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Re-Evaluating Present Day Labour Curve

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ABSTRACT
Our purpose was to analyse the pattern of labor progression in Low risk parturients in contemporary obstetric practice. We extracted detailed labor data from 1531 low risk parturients with a term, singleton, vertex fetus of normal birth weight after spontaneous onset of labor. Cesarean deliveries,instrumental deliveries and those needed oxytocin augmentation were excluded.Those women whose new born needed resuscitation were also excluded. We used statistical measures to discover the average labor curve under contemporary practice. We also computed the expected time interval of the cervix to reach the next centimeter, the expected rate of cervical dilation at each phase of labor. Our average labor curve differs markedly from the Friedman curve . The cervix dilated substantially slower till 6 cm cervical dilatation. It took approximately 3.66 hours from 4 cm to 10 cm, compared with 2.5 hours under the Friedman curve. We observed no deceleration phase . Mean rate of cervical dilatation in active phase of labour was 1.42 cm/hr which is less than friedman's rate of cervical dilatation which was 3 cm/hr. As per Zhang *et al*. labour progress differentially at different degree of dilatation. Our results suggest that the pattern of labor progression in contemporary practice differs significantly from the Friedman curve in terms of start of active phase of labour and rate of progression in active phase of labour. The diagnostic criteria for protraction and arrest disorders of labor may be too stringent in contemporary clinical practices.

INTRODUCTION

Friedman[1] published a landmark study on a graphicostatistical analysis of primigravid labor based on his observation of 500 parturients at term. He depicted the relationship between duration of labor and cervical dilation as a sigmoid curve, which consisted of latent and active phases, followed by the second stage of labor. The active phase was further divided into acceleration phase, phase of maximal slope and deceleration phase. This curve has been known as the Friedman curve. He also established a series of definitions of labor protraction and arrest[2]. These definitions have been widely adopted and applied in practice in the past half century[3]. However, labor management has changed substantially since then in contemporary practice whereas instrumental deliveries are rarely performed. The mean body mass, height, age of women, neonatal weight is significantly higher than it was 50 years ago, which may also differ for different ethinicity and race. Some studies suggested that the Friedman curve was no longer appropriate for contemporary labor management[4-6] In addition, the debate whether the deceleration phase described by Friedman exists remains unsettled[7]. We decided to re-examine the pattern of labor progression among low risk pregnant women in contemporary practice by use of statistical methods.

Zhang *et al*.[8] published his study, done on large number of parturient women and came up with contemporary labour curves, based on which American college of Obstetricians and Gynecologists (ACOG) and Society for Maternal-Fetal Medicine (SMFM) released new set of recommendatons to identify abnormality of labour progress, basically highlighting the fact that contemporary labour progresses with much slower rate than described by Friedman decades ago. Since the time, Zhang *et al*[8]. published their labour curves,many studies are done in different geographic regions all over world. Moreover, the results derived from this study showed difference from each other and also from study of Zhang *et al*.[8].These studies can actually affect the labour management approach. India is a country of huge population with a steep rise in caesarean delivery rates during last decade. Till date no previous study has focused on labour patterns in Indian females with a large sample size. The purpose of current study was to analyze labour curves of Indian origin females and to compare it with labour duration and rate of progression of Friedman's labour curve.

MATERIALS AND METHODS

This was a prospective observational study conducted from August 2017 to July 2018. The study was conducted at Department of Obstetrics and Gynaecology, SS Medical College Rewa. The study was approved by Institutional Ethics Committee. All patients admitted in the labour room during the course of study and fulfilling the inclusion and exclusion criteria were enrolled in the study. After considering inclusion and exclusion criteria all laboring females were allowed to progress naturally and a four hourly partogram was recorded. All females who required augmentation, caesarean or instrumental delivery were excluded from the study. On the basis of individual labour progress chart which were obtained, a final composite labour graph was derived and appropriate statistical tests were applied

Inclusion criteria includes Term pregnant female of Indian origin in age group of 18-35 years old with Gestational age: 37 weeks to 41 weeks with Spontaneous onset of labour.Only First to fourth gravid pregnant women with singleton pregnancy with vertex presentation having Cervical dilatation less than or equal to 4 cm at the time of admission with Normal neonatal outcome were included.

