EFFECT OF DIFFERENT FETAL BACK POSITION DURING EARLY LABOUR ON MATERNAL COMFORT AND BIRTH OUTCOMES

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Dissertation Submitted in Partial Fulfilment of the Requirement for Degree of Master of Medicine (Obstetrics and Gynaecology)

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1.3 ACKNOWLEDGEMENT

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1.4 LIST OF ABBREVIATION

BMI	Body Mass Index
CO	Cardiac output
CS	Caesarean section
CTG	Cardiotocography
FD	Forceps delivery
HR	Heart rate
HRPZII	Hospital Raja Perempuan Zainab II
IVC	Inferior vena cava
MAP	Mean arterial pressure
PAC	Patient Assessment Center
OA	Occiput anterior
OP	Occiput posterior
SA	Spine anterior
SP	Spine posterior
SBP	Systolic blood pressure
SD	Standard deviation
SVD	Spontaneous vertex delivery
VAD	Vacuum assisted delivery

1.5 ABSTRAK

OBJEKTIF: Menentukan kesan kedudukan belakang janin yang berbeza semasa fasa awal bersalin terhadap tahap keselesaan ibu, hubungan antara kedudukan belakang janin dan posisi pilihan ibu serta kesan terhadap ibu dan bayi semasa proses bersalin untuk posisi mengiring ibu dengan kedudukan belakang janin yang sama dan bertentangan.

KAEDAH KAJIAN: Kajian prospektif kohort ini melibatkan semua wanita hamil yang datang ke bilik bersalin Hospital Raja Perempuan Zainab II dengan kehamilan tunggal, pada fasa awal kelahiran pada usia kehamilan 37 minggu dan seterusnya. Kedudukan *occiput* dan tulang belakang janin ditentukan melalui pemeriksaan *ultrasound*, dan kedudukan pilihan ibu semasa fasa awal kelahiran juga dikenalpasti. Pesakit dikategorikan secara rawak kepada nisbah 1:1 berdasarkan kedudukan sisi ibu pilihan mereka. Skor untuk tahap keselesaan ibu dinilai semasa proses bersalin. Data dianalisis menggunakan analisis *multivariate*.

HASIL: Kedudukan sisi pilihan ibu semasa bersalin berkaitan dengan sisi yang sama dengan kedudukan belakang janin (p <0,001). Purata kedudukan sisi ibu semasa bersalin dengan belakang janin yang sama adalah lebih tinggi dengan perbezaan skor yang ketara diantara kumpulan kedudukan sisi ibu yang berbeza. Perkaitan yang ketara antara kedudukan ibu dan CTG (p <0.001), dimana posisi letaral ibu dan belakang janin yang sama mempunyai lebih banyak kes CTG yang normal. Tempoh persalinan, cara bersalin, keperluan analgesia dan *Apgar score* tidak dikaitkan dengan kedudukan lateral ibu dan janin semasa bersalin.

KESIMPULAN: Dalam kajian ini, ibu bersalin lebih selesa berbaring dalam posisi lateral yang sama dengan kedudukan belakang janinnya dengan pola denyut jantung janin yang normal.

Kata kunci: *posisi tulang belakang janin, tahap keselesaan ibu, proses bersalin, posisi ibu dan janin, CTG.*

1.6 ABSTRACT

OBJECTIVE: We sought to determine the maternal preferred lateralisation position at early labour and the effect of fetal back positions in relation to maternal lateralisation position during active labour on maternal comfort, as well as the delivery outcomes to both mother and fetus in the same and opposite maternal lateralization-fetal spine concordance.

STUDY METHOD: This prospective cohort study involved pregnant women who attended to labour room at Hospital Raja Perempuan Zainab II with singleton pregnancies in early labour at 37 weeks of gestation and beyond. Fetal occiput and spine position was confirmed by transabdominal ultrasound examination, and the maternal preference position at early labour was identified. The patients were randomly categorized to a 1:1 ratio based on their preferred maternal lateral position. The maternal comfort score was assessed during the delivery process. Data were analysed using multivariate analyses.

