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Research Article

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Fetal Head Station in Active Phase of Labour in Nullipara: Study at a Tertiary Care Centre

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ABSTRACT

Objective: To study the course and duration of labor, mode of delivery, fetomaternal outcome in relation to station of fetal head in active phase in a nullipara. **Study design**: A Prospective observational study was conducted in the department of Obstetrics and Gynaecology for a period of 2 years in Government Medical College, Aurangabad. This study was done on 100 nullipara women at 37 completed weeks to 41 completed weeks of gestation who delivered in our institute. **Results**: In our study, 56% cases were at age group of 21-25 years. Maximum cases i.e. 41% presented at 39.1-40wks of gestation age. The mean duration of labour was found to be more with higher stations. Need for LSCS increased with higher station. The mean birth weights were found to be more with higher fetal head stations. The rate was NICU admission was 9%. **Conclusion**: A nullipara with unengaged fetal head and high station can be given successful trial of normal vaginal delivery under constant vigilance and timely intervention if required.

Key Words: *nullipara, fetal station, fetomaternal outcome*

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INTRODUCTION

Labor is the process through which a fetus and placenta are delivered from the uterus through the vagina [1]. A labour that is unduly prolonged gives rise to three types of distress namely fetal, maternal and obstetrician [2]. All such cases need to be identified and intervened.

Seventy to eighty percent of nulliparous women present with unengaged head in latent phase or at onset of first stage of labor. The emerging risk of caesarean section is increasing proportional to station of fetal head. Nevertheless 80% who present with unengaged head deliver vaginally [3].

In early studies by Friedman et al [4-6], a high fetal station upon admission was associated with a dysfunctional labor pattern. In contrast, a recent secondary analysis, including 4018 nulliparous women, revealed the lack of a significant association between an unengaged fetal station and vaginal delivery after controlling for other factors [3].

Early detection and timely intervention on obstetric complications are the most important activities to prevent maternal and perinatal mortality and morbidity [7]. Also a nulliparae in labour is a high risk pregnancy. A study on the prediction of complications with high fetal stations at onset of labour and appropriate interventions to decrease morbidity and mortality in nulliparae women has become a necessity and a need of hour.

Aims and objectives: To study course and duration of labor, mode of delivery, fetomaternal outcome in relation to station offetal head in a nullipara in active labour.

MATERIAL & METHODS

A prospective, observational study on a group of 100 nulliparaeat 37 completed weeks to 41 completed weeks of gestation was conducted at our tertiary care centerat our institution during the October 2020 to October 2022. After Institution Ethics Committee permission and after applying inclusion and exclusion criteria women were included in the study.

Nullipara with live singleton, full term gestation, vertex presentation, and spontaneous onset of labor with intact membranes were included in study. Primipara and above, preterm deliveries, multiple gestations, non-vertex

presentations,cases of imminent LSCS, cases with obstetric complications (like hypertensive disorders of pregnancy, gestational diabetes, antepartum hemorrhage, placenta praevia, fetal growth restriction), cases with medical complications (like anemia, cardiac diseases, hepatic diseases, renal diseases, maternal infections),and cases who did not give consent were all excluded from the study.

A detailed history and examination was done at admission.All details were filled in a prescribed validated proforma. Obstetric examination was done to confirm gestational age, lie, presentation, and station at onset of labour.

Vaginal examination was done after emptying bladder. Pelvic adequacy was confirmed clinically by seeing the Obstetric conjugate, interspinous diameter and transverse diameter of outlet before conducting vaginal delivery. Cephalopelvic disproportion was ruled out by performing Muller Munro- kerr test.

Baseline investigations were done.
Fetal heart rate monitoring was done by CTG.
Cases were observed for spontaneous progress of labour.

Augmentation of labour was done by ARM in cases of dysfunctional labour or when no cervical changes were noted after 4cm of cervical dilatation for 2 hours or cervical dilatation was <1 cm /hr with adequate contractions. Color of liquor was noted. Cases with blood stained liquor were immediately taken for LSCS and excluded from study.

High dose regimen oxytocin infusions were started after an hour of ARM when no cervical changes were noted. "High dose regimens" were given as an initial dose of ≥ 4mU/ min i.e. 8 drops per minute and dose increments of at least 4 mU/ min. Increments were done at 30 minute intervals at the rate of 4m IU/min till adequate uterine action (3 to 5 contractions in the 10-minute window, each lasting 30 to 40 seconds). For infusion preparation ringer lacatate or normal saline was used.

Instrumental vaginal delivery was done when indicated for obstetric indications as usual.

