Original Research Article

Indian Journal of Obstetrics and Gynecology
Volume 7 Number 1, January - March 2019
DOI: http://dx.doi.org/10.21088/ijog.2321.1636.7119.13

The Occiput-Spine Angle and Fetal Head Deflexion During the First Stage of Labor

Anjani Shrivastava[1], Kedar Ajay Trivedi[2], Ronak V. Makwana[3]

How to cite this article:
Anjani Shrivastava, Kedar Ajay Trivedi, Ronak V. Makwana. The Occiput-Spine Angl and Fetal Head Deflexion During the First Stage of Labor. Indian J Obstet Gynecol. 2019;7(1):72-79.

Abstract

Introduction: Cephalopelvic disproportion/deflexed head increases the hazard of vaginal delivery both for the mother and for the child. Protracted labour is more common in primigravid women than in multipara. Initially it was X-ray pelvimetry which was used but now a days due to advanced technology it is ultrasound which has replaced X-ray pelvimetry and it is more informative and more accurate. *Aims and Objectives:* (1) To quantify the degree of fetal head deflection (2) To determine whether a parameter derived from ultrasound examination has a relationship with the course and outcome of labor. *Subjects and Methods:* The primigravidas with 1. Low risk pregnant women at or beyond 37 weeks of gestation in the 1st stage of labour with vertex presentation with 2. Cervical Dilatation 3-6 cms and 3. The station above the ischial spine with regular contractions. *Methods:* From the Eligible patients, informed consent was taken. Measurement of occipitospinal angle using abdominal probe of the USG machine and readings were noted. *Summary*: Age of the patient, Gestational age and weight of the baby are not found to have any significant association with the outcome of the labour. patients with lower occipitospinal angle (<120°) had undergone caesarean section majority of the time (11 patients) and those with occipitospinal angle >120° had spontaneous vaginal delivery (86 patients). *Conclusion*: The degree of fetal head deflexion in the first stage of labour may be quantified accurately by means of transabdominal ultrasound. The occiput-spine angle width seems significantly related to the fetal head station and to the risk of obstetric intervention.

Keywords: Primigravida with Vertex Presentation; Occiput-Spinal Angle and Outcome of the Labour (Lscs or Normal Vaginal Delivery).

Introduction

''No more dying during labour'' is a legitimate goal that the obstetricians aim at and tackle every day to make it happen. Among the causes of maternal death include dystocia, one of the involved factors in their occurrence being the pelvis. Cephalopelvic disproportion increases the hazard of vaginal delivery both for the mother and for the child. It may lead to protracted labour with fetal asphyxia or severe fetal damage due to pathological moulding of the fetal head or shoulder dystocia. The risk of injury to the maternal vagina and the perineal soft tissue is increased. For

[1]Associate Professor [2]Assistant Professor [3]3rd Year Resident, Dept of Obstetrics and Gynecology, Government Medical College, Surat, Gujarat 395001, India.

Corresponding Author:
Kedar Ajay Trivedi,
Assistant Professor, Dept of Obstetrics and Gynecology, Government Medical College, Surat, Gujarat 395001, India.

E-mail: dr_kedar_trivedi@gmail.com

Received on 02.12.2018

Accepted on 19.01.2019

identification of women at risk, manual screening of the pelvic capacity is a widely used method. Postpartum haemorrhage and sepsis are the most common causes of maternal death in developing countries, but obstructed labour and ruptured uterus may cause as many as 70% of all maternal deaths in some situations.

Prolonged labour in the developing world is commonly due to cephalopelvic disproportion (CPD), which may result in obstructed labour/ deflexed fetal head, maternal dehydration, exhaustion, uterine rupture and vesicovaginal fistula. Protracted labour is more common in primigravid women than in multipara and the complications and effects of CPD differ between them. Early detection of abnormal progress of labour and the prevention of prolonged labour would significantly reduce the risk of postpartum haemorrhage and sepsis, and eliminate obstructed labour, uterine rupture and its sequelae. In case of obstructed labour, partograph helps to know the progress of labour. Initially it was x-ray pelvimetry which was used but now a day due to advanced technology it is ultrasound which has replaced x-ray pelvimetry and it is more informative and more accurate. It is easily available now a days and has no harmful effects to mother or fetus.