RESULT: The preferred maternal position was associated to the same maternal lateralization-fetal spine concordance ($p<0.001$). Higher means comfort score in same lateral position of the mother and fetal back during labour with significant difference of mean comfort score between different group of maternal position (p-value 0.047). A significant association between maternal position and CTG ($p<0.001$), with the same position having more cases of normal CTG. Duration of labour, mode of delivery, the requirement of analgesia, and Apgar score were not associated with lateralization of the mother and fetal back position during labour.

CONCLUSSION: In this study, the parturient were preferred and more comfortable lying in the same lateral position with their fetal back with a reassuring fetal heart rate pattern.

Keywords: *fetal spine position, maternal comfort, labour, maternal-fetal position, CTG.*

2.0 INTRODUCTION

The process of birth is influence by the position of the fetus and the movements it adopts to birth spontaneously. Fetal spine position is one of the indicators whereby, in clinical practice, both the spine and occiput are used to define the fetal position. Intrapartum ultrasonography showed a sensitivity of 100%, specificity of 98%, positive predictive value (PPV) of 85% and negative predictive value (NPV) of 100% in determining fetal spine position.(1)

Maternal supine position during the third trimester of pregnancy causes significant reduction in cardiac output due to compression of the inferior vena cava (IVC) by the gravid uterus. This condition may cause supine hypotensive syndrome.(2)(3) Furthermore, supine going to sleep position at third trimester give 2.6-fold increase for late stillbirth.(4) However going to sleep on the left or right side appears equally safe.(4) 50.6% of the mothers preferred left lateral positioning while 43.8% preferred right lateral positioning in the second half of pregnancy.(2) The mother's left or right lateral positioning appears safe. No study has examined the potential benefit of preferred maternal laterization in relation to the fetal back position.

The aim of this study is to determine the effect of fetal back position during early labour on maternal comfort. The association between fetal back and maternal lateral position (i.e same, or different position) with maternal preferred position, and maternal and neonatal outcomes were also analysed.

2.1 LITERATURE REVIEW

2.1.1 MECHANISM OF LABOUR

The complete process of labour and delivery principally defines the physiological transition from intrauterine to extrauterine life for the fetus, and from pregnant women to mother for the parturient. Labour is defined as regular and painful uterine contractions that cause progressive effacement and dilatation of the cervix. Mechanism of labour is described as a mechanical process, whereby the fetus is expelled from the uterus with the aid of uterine contractions.(1) The fetus has always been described as an active participant that must undergo a series of complex movements as it descends into the maternal pelvis. Parous women who have had a previous vaginal birth have faster labour than nulliparous.

Interpreting labour progress depends on the stages and phases of the labour. The first stage of labour lasts until full cervical dilatation, the second stage ends with fetal expulsion, and the third stage ends with placental expulsion. The first stage has latent and active phase. The process of birth is promoted by the position of the fetus and the movements it adopts to birth spontaneously. Fetal position is defined as the relationship of a particular landmark of the fetus, which in the normal instance is the fetal occiput, in relation to the landmarks of the female pelvis.(5) Labour mechanism is delineated according to this relationship and how the process of normal labour is described. Seven cardinal movements of labour in vertex presentations are engagement, descent, flexion, internal rotation, external rotation and expulsion.(6)

2.1.1.1 Engagement

The vertex is engaged when the biparietal diameter is at the level of the pelvic inlet or lower. In clinical practice, it refers to occiput palpable at 0 station.

2.1.1.2 Descent

Often occur concomitant with engagement and is typically documented late in the active phase of the first stage of labour.

2.1.1.3 Flexion

As the vertex descends into the maternal pelvis, it will encounter resistance from the maternal pelvic floor muscles causing the flexion of the fetal head onto the thorax.

2.1.1.4 Internal rotation

During engagement and descent of the vertex into the pelvis, the fetus will be in a transverse position. Because of the anatomic configuration of the pubococcygeus and iliococcygeus muscles, the occiput will be forced to rotate to the symphysis pubis. This is the widest area of the pelvic floor that will allow the passage of the fetus.

