

THE RELATIONSHIP BETWEEN CERVICAL DILATATION AT INITIAL PRESENTATION IN LABOUR AND SUBSEQUENT INTERVENTION AT KENYATTA NATIONAL HOSPITAL LABOUR WARD

J Wanyoike Gichuhi, Aruasa W K, Oyieke J B O

J. Wanyoike Gichuhi MBChb, MmED; Department of obstetrics &Gynaecology,
Univarsity of Nairobi, Kenya

Aruasa W K; Moi Referral and Teaching Hospital Eldoret Kenya.

Oyieke J B O; Department of obstetrics & Gynaecology, Univarsity of Nairobi, Kenya

Requests for reprint:

J. Wanyoike Gichuhi MBChb, MmED,
Department of obstetrics &Gynaecology,
Univarsity of Nairobi,
PO Box 19676, Nairobi, Kenya

ABSTRACT

Objectives Theaim of the study was to assess the relationship between cervical dilatation at which parturients presented in labour and subsequent interventions. It also aimed at deterrming the maternal and fetal outcomes of mothers presenting early in labour (latent phase) and those presenting late in labour(active phase)

Design: This was a prospective comparative study

Setting: Kenyatta National Hospital, Nairobi

Population: 200 parturients who met the entry criteria

Methods: A total of200 parturients presenting to Kenyatta National Hospital in latent and active phases of first stage of labour

Systematic sampling was used and 2 sets of parturients recruited: 100 in latent and 100 in active groups, depending on their cervical dilatation at first assessment They were followed up in time and data collected using a precoded questionnaire

Results: The number of vaginal examinations was high in those presenting at 0-3cm group >3 in 41% vs >3 in 10% in 4-10cm, p-value <0.001, which is significant

There was significantly greater oxytocin use rate in women presenting earlier in labour. Primigravidas at 0-3cm 62.7 % vs 33.9 % in 4-10 cm, p-value 0.002; multipara at 0-3cm 68.3 % vs 34.1 % in 4-10cm, p-value 0.001 which were significant.

Obstetric analgesia (opiates) use showed a significant difference in primigravidase, 0-3cm 49.2 % vs 29.8 % in 4-10cm, p-value 0.001. However, among multipara, there was no significant difference ;0-3cm 29.3 % vs 25 % in 4-10cm, p-value 0.6.

The likelihood of caesarean section increased with increasing cervical dilatation at presentation. However, the increase was not significant when analyzed according to parity. Primigravidas presenting at 0-3cm 22% vs 32.1 % in 4-10cm (p-value 0.2) Multiparous women presenting at 0-3cm 12.2% vs 27.3% in 4-10cm (p-value 0.08).

The proportion of labour at home was significantly longer in those presenting in active phase of labour irrespective of parity (for primigravid 33.8% 0-3cm vs 50% in 4-10cm(p= 0.0002) and multiparous 34.2% vs 59.4% in 4-10cm(p=0.002).

Fetal vital status at birth were similar in the 2 groups (fetus alive in 96% of both groups).

Apgar score at 1 minute was: 7 in 24% in 0-3cm vs 8.3% in 4-10cm , p-value 0.0003. However, at 5 mins it was not significantly different in the 2 groups, 8% vs 68% respectively, p-value 0.3.

Conclusions: Women who present to hospital in latent labour spent less time in labour before presentation and were less likely to have a caesarean section compared to those presenting in active labour. However, other obstetric interventions like labour augmentation with oxytocin and use of obstetric analgesia were significantly more likely to be carried out in women who presented to hospital in latent than in those presenting in active labour.

INTRODUCTION

In most maternity units mothers admitted for delivery would either be in true or false labour. Mothers in true labour may present either in first, second or third stage of labour'.

True labour is characterized by regular uterine contractions ("pains") that become more frequent, forceful and of longer duration with the passage of time, accompanied by effacement and dilatation of the cervix (2) First stage of labour is sub-divided into latent and active phases. Latent phase of labour is found in a mother in true labour whose cervical dilatation is less than 4 cm. Active phase of labour occurs when cervical dilatation is 4- 10cm, rate of cervical dilatation is typically 1 cm per hour or more and fetal descent begins (1,8).