Aims and Objectives

The aims of this study were:

(1) To quantify the degree of fetal head deflection via the use of sonography during the first stage of labor

(2) To determine whether a parameter derived from ultrasound examination (the occiput-spine angle) has a relationship with the course and outcome of labor.

Subjects and Methods

The present study was undertaken at New Civil Hospital, Surat.

The primigravidas who have attended labour room were the targets of our study. After over all evaluation if they fulfilled following criteria they were included in the study:

1. Low risk pregnant women at or beyond 37 weeks of gestation in the 1st stage of labour with vertex presentation with

2. Cervical Dilatation 3-6 cms and

3. The station above the ischial spine with regular contractions.

Subjects came from various areas even outside Surat district

Methods

From the Eligible patients, informed consent was taken.

Measurement of occipitospinal angle using abdominal probe of the USG machine and readings were noted. Management and monitoring (according to the occipitospinal angle) was done as per the obstetric dept. protocol.

After delivery fetomaternal outcome was noted and data analysis was done.

Observation and Discussion

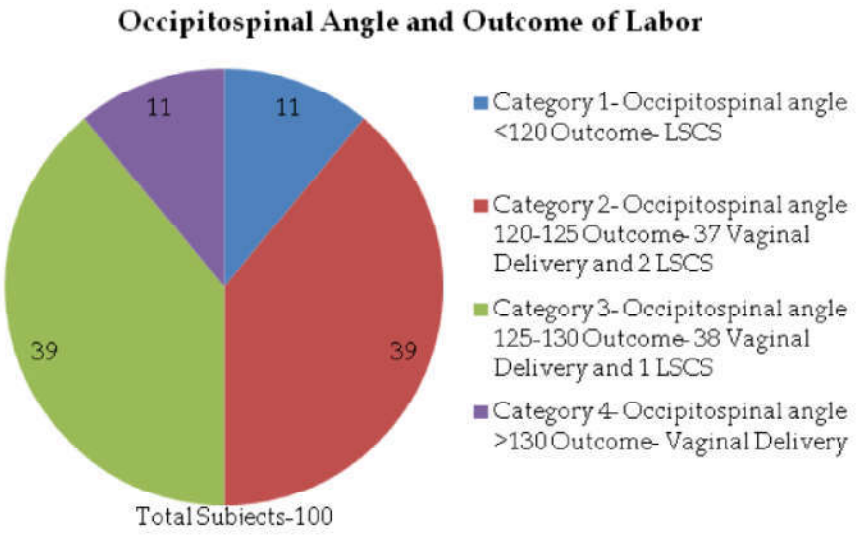
The present study was undertaken in tertiary hospital, surat where 100 admitted pregnant patients were taken as study group during the period of January 2018 to june 2018 via using Departmental Ultrasound machine near labour room. The study discussed below provides a detailed statistics and analysis of the patient's gestational age at the time of admission, mode of delivery, foetal outcome, duration of labour. The data of this study has been tabulated, analyzed and discussed as in Table 1.

In table 1 we have discussed categories of occipitospinal angle (in 4 categories 120, >120-125, >125-130, >130), number of subjects coming to those categories and outcome of labor.

In analysis it is made clear that Occipitospinal angle below 120, usually require operative intervention. In our data we have 11 subjects in category 1 and all of them delivered through LSCS. While angle >120-125, we have 39 subjects, most of them (37 subjects) delivered vaginally except

Table 1: Occipitospinal Angle and Outcome of Labor

Category	Occipitospinal angle	Subjects	%	Outcome
Category- 1	<120°	11	11	LSCS
Category-2	>120°-125°	39	39	37 vaginal delivery + 2 LSCS
Category-3	>125°-130°	39	39	38 Vaginal delivery+ 1 LSCS
Category-4	>130°	11	11	Vaginal Delivery