2.1.1.5 Extension

During delivery of the fetal head, the occiput slips beneath the suprapubic arch allowing the head to extend.

2.1.1.6 External rotation

Occur when the fetal head is free of resistance, it externally rotates to face the right or left medial thigh of the mother.

2.1.1.7 Expulsion

After delivery of the head, the anterior shoulder will descend under the pubic bone. The anterior shoulder then rotated under the symphysis, followed by the posterior shoulder and the rest of the body.

2.1.2 FETAL OCCIPUT AND SPINE POSITION DURING LABOUR

In 2017 a study conducted by A. Svelato et al. observed that fetal spine position could have an important role in determining fetal occiput position at birth. At the beginning of labor, in 52.3% of cases, the fetal occiput was in a posterior position and, in 81.5% of cases, the spine was in anterior position. At birth, occiput and spine are both in the anterior position in 90.4% of cases (66/73 vaginal deliveries), this phenomenon can be explained as the fetal occiput tends to rotate in the direction of the spine position.

They also observed that spine anterior (SA) positions were associated with vaginal deliveries in a higher percentage (71%) compared to spine posterior (SP) positions (14%), independently of occiput position. Conversely, SA positions were associated with operative delivery in a lower percentage (29%) compared to SP positions, independently of occiput positions.(7) These facts suggest that spine position might play a crucial role in the outcome of delivery, but, in relation to the complexity and dynamism of human labour, it would not be right to say that the evaluation of spine position has a predictive value regarding the type of delivery.

Blasi et al. claimed that the position of the spine during the second stage of labor can be considered a diagnostic sign in predicting the occiput posterior (OP) position at birth. Precisely, they focused on two main findings: firstly, when the occiput and spine were anterior at the ultrasound examination none of the infants was born in the OP position; secondly, when the occiput was posterior and the spine was anterior at the ultrasound examination none of the infants was born in the OP position; thirdly when occiput and spine were posterior at the ultrasound examination only 14% of cases

rotated into an occiput anterior (OA) position at birth.

Blasi et al. showed that the diagnostic sonographic accuracy of the fetal occiput position assessment at the second stage of labour had a sensitivity of 100%, specificity of 78%, positive predictive value (PPV) of 26%, and negative predictive value (NPV) of 100% to predict the same position at birth. Considering the fetal spinal position, ultrasound showed a sensitivity of 100%, specificity of 98%, PPV of 85%, and NPV of 100%. Intrapartum ultrasound may improve the detection of fetal head position.(1) Although the identification of OP position before or during labour is not predictive of the same position at delivery, its early detection argues for a greater monitoring of the labour evolution.

Recently, Gizzo et al investigated the role of the spine position in determining the likelihood of persistent OP position at birth and possible associated implications in obstetrical management.(8) They found that spine position had a high accuracy in predicting the position of the occiput at birth, especially if it was evaluated during the first stage of labor. Caesarean section and operative vaginal were more frequent during the second stage of labor in cases of persistent OP, especially if the spine was in a posterior position. Furthermore, in concordant posterior positions, labor length, analgesia request, operative delivery, and caesarean section rate were higher than in other combinations.

2.1.3 PHYSIOLOGICAL EFFECT OF MATERNAL POSITION

A pronounced decrease in blood pressure (BP), and the associated symptoms, is the most recognized response to maternal supine position. The generally accepted cause is the gravid uterus compressing the inferior vena cava (IVC) and/or abdominal aorta, collectively known as aortocaval compression. Supine hypotension syndrome of late pregnancy is defined as a ≥15 mmHg decreased in mean arterial pressure (MAP) or a 15-30 mmHg decrease in systolic blood pressure (SBP) with an associated 20 beats per minute (bpm) persistent elevation of heart rate (HR) over baseline when in supine position.(9)