The progress and final outcome of labour are influenced by 4 factors (1) the passage (the bony and soft tissues of the maternal pelvis), (2) the powers (the contractions or forces of the uterus), (3) the passenger (the fetus), and (4) the psyche (2). Abnormalities of any of these components, singly or in combination, may result in dystocia. The first is not subject to change by therapeutic manipulation during delivery; the second and third can be influenced by medications or by manual or forceps/vacuum interventions. The psyche is profoundly influenced by preparation for labour, familial support; trust in the care providers, previous life experiences, and by behaviour of those in her environment during labour.

The relationship between cervical dilatation at initial presentation in labour and subsequent intervention at Kenyatta National Hospital labour Ward has not been adequately assessed. This is in spite of the fact that cervical dilatation assessment is fairly easy to do and is always carried out on all patients at initial presentation in labour, as long as there is no contraindication like ante-partum haemorrhage. Labour interventions such as use of oxytocin for augmentation of labour, use of obstetric analgesia and caesarean

section rates continue to be on the rise. Optimum intervention levels have not been ascertained. The rates of caesarean section have been a major health concern in the whole world.

Knowledge of the patterns of normal and abnormal labour, and of women's behaviour, is fundamental to the formulation of strategies to optimize on the use of obstetric interventions in labour, particularly of caesarean section use (5). One of the difficult decisions that women have to make during a pregnancy is the decision when to go into hospital if they think that labour may be beginning. Nulliparous women in particular have no experience of labour and so may find the timing of presentation hospital particularly difficult to judge (7). In addition, transportation to hospital in Kenya in general and Nairobi in particular may present a difficult problem at the time of an emergency, and this may lead to increased journey times to hospital. Two previous studies, one locally and another one in Europe, have shown that women admitted hospital early (contractions of four hours or less) have a higher frequency of obstetric interventions in labour than those admitted later (9, 10).

Kenyatta National Hospital is the premier health institution in Kenya and also serves as a training centre for midwives and Obstetricians/ Gynecologists and therefore is very crucial in setting the pace and standards of intrapartum care and interventions.

It was with this reason in mind that this hospital's labour ward was chosen as the centre for this study that aimed at determining how obstetric interventions change with the cervical dilatation at which women present in labour. Maternal and fetal outcomes of mothers presenting in latent phase of labour and those presenting in active phase of labour were also assessed.

The current study looked at how obstetric interventions changed with the cervical dilatation at which women presented in labour at Kenyatta National Hospital Labour Ward. It also assessed how these obstetric interventions affected foeto-maternal outcome.

Materials and method

This was a prospective comparative study conducted at Kenyatta National Hospital Labour Ward, Kenya. The study comprised 200 mothers arriving in latent and active phases of labour who met the following inclusion and exclusion criteria. The population was divided into 2 equal groups, 100 arriving in latent phase and 100 arriving in active phase of labour.

Inclusion criteria: Women with spontaneous true labour with a singleton pregnancy and a cephalic presentation at 37 completed weeks- 42 weeks of gestation and willing to participate in the study.

The sample size was 200, 100 for the latent phase group and 100 for the active phase

Group and the calculation was done using Epi Info version 5. Every third mother in latent or active phase of labour was taken. The study went on until an adequate sample size (200) was achieved. Data was collected by completion of a set out precoded questionnaire by the principal investigator.

A statistical analysis for social sciences SPSS for windows version 10 was used to aid in the analysis and information obtained presented in the form of tables. The package had in-built internal and external checks.

RESULTS**Table Ia: Socio-Demographic Characteristics**

		Latent Phase	Active Phase	p-value
Age (Years)	<20	24 (24.0%)	13 (13.0%)	0.02
	20 – 24	29 (29.0%)	50 (50.0%)	
	25 – 29	31 (31.0%)	23 (23.0%)	
	30 – 39	16 (16.0%)	14 (14.0%)	
Educational Level	Primary	49 (49.0%)	31 (31.0%)	0.0005
	Secondary	22 (22.0%)	50 (50.0%)	
	College	28 (28.0%)	19 (19.0%)	
	University	1 (1.0%)	0 (0.0%)	
Occupation	Housewife	47 (47.0%)	50 (50.0%)	0.05
	Professional	24 (24.0%)	14 (14.0%)	
	Unskilled	10 (10.0%)	20 (20.0%)	
	Student	19 (19.0%)	7 (7.0%)	
Marital Status	Single	26 (26.0%)	11 (11.0%)	0.01
	Married	74 (74.0%)	87 (87.0%)	
	Divorced/Separated/ Widowed	0 (0.0%)	2 (2.0%)	

Most of those who came in latent phase were aged 25 - 29 years (31.0%), whereas most of those who came in active phase of labour were aged 20 - 24 years (50.0%). Most of the latent group (49.0%) had primary level of education whereas most of the active group (50.0%) had secondary level of education. Single mothers were more among those who came early (26%) compared to 11 % among those who came in active phase. p-value 0.01.