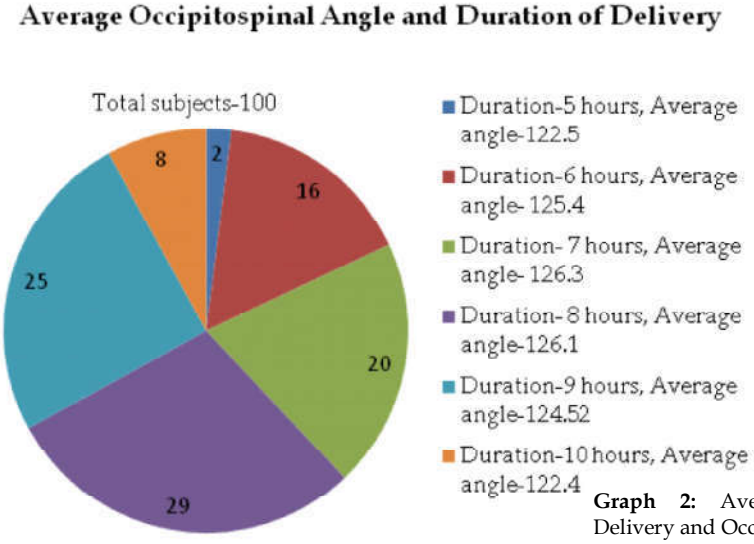
Graph 1: Occipitospinal Angle and Outcome of Labor

2 which required operative delivery (indication: Fetal Distress). In category 3, we have 39 subjects, out of which 38 delivered vaginally while 1 subject required EM LSCS. In last category we have 11 subjects, all of them delivered vaginally.

Table 2 shows that out of 100 subjects, 2 Subjects with Average Occipitospinal angle of 122.5 delivered in 5 hours, 16 subjects with Average Occipitospinal angle of 125.4 delivered in 6 hours, 20 subjects with Average Occipitospinal angle of 126.1 delivered in 7 hours, 29 subjects with Average Occipitospinal angle of 126.1 delivered in 8 hours, 25 subjects with Average Occipitospinal angle of 124.52 delivered in 9 hours and 8 subjects with Average Occipitospinal angle of 122.4 delivered in 10 hours (Table 2).

Table 2: Average Duration of Delivery and Occipitospinal Angle

Average Duration of active phase of labor	Subjects	Average Occipitospinal angle
5 hours	2	122.5°
6 hours	16	125.4°
7 hours	20	126.3°
8 hours	29	126.1°
9 hours	25	124.52°
10 hours	8	122.4°



Graph 2: Average Duration of Delivery and Occipitospinal Angle

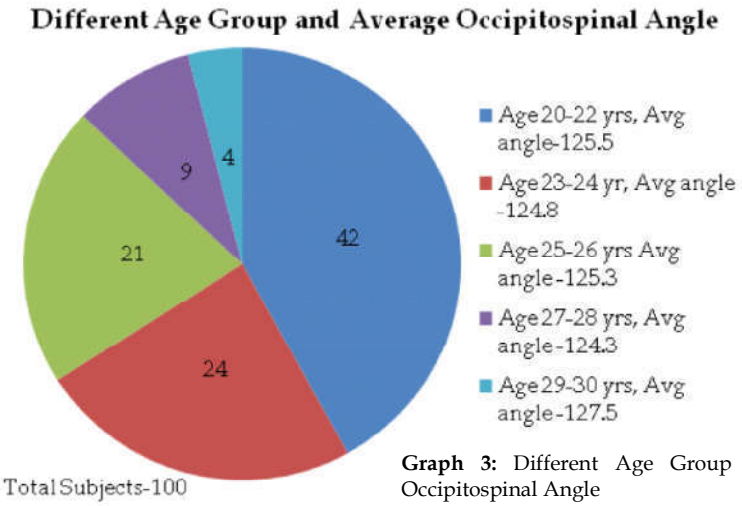
Table 3 shows that out of 100 subjects, 43 subjects with age group of 20-22 years had average Occipitospinal angle of 125.5, 24 subjects were in age group of 23-24 years had average Occipitospinal angle of 124.8, 21 subjects with age group of 25-26 years had average Occipitospinal angle of 125.3, 9 subjects in age group of 27-28 years had average Occipitospinal angle of 124.3 while in age group of 29-30 years had average Occipitospinal angle of 127.5 (Table 3).

