FACTORS AFFECTING LABOR DURATION IN PREGNANT WOMEN AT NGHE AN GENERAL HOSPITAL, 2022

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Abstract:The aim of the study was to describe clinical characteristics, labor duration, factors related to the labor duration and effects of the labor duration on women with full-term, varginal delivery at the Obstetrics and Gynecology Department of Nghe An General Hospital in 2022.Cross-sectional descriptive study with analysis. Results**:** A total of 295 pregnant women at the Department of Obstetrics and Gynecology, Nghe An General Hospital were included in the study. Data were collected using a pre-designed medical record form. Results showed that the average BMI was 25.47 ± 2.31. Commonly seen signs of labor included dull belly pain (44.1%); pinkish discharge or blood show (33.5%). The average labor duration of primiparous pregnant women was 19.32 ± 12.19 hours; of multiparous pregnant women was 11.90 ± 7.90 hours. The rate of urinary retention was 13.5%; postpartum hemorrhage was 2.4%; and artificial rupture of membranes was 73.2%. There was a weak positive correlation ($r = 0.284$, $p<0.001$, $R2 = 8.1\%$) between maternal BMI and Stage 1a labor duration; the pregnant women with BMI > 30 had the longest Stage 1a labor duration ($p < 0.05$). Prolonged labor is an increased labor duration compared to pregnant women with same risk factors. Prolonged labor can lead to serious complications or sequelae if it is not early detected and promptly treated. Possible complications includes: fetal distress, potential of uterine rupture, uterine rupture, bladder or rectal fistula, neonatal infection, and postpartum infection. Therefore, monitoring of labor process and detection of possible problems should reduce complications affecting the mother's health during labor.

*Keywords***:** *full-term pregnant women, prolonged labor.*

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1. Introduction

Labor is a process in which uterine contractions occur during labor, causing the opening of the cervix to expel the fetus through the vagina. According to WHO, the duration of labor in the latent phase is defined as prolonged when the labor lasts more than 8 hours since the time of mother's hospital admission. Friedman 1955 published a groundbreaking study, describing the correlation between labor duration and cervical dilation and representing it under a curve graph - the Friedman curve, which was the basis for WHO (1993) to build a labor chart [1]. In Vietnam, studies have demonstrated the close relationship between the duration of stage 2 labor and a number of adverse factors for mothers and children after birth. Nghe An Provincial Hospital is the upper level hospital in terms of medical examination and treatment in the North Central region. We conducted the study "Factors affecting labor duration in pregnant women at Nghe An General Hospital, 2022" with the aim of describing clinical characteristics, labor duration, factors related to the labor duration and effects of the labor duration on women with full-term, varginal delivery at the Obstetrics and Gynecology Department of Nghe An General Hospital in 2022.

2. Materials and methods

2.1. Subjects, location and time

Subjects: Pregnant women who had a singleton term gestation, spontaneous labor and full-term delivery at the Department of Obstetrics and Gynecology, Nghe An General Hospital from January 2022 to November 2022.

Inclusion criteria: Vertex presentation, diagnosed with the latent labor (cervix < 3cm), and agreeing to participate in the study.

Exclusion criteria: Pregnant women with gestational diabetes, hypertension, preeclampsia, heart, kidney, endocrine diseases...; labor ended with cesarean section, or instrumental delivery, pain relief applied during delivery, emergency cases requiring rapid delivery: placental abruption, vaginal bleeding related to trauma, umbilical cord prolapse...

Location and time: Department of Obstetrics and Gynecology, Nghe An General Hospital; from January 2022 to November 2022.

2.2. Methods

2.2.1. Study design

The study was designed using a cross-sectional descriptive research method with analysis.

2.2.2. Sample size and sampling method

The sample size was 295 mothers giving birth at Nghe An General Hospital

All the mothers met the selection criteria and agreed to participate in the study.

2.2.3. Standards applied in the study

- Group of clinical characteristics: age, labor duration of stage 1a, 1b, ...

- Group of variables: BMI, amniotic fluid status, amniotomy, ...

2.2.4. Data processing method

Data were collected using pre-designed questionnaires, and processed using SPSS 22.0 software.

2.2.5. Research ethics

The study complied with ethical principles in biomedical research stipulated in Circular 04/2020/TT-BYT by the Minister of Health.

3. Results

3.1. General information about the subjects

Table 1. Characteristics by age (n =295)

Age	Primiparous		Multiparous		Total	
	No.	Percentage (%)	No.	Percentage (%)	No.	Percentage (%)
< 25	44	37.3	21	11.9	65	22.0
25 - 35	71	60.2	133	75.1	204	69.2

> 35	3	2.5	23	13.0	26	8.8
X ± SD	25.81 ± 3.34		28.34 ± 4.30		27.33 ± 4.13	

The pregnant women aged 25 to 35 accounted for the highest proportion (69.2%).