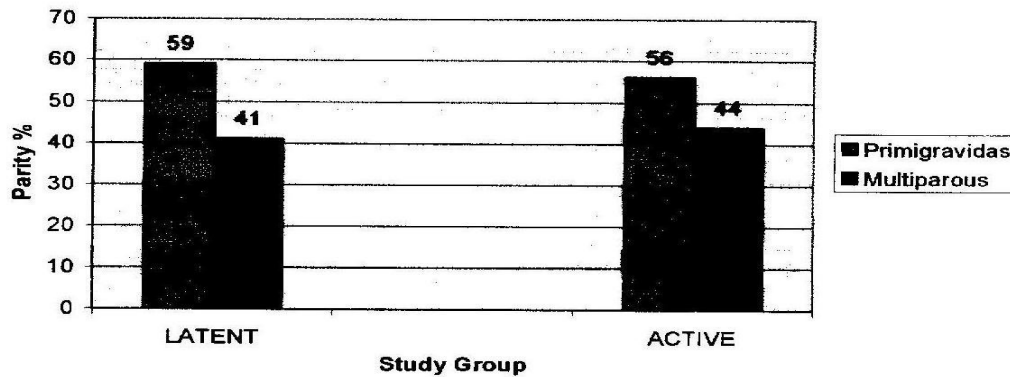
(b): Study Group by Parity N=100 per Group

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Group	Parity	
	0	1 +
Latent Phase	59 (59.0%)	41 (41.0%)
Active Phase	56 (56.0%)	44 (44.0%)

p-value 0.05291

Bar Graph of Study Group by Parity



Primigravid women were more in both groups (59% for latent phase and 56% for active phase) compared to multiparous (41% for latent phase and 44% for active phase)

Table 2 :Study Group and Obstetric History(N=100 per group)

Significant obstetric history	Latent phase	Active phase	p value
None	94(94%)	84(84%)	x ² not valid
Pre-eclampsia	2(2%)	4(4%)	
Gestational diabetes	0	6(6%)	
Antepartum haemorrhage	4(4%)	2(2%)	
Prolonged labour	0	2(2%)	
Cardiac disease in pregnancy	0	2(2%)	

Majority in both groups (94% in latent phase group and 84% in active phase group) had no significant obstetric history in their past.

Table 3:Duration of Labour in Hours**(a):Study Group and Duration of Labour**

	Study Group		p-value
	Latent N=100	Active N=100	
Total duration of labour(hours)	13.157	10.975	< 0.001
Duration of labour from onset to presentation(hours)	4.477	5.909	0.0009

(b):Duration of Labour by Parity

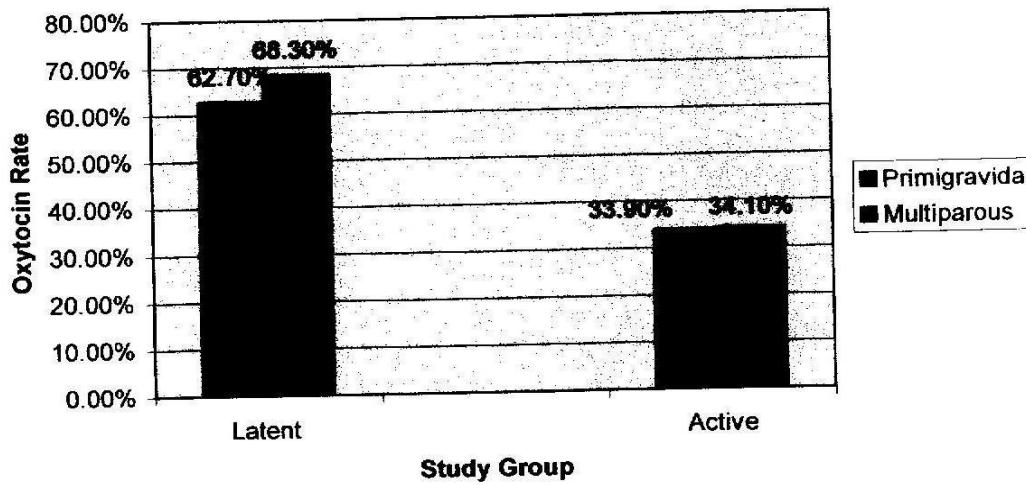
	Parity		p-value
	P ₀	P ₁₊	
Latent phase duration (mean hours)	N=100 7.125 hrs	N=73 6.247 hrs	0.07
Active phase duration (mean hours)	N=97 5.993 hrs	N=72 4.602 hrs	0.001
Total duration of labour (mean hours)	N=115 12.816 hrs	N=85 11.051 hrs	0.002

