science. Reliability of content was checked by Cronbach's alpha. Correlation coefficient of 20 completed questionnaires was 0.68, measured by two researchers. after taking testimonial from research centers, inclusion criteria such as: term labor (38-42 weeks based on precise LMP or ultrasound (6-8 months)) and latent or active phases, vortex presentation, optimum pelvic diameter for vaginal delivery, singleton pregnancy, to have uncomplicated pregnancy, existing NST at admission time were analyzed and if they had inclusion criteria, they would be included in our study and they were studied in 4 steps. In first step features of research centers were checked and it was recorded in the mentioned form. Then according to vaginal examination, participants were divided in two groups including latent and active phase. In second stage after hospitalization in labor ward, labor progression and required efforts were studied and recorded in partograph form. In third step participants were moved to delivery room, 2, 3 & 4th stages of labor were observed attentively and results were recorded in check list. In 4th step, results of examination before discharge were recorded in questionnaire and finally it's recommended that participants attend the hospital to examine the complications 10 day after labor. In 5th stage results of

the first 10 days after labor were recorded in the complication checklist, moreover if there wasn't any reference they would be called with telephone. Excluding criteria included: fetal mortality, premature rupture of membrane, excessive bleeding at time of referring, existing CPD, Abnormalities in Amniotic Fluid, Abnormal placental attachment to the uterine wall, placenta previa, major anomaly in fetus, fetus growth abnormalities such as IUGR and macrosomia, blood pressure of 140/90 mmHg or more, fever higher than 37.8, history of previous cesarean, surgical uterus history and perineorrhaphy, uterine leiomyomas, history of infertility, medical abnormalities and midwifery. Before starting study , research authorization was obtained from Tabriz University of medical science research committee, moreover required information about optional participating, confidentiality of data and whether they would like at any time, they could pass up the study was informed besides testimonial was obtained from research centers.

Statistical analyses were performed with SPSS (ver.13). The findings of the study were analyzed using descriptive statistics (Frequency, Percent Frequency, Mean, Standard deviation) logistic regression, t-test and Chi-squared test were used to assess outcome of labor in hospitalized women in active and latent phases.

3. Results

Findings show mean age in group 1 (hospitalized women in latent phase) was 25.08 ± 5.12 years and in group 2 (hospitalized women in active phase) it was 24.38 ± 5.62 years 66.8% of group 1 and 50.8% of group 2 were nulliparous. Results of tests in admission time indicates that in group 1 mean Hemoglobin level was 12.2 ± 1.1 gr/dl and Hematocrit $36.9 \pm 3.2\%$ and in group 2 were 12.4 ± 1.2 gr/dl and $37.2 \pm 3\%$ respectively. Urine analyses show that 17.6% of group 1 and 14.8% of group 2 suffer from urinary disorders such as proteinuria, bacteriuria, and pyuria. Mean platelet count, PT, PTT in group 1 were 200214.8 ± 53947.9 , 13 ± 0.3 , 37.8 ± 3.3 and in group 2 were 1998282.8 ± 51308.2 , 13.1 ± 0.3 , 37.8 ± 3.3 , respectively. In these two groups there wasn't any statistically significant differences ($p > 0.05$); most of the women in latent phase (64%) in 3 cm dilatation and in active phase (67.3%) in 5&6 cm dilatation who were admitted. Partograph form assay shows that in latent phase the number of women who had used oxytocin to induce labor was 187 (74.8%) and in active phase was 76 (30.4%). therefore, there was a meaningful statistical difference between two groups ($P < 0.001$). Amniotomy in latent phase was more than active phase (55.6% compared to 53.6%) and there was a statistically significant difference between them ($P < 0.021$). There was a statistically significant

difference between two groups about medication through labor and delivery such as Ampicillin ($P<0.009$), Hyocine ($P<0.016$), Pethidine ($P<0.016$), and Promethazine ($P<0.001$). However, there wasn't any statistically significant difference about Cefazolin and Atropine between groups. Usage of all kinds of drugs was more in group 1. Fetus Heart rate Monitoring (FTR) has shown that 6.8% in latent phase and 5.8% in active phase had arrhythmia including bradycardia and tachycardia; according to t-test results there wasn't any statistically significant difference between them. Analyzing the uterus contraction shows that 18.8% in latent phase and 2.8% in active phase were hypotonic although they had used oxytocin. There was a meaningful difference between them ($P<0.001$).

According to results of the second stage of labor, about applying pressure on uterine fundus through labor, first minute APGAR, umbilical artery blood PH and some approaches done on neonates there was a statistically significant difference between active and latent phase groups (P -value <0.05). Results of second stage of labor in hospitalized women in active and latent phases are shown in table 1.