The increased aortocaval compression in the third trimester was offered as a possible cause for second trimester peak and subsequent third trimester plateau or relative decrease in cardiac output (CO).(10) (11) (12) It has been reported that the aorta and IVC are both compressed when supine, whereas elsewhere it was reported that the IVC was compressed and the aorta was unchanged.(13) Therefore, change in IVC size is an appropriate measure of the effects of the maternal position

Based on the study conducted by Nobuko Fujita et al; 30° left-lateral tilt position consistently reduced compression of the IVC by the gravid uterus compared with the supine position.(3) The mean IVC volume in pregnant women was not increased in either the 15° or 30° right-lateral tilt positions compared with that in the 30° left-lateral tilt position. However, in a subset of patients, the optimal IVC volume was achieved in the 30° right lateral tilt position.

Mean IVC volumes of the subjects in the supine position and in the left-lateral tilt position at 15° and 30° were comparable to those obtained in previous study. (13) Similarly, IVC compression was consistently relieved by a 30° left-lateral tilt.(3) (14) Despite the accepted routine practice of placing pregnant women in the left-lateral position, very little evidence specifically addresses the advantages of a left-over right-lateral tilt for hemodynamic disturbances and uteroplacental hypoperfusion in pregnant women.

In 2016, Saravanakumar et al. reported cross-sectional IVC and aortic areas calculated from magnetic resonance images for six term obese pregnant women in various postures, including the right-lateral decubitus position.(15) They showed that the mean IVC cross-sectional area was significantly increased in the left-lateral decubitus position, but not in the right-lateral decubitus position, compared to a supine position with pelvic tilt, however the mean IVC cross-sectional area did not differ between the left and right decubitus positions.

The reason for this variability in the IVC volume depending on the positions remains unclear. The degree of IVC compression by the gravid uterus is influenced by many factors (eg, the side of fetal spine).(16) In the latest study by Nobuko Fujita et al; the number of subjects studied was small, and the statistical power of the study was not sufficient for a multivariate analysis to accurately determine the precise factors resulting in a larger IVC volume in right-tilted patients.(3) Further studies with large sample sizes are required.

2.1.4 LABOUR PAIN, MATERNAL COMFORT AND PREFERENCE POSITION DURING LABOUR

Management of labour pain is a major goal of intrapartum care. There are two general approaches: pharmacologic and nonpharmacologic. Pharmacologic approaches are directed at eliminating or decreasing the physical sensation of labour pain. In contrast, nonpharmacologic approaches are largely directed at increasing comfort, enabling the labouring woman to cope with the pain, and preventing suffering.

The International Society for the Study of Pain describes pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage". Suffering may be defined in terms of any of the following psychological elements: a perceived threat to the body and/or psyche, helplessness and loss of control, distress, insufficient resources for coping with the distressing situation, or fear of death of the mother or baby.

Both uterine contractions and perineal pressure contribute to the pain experienced during labour. Uterine pain is typically transmitted via nerve roots T10 to L1 and perineal sensation is transmitted through nerve roots S2 to S4.(17) There is anatomical support for the hypothesis that at least some low back pain during labour is actually referred pain since the nerves originating from the corpus uteri and cervix terminate in the dorsal horns of the spinal segments T10 to L1 and reflect visceral pain, which is often referred to the lower back.

Parturient have always changed positions to make themselves more comfortable.(18) Pelvic dimensions vary with differences in maternal positions; thus, these changes may help to ameliorate labour pain.(19) Caregivers often suggest specific positions to accelerate labour progress or correct a fetal or maternal problem (eg, fetal heart rate decelerations or malposition, maternal hypotension). Maternal mobility can be limited when women are connected to equipment or asked to limit movement because of the need for continuous maternal or fetal monitoring.

Labouring women should assume positions that are comfortable,(18) unless specific positions are needed because of maternal-fetal status and need for close monitoring. Data from randomized trials provide no strong evidence to discourage maternal preference for choosing position during labour. If no fetal manipulation or complications are anticipated, delivery can be accomplished with the mother in almost any position that she finds comfortable.