A decision of caesarean delivery was taken when no cervical changes were noted with ARM and oxytocin infusions with adequate uterine activity for at least 2 hours (arrest of dilatation), no descent of fetal head noted in active labour with cervical dilatation (arrest of descent), second stage exceeds 2 hours (second stage arrest), fetal heart rate abnormalities on CTG or fetal doppler (non reassuring NST) or meconium stained amniotic fluid (MSAF).

Course and duration of labour was monitored and studied by plotting modified WHO partographs.
The mode of delivery and maternal outcome in terms of PPH, perineal tear, infection were noted.
New-born outcome in terms of APGAR scoring at 5 min, fetal weight at birth, instrumental injuries or complications, NICU admissions were noted. All findings was noted in Microsoft excel sheet.

RESULTS

A total of 100 nulliparae at onset of active labour were included and studied.

Table 1: Distribution of study group on socio-demographic features

Age Group	**No. of Cases**	**Percentage**
18-20 years	31	31
21-25 years	56	56
26-30 years	12	12
31-35 years	01	01
	N=100	100
Booking Status		
Booked	46	46%
Unbooked	54	54%
	N=100	100%
Residence		
Urban	37	37
Rural	63	63
	N=100	100
Socioeconomic Status(Kuppuswamy classification)		
Upper class	0	0
Upper middle	7	7
Lower middle	13	13
Upper lower	34	34

Lower	46	46
	N=100	100
Education		
Illiterate	29	29
Primary	49	49
Secondary	14	14
Graduate+Postgraduate	8	8
	N=100	100

Out of 100 cases maximum cases that is 56% between were between 21-25 years. 46% of cases were booked and 54% were unbooked. 63% of cases were from rural area and 37% from urban area. Most cases i.e., 46% of total cases belonged to lower socio economic class. Most of the women had completed primary education i.e. 49% of cases.

Table 2: Fetal head station in relation to Gestational age at onset of active labour

Station	**No. of Cases**	**37.1weeks – 38 weeks**		**38.1weeks – 39 weeks**		**39.1weeks – 40 weeks**		**40.1weeks – 41 weeks**	
		No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
High Floating	04	00	00	01	25	02	50	01	25
"-3"	24	03	12.5	05	20.83	09	37.5	07	29.16
"-2"	42	07	16.6	08	19.04	18	42.85	09	21.42
"-1"	28	05	17.85	03	10.71	11	39.28	09	32.14
" 0"	02	00	00	00	00	01	50	01	50
	N=100	15	15	17	17	41	41	27	27

Out of 100 cases maximum cases i.e. 41% were at 39.1-40wks of gestational age.
The mean gestational age of spontaneous onset of labour is 39 weeks 3 days, with standard deviation of 0.97.
Maximum cases i.e., 42% presented with fetal head station at "-2".

Table 3: Mean duration of active phase according to fetal head stations

Station	**No. of Cases with vaginal delivery**	**Mean Duration of Labour (hours)**	**SD**
"-3"	10	5.47	1.47
"-2"	31	4.28	1.03
"-1"	25	3.79	1.72
"0"	2	2.8	0.6

The mean duration of active phase in higher stations i.e. "-3" (5.47hours), "-2" (4.28hours) and "-1" (3.79hours) was longer as compared to "0 station (2.8hours).

Station	**No. of Cases**	**FTNVD**		**Forceps Delivery**		**LSCS**	
		No.	**%**	**No.**	**%**	**No.**	**%**
High Floating	04	0	0	0	0	4	100
"-3"	24	10	41.67	0	0	14	58.33
"-2"	42	30	71.42	1	2.38	11	26.19
"-1"	28	25	89.28	0	0	3	10.71
" 0"	02	02	100	0	0	0	0
	N=100	57	57	1	1	32	32

Table 4: Need for Augmentation of labour in relationto and Mode of delivery in relation to fetal head station at onset of active labour

Station	No. of Cases	Augmentation		ARM		ARM + Oxytocin	
		No.	%	No.	%	No.	%
High Floating	04	4	100	4	100	0	0
"-3"	24	22	91.67	7	31.81	15	68.18
"-2"	42	38	88.09	26	68.42	12	31.57
"-1"	28	12	42.85	6	50	6	50
" 0"	02	1	50	1	100	0	0
	N=100	77	77	44	57.14	33	42.85

Percentages of cases requiring augmentation and LSCS were more with higher stations.

Table 5: Indication for LSCS with fetal head station at onset of active labour

Indication for LSCS	Arrest of descent		Arrest of Dilatation		Second Stage Arrest		Non reassuring NST		MSAF	
Station	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
High Floating	2	40	0	0	0	0	1	10	1	14.2
"-3"	2	40	1	33.3	4	57.1	3	30	4	57.1
"-2"	1	20	2	66.6	2	28.5	4	40	2	28.5
-1"	0	0	0	0	1	14.2	2	20	0	0
Total	5	100	3	100	7	100	10	100	7	100

The incidence of arrest of progress of labour in cases with higher fetal head stations was higher when compared with lower fetal head stations. Arrest of progress was seen in 50% of high floating fetal head station.