All pregnant women requiring, Oxytocin augmented labour, Induced labour, Elective LSCS or emergency LSCS, With history of any medical illness, High risk pregnancy were excluded.

Out of total 6759 vaginal deliveries during this time period, 5800 women fulfilling inclusion criteria were taken initially for study. On further study 4237 were excluded due to oxytocin augmentation needed or due to instrumental or caesarean delivery needed. 1563 remaining were further studied. Among 1563 women, neonates of 32 women required resuscitation so these 32 were also excluded. Finally 1531 women were taken in study group. Cervical dilatation and effacement was measured 4 hourly. Composite labour curve was drawn for study population.rate of cervical dilatation and time was also calculated for each centimeter of dilatation separately.

RESULTS

Total of 1531 low risk pregnancy cases (n = 1531) were included in the study. Table 1 shows demographic characteritilcs of study population. Mean age of study population was 24.43 years with a range of 18 to 35 years. Mean BMI of study population was 21.49 with a range of 18.5-30 kg m^{-2}. Maximum number of females were nulliparous i.e 79.10%. Mean gestational age was found to be 39.05 weeks with a range of 37 to 41 weeks. Mean neonatal weight of study population was 2.39 kg with a range of 1.5-3.5 kg.

Table 1: Demographic Characteristics of Study Population -

Variables	Mean	Range
Age (years)	24.43	18-35
BMI (kg m^{-2})	21.49	18.5-30
Gestational age (weeks)	39.05	37-41
Neonatal weight (kg)	2.39	1.5-3.5

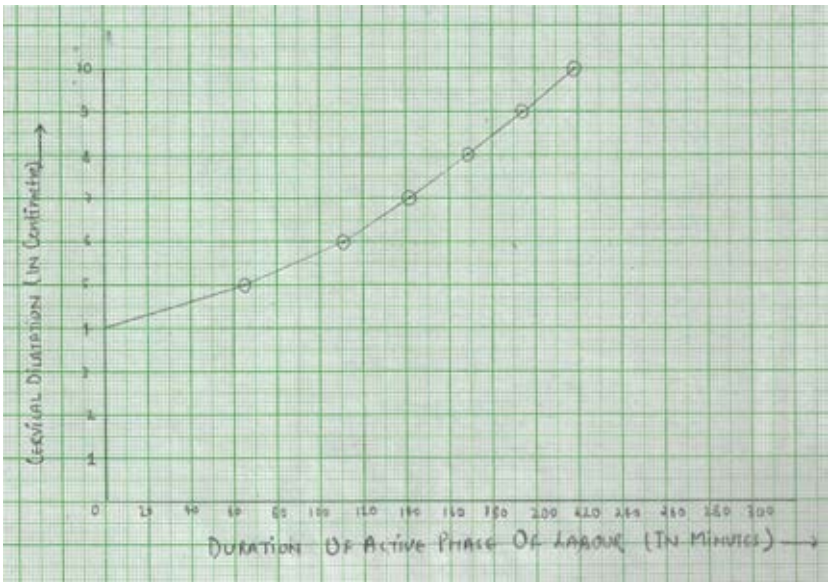

Fig. 1: Composite labour curve of study population

Table 2: Composite labour curve of study population

Sr. No.	Cervical dilatation (cm)	Mean Duration of progress (min)
1	4-5	65.34
2	5-6	45.36
3	6-7	32.28
4	7-8	26.22
5	8-9	25.14
6	9-10	24.96
7 Mean total duration of Active phase of labour		Total-219.3 min (3.66 hrs)
8 Mean of Duration of Second stage of labour		0.64 hours (38.4 min)
9 Mean of Cervical dilatation rate during Active phase of labour		1.42 cm/hrs (±0.41)