About approaches done in 3rd and 4th stage of labor, only in massaging the uterus through abdomen there was a statistically significant difference between two groups ($P<0.001$). In other cases there wasn't such a statistical relation. Results of 3rd and 4th stage of labor in hospitalized women of latent and active phases are shown in table 2. Analyzing vital signs before transferring women to postpartum ward indicates that mean blood pressure level, body

temperature, heart rate and respiration rate were: 112.68 ± 8.8 mmHg, 37.3 ± 4.03 °C, 80.4 ± 14.8 , 20.3 ± 10.7 respectively.

Physical Examination before discharge in group 1 and 2 indicate that, 3.2% & 1.6% (respectively) of women had vulva and perineum hematoma, 6% & 1.6% (respectively) of them had bleeding after labor and 2% & 0.4% (respectively) of them had urinary disorders. Based on statistical test there was a statistically significant difference between two groups just about postpartum bleeding ($P<0.017$). Mean Hemoglobin level and Hematocrit level in group 1 were 10.8 ± 1.4 gr/dl, $33.1 \pm 3.9\%$ and in group 2 were 11.6 ± 3.1 gr/dl, $33.7 \pm 4.8\%$, respectively. Correlation test indicates that hemoglobin level ($P<0.007$) and hematocrit ($P<0.008$) in active phase were more after labor. Difference in mean hemoglobin and hematocrit level in admission time and before discharge wasn't statistically significant between two groups. Patients were examined 10 days after labor. It was realized that 3.6% in latent phase and 2% in active phase suffered from episiotomy infection, and none of the first group patients had endometritis nor delayed postpartum bleeding. 2% of patients of both groups had urinary infections; however, there wasn't any report of deep vein thrombosis. None of the first ten-day postpartum complications were significant in 2 groups.

Duration in different stages of labor in hospitalized women in active and latent phases are shown in table 3. One of the confounding factors in this study was Parity factor. Based on logistic and regression test, it was realized that there isn't any parity distribution difference in two groups.

Table1. Second stage results of labor in hospitalized women in active and latent phases.

Second Stage of Labor		Latent Phase		Active Phase		P-Value & Type of Test
		Frequency	Percentage	Frequency	Percentage	
Type of Labor	Vaginally without episiotomy	5	2	2	0.8	P=0.2 X2= - 7.69
	Vaginally with episiotomy	208	83.2	195	78	
	Perineal and vaginal lacerations	10	4	18	7.2	
	Vaginally without episiotomy and perineal laceration	25	10	34	13.6	
	Vaginally with episiotomy and use of vacuum	2	0.8	1	0.4	
Pressure on the fundus of the uterus during labor	Yes	97	38.8	56	22.4	P=0.001 X2= 15.831
	No	153	61.2	194	77.6	
First minute neonate APGAR M±SD of Latent phase: 8.77±0.64 M±SD of Active phase: 8.88±0.44	>5	1	0.4	0	0	P=0.03 X2= -2.187
	6_8	12	4.8	4	1.6	
	9_10	237	94.8	246	98.4	
PH Cord blood M±SD of Latent phase: 7.29±0.08 M±SD of Active phase: 7.33±0.094	7_7.2	40	16	16	6.4	P=0.001 X2= -4.86
	7.21_7.4	187	74.8	171	68.4	
	7.41_7.6	23	9.2	63	25.2	
Meconium Impregnation	Yes	25	10	16	6.4	P=0.19 X2= 2.152
	No	225	90	234	93.6	
Actions Taken on Neonates	Not required	87	34.8	120	48	P=0.001 X2= -36.83
	Primary Care (physical stimulation, Free O2, Suction)	136	54.4	123	49.2	
	Revival Actions	27	10.8	7	2.8	

Table2. 3th & 4th stages of Labor Results in Hospitalized Mothers in Active and Latent Phases.

3th & 4th Stages of Labor		Latent Phase		Active Phase		P-Value& Type of Test
		Frequency	Percentage	Frequency	Percentage	
Type of Placenta Removal	Spontaneously	226	90.4	233	93.2	X2= -1.269 P=0.26
	Manually	24	9.6	17	6.8	
	Under anesthesia in the operating room	0	0	0	0	
Complications of 4th stage of labor	Without complication	219	87.6	231	92.4	X2= -9.943 P=0.4
	Atonic Uterus	9	3.6	1	0.4	
	Remaining pieces of the placenta in the uterus	22	8.8	17	6.8	
	3rd & 4th degree of Rupture	0	0	1	0.4	
Massage the uterus through the abdomen	Yes	148	59.2	95	38	X2= 22.49 P=0.001
	No	102	40.8	155	62	
Evacuating Corpus Luteum	Yes	32	12.8	22	8.8	X2= 2.07 P=0.19
	No	218	87.2	228	91.2	
Methergin Administration in 4th Stage of Labor	Yes	12	4.8	8	3.2	X2= 0.83 P=0.37
	No	238	95.2	242	96.8	
Prostaglandin Administration in 4th Stage of Labor	Yes	6	2.4	5	2	X2= 0.093 P=0.77
	No	244	97.6	245	98	
Blood Administration in 4th Stage of Labor	Yes	4	1.6	0	0	X2= 4.032 P=0.12
	No	246	98.4	250	100	

Table3. Duration of Labor Stages in Hospitalized Mothers in Active and Latent Phases.