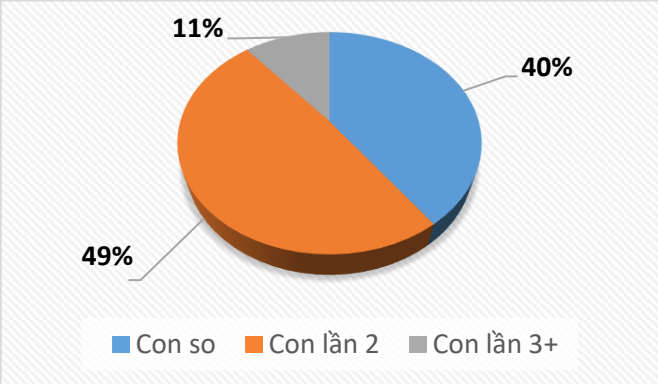

Figure 1. Distribution of births among the study subjects

40% of the women gave birth for the first time, and 49% gave birth for the second time.

Table 2. BMI of the study subjects (n = 295)

BMI	Primiparous		Multiparous		Total	
	No.	Percentage (%)	No.	Percentage (%)	No.	Percentage (%)
< 25	50	42.4	75	42.4	295	100
25 - 30	67	56.8	92	52.0		
> 30	1	0.8	10	5.6		
X ± SD	25.23 ± 2.02		28.34 ± 4.30		25.47 ± 2.31	

The mean BMI of the study group was 25.47 ± 2.31.

3.2. Clinical features of labor

Table 3. Labor duration (n = 295)

Labor duration (X ± SD)	Primiparous	Multiparous	p
Stage 1a (hour)	15.65 ± 11.68	8.98 ± 7.69	<0.001
Stage 1b (hour)	3.22 ± 1.58	2.51 ± 1.85	<0.001
Stage 2 (min.)	17.59 ± 10.65	14.77 ± 13.74	<0.001
Stage 3 (min.)	9.69 ± 3.4	9.37 ± 5.2	= 0.018
Total labor time	19.32 ± 12.19	11.90 ± 7.90	<0.001
Total	118	177	295

Total stage of labor was longer in multiparous than in primiparous women, p<0.05.

3.3. Some factors related to labor duration and effects of labor duration on the women.

Table 4. Relationship between labor duration and indications for artificial rupture of membranes (n =295)

Pregnant women	Duration X ± SD	Indications for artificial rupture of membranes		p
		Yes	No	
Primiparous	Stage 1b(hour)	2.84	4.16	<0.001
Multiparous	Stage 1b(hour)	2.43	2.75	0.334

The duration of stage 1b labor in primiparous women with artificial rupture of membranes was shorter than that in the group without artificial rupture of membranes (p<0.001).

Table 5. Relationship between labor duration and age of primiparous women (n = 295)

Age	< 25 years old (1)	25 - 35 years old (2)	> 35 years old (3)	p

Stage1a(hour)	17.13	15.00	9.10	> 0.05
Stage1b (hour)	2.91	3.42	2.88	> 0.05
Stage2(min.)	14.59 p(1.2)=0.016	19.80 p(2.3)=0.584	12.67 p(1.3)=0.152	< 0.05
Stage3(min.)	9.52	9.63	9.67	> 0.05

The duration of second stage labor in primiparous women aged 25 - 35 years old was longer than that in primiparous women aged <25 years old, p=0.016.

Table 6. Relationship between labor duration and age of multiparous women (n = 295)

Age	< 25 years old (1)	25 – 35 years old (2)	> 35 years old (3)	**p**
Stage1a(hour)	9.04 p(1.2)=0.084	8.46 p(2.3)=0.045	11.95 p(2.3)=0.019	0.024
Stage1b (hour)	1.74	2.54	1.94	>0.05
Stage2(min.)	9.33	15.13	17.65	>0.05
Stage3(min.)	10.67	9.25	8.91	>0.05

No correlation was found between age of multiparous women and duration of labor stages.

Table 7. Relationship between labor duration and BMI of primiparous women (n= 295)

BMI	<25 years old (1)	25 – 35 years old (2)	> 35 years old (3)	p
Stage1a(hour)	12.95 p(1.2)=0.008	17.63 p(2.3)=0.524	18.5 p(2.3)=0.342	0.023
Stage 1b (hour)	3.23	3.24	1.5	>0.05
Stage 2(min.)	15.86	18.7	40	>0.05
Stage 3(min.)	9.58	9.6	10	>0.05

No correlation was found between BMI of primiparous women and duration of labor stages.