In a systematic review of 30 studies (n = 9015 women) comparing various labour positions with supine position on birth outcomes for women in the second stage of labour without an epidural, any non-supine birth position was associated with:(20) fewer assisted vaginal deliveries, fewer episiotomies, a mean reduction in the second stage of labour of six minutes, no clear difference in the rate of caesarean delivery, fewer abnormal fetal heart rate tracings, but no clear difference in number of admissions to the neonatal intensive care unit.

2.2 STUDY JUSTIFICATION

Fetal back position influences the maternal comfort where preferred lateralization of the mother is related to fetal back on the same side, however there is no study investigating the relationship between fetal back position that determined at the onset of labour with maternal preference or comfort position.

Left lateral is the most advisable position for pregnant to take to avoid aortocaval compression, which cause the parturient receives fewer opportunities to lying on her comfort position during labour. Discordant lateralization of the mother and fetal back associated with maternal discomfort.

Maternal comfort position will improve labour outcomes, when the correct maternal lateralization is applied, the labour process is normal and less discomfort with good fetal and neonatal outcomes.

3.0 OBJECTIVES

3.1 GENERAL OBJECTIVE

To determine the effect of different fetal back or spine position during early labour on maternal comfort and birth outcomes.

3.2 SPECIFIC OBJECTIVES

1. To determine the association between fetal spine position in relation to maternal preference position.
2. To determine the maternal outcomes in same and discordant lateralization of the mother and fetal back/spine.
3. To determine the fetal and neonatal outcomes in same and discordant lateralization of the mother and fetal back/spine.

4.0 METHODOLOGY

4.1 STUDY DESIGN, SETTING AND DURATION

This is a prospective cohort study which was conducted in labour room of Hospital Raja Perempuan Zainab II. It is a tertiary hospital and the referral centre of all hospitals in the district of Kota Bharu with total deliveries of 11000 per year. This study was carried out from 1st March 2020 until 31st August 2020.

4.2 STUDY POPULATION

4.2.1 Reference Population

All pregnant women who had delivered in Kelantan.

4.2.2 Source Population

All pregnant women who attended and delivered in HRPZII

4.2.3 Study Participants

Study participants include all pregnant women who were presented in early labour with a live singleton pregnancy in cephalic presentation at 37 to 42 weeks of gestation, who planned to deliver vaginally and gave written informed consent to participate in the study.

4.3 SAMPLE SIZE CALCULATION

- The sample size was calculated using kappa statistics.
- The primary outcome based on previous data by Koji Matsuo et al in 2007 (the relationship between maternal positioning in late pregnancy and fetal positioning in utero) was used to calculate the sample size.
- Probability fetal left back positioning: 50.6%
- Probability women preferring left lateral positioning: 51.7%
- Power: 0.95, alpha: 0.05
- k1: 0.75, k0: 0.65
- Using IRR package, calculated sample size was 327.
- Assuming dropout rate of 10%, the total sample was 360.

4.4 ETHICS AND CONSENT

The conduct of this study was approved by the Human Medical Research and Ethics Committee of USM dated March 12, 2020, and by the Medical Research and Ethics Committee of Ministry of Health Malaysia (MREC) dated February 28, 2020 (Appendix 3).

4.5 INCLUSION, EXCLUSION AND WITHDRAWAL CRITERIA

4.5.1 INCLUSION CRITERIA

Inclusion criteria are as follow:

1. Live, singleton fetus
2. Cephalic presentation
3. No known fetal abnormalities
4. Spontaneous onset of labour at term (37-42 weeks of gestation)
5. In early labour (cervical dilatation <4cm)
6. Body mass index (BMI) at patient recruitment: 18.5 - 35 kg/m2
7. Estimated fetal weight between 2.5-3.5kg
8. Attempt for vaginal delivery
9. Age 18 years old and above

4.5.2 EXCLUSION CRITERIA

Exclusion criteria are as follow:

1. Medical/ obstetric complications (eg: preeclampsia, cardiovascular disorder including hypertension, respiratory or renal disorders, all forms of diabetes)
2. Any orthopaedic or musculoskeletal conditions which would make adopting different maternal position difficult.
3. Scarred uterus
4. Oligo or polyhydramnios
5. Sonography evidence of nuchal cord
6. Abnormal fetal heart rate pattern

4.5.3 WITHDRAWAL CRITERIA

Subjects can choose to withdraw at any time. Subjects was withdrawn from study if the investigator deems that it is detrimental or risky for the subject to continue the study for example if there is presence of abnormal fetal heart rate pattern or unable to sustain on position that we initially assigned. All withdrawn subjects were attended the final study visit. Withdrawn subjects were not replaced.