Table 4 shows that out of 100 subjects, 39 subjects with baby weight of 2 kg to 2.5 kg have average occipitospinal angle of 125.16°, 56 subjects with baby weight of 2.5 kg to 3 kg have average occipitospinal angle of 126.37° and 5 subjects with baby weight of 3 kg-3.5 kg have average occipitospinal angle of 124.67° (Table 4).

In our study we have divided 100 subjects in 5 category of age group and 4 category of occipitospinal angle. In 20 to 22 years of age group

Table 3: Different Age Group and Average Occipitospinal Angle

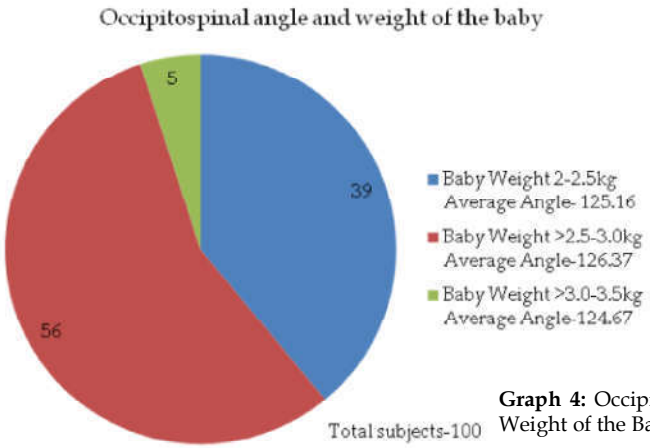
Age group	Subjects	Average occipitospinal angle
20-22	42	125.5°
23-24	24	124.8°
25-26	21	125.3°
27-28	09	124.3°
29-30	04	127.5°



Graph 3: Different Age Group and Average Occipitospinal Angle

Table 4: Occipitospinal Angle and Weight of the Baby

Baby weight (kg)	Subjects	Occipitospinal angle (°)
2 kg-2.5 kg	39	125.16°
>2.5 kg-3 kg	56	126.37°
>3 kg-3.5 kg	5	124.67°

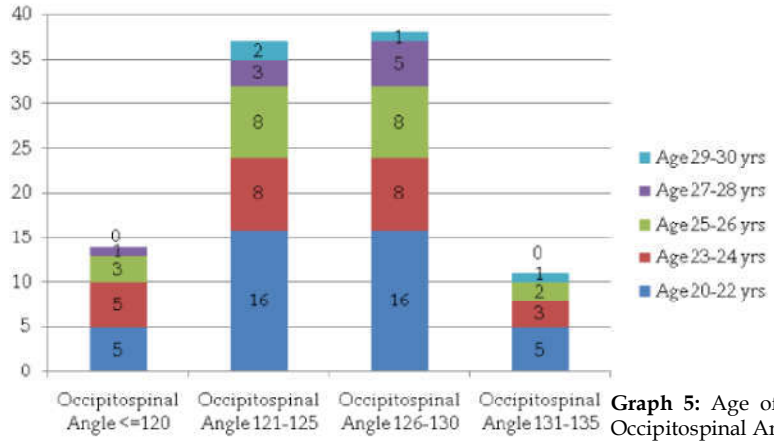


Graph 4: Occipitospinal Angle and Weight of the Baby

there were 5 subjects with occipitospinal angle of ≤ 120^0, 16 subjects with occipitospinal angle of 121^0 to 125^0, 16 subjects with occipitospinal angle of 126^0 to 130^0 and 5 subjects with occipitospinal angle of 131^0 to 135^0. At 23 to 24 years of age, there were 5 subjects having occipitospinal angle of ≤ 120^0, 8 subjects with occipitospinal angle of 121^0 to 125^0, 8 subjects having occipitospinal angle of 126^0 to 130^0 and 3 subjects having occipitospinal angle of 131^0 to 135^0. At 25 to 26 years of age, there were 3 subjects with occipitospinal angle of ≤ 120^0, 8 subjects with occipitospinal angle of 121^0 to 125^0, 8 subjects with occipitospinal angle of 126^0 to 130^0 and 2 subjects with occipitospinal angle of 131^0 to 135^0. At 27 to 28 years of age there was 1 subject with occipitospinal angle of ≤ 120^0, 3 subjects with occipitospinal angle of 121^0 to 125^0, 5 subjects with occipitospinal angle of 126^0 to 130^0 and there was no subject having occipitospinal angle of 131^0 to 135^0. At 29 to 30 years of age, there was no subject with occipitospinal angle of <120^0, 2 subjects with occipitospinal angle of 121^0 to 125^0, 1 subject with occipitospinal angle of 126^0 to 130^0 and 1 subject with occipitospinal angle of 131^0 to 135^0 (Table 5).