There was no significant difference in the mean duration of latent phase of labour by parity, 7.125 hours vs 6.347 hours, p-value 0.07. The duration of active phase of labour was significantly shorter in multiparous women, 5.993 hours vs 4.602 hours p-value 0.001. The total duration of labour was significantly shorter in multiparous women compared to primigravid women, 12.816 hours vs 11.051 hours. p-value 0.002.

Table 4 : Study Group by Parity, Labour Characteristics and Interventions

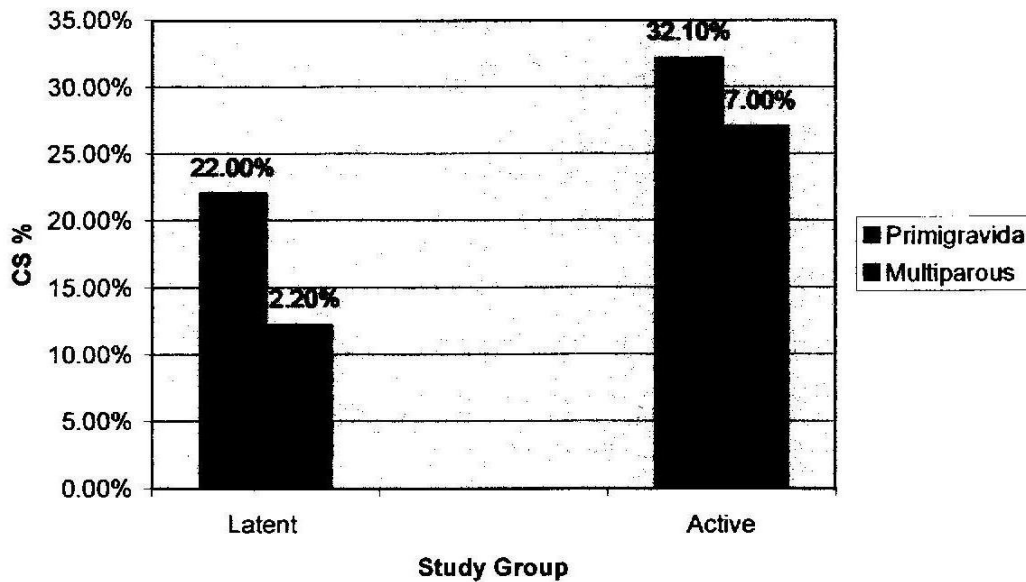
Labour Characteristic and Intervention	Parity P ₀			P ₁ +		
	Presented in latent Phase (0-3cm) N=59	Presented in active phase (4-10cm) N=56	p-value	Presented in latent phase (0-3cm) N=41	Presented in active phase (4-10cm) N=44	p-value
Gestation 40-42 weeks	39.0 %	42.9 %	0.6	31.7 %	27.3 %	0.6
Proportion of labour at home (i.e. duration before presentation and total duration of labour %)	4.7 ± 2.5 13.9 ± 4.2 33.81%	5.8 ± 2.6 11.6 ± 3.7 50%	0.002	4.1 ± 2.4 12.0 ± 4.2 31.17%	6.0 ± 3.9 10.1 ± 3.7 59.4%	0.02
Caesarean Section rate	22%	32.1%	0.2	12.2%	17%	0.06
Opiate analgesic use	49.2%	26.8%	0.01	29.3%	25.0%	0.6
Oxytocin use	62.7%	33.9%	0.002	68.3%	34.1%	0.001
Number of vaginal exams >3	41%	10%	0.001	41.5%	9.1%	0.001
Vacuum delivery	3.4%	0%	0.2	4.9%	4.5%	0.6