Table 6: Fetal head station at onset of active labour and maternal complications

Station	No. of Cases	Perineal Tear	
		No.	%
High Floating	04	0	0
"-3"	24	2	8.33
"-2"	42	3	7.14
"-1"	28	0	0
" 0"	02	0	0
	N=100	5	5

2 cases in -3 group and 3 cases (7.14%) in -2 group had extension of episiotomy to third degree perineal tears. In -2 group, out of 2 cases of perineal tear 1 was delivered through instrumental delivery.
No postpartum haemorrhage, exhaustion and sepsis were noted in the study group..

Table 7: Comparison of mean birth weight with fetal outcome and mean birth weight

Station	Number	Baby with mother		NICU admissions		Mean Birth weight
		number	%	number	%	
High Floating	04	4	100	0	0	3 kg
"-3"	24	22	91.67	2	8.33	2.9kg
"-2"	42	35	83.34	7	16.66	2.8kg
"-1"	28	28	100	0	0	2.8kg
" 0"	02	02	100	0	0	2.65kg
	N=100	91	91	9	9	

9% of NICU admissions are noted out of 100 deliveries. The NICU admissions were 8.33% in -3 group and 16.66% in-2 group. No NICU admissions were noted in high floating group, -1 and 0 group.

The neonates admitted in NICU were followed. 3 cases (33.34%) were admitted for less than 24 hours in view of MSAF, 4 cases (44.45%) admitted for 24-72 hours; and 2 cases (22.23%) which needed intubation were admitted for more than 72 hours. NICU babies were followed upto day 7. No neonatal deaths were noted in the study group.

The mean birth weights were found to be more with higher fetal head stations. 3 kgs in high floating group, 2.9 kgs in -3 station group, 2.8 kgs in -2 station group, 2.8 kgs in -1 station group and 2.65 in 0 station group

DISCUSSION

In this study evaluation of relation of fetal head station at onset of labour with progress of labour, mode of delivery and fetal outcome was done.

A hospital based prospective, observational study was conducted with 100 cases to evaluate clinical study of fetal head station at onset of labour and labour outcome in nulliparae.

In the study group 77% (77 cases) nulliparae belong to 20-25 years age group and 13%(13 cases) belong to 26-35 years age group comparable to study done by Dayal S et al [8] and study by Aruna Rekha N et al [9].

Table 8: Comparison of mean age

Study	**Mean Age**
Dewan et al	25.34 ± 3.34
El- Desouky ESA et al	22.5 ± 3.38
Present Study	22.35 ± 2.77

Mean age in this study group was 22.35yrs with standard deviation of 2.77. This is comparable to study done by Dewan et al [10] and El- Desouky ESA et al [11]. Ours' is rural area where marriages occur at early ages. So, the mean age of pregnancy in nullipara in this study group was 22.35yrs.

Table 9: Comparison of mean gestational age

Study	**Gestational age Range**	**Mean Gestational age**
ArunaRekha N et al	38wks - 41wks	39.5wks
El- Desouky ESA et al	37wks - 40wks	39.19wks
Dewan et al	37wks - 40wks	39.03wks
Present Study	37wks – 41wks	39.3wks

In the study group, 17% (17 cases) went into spontaneous labour between 38w1d and 39 wks, 41% (41 cases) nulliparae set into spontaneous labour during 39w1d to 40w gestational age and 27%(27 cases) set into spontaneous labour between 40w1d and 41 weeks. Mean gestational age for onset of labour in the study group was 39.3weeks which is comparable to study by ArunaRekha N et al where mean gestational age for onset of labour was 39.5 weeks [9].

The mean gestational age in other studies where gestational age range was from 37wks to 40wks, 39.19 ± 1.07 in study by El- Desouky ESA et al [11] and 39.03 ± 0.96 in study by Dewan et al [10]. The mean gestational age compared in different studies from different parts of globe is comparable.

The distribution of nulliparae according to fetal head stations were comparable to other studies of Shivamurthy et al [12]**,** El- Desouky ESA et al [11], Aruna Rekha N et al [9] and included 4% (4 cases) with high floating station, 24% (24 cases) with -3 station, 42%(42 cases) with -2 station, 28% (28 cases) with -1 station and 2% (2 cases) with 0 station i.e., engaged fetal head.