Table 3: Comparison of Present study with Friedman's study

Characteristics	Friedman's Study	Present Study
Duration of Active Phase of labour (4-10 cm)	2.5 hrs	3.66 hrs
Duration of Second stage of labour	0.75 hrs (45 min)	0.64 hrs (38.4 min)
Mean Cervical Dilatation rate during Active phase	3 cm/hrs	1.42 cm/hrs

Table 2 and Fig. 1 show findings derived from composite labour curve of study population. It shows that labour progress s slowly till 5 cm cervical dilatation.From 5 cm to 6 cm cervical dilatation labour progress was little fast than before 5 cm. But from 6 cm cervical dilatation labour progressed rapidally than before.Mean total duration of active phase of labour was 3.66 hours. Mean duration of second stage of labour was 0.64 hrs. Mean rate of cervical dilatation during active phase of labour was 1.42 cm/hr.

Table 3 is showing comparison of present study with Friedman's study. Duration of active phase of labour was 2.5 hours in Friedman's study which was 3.66 hours in present study. Duration of second stage of labour was 0.75 hours in Friedman's study which was 0.64 hours in the present study. Mean cervical dilatation during active phase was 3 cm/hrs in Friedman's study which was 1.42 cm/hrs in present study. No deceleration phase was found in labour curve of study population which is different from fried man's labour curve.

DISCUSSION

For decades labour management was based on classic sigmoid shaped curve given by Friedman years ago while contemporary labour guidelines are basically based on work of Zhang *et al*.[7]. None of these studies are done on Indian females. In the present study we have tried to derive a labour curve for Indian population. In present study mean duration of active phase of first stage of labour is 3.66 hours. Duration of active phase of labour as per Friedman's study is 2.5 hrs. This duration is much less than duration of active phase in many recent research studies. As per Zhang *et al*.[8] mean duration of active phase is 5.5 hours. As per recent Japanese study done by Suzuki *et al*.[9] mean duration of active phase is 5 hours. A study done by Lugie *et al*.[10] in Filipino women also found mean duration of active phase as 5 hrs. Mean rate of cervical dilatation in active phase of labour is 1.42 cm/hrs which is less than Friedman's mean rate of cervical dilatation i.e. 3 cm/hrs. As per Zhang *et al*.[7] labour progress differentially at different degree of

dilatation. In present study mean duration of second stage of labour is 0.64 hrs (38.4 minutes) which is comparable with Friedman's study (Table 3). This duration is also found comparable with study done by Jones *et al*.[11] who found it 54 minutes and with Albers *et al*.[12] who found it 53 minutes. As per Zhang *et al*.[7] mean duration of second stage is 2.8 hrs. Shi *et al*.[13] studied Chinese population and found duration of second stage 1.93 hours. At 6 cm dilatation there is a rapid change in rate of cervical dilatation in present study. As per Friedman cervical dilatation at onset of active phase is 4 cm. Cervical dilatation of our study population at onset of active labour is comparable that with Zhang's study. As per Zhang *et al*.[7] there is a change in cervical dilatation rate at 6 cm cervical dilatation. Shi *et al*.[13] studied Chinese population and found 6 cm cervical dilatation at onset of active phase, but onset of active phase was little delayed in study done by Suzuki *et al*.[9] in Japanese population.

Thus labour curve of our study population is comparable with that given by Friedman years ago in terms of duration of active phase of labour and second stage of labour but differ in terms of start of active phase of labour,rate of progression of labour and absence of deceleration phase in our study group.

These differences in labour characteristics may be due to different demographic characteristics of different study population. Greenberg *et al*.[14] also found that black women had shorter duration of second stage of labour and concluded that ethnicity effects progression of labour. Jones *et al*.[11] also found that in Hispanic women length of active phase of first stage of labour is longer than that of Friedman's group that concluded that this variation is due to difference in race and ethnicity of study population. Diegmann *et al*.[15] also found that African American women have shorter duration of second stage of labour than that of Puerto Rican women and concluded that labour progresses differently in different ethnic groups.