4.6 SAMPLING METHODS

All pregnant women who attended the labour room in HRPZII and fulfilled the inclusion and exclusion criteria were included in the study.

4.7 SUBJECT RECRUITMENT

Recruitment has taken place over 6 months period from 1st March until 31st August 2020. All pregnant women at term pregnancy who were admitted in early labour was approach upon admission at patient assessment centre (PAC). Women from 28 weeks gestational age who were attended antenatal clinic appointment at HRPZII was also recruited. They were provided with the nature of the study in patient information sheet and informed consent was taken prior to their participating in the study. Eligible women who fulfilled inclusion and exclusion criteria was selected and sample number was used on subject data sheets for confidentially. Participants who were recruited during antenatal follow up, was then continue the followed up in antenatal clinic until their admission for delivery.

The recruitment process was ensured that the women was recruited in an ethical manner providing consent voluntarily after assimilating the relevant information. Women were allowed to withdraw their consent in participating the study at any point.

4.8 DATA COLLECTION

Baseline demographic data was routinely recorded on maternal parity, age, height, weight, and body mass index by the attending midwife during admission to PAC. Fetal occiput and spine position was determined by transabdominal ultrasound performed by medical officer in charge (service at least 2 years) in PAC. A valid scan was performed at the onset of labour, with observation of both position defining structures (fetal spine and occiput) and the mother is in established first stage of labour within 12 hours of the ultrasound findings being recorded.

With the mother in the supine position the ultrasound transducer was placed in the transverse plane on the suprapubic area of the maternal pelvis. The examination was directed to the fetal cranial vault, in the axial plane. Fetal position was then determined using the cranial contour, cranial midline, fetal orbits, nasal bridge, and the paired thalami. It was clear from other studies that not all intracranial landmarks are visualized every time, yet each scan would have position defining structures recorded. In cases where structures were difficult to identify ‘slight lateral angulation’ and ‘lateral rocking’ of the transducer was applied which assisted in the identification of the structures.

The transducer was then placed on the maternal abdomen in a longitudinal manner to obtain a sagittal plane view of the fetal spine. The sagittal plane view of the fetal spine is only obtained when the transducer is directly above the fetal spine therefore allowing detection of its position in relation to the maternal abdomen.

Both fetal head and spine positions were defined as direct occipito/ spine anterior, right occipito/ spine anterior, left occipito/ spine anterior, right occipito/ spine transverse, left occipito/ spine transverse, direct occipito/ spine posterior, right occipito/ spine posterior, or left occipit/ spine posterior. The data collected on fetal spine and occiput position was recorded on an ultrasound examination form.

If the study participants were found in the active phase of labour; where the cervical dilation was greater than 4 cm, they were ineligible for the study. If the study participants were not in labour, ultrasound scan were not performed, instead the women were discharged home first, and readmission were awaited and the process on subsequent admissions repeated. If a heart rate abnormality was detected at any point, the scan was abandoned, and immediate medical attention sought.

The study participants were allocated the next available numbers in a concealed sequence of a computer-generated randomization to determine the maternal position which was adopted during labour. Participants was randomly assigned to one of two maternal positions groups: same lateralization with fetal spine (n = 180) and opposite to the fetal spine (n = 180). Maternal preference position beginning from third trimester of gestation, either lying in same lateralization with fetal spine or opposite to fetal the spine was assessed during admission.