Table 10: Comparison of mean duration of labour in hours

Study	**-3**	**-2**	**-1**	**0**
Shivamurthy et al	5.17	4.26	4.2	3.66
ArunaRekha N et al	6.24	5.28	4.52	2.9
Present Study	5.47	4.28	3.79	2.8

The mean duration of active phase was longer with higher fetal head stations i.e., 5.47 hours in -3 station, 4.28 hours in -2 station and 3.79 hours in -1 station and 2.8 hours in 0 station. It was coinciding with the study done by Shivamurthy et al and Aruna Rekha N et al.

Table11: Comparison of need for augmentation

Study	High Floating	-3	-2	-1	0
Shivamurthy et al	100%	91.3%	75%	90%	58.6%
ArunaRekha N et al	100%	90%	76.6%	55.6%	20%
Present Study	100%	91.67%	88.09%	42.85%	50%

Higher the station of fetal head, more was need of augmentation of labour in all studies. The incidence of cases requiring augmentation of labour was higher in cases in high floating higher fetal head stations as compared to 0 station.100%(4 cases) in high floating higher 0 station, 91.67%(22 cases) in -3 station, 88.09% (38 cases) in -2 station, 42.85% (12 cases) of -1 station and 50%(1 case) of 0 station required augmentation. The results were comparable to study done by Shivamurthyet al [12] and Aruna Rekha N et al [9].

Table 12: Comparison of mode of delivery in unengaged head

Study	Gestational age range	LSCS %	Vaginal delivery %
Iqbal et al	38-42wks	38	62
Assadi et al	≥37wks	38.6	61.4
ArunaRekha N et al	38-41wks	33.68	66.3
Present Study	37-41 wks	32.65	66.32

Among the nulliparae in who had high floating fetal head at the time of admission, none had vaginal delivery or outlet forceps delivery and 100% (4 cases) delivered by caesarean section.

In -3 group, 41.67%(10 cases) had vaginal delivery, none had outlet forceps delivery and 58.33%(14 cases) delivered by caesarean section. In -2 group, 71.42%(30 cases) had vaginal delivery, 2.38%(1 case) had outlet forceps delivery and 26.19%(11 cases) delivered by caesarean section. In -1 group, 89. 28% (25 cases) had vaginal delivery, none had outlet forceps delivery and 10.71%(3 cases) delivered by caesarean section. In 0 group, 100%(2 cases) had vaginal delivery. All nulliparae with engaged fetal head (0 station) had normal vaginal delivery.

The results of the study done by Shivamurthy et al were 80% of high floating group delivered by caesarean section, 21.7% of -3 group delivered by caesarean section and 6% of 0 station delivered by caesarean section [12].

65%(65 cases) of nulliparae with unengaged fetal head at onset of labour had vaginal delivery, 1%(1 case) had outlet forceps delivery and 32% (32 cases) delivered by caesarean section which was significant. Results were comparable to the studies done by Iqbal et al(2009) [13] and Assadi et al (2005) [14].

Our study shows that maximum vaginal delivery were seen. It is also true that the mean duration of labour was not more than other studies to achieve more vaginal deliveries.

Complications like arrest of progress of labour were studied. 15%(15 cases) nulliparae had arrest of progress. It was higher in higher fetal head stations when compared to 0 station. 50%(2 cases) had arrest of progress in high floating group, 29.16%(7 cases) in -3 group, 7.14%(5 cases) in -2 group and 3.57% (1 case) had arrest of progress in -1 station and no cases had arrest of progress in 0 station group. Results were comparable to study done by Friedman et al [6] and Aruna Rekha N et al [9]. Hence, higher the station of fetal head, more arrest of labour is seen.

Mean birth weight was 3 kgs in high floating group,2.9 kgs in-3 station group,2.8 kgs in -2 station group,2.8 kgs in -1 station group and 2.65 kgs in 0 station group. This shows that the mean birth weights were more with higher fetal head stations in all studies. Results were comparable to other study of Dayalet al [8], Chaudhary et al [15] and ArunaRekha etal [9].

The outcomes of neonate noted in terms of apgar scores and admission to NICU done when apgar<7 noted. 9% admissions were noted in the study group. 8.33% (2 cases) of -3 station, 16.66%(7 cases) of -2 station, no cases in -1 station and 0 station had NICU admission. Results were against the finding of Chaudhary et al study [15].

CONCLUSION

This study indicates that most nulliparae present with an unengaged fetal head in active labour i.e, 98% present with unengaged fetal head in active labour.Constant vigilance is needed throughout the course of labour by using partograms to detect dysfunctional labour, in a way that interventions with augmentation and decisions regarding the mode of delivery can be made. Need for LSCS increased with higher fetal head station. Nulliparous cases with a high station at the onset of labour is not necessarily an omnious finding, obstetricians can still be optimistic towards vaginal delivery.

Limitation: There is a need to study more number of cases to establish better correlation of results.
Conflict of Interest: none.

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