Table 5: Age of Patient and Occipitospinal Angle

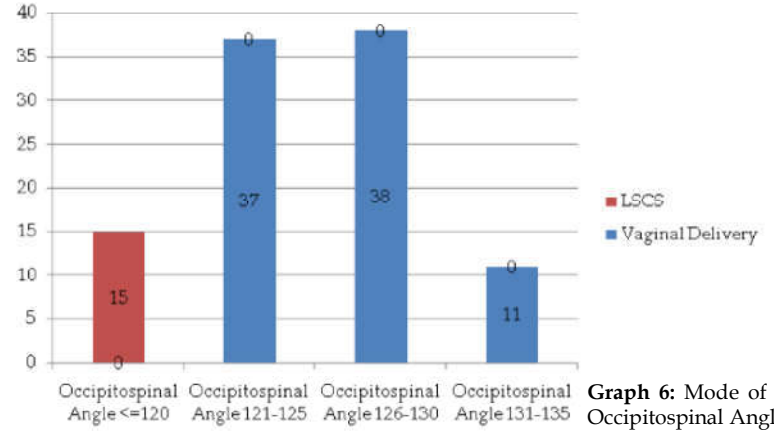
Age of Patient↓	Occipitospinal Angle→	≤ 120^0	121^0-125^0	126^0-130^0	131°°-135°°
	20-22	5	16	16	5
	23-24	5	8	8	3
	25-26	3	8	8	2
	27-28	1	3	5	0
	29-30	0	2	1	1



Graph 5: Age of Patient and Occipitospinal Angle

Table 6: Mode of Delivery and Occipitospinal Angle

Mode of Delivery↓	Occipitospinal Angle→	<=120°°	121°-125°	126°-130°	131°-135°
	Vaginal Delivery	00	37	38	11
	LSCS	14	00	00	00



Graph 6: Mode of Delivery and Occipitospinal Angle

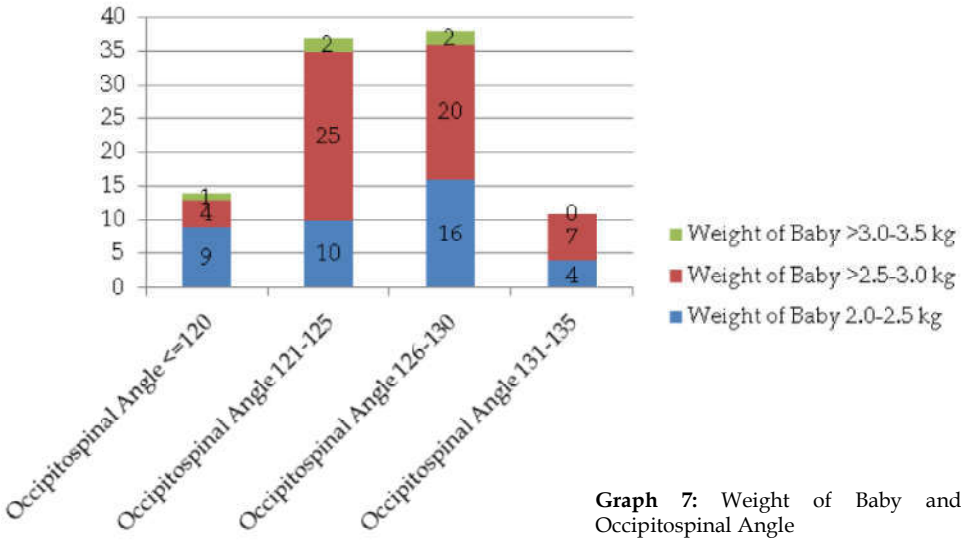
In our study we have divided 100 subjects in 2 categories of mode of delivery and 4 category of occipitospinal angle. In all the vaginal deliveries observed, none had occipitospinal angle of less than or equal to 120^0, 37 subjects had occipitospinal angle between 121^0-125^0, 38 subjects had occipitospinal angle between 126^0-130^0 and 11 subjects had occipitospinal angle between 131^0-135^0. All the LSCS performed were observed to have occipitospinal angle less than or equal to 120^0, which were totalled to 11 (Table 6).