Duration of Labor Stages		Latent Phase		Active Phase		P-Value& Type of Test
		Frequency	Percentage	Frequency	Percentage	
Duration of 2nd Labor Stage (minute) M±SD of Latent Phase: 27.22±18.43 M±SD of Active Phase: 26±26.3	1_20	134	53.6	159	64.6	P=0.49 t= 0.685
	21_40	82	32.8	49	19.8	
	41_60	14	5.6	24	9.6	
	61_80	12	4.8	4	1.6	
	81_100	6	2.4	11	4.4	
Duration of 3th Labor Stage (minute) M±SD of Latent Phase: 7.8±5.1 M±SD of Active Phase: 7.1±3.7	1_5	125	50	138	55.2	P=0.22 t= -1.206
	6_10	99	39.6	87	34.8	
	11_15	22	8.8	20	8	
	16_20	3	1.2	5	2	
Length of Hospitalization in latent and active phases in gynecology ward (hour) M±SD of Latent Phase: 21.33±8.9 M±SD of Active Phase: 19.73±7.6	10_20	103	41.2	121	48.4	P=0.04 t= -2.064
	21_30	113	45.2	100	40	
	31_40	2	0.8	0	0	
	41_50	12	4.8	7	2.8	
	51_60	0	0	0	0	
	61_70	2	0.8	1	0.4	

4. Discussion

In this study 250 women in latent phase were compared with 250 women in active phase of labor. Results show that admission in latent phase accompany by increasing duration of labor, length of hospitalization as well as increasing complication and

intervention on neonates and mothers. When women are hospitalized in latent phase because of inadequate uterus contractions, midwifery intervention will be raised, also they might undergo the labor induction and aminotomy which might be accompanied by some complications. Heidarnia et al. in a study in

usage of oxytocin administration during labor in latent phase was more than those in active phase (16). In a study performed by Bailit et al. women in latent phase were more feasible to stop active phase, oxytocin use, assaying fetal scalp pH, using intrauterine pressure catheter, using internal fetal heart monitoring and amnionitis (3); which is same as our study results.

Hospitalization in latent phase led to increased medication, postpartum bleeding and as a result hemoglobin and hematocrit levels was decreased so these women would require long-term treatment of anemia. Ajori et al. in an study indicated that postpartum excessive bleeding rate in hospitalized women in latent phase is more comparing to same women in active phase (17) same as our findings. Although hospitalization in latent phase doesn't have association with poor neonatal outcome, if this stage is prolonged there might be a decline in first minute APGAR and umbilical artery blood pH, besides procedures done on neonates will be increased. Similar studies have questioned the validity of previous studies which supposed that "prolonged latent phase is benign"(2).

Ajori et al. reported that APGAR score in latent phase is low and meconium aspiration high (17). Hodnet et al. in a study indicated that prolonged latent phase more than 12 hours for nulliparous women and 6 hours for multiparous ones is accompanied by decrease in first minute APGAR and resuscitation rate (18).

According to the aim of modern gynecology which is safe birth process for mother and neonate and as far as hospitalization in latent phase can increase complications, midwifery intervention and duration of hospitalization, it's necessary to determine the admission time per labor precisely before hospitalization and doing interventions. Moreover false labor should be distinguished from true labor (because about 10% of women hospitalized in latent phase are diagnosed as false labor)(19). Hence to prevent hospitalization problems in latent phase, admission must occur when painful uterus contractions are regular or painful uterus contractions is accompanied by one of these criteria: 1) rupture of membranes 2) bleeding show 3) complete effacement in cervix(2).

The increased duration of hospitalization, complication on neonates and mothers and intervention can cause a decrease in normal vaginal delivery satisfaction and have interaction with reelection of normal vaginal delivery. Thus if patient isn't at high risk, it's better to avoid hospitalization in latent phase.

Based on these findings it's suggested to teach pregnant women about initiation of active phase of

pregnancy symptoms sufficiently in prenatal care. In order to prevent the complication of early hospitalization it's better to urge them if they don't have any particular problem, they'd would be hospitalized only in their active phase of labor. Besides it is recommended to conduct the same study in a larger population in other medical centers of country in order to change the idea said "prolonged latent phase is benign" and prepare a specific protocol in community health centers to manage this phase.

Acknowledgment

This research project is approved by Tabriz University of medical science. At the end, the efforts of president and staff of Taleghani Hospital as well as the Medical Research Council that provided funding of this project are appreciated.

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