Table 8. Relationship between labor duration and BMI of multiparous women (n= 295)

BMI	< 25 years old (1)	25 – 35 years old (2)	> 35 years old (3)	p
Stage1a (hour)	7.10 p(1.2)=0.006	10.07 p(2.3)=0.041	13.03 p(1.3)=0.002	0.001
Stage1a	r	p	r^2	
	0.284	< 0.001	0.081	
	-13.701 + 0.885 x BMI			
Stage1b (hour)	2.29	2.59	3.53	>0.05
Stage2 (min.)	14.83	12.95	31.1	>0.05
Stage3 (min.)	9.05	9.18	13.05	>0.05

No association was found between BMI of multiparous women and duration of stage 1a labor ($r = 0.284$, $p<0.001$, $r^2 = 0.081$)

4. Discussions

- ***Age*:** The mean age of the study subjects was 27.39 ± 4.12 years old. The mean age of primiparous pregnant women was 25.97 ± 3.39, while it was 28.34 ± 4.30 in multiparous women. The women aged more than 35 years old accounted for 8.8%. Those aged 25 to 35 (70.5%) outnumbered the other age group.

- ***Number of births*****:** multiparous women accounted for the highest proportion of 49% (145/295), while the percentage of primiparous women was 40% (118/295), and 32 pregnant women had 3 or more children (11%).

- ***Weight:*** The mean BMI of the study subjects was 25.47 ± 2.31. BMI among the primiparous and multiparous women was similar (42.4% and 42.4%; 56.8% and 52%; 0.8% and 5.6%). The ideal weight gain for the entire pregnancy was 10 - 12 kg. Nowadays, the rate of overweight, obesity, and excessive weight gain during pregnancy is gradually increasing. According to recent studies, the more weight a pregnant woman gains, the more adverse risks there are, especially the rate of cesarean section [2]. Our study found that the pregnant women were mainly in the BMI group of 25-29.9; the women with BMI>30 accounted for the lowest rate in both the primiparous and multiparous.

- ***Labor duration:*** The labor duration of multiparous women was longer than that of primiparous women at all stages; the difference was statistically significant with p<0.05. Our findings are similar to Hongquin Chen [3] which showed a statistically significant difference in labor duration of stages 1a, 1b, and 2. Primiparous mothers usually labor for about 12 to 18 hours, meanwhile it only takes about 8-12 hours for multiparous mothers to labor.

- ***Relationship between labor duration and indications for artificial rupture of membranes:*** Cochran [4] showed that artificial rupture of membranes reduced the time of stage 1b labor but it was not statistically significant. According to our findings, the labor duration of stage 1b among primiparous women with artificial rupture of membranes was statistically significantly lower than those without artificial rupture of membranes (p<0.001).

- ***Relationship between labor duration and maternal age:*** For the group of primiparous mothers, no correlation was found between labor duration and maternal age. However, we found that the duration of stage 2 labor among mothers aged 25 - 35 was longer than that among those aged <25 years old, p=0.016. Our findings are similar to Hongquin Chen et al. [3]. For the group of multiparous mothers, those women aged >35 years old had the longest duration of stage 1a labor, with statistical significance, p<0.001 (0.045 and 0.019). Previous classical studies have confirmed the relationship between maternal age and labor duration in the stage 2 [5]. This is due to the uterine muscle undergoing physiological aging and becoming less effective or less responsive to oxytocin as the age of the mother increases. In addition, the quality of mother's musculoskeletal system also decreases with age. A study by Greenberg et al. [6] on 2,500 retrospective cases showed that the duration of labor was significantly different according to maternal age in both primiparous and multiparous women. Our study showed that the duration of stage 2 labor in primiparous women and the duration of stage 1a labor in multiparous women increased with age.

- ***Labor duration and maternal BMI***: For the primiparous mothers, the duration of stage 1a labor among those with BMI 25-29.9 was longer than those with BMI < 25, the difference was of statistical significance with p=0.008. For the multiparous mothers, those with BMI > 30 had the longest duration of stage 1a labor; the difference was statistically significant with p<0.05.

There was a weak positive correlation ($r = 0.284$, $p < 0.001$, $r^2 = 0.081$) between maternal BMI and duration of stage 1a labor. Duration of stage 1a labor (hours) was 13.701 + 0.885 x BMI. In other words, for every 1 BMI increase, the duration of stage 1a labor increased by 0.885 hours. Our study showed a strong association between duration of stage 1a labor and BMI of multiparous women. For the primiparous women, no difference was found between the women with BMI>30 and the others, nor correlation between

duration of stage 1a labor and maternal BMI in the multiparous women. This may be explained by the fact that there were too few primiparous women with BMI > 30 (n=1) in our study populations. This result may change if we try a larger sample size.

5. Conclusions

The first signs of labor included dull abdominal pain (44.1%) and pinkish discharge or blood show (33.5%). The rate of urinary retention, postpartum hemorrhage, and artificial rupture of membranes was 13.5%, was 2.4%, and 73.2%, respectively.

The duration of stage 2 labor among the women aged 25 - 35 years old lasted longer than among those aged below 25 years old ($p = 0.016$); The duration of stage 1b labor in those with artificial rupture of membranes was shorter than in those without artificial rupture of membranes ($p < 0.001$).

The duration of stage 3 labor among the women aged above 35 years old was the longest ($p = 0.045$ and $p = 0.019$).

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