In our study we have divided 100 subjects in 3 categories of baby weights and 4 category of occipitospinal angle. Of all the babies born with a weight of 2.0-2.5 kg, 9 were observed to have an occipitospinal angle less than or equal to 120°, 10 subjects had occipitospinal angle between 121^0-125^0, 16 subjects had occipitospinal angle between 126^0-130^0 and 4 subjects had occipitospinal angle between 131^0-135^0. Of all the babies born with a weight of >2.5-3.0 kg, 4 were observed to have an occipitospinal angle less than or equal to 120^0, 25 subjects had occipitospinal angle between 121^0-125^0, 20 subjects had occipitospinal angle between 126^0-130^0 and 7 subjects had occipitospinal angle between 131^0-135^0. Of all the babies born with a weight of >3.0-3.5 kg, 1 was observed to have an occipitospinal angle less than or equal to 120^0, 2 subjects had occipitospinal angle between 121^0-125^0, 2 subjects had occipitospinal angle between 126^0-130^0 and no subjects had occipitospinal angle between 131^0-135^0 (Table 7).

In our study we have divided 100 subjects in 6 categories of durations of labor and 4 category of occipitospinal angle. 2 subjects had duration of labor of 5 hours, 1 subject had occipitospinal angle less than or equal to 120^0, no subject had occipitospinal angle between 121^0-125^0, 1 subject had occipitospinal angle of 126^0-130^0 and none had occipitospinal angle of 131^0-135^0. Out of all the subjects who had duration of labor of 6 hours, 1 subject had occipitospinal angle less than or equal to 120^0, 7 subjects had occipitospinal angle between 121^0-125^0, 8 subjects had occipitospinal angle of 126^0-130^0 and none had occipitospinal angle of 131^0-135^0. Out of all the subjects who had duration of labor of 7 hours, 2 subjects had occipitospinal angle less than or equal to 120^0, 7 subjects had occipitospinal angle between 121^0-125^0, 6 subjects had occipitospinal angle of 126^0-130^0 and 5 had occipitospinal angle of 131^0-135^0. Out of all the subjects who had duration of labor of 8 hours, 2 subjects had occipitospinal angle less than or equal to 120^0, 10 subjects had occipitospinal angle between 121^0-125^0, 13 subjects had occipitospinal angle of 126^0-130^0 and 4 had occipitospinal angle of 131^0-135^0. Out of all the subjects who had duration of labor of 9 hours, 5 subjects had occipitospinal angle less than or equal

Table 7: Weight of Baby and Occipitospinal Angle

Weight of Baby↓ / Occipitospinal Angle→	<=120°	121°°-125°	126°-130°	131°-135°
2.0-2.5	9	10	16	4
>2.5-3.0	4	25	20	7
>3.0-3.5	1	2	2	0