Bar Graph of Study Group and Oxytocin Rate



There was significantly greater use of oxytocin among primigravidas in latent phase (62.7 %) compared to those in active phase (33.9 %), p-value 0.002. The same obtained for multipara; latent 68.3 % while active 34.1 % p-value 0.001

Bar Graph of Study Group and Intervention by Caesarean Section



There was no significant difference in caesarean section rate between primigravidas presenting in latent phase (22.0 %) and those presenting in active phase (32.1 %). p-value 0.22. There was equally no significant difference in caesarean section rate between multipara presenting in latent phase (12.2 %) and those presenting in active phase (27.3 %), p-value 0.08.

Table 5: Study Group by Reason for Caesarean Section (N=100 per Group)

Reason for C/S	Study group			
	Latent phase		Active phase	
	P ₀	P ₁₊	P ₀	P ₁₊
Protracted labour	0	0	5	3
CPD	0	0	1	1
Malposition	1	1	3	1
APH	0	0	0	2
Fetal distress	12	3	7	5
Eclampsia	1	0	0	0
Arm prolapse	0	0	0	2
Total %	14	4	16	14

Most of the caesarean sections performed among both primigravid women(63%) of all primigravid women who had caesarean section) and multiparous women(44%) of all multiparous women who had caesarean section) were for fetal distress **The** next most frequent indication was dystocia (protracted labour, CPD, malposition) constituting 30% of primigravidae and 33.3% of multiparous women who had caesarean section delivery

Table 6:Study Group by Use of Obstetric Analgesia N=100per Group

Group	None	Opiate	Psychoprophylaxis
Latent phase	27 (27.5)	41 (41%)	32 (32%)
Active phase	39 (39%)	26 (26%)	35 (35%)
p-value	0.05859		

Pie Chart of Study Group and Analgesic Used

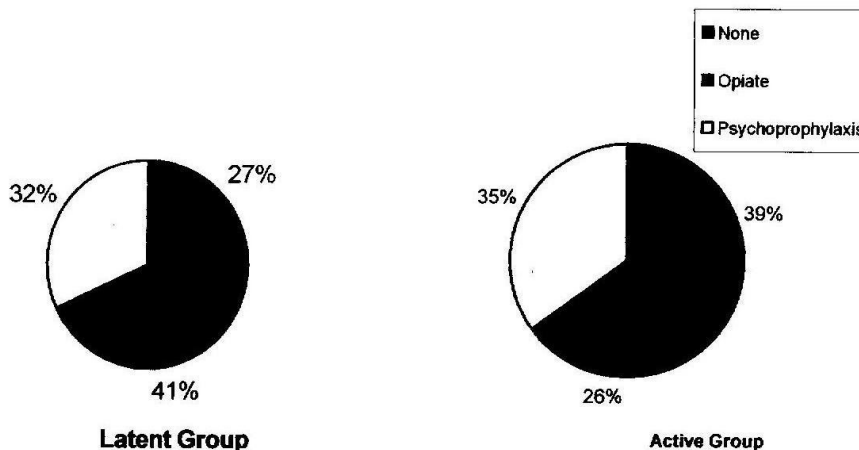


Table 7: Study Group by Maternal Outcome N=100per Group

Group	Maternal Outcome			
	Good	Uterine atony	Endometritis	Other
Latent phase	90 (90%)	4 (4%)	4 (4%)	2 (2%)
Active phase	94 (94%)	2(2%)	2(2%)	2 (2%)

X^2 Not Valid

Overall maternal outcomes were good in both groups. However, the rate of uterine atony and postpartum endometritis among the latent phase group were both twice that in the active phase group.