Once patient entered active phase of labour, she was transferred to labour room and labour was followed up according to hospital protocol. Depends on which position they were assigned; they were asked to be in the selected position throughout labour process. If the labour duration was longer than 4 hours, there was possibility of not

compliance to that certain position, so we were accepted at least 80% of the duration of labour the women were place on the position that we allocate. Labour was monitored using partogram, fetal heart rate and cardiotocography was monitored continuously via obs-central.

The comfort level was assessed using Maternal Comfort Assessment Tool (Appendix 1), developed by Chrzanowski and Young. Comfort scores was assessed and filled in by treating doctors on 2 hourly bases during active phase of labour and averages for a mean comfort score for each woman. The permission to use of this tool was obtained from the Elsevier publication through Copyright Clearance Center. The license to use this tool was attached together in appendix. Both primary (maternal comfort level and mode of delivery) and secondary outcome measures (labour duration, pain relief, cardiotocography (CTG) reactivity, fetal condition at birth) was recorded on patients proforma. The higher the score the more comfort parturient during the delivery process with the maximum score of 14. This tool was divided into seven subcategories (focus of attention, eye contact during contraction, breathing pattern during contraction, vocal behaviour with contraction, muscle tension with contraction, activity during contraction and verbalization), each of it was score from 0 to 2.

4.9 STATISTICAL ANALYSIS

Statistical analysis was performed using the SPSS (IBM Company Chicago, IL, USA) version 27. Numerical data was expressed as mean and standard deviation (SD), whilst categorical data was expressed as number and percentage. The association between the concordance of maternal lateral position and fetal spine with maternal preferred position, maternal comfort score, delivery and neonatal outcomes was tested using parametric and non-parametric tests where appropriate. Continuous data was tested using student's t-test and categorical data was tested by the chi square test or Fischer's exact test. Correlation for variables which were shown to be significantly associated with maternal lateralization-fetal spine concordance was tested using Pearson correlation. $P < 0.05$ was taken as statistically significant.

4.10 DEFINITION OF OPERATIONAL TERMS

1. Fetal spine position

   The position of the fetal spine in relation to the maternal abdomen. It is divided into direct spine anterior, left spine anterior, left spine lateral, left spine posterior, direct spine posterior, right spine posterior, right spine lateral and right spine anterior.

