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RESEARCH PROPOSAL FOR MASTER OF MEDICINE

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ROUTINE VAGINAL EXAMINATION AT 4 VS 8 HOURS IN MULTIPAROUS WOMEN IN EARLY SPONTANEOUS LABOUR: A RANDOMISED CONTROLLED TRIAL

BY DR NOR IZZATI BINTI MOHD RADZALI

MGG 17152597

SUPERVISOR

PROF. DR. TAN PENG CHIONG

A/P DR VALLIKANNU NARAYANAN

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1.0 INTRODUCTION

Methods used to monitor labour progress in labour progress include routine vaginal examinations (at different frequencies[1] or as indicated[2]), routine ultrasound assessments and routine rectal examinations.[3] Evidence on the optimal frequency of routine vaginal examination is very sparse: Cochrane review concludes that "it is surprising that there is such a widespread use of this intervention without good evidence of effectiveness, particularly considering the sensitivity of the procedure for the women receiving it, and the potential for adverse consequences in some settings"[4] with only "four studies that randomised a total of 755 women, with data analysed for 744 women and their babies".[5] Nevertheless, "Digital vaginal examination at intervals of four hours is recommended for routine assessment of active first stage of labour in low-risk women"[6, 7] based on expert opinion.

In a seminal study by Zhang et al, labour may take more than 6 hours to progress from 4 to 5 cm and more than 3 hours to progress from 5 to 6 cm of dilation. Nulliparous and multiparous women appeared to progress at a similar pace before 6 cm. However, after 6 cm labour accelerated much faster in multiparas than in nulliparas.[8]

A study of 10,661 women finds even with a first stage longer than 30 hours their neonates are not at risk of increased morbidity.[9] A 2022 Cochrane Systematic Review also comments that slow labours can also be a normal variation of labour progress, and recent evidence suggests that if mother and baby are well, length of labour or cervical dilation alone should not be used to decide whether labour is progressing normally.[3]

A 2023 cluster randomized controlled trial (based on 45,193 deliveries at intervention sites and 43,725 deliveries at control sites) of a knowledge translation program of the guidelines for diagnosing nonprogressive labour finds a non-significant decrease in

caesarean rate but a significant increase for spontaneous vaginal delivery rate in the intervention group in using the new criteria for labour dystocia diagnosis.[10] A 2023 systematic review and meta-analysis on labour augmentation with oxytocin in low- and lower-middle-income countries finds that rates of oxytocin for labour augmentation varied from 0.7% to 97.0%, exceeding 30% in 14 countries and 89.5% of labours augmented with oxytocin did not cross the partograph's action line. Meta-analysis reveals that oxytocin was associated with stillbirth, day-1 neonatal mortality, low Apgar score, neonatal resuscitation and neonatal encephalopathy.[11] In nulliparous term women with spontaneous onset of labor and dystocia requiring oxytocin augmentation. the cesarean section rates were 12% in the ≤ 5 cm group, 6% in the 6-10 cm group and 0% in the fully dilated group($p < 0.001$).[12] The frequency of labour dystocia in primiparas was 33.6% compared to 7.6% in multiparas (without a prior caesarean)[13], indicating that dystocia after spontaneous labour is uncommon in multiparas.

These findings caution against any haste to diagnose labour dystocia, especially in multiparous women at low risk and to resort oxytocin augmentation and operative delivery like instrumental vaginal delivery or Caesarean section.[14] WHO guidance (2014) also states 'there is growing concern that caesarean section is performed too soon in many cases, without due consideration for less invasive interventions that could lead to vaginal birth'.[15]

The number of vaginal examinations performed during labor is directly correlated with febrile morbidity[16] and early onset neonatal sepsis[17] but these findings are not consistently reported[18, 19].

A 2012 study reports that "Palestinian women are undergoing unnecessary and frequent vaginal examinations during childbirth, conducted by several different providers and suffer pain and discomfort un-necessarily".[20] A 2015 study reports that "Jordanian

women are exposed to frequent and short interval vaginal exams during childbirth. The examinations are conducted by too many providers. Women reported suffering from pain, and poor respect for dignity and humanity, with insufficient means of privacy . Although the majority of women were asked permission to perform the examination there was poor communication regarding indication, preparation and findings".[21] During labour induction using oral misoprostol, regular compared to as required vaginal examination results in a shorter induction to vaginal delivery interval, a similar vaginal delivery rate at 24 hours and birth process satisfaction score but women still expressed a higher preference for the restricted (as required) examination schedule and were more likely to recommend such a schedule to a friend.[2] These are findings indicate that women in general prefer to have less vaginal examination in labour and may even do so at the cost of a longer labour.