Table 8: Study Group, Parity and Fetal Outcome N= 200

Foetal Outcome	Parity P ₀			P ₁₊		p-value
	Presented in latent phase (0-3cm)	Presented in active phase (4-10cm)	p-value	Presented in latent phase (0-3cm)	Presented in active phase (4-10cm)	
Birthweight <2500g	3.4 %	0	0.2	4.9 %	4.5 %	0.6
Apgar score ≤ 7 at 1 min	31.6%	3.8%	<0.001	12.8%	13.6%	0.9
Apgar score ≤ 7 at 5 min	5.3%	3.8%	0.5	5.1%	13.6%	0.1
Early neonatal death	0%	0%	-	0%	6.8%	0.1
Admission of baby to NBU	22.8%	13.5%	0.2	12.8%	27.3%	0.1

There was no significant difference in the proportion of low birth weight infants (<2500g) between the early and late presenters, even when analyzed by parity. Low Apgar scores at 1st minute was only significantly different among primigravid women 31.6% among early presenters vs 3.8% among late presenters. p-value <0.001. Low Apgar scores at 5th minute, admission of babies to NBU, and early neonatal deaths showed no significant differences between early and late presenters when controlled for parity.

DISCUSSION

Socio-demographic factors such as age, occupation, marital status, and education level did not significantly affect labour interventions and outcomes. A significantly higher number of digital vaginal examinations (>3) was done in women presenting in latent phase of labour compared to those presenting in active phase of labour. Among primigravid women presenting in latent phase of labour 21% had more than 3 vaginal examinations compared to only 10% of those presenting in active phase of labour (p-value <0.001, significant). Similarly, 41.5% of multiparous women presenting in latent phase of labour had more than 3 vaginal examinations compared to only 9.1% of those presenting in active phase of labour (p-value <0.001, significant). Those in latent spent most of their labours at hospital hence increasing their likelihood of having more vaginal examinations.

The higher number of vaginal examinations among women presenting in latent phase of labour could explain why they had double the rate of postpartum endometritis compared to those presenting in active phase of labour.

Opiate analgesic use rate was significantly higher only in primigravid women presenting in latent phase of labour (49.2%) compared to those presenting in active phase of labour (26.8%), p-value 0.013 which was significant. However this was not significant among multiparous women, 29.3% among those presenting in latent phase and 25.0% among

Primary caesarean section rate was not significantly different among primigravid women presenting in latent phase compared to those presenting in active phase (22% versus 32%), p-value 0.2. Similarly, no significant difference was noted among multiparous women in the 2 groups (12.2% versus 27%), p-value 0.008. Fetal distress constituted the bulk of the primary caesarean sections (63.3% of all primigravid women undergoing caesarean section and 44.4% of all multiparous women undergoing caesarean section). This was followed by dystocia which made up 30.0% of all caesarean sections among primigravid women and 33.3% among multiparous women.

Vacuum delivery was similar in primigravid women presenting in latent phase of labour (3.4%) and those presenting in active phase of labour (0%), p-value 0.2, not significant. Similarly, vacuum delivery in multiparous women presenting in latent phase of labour (4.9%) was not significantly different from those presenting in active phase of labour (4.5%), p-value 0.6, not significant.

Low Apgar scores (less than 7) at first minute were significantly more among primigravid women presenting in latent phase of labour (31.6%) compared to those presenting in active phase of labour (3.8%), p-value <0.001, significant. However for multiparous women, these 2 groups were similar (12.8% versus 13.6%), p-value 0.9, not significant.

Apgar score of less than 7 at the 5th minute was similar in primigravid women presenting in latent phase of labour (5.3%) compared to those presenting in active phase of labour (3.8%), p-value 0.2, not significant. The same was the case for multiparous women (5.1% versus 13.6%), p-value 0.1, not significant.

Early neonatal death of 6.8% was recorded only among multiparous women presenting in active phase and none among those presenting in latent phase of labour (0%), p-value 0.1, not significant. Early neonatal death was not recorded among primigravid women presenting in both latent and active phases of labour.

Admission to neonatal unit of babies born to primigravid mothers presenting in latent phase of labour (22.8%) was not significantly higher than for those presenting in active phase of labour (13.5%), p-value 0.2, not significant. For multiparous women, the 2 groups were not significantly different either (12.8% versus 27.3%), p-value 0.1

This study therefore demonstrates that women who present to hospital early in labour have greater risk of augmentation of labour using oxytocin, opiate analgesic use and increased number of digital vaginal examinations during labour. There are a number of possible explanations for this observation.

Firstly, women presenting early in labour may represent a higher risk group than those presenting late, perhaps having been instructed to attend early. However, given the method of sampling (simple random sampling), the exclusion of inductions and the absence of a significant difference in the proportion of low birth weight (<2500g) infants between the early and the late presenters, it is felt that such an effect would be minimal in this population.