CONCLUSION

In summary, the labor curve has a profound impact on the diagnosis of protraction and arrest disorders and the decision on cesarean delivery. Our results suggest that the pattern of labor progression in contemporary obstetrics differs not only from the Friedman curve but also from many contemporary studies. This may be due to different studies being done in population of different geographic regions differing in race, ethinicity, demographic characteristics. As we all know that labour is a complex physiological phenomena being effected by varied sets of variables. This difference in pattern of labour curve in different studies may be due to these various demographic, geographic, clinical variables. This study represents labour curve for small subset of women from central India. Many multicentre studies are needed to draw a composite labour curve for Indian population. The diagnostic criteria for protraction and arrest disorders based on previous studies were may be too stringent but adoption of contemporary labour guidelines too needs deep deliberation before its wide adoption.

REFERENCES

1. Friedman, E.A., 1955. Primigravid labor: a graphicostastistical analysis. Obstet. Gynecol., 6: 567-589.
2. Friedman, E.A., 1978. Labor: clinical evaluation and management. 2nd Edn. New York: Appleton-Century-Crofts.
3. ACOG., 1995. Dystocia and augmentation of labor. Washington (DC): The College; 1995. Technical bulletin No.: 218.
4. Lu, G.C., D.J. Rouse, M. DuBard, S. Cliver, D. Kimberlin and J.C. Hauth, 2001. The effect of the increasing prevalence of maternal obesity on perinatal morbidity. Am. J. Obstet. Gynecol., 185: 845-849.
5. Rinehart, B.K., D.A. Terrone, C. Hudson, C.M. Isler, J.E. Larmon and K.G. Perry, 2000. Lack of utility of standard labor curves in the prediction of progression during labor induction. Am. J. Obstet. Gynecol., 182: 1520-1526.
6. Impey, L., J. Hobson and C. O'Herlihy, 2000. Graphic analysis of actively managed labor: prospective computation of labor progression in 500 consecutive nulliparous women in spontaneous labor at term. Am. J. Obstet. Gynecol., 183: 438-443.
7. Kelly, G., A.M. Peaceman, L. Colangelo and A. Rademaker, 2001. Normal nulliparous labor: are Friedman's definitions still relevant? Am. J. Obstet. Gynecol., Vol. 182, S129.
8. Zhang, J., H.J. Landy, D.W. Branch, R. Burkman and S. Haberman et al., 2010. Contemporary patterns of spontaneous labor with normal neonatal outcomes. Obstet. Gynecol., 116: 1281-1287.
9. Suzuki, R., S. Horiuchi and H. Ohtsu, 2010. Evaluation of the labor curve in nulliparous Japanese women. Am. J. Obstet. Gynecol., 203: 226-227.
10. Testado, L.B. and A.V. Sanchez, 2012. Evaluation of the labor curve in term nulliparous Filipino women in a tertiary care hospital from january 2008 to december 2011. Philippine J. Obstet. Gynecol., 36: 149-156.
11. Jones, M. and E. Larson, 2003. Length of normal labor in women of Hispanic origin. J. Midwifery Women's Health, 48: 2-9.

12. Albers, L.L., 1999. The duration of labor in healthy women. J. Perinatol., 19: 114-119.
13. Shi, Q., X.Q. Tan, X.R. Liu, X.B. Tian and H.B. Qi, 2016. Labour patterns in Chinese women in Chongqing. BJOG: Int. J. Obstet. Gynaecol., 123: 57-63.
14. Greenberg, M.B., Y.W. Cheng and M. Linda, 2006. Are there ethnic differences in the length of labor? Am. J. Obstet. Gynecol., 195: 743-748.
15. Diegmann, E.K., C.M. Andrews and C.A. Niemczura, 2000. The length of the second stage of labor in uncomplicated, nulliparous African American and Puerto Rican women. J. Midwifery Womens Health, 45: 67-71.