A 2013 study reports that "Despite maternity care policy to limit interventions in normal labour, we found that a substantial number of women received more vaginal examinations than was consistent with adherence to guidelines. However, until further research is conducted to validate other measures of labour progress, the number of vaginal examinations undertaken during labour is unlikely to decrease".[22] Hence, it becomes imperative to evaluate routine vaginal examination less frequently than 4 hours in low-risk multiparas in early labour (cervix at 3-5 cm dilation), so that a minimum necessary is performed as wanted by women, whilst maintaining the capacity to respond in the event of labour dystocia (with oxytocin augmentation).

OBJECTIVE OF THE STUDY

This study aims to compare routine vaginal examination to assess labour progress at a planned 8 hours compared to 4 hours in multiparas in spontaneous labour on outcomes of

1) Last vaginal examination before randomization to delivery interval (hours)
2) Maternal satisfaction on the allocated vaginal examination regimen in labour (using the 0-10 Visual Numerical Rating Scale, VNRS)

RESEARCH HYPOTHESIS

We hypothesise that routine vaginal assessment after 8 hours compared to 4 hours will

1) Not prolong the interval to delivery (Non-inferiority hypothesis)
2) Increase maternal satisfaction on the allocated vaginal examination in labour regimen (Superiority hypothesis)

MATERIALS AND METHODOLOGY

STUDY DESIGN

Single centre, parallel group, randomised controlled trial

PLACE OF STUDY

Labour and postnatal ward of University Malaya Medical Center, Kuala Lumpur

POPULATION STUDY

Multiparous women at 3-5 cm cervical dilatation in early spontaneous labour

INCLUSION CRITERIA	√
Multiparous women (at least one vaginal birth ≥24 weeks)	
Spontaneous labour i. Cervical dilatation 3-5 cm ii. Painful contractions ≥3 in 10 minutes	
As soon as possible after last vaginal examination (within two hours)	
Reassuring fetal cardiotocography (CTG)	
Singleton pregnancy	
Gestational age of ≥ 37 weeks	
18 year old and above	

EXCLUSION CRITERIA	√
Previous uterine trauma (caesarean, myomectomy, perforation)	
Major fetal malformation	
Chorioamnionitis	
Severe preeclampsia	
Non-reassuring maternal status	
Contraindication for vaginal delivery (malpresentation, abnormal lie, etc.)	

4.4 METHODS

Participant in early labour in the labour ward, UMMC will be assessed. Potentially eligible women will be approached, provided with the Participant Information Sheet and engaged as to trial participation. The recruiter will invite and respond to all oral queries. Written informed consent will be obtained from all participants.

Randomisation

The randomisation sequence will be generated using an online randomiser https://www.sealedenvelope.com/simple-randomiser/v1/lists in blocks of 4 or 8. Numbered, sealed and opaque envelopes will be prepared containing the allocated trial intervention. Randomisation is affected by assigning the lowest number envelope available to the newest recruit in strict order. Inappropriately opened envelopes will be discarded and the event recorded.

Participants will be randomised to:

1. Routine vaginal examination 4 hours after the last vaginal examination
2. Routine vaginal examination 8 hours after the last vaginal examination

Interim vaginal examination can be performed at any time as deemed clinically indicated by the care provider (including non-reassuring fetal status, severe maternal distress, suspicion of second stage or imminent delivery, meconium staining of the liquor etc). The unscheduled examination will be recorded. Vaginal examination frequency following an interim or the scheduled routine examination will revert to the care provider's usual practice and recorded.

Labour care

In our centre, multiparous women presenting at term with regular painful contractions and a cervical dilatation of 3 cm or more are considered to be in labour and managed in the labour ward. Vaginal examination in labour is routinely performed at least every 4 hours to assess progress. Labour progress is charted on an electronic modified WHO partograph with a four hour delay response line for oxytocin augmentation.[23] Continuous electronic fetal heart rate monitoring is mandated in all augmented labours to delivery. A non-reassuring fetal heart rate tracing will mandate a response. Delivery can be expedited if indicated, by caesarean section or instrumental vaginal delivery depending on the circumstances. Tocolysis with subcutaneous terbutaline may be used for uterine hyperstimulation. Epidural analgesia in labour is readily available. First line care providers are residents in training supported by a faculty member who was onsite round the clock. A decision for caesarean delivery in labour will be made by a faculty member with indication based on institutional practice norms.