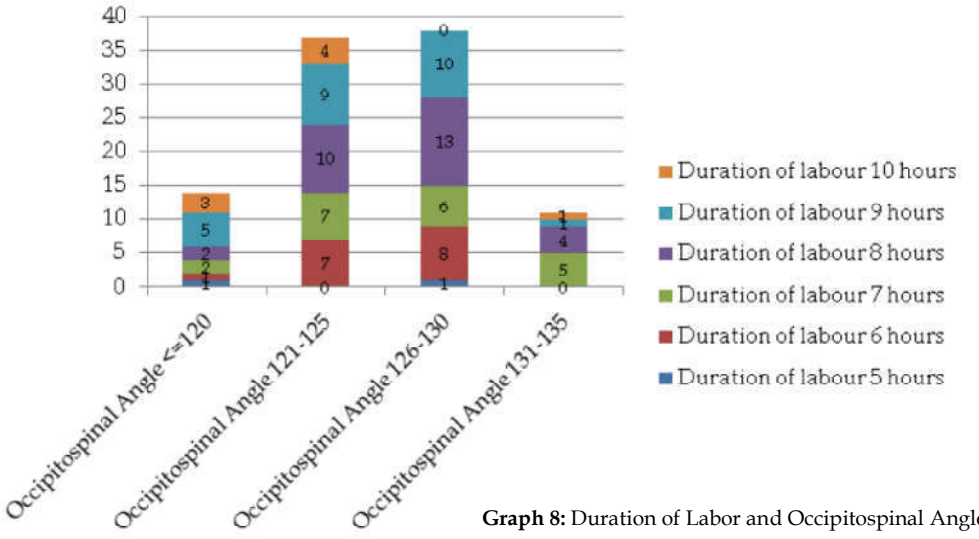
Graph 7: Weight of Baby and Occipitospinal Angle

to 120^0, 9 subjects had occipitospinal angle between 121^0-125^0, 10 subjects had occipitospinal angle of 126^0-130^0 and 1 had occipitospinal angle of 131^0-135^0. Out of all the subjects who had duration of labor of 10 hours, 3 subjects had occipitospinal angle less than or equal to 120^0, 4 subjects had occipitospinal angle between 121^0-125^0, 0 subjects had occipitospinal angle of 126^0-130^0 and 1 had occipitospinal angle of 131^0-135^0 (Table 8).

In our study we have divided 100 subjects in 4 categories of age of gestation at the time of delivery and 4 category of occipitospinal angle. 15 deliveries were done at gestational age of 37-38 weeks, none had occipitospinal angle of less than or equal to 120^0, 5 subjects had occipitospinal angle between 121^0-125^0, 9 subjects had occipitospinal angle of 126^0-130^0 and 1 had occipitospinal angle of 131^0-135^0. 31 deliveries were done at gestational age of >38 weeks - 39 weeks, 5 had occipitospinal angle of less than or equal to 120^0, 14 subjects had occipitospinal angle between 121^0-125^0, 7 subjects had occipitospinal angle of 126^0-130^0 and 5 had occipitospinal angle of 131^0-135^0.36 deliveries were done at gestational age of >39 weeks -40 weeks, 5 had occipitospinal angle of less than or equal to 120^0, 12 subjects had occipitospinal angle between 121^0-125^0, 16 subjects had occipitospinal angle of 126^0-130^0 and 3 had occipitospinal angle of 131^0-135^0. 18 deliveries were done at gestational age of >40 weeks, 4 had occipitospinal angle of less than or equal to 120^0, 6 subjects had occipitospinal angle between 121^0-125^0, 6 subjects had occipitospinal angle of 126^0-130^0 and 2 had occipitospinal angle of 131^0-135^0 (Table 9).

Table 8: Duration of Labor and Occipitospinal Angle

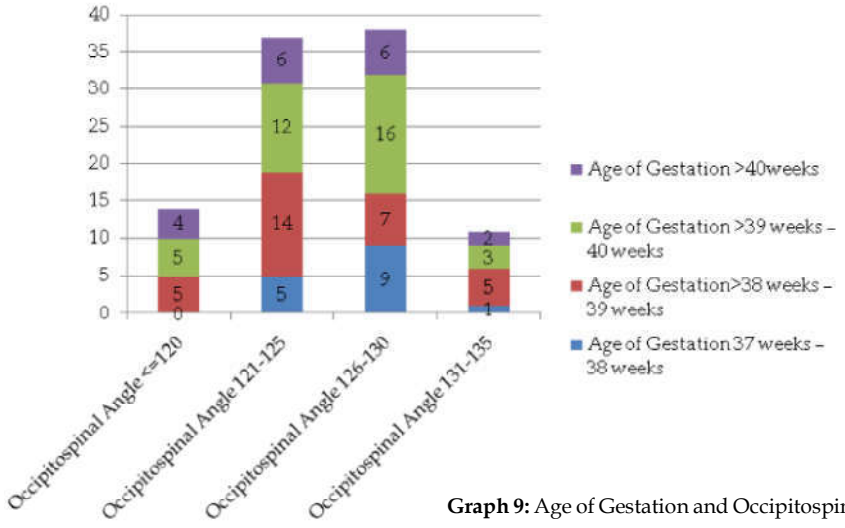
Duration of Labor↓ / Occipitospinal Angle→	≤ 120^0	121^0-125^0	126^0-130^0	131^0-135^0
5 hours	1	0	1	0
6 hours	1	7	8	0
7 hours	2	7	6	5
8 hours	2	10	13	4
9 hours	5	9	10	1
10 hours	3	4	0	1