Secondly, those presenting early may have had a dysfunctional latent phase of labour and they might have laboured for as long, or longer, before attending hospital than women who present late(11). A prolonged latent phase has previously been shown to be independently associated with an increased incidence of caesarean section and other abnormalities (12). This possibility was examined by comparing the total length of labour, and the length of time from labour onset to first vaginal examination between the two groups of women. The women presenting early did have significantly longer labours, both in primigravid and multiparous women, but they spent less time at home before presentation, with a smaller proportion of labour at home, than women who presented late. This in turn may be related to higher levels of anxiety, or lack of support at home. It is well recognized that high levels of pain and anxiety are associated with increased interventions in labour, and that provision of support in hospital for women in childbirth reduces both anxiety and obstetric intervention (13,14,15).

Thirdly, early admission to hospital may itself have an effect on labour through differences in maternal position and ambulation, although this issue was not specifically addressed in this study (16). In addition, there is evidence that the longer the labour is perceived to be by the physician, the higher the chances of intervention. One major distinction between early and late presenters is the absence of data relating to the duration of the latent phase of labour in the late presenters. Intervention rates were higher when physicians are provided with this information (17).

The findings of this study agree with similar studies on the increased risk of augmentation of labour with oxytocin and use of opiate analgesia among those presenting in latent phase compared to those presenting in active phase of labour(5,9).

However, this study's finds that there is no significant difference in caesarean section rate among early and late presenters in labour, differs appreciably from a study carried out at the same set up by Murage, 2003. In his study, Murage found that 10% (N= 160) of those women presenting in latent phase had caesarean section compared to 17.5% among those presenting in active phase of labour (p-value 0.006). In that particular study, however mothers were not

O'Driscoll and colleagues (1984) at the National Maternity Hospital in Dublin pioneered the concept that a disciplined, standardized labour management protocol reduced caesarean deliveries (18,20). Their overall caesarean rate was 5 per cent in the 1970s and 1980s with such management. More recently, however, the caesarean section rate for nulliparous women delivered at the National Maternity Hospital in 1997 has more than doubled to 11.6 per cent (21). This increase was attributed to induction of labour, caesarean delivery for breech presentation and changing maternal attitudes. Our overall caesarean section rate for nulliparous women (inductions and breech presentations were excluded) was 30 per cent in the study and most were due to fetal distress and dystocia (21).

Dystocia is the most common current indication for primary caesarean section worldwide, Gifford and colleagues (2000) reported that lack of progress in labour was the reason for 68 per cent of unplanned caesarean deliveries in cephalic presentations (23,24).

It is generally agreed that dystocia leading to caesarean delivery is over diagnosed in the United States and elsewhere (8,24). Factors leading to increased use of caesarean delivery, are however, are controversial. Another factor implicated in the increase in the diagnosis of dystocia is insufficient oxytocin stimulation of labour in women with slow labour (Rouse and colleagues, 1999)(26). Thus, in our study, the relatively

lower use of oxytocin among mothers presenting in active phase(34% overall) compared to those presenting in latent phase(65% overall) could explain the relatively higher overall caesarean delivery rate of 30% among those presenting in active phase compared to 18% among those presenting in active phase.This study's overall primary caesarean section rate of 24 % compares favourably with the 21 % rate for England and Wales(27). However it is way above the 15 % rate recommended by WHO(8). This apparently high rate of intrapartum (unplanned caesarean section in our unit ought not to cause much alarm since a recent cross-sectional study in England and Wales has re-emphasized the need for coming up with maternity unit specific caesarean section rates (28). In conclusion, the risk of obstetric interventions such as oxytocin augmentation of labour, opiate analgesia and increased number of vaginal examinations tend to reduce with cervical dilatation. However, the risk of caesarean section does not change significantly with increasing cervical dilatation. Foetal and maternal outcomes were similar in both study groups.

CONCLUSIONS:

1. Women who present to hospital early in labour have higher risk of oxytocin augmentation of labour, opiate analgesic use, and higher number of vaginal examinations
2. The caesarean section rate among parturients presenting in latent phase of labour is lower compared to those presenting in active phase of labour.
3. There is no significant difference in maternal outcome, perinatal mortality and morbidity between parturients presenting in latent phase of labour and those presenting in active phase of labour

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