Blinding

As the nature of the interventions are obvious, blinding of participants or care providers is not feasible.

4.5 SAMPLE SIZE CALCULATION

5.0 PRIMARY OUTCOMES

Primary outcome 1: Last vaginal examination before randomisation to delivery interval (hours)

For time of last VE before randomisation (taken as the start of labour) to delivery, we use the labour duration reported from a study of 7109 multiparous Chinese parturients[24] with median [interquartile range] 6.9 [4.1–10.7] hours which is converted[25] to mean ± standard deviation of 7.23 ± 4.89 hours.

Applying alpha 0.05, 80% power, 1-1 randomization ratio, standard deviation 4.9 hours, non-inferiority margin of 2 hours, the number needed in each arm is 95 (sealed envelope https://www.sealedenvelope.com/power/continuous-noninferior/). If the data is not normally distributed and the Mann Whitney U test is to be applied instead, the sample size is uplifted by 15% and factoring in a 10% drop-out rate, total sample size needed is [(75 x 1.15)/0.9] x 2; N = 192.

Primary outcome 2: Maternal satisfaction with the allocated vaginal examination in labour regimen

A 1-point difference in the 0-10 VNRS maternal satisfaction score is considered as clinically relevant. We assumed a standard deviation of 2 for the distribution of the satisfaction score in both arms. Applying alpha 0.05, 80% power, 1-1 randomisation ratio, mean difference of 1 and standard deviation 2.5, and applying t-test, the number needed is 99 in each arm.[26] As satisfaction score data is ordinal and the Mann Whitney U test is to be applied, the sample size is uplifted by 15% and with a 10% drop-out rate factored in, total sample size needed is [(99 x 1.15)/0.9] x 2; N = 253. A total sample size of 254 should be sufficient for a powered study to cover both primary outcomes.

6.0 SECONDARY OUTCOMES

Maternal outcomes

- Mode of delivery (spontaneous vaginal, vacuum, forceps and caesarean)

  and indication of operative delivery (vacuum, forceps and caesarean)
- Epidural analgesia in labour
- Estimated delivery blood loss
- Fever with temperature ≥38ºC or greater (intrapartum to hospital discharge)
- Maternal recommendation of allocated intervention to a friend (5-point Likert scale)
- Maternal ICU admission
- Hysterectomy
- Relaparotomy
- Vaginal examination as scheduled
- Interim vaginal examination
- Number of vaginal examinations during study period (to delivery)
- Time (from index vaginal examination at recruitment) to
    - First subsequent vaginal examination
    - Diagnosis of second stage
    - Birth
    - Hospital discharge

Neonatal outcomes

- Apgar score at 1 and 5 minutes
- Birth weight
- Neonatal admission (and indication)

- Cord pH
- Birth trauma (specify)
- Hypoxic ischaemic encephalopathy/need for therapeutic hypothermia

As soon as possible on the postnatal ward and before their discharge, participants will be asked

1) to rate using a 11-point VNRS their satisfaction with allocated intervention of vaginal examination at 4 or 8 hours
2) to provide a response using a 5-grade Likert scale on if they will recommend their allocated intervention of vaginal examination at 4 or 8 hours to a friend

6.1 STATISTICAL ANALYSIS

Data will be entered into SPSS statistical software. Data distribution of continuous data will be evaluated for normality using the 1-sample Kolmogorov-Smirnov test. Normally distributed continuous data will be analysed with t test. Non normally distributed or ordinal data will be analysed using the Mann Whitney U test. Chi square test will be used for the analysis of categorical or nominal data (Fisher exact test used instead if ≥20% of analysed cells has <5 samples). Analysis is by intention to treat.

6.2 ETHICAL CONSIDERATION

This study is submitted to the University of Malaya Medical Centre Medical Research and Ethics committee, the local institutional review board for approval. Participants can withdraw at any time of study without having to provide a reason.

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Duration	Jan to March 2023	March to June 2023	June to Aug 2023	Sep 2023 to Nov 2024	Dec 2024 to Jan 2025	Feb to April 2025
Literature Review	✓	✓				
Proposal preparation and defence		✓				
Ethics Review			✓			
Data Collection				✓		
Data analysis and writing					✓	
Thesis Defence/ Submission						✓

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