Graph 8: Duration of Labor and Occipitospinal Angle

Table 9: Age of Gestation and Occipitospinal Angle

Age of Gestation↓ / Occipitospinal Angle→	≤ 120^0	121^0-125^0	126^0-130^0	131^0-135^0
37 weeks – 38 weeks	0	5	9	1
>38 weeks – 39 weeks	5	14	7	5
>39 weeks – 40 weeks	5	12	16	3
>40 weeks	4	6	6	2



Graph 9: Age of Gestation and Occipitospinal Angle

Summary

This study was conducted in Tertiary Health Centre in Surat with A total of 100 pregnant patients from January 2018 to june 2018. Out of 100 pregnant women, 86 of which underwent a spontaneous vaginal delivery and 14 had undergone caesarean section. The result shows that patients with lower occipitospinal angle (<120°) had undergone caesarean section majority of the time (11 patients) and those with occipitospinal angle >120^0 had spontaneous vaginal delivery (86 patients). Patients with lower occipitospinal angle (average 125^0) had taken longer time to deliver the baby compare to those with higher occipitospinal angle (>125^0). Age of the patient, Gestational age and weight of the baby are not found to have any significant association with the outcome of the labour. It is the occipitospinal angle which matters the most.

Limitations

The *occiput posterior position* is not uncommon in the first stage of labor and is sonographically documented in 30%−50% of fetuses. Although most of the fetuses in occiput posterior position in the first stage of labor have been shown to convert to occiput anterior during the fetal head descent, the sonographic diagnosis of occiput posterior in early active labor has been reported recently to be significantly associated with the risk of caesarean delivery. Unfortunately, the sonographic measurement of the occiput-spine angle in these cases is not technically feasible because of the posterior position of the cervical spine of the fetus.

The *scanning technique* is a factor that may increase to some extent the variability of the occiput-spine angle measurement among different examiners, and this should be acknowledged as a further limitation of this study.

Conclusion

The degree of fetal head deflexion in the first stage of labour may be quantified accurately by means of transabdominal ultrasound. The occiput-spine angle width seems significantly related to the fetal head station and to the risk of obstetric intervention.

References

1. American College of Obstetricians and Gynecologists, Society for Maternal-Fetal Medicine, Caughey AB, Cahill AG, et al. Safe prevention of the primary cesarean delivery. Am J ObstetGynecol 2014;210:179-93.
2. Barber EL, Lundsberg LS, Belanger K, Pettker CM, Funai EF, Illuzzi JL. Indications contributing to the increasing cesarean delivery rate. ObstetGynecol. 2011;118:29-38.
3. Friedman E. The graphic analysis of labor. Am J ObstetGynecol. 1954;68:1568-75
4. Friedman EA. Primigravid labor; a graphicostatistical analysis. ObstetGynecol. 1955;6:567-89
5. Zhang J, Landy HJ, Branch DW, et al. Contemporary patterns of spontaneous labor with normal neonatal outcomes. ObstetGynecol. 2010;116:1281-7.
6. Stitely ML, Gherman RB. Labor with abnormal presentation and position. ObstetGynecolClin North Am. 2005;32:165-79.
7. Oboro VO, Tabowei TO, Bosah JO. Fetal station at the time of labour arrest and risk of caesarean delivery. J ObstetGynaecol. 2005;25:20-2.