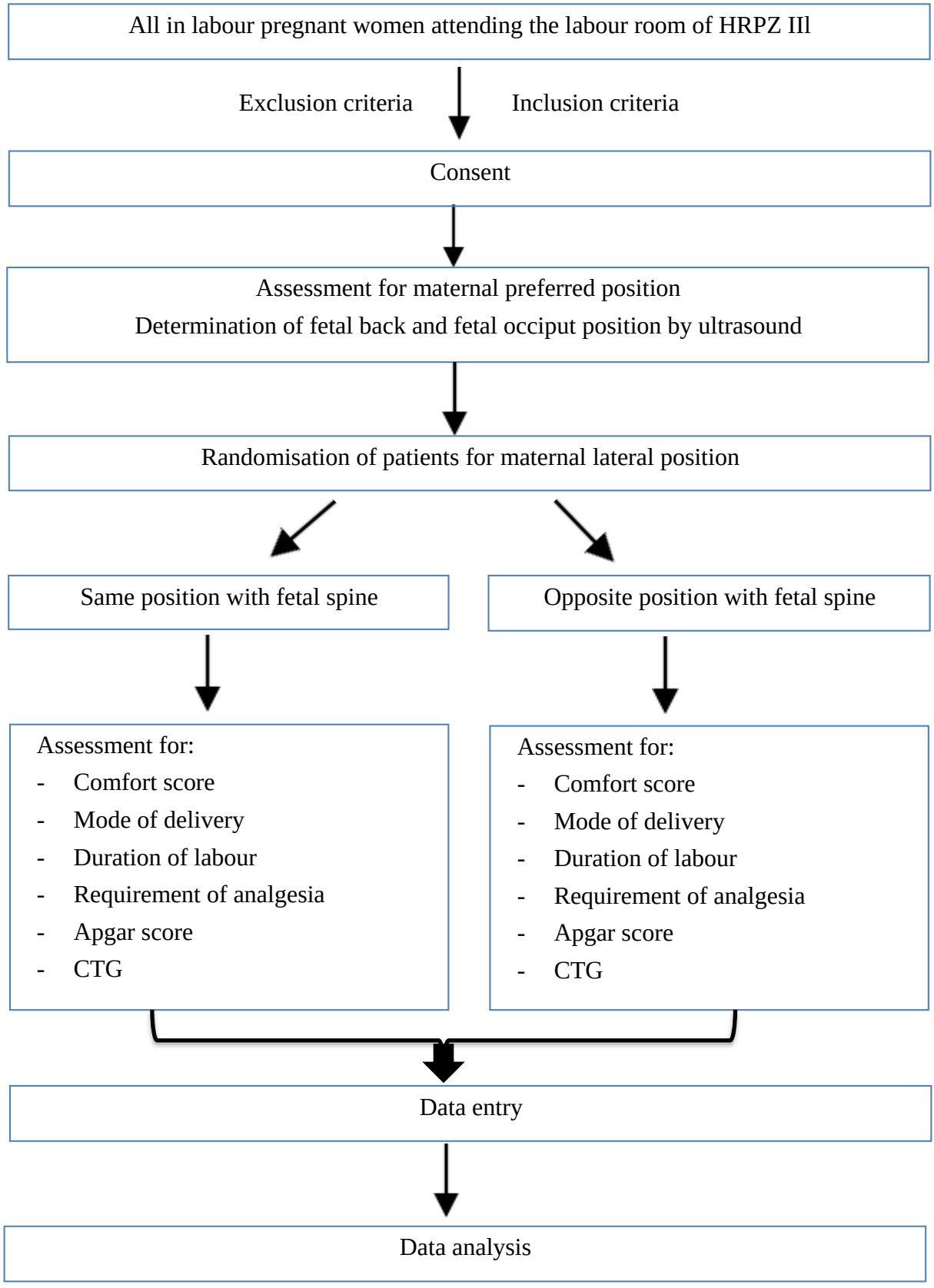
2. Fetal occiput position

   The position of the fetal occiput in relation to the maternal pelvis. It was categorized into direct occipito-anterior, left occipito-anterior, right occipito-anterior, left occipito-lateral, right occipito-lateral, direct occipito-posterior, left occipito-posterior and right occipito-posterior.

3. Maternal position

   The position of the pregnant women either in same or opposite to her fetal back or spine during labour.

4.11 FLOW CHART



5.0 MANUSCRIPT

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Effect of Different Fetal Back Position During Early Labour on Maternal Comfort and Birth Outcomes

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ABSTRACT

OBJECTIVE: We sought to determine the maternal preferred lateralisation position at early labour and the effect of fetal back positions in relation to maternal lateralisation position during active labour on maternal comfort, as well as the delivery outcomes to both mother and fetus in the same and opposite maternal lateralization-fetal spine concordance.

STUDY METHOD: This prospective cohort study involved pregnant women who attended to labour room at Hospital Raja Perempuan Zainab II with singleton pregnancies in early labour at 37 weeks of gestation and beyond. Fetal occiput and spine position was confirmed by transabdominal ultrasound examination, and the maternal preference position at early labour was identified. The patients were randomly categorized to a 1:1 ratio based on their preferred maternal lateral position. The maternal comfort score was assessed during the delivery process. Data were analysed using multivariate analyses.

RESULT: The preferred maternal position was associated to the same maternal lateralization-fetal spine concordance ($p<0.001$). Higher means comfort score in same lateral position of the mother and fetal back during labour with significant difference of mean comfort score between different group of maternal position (p-value 0.047). A significant association between maternal position and CTG ($p<0.001$), with the same position having more cases of normal CTG. Duration of labour, mode of delivery, the requirement of analgesia, and Apgar score were not associated with lateralization of the mother and fetal back position during labour.