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Measurement of Lumbar Lordosis in 3rd Trimester Pregnancy-Pilot Study

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Abstract
Background: Lumbar Lordosis was measured by an invalidated method which involved assessing the perpendicular distance to the apex of the lumbar lordosis from a straight line connecting the apex of the thoracic kyphosis and the posterior part of the sacrum. The degree of lumbar Lordosis is variable among individuals and is the result of many factors, including the fact that the L5 vertebra is wedge-shaped, with the anterior aspect of the vertebral body being approximately 3 mm higher than the posterior aspect. Aim & objective of the study: To analysis and understand measurement of lumbar Lordosis in 3rd trimester pregnancy. Data Analysis and Results: Data analysis and result of this study shows that there is statistically significant increase in mean value of lumbar lordotic curve in third trimester of pregnant women with mean value of 6.75 in 4 subjects when compared to the normal counterpart 4 female subjects with mean value of 4.5 mm (Table 4.3.1). **Conclusion:** It is concluded that in third trimester of pregnancy, there shall be statistically significant increased lumbar Lordosis when compared to normal counterpart women.

Keywords: Third Trimester, Pregnancy, Lumbar Lordosis.

1. Introduction

Women commonly experience back pain during and after pregnancy. Incidence of back pain during pregnancy has been reported to range from 47 to 82% [1-7]. At the time of delivery, Ostgaard and Andersson [8]found that 67% of 817 pregnant women reported back pain directly after delivery and 37% experienced back pain 18 months postpartum. In another study involving 855 pregnant women, Ostgaard et al[5] found that back pain began early in pregnancy, with a prevalence of 25% at12 weeks. The sacroiliac area has been described as the most common location of back pain in pregnant women [1,5]. Berg et a1 [1], in a study of 862 pregnant women, identified two-thirds of the back pain experienced during pregnancy as sacroiliac in origin.

The etiology of back pain during and after pregnancy remains unproven. An excellent review of the different theories has been written by Rungee[9]. These theories include hormonal influences causing laxity of joints in the pelvis, vascular changes, postural changes from increasing growth of the fetus, herniated nucleus pulpous, tumors, and infection[9].

Although never substantiated, postural changes have often been implicated as a major cause of back pain in pregnant women. In 1949, Bushnell [12] described a parietal neuralgia of pregnancy that he stated was from "high heels, corsets, and a laissez faire attitude of posture that produced a generation of women[10-16] whom were not ideal subject. for parturition." Bushnel[12] further stated that this vanity caused abnormal postures that produced the parietal neuralgia. Few studies have assessed postural changes that occur during pregnancy. Bullock et a1[2] found that in 34 pregnant women lumbar lordosis and thoracic kyphosis increased between the fourth and ninth month of pregnancy. In a case study involving a 31-year-old pregnant woman, Fries and Hellebrandt[17]determinedthat the center of gravity was displaced posteriorly, the head elevated, the cervical spine hyper extended, and the knee and ankle joints extended over a total of nine observations taken every 2 weeks during pregnancy.

Lumbar lordosis was measured by an invalidated method which involved assessing the perpendicular distance to the apex of the lumbar lordosis from a straight line connecting the

apex of the thoracic kyphosis and the posterior part of the sacrum.

Pelvic tilt is defined as the angle between the horizontal plane and a line passing through the midpoint of the posterior superior iliac spines and the midpoint of the anterior superior iliac spines[18]. Lumbar lordosis is the curve assumed by the lumbar spine, where the lumbar spine forms an anterior convexity [19]. The degree of lumbar lordosis is variable among individuals and is the result of many factors, including the fact that the L5 vertebra is wedge-shaped, with the anterior aspect of the vertebral body being approximately 3 mm higher than the posterior aspect[20]. The intervertebral discs in the lumbar area are also wedge-shaped, especially at the L4, L5 and L5, S1 segments; the intervertebral disc at the L5S1 inter space has been measured to be 6-7 mm higher anteriorly than posteriorly[21]. The vertebrae above L5 are less wedge-shaped; however, due to the shape of the L5S1 vertebral levels, each vertebra above this level lies slightly behind the vertebra above. All of these factors contribute to producing the normal lumbar lordosis.

Fetal growth and skeletal development are dependent on the continuous maternal transfer of essential minerals through the placenta. Fetal accretion of calcium increases progressively from50 mg/d at 20 wk of gestation to 330 mg/d at 35 wk of gestation[22]. After delivery, the rate of calcium accretion in the infant is the highest during the first months and slows down subsequently. Whole-body calcium accretion is 140 mg/d on average during the first year of life[23].In adult mothers with habitual adequate calcium intake, metabolic adaptation during pregnancy appears to ensure adequate transfer of calcium to the fetus without requiring an increase in maternal mineral intake[22]. However, in adolescent mothers, physiologic adaptation during pregnancy may not be sufficient for optimal fetal bone growth[24-26]. Moreover, a low calcium intake by pregnant adolescents may limit the amount of calcium transferred to the fetus because of simultaneous maternal calcium need for bone mass consolidation[25]. In theory, calcium supplementation during adolescent pregnancy could benefit fetal bone development. The results of studies on the effects of maternal calcium supplementation during pregnancy on fetal growth and infant bone mass are controversial[24,25-28] and most of these studies were conducted in groups of mothers who were predominantly of adult age[25-28].

Aim of this study to analysis and understand measurement of lumbar lordosis in 3rd trimester pregnancy. By obtaining and understand of pregnant women, the measurement may include Lumbar lordosis in third trimester. By doing this study the importance and significance of measurement of lumbar lordosis in pregnant women at third trimester will be strengthened and ascertained. Hypothesis of this stated that there shall be statistically significant difference in lumbar lordosis in pregnant women at third trimester.

2. Materials and Methods

Study Design
Pilot Study.

Study Setting
Nithila Hospital, Madurai, Tamilnadu

Study Duration:
3 Months

Study Sampling
Convenient sampling

Study Population
In and around Madurai district

Study Sample
Number of patients within that period

Criteria of Selection
Inclusion Criteria
Age: 20-32 Years.
Sex: Females.
Intrauterine Third trimester of pregnancy

Exclusion Criteria
Complicated Pregnancy (Ectobic).
Artificially In fertilized Pregnancy.
Intratubal Pregnancy.

Variables
Lumbar Spine Lordotic Curve Measurements

Materials and Tools
Pen
Paper

Procedure
Subjects were fulfilled the criteria of selection were selected recruited for this study through convenient method.
Their Demographic data including vitals were collected & documented
Variable of lumbar lordosis by using corel draw software were measured and documented.

Measurement of Lumbar Lordosis

1. Subjects were asked to stand erect without support. A clear photograph on lateral view was taken in that position.
2. A straight line was drawn from the T12 vertebra to the tip of the 4th coccyx vertebrae was drawn.
3. A base line drawn from right to left ASIS.
4. The straight line drawn from T12 vertebra to 4th Coccyx vertebra intersects the base line at 90 degrees.
5. A curved slanting line drawn from the baseline to L1 Vertebra was drawn. And the angulations measured in degrees by corel draw software for windows.
6. Reporting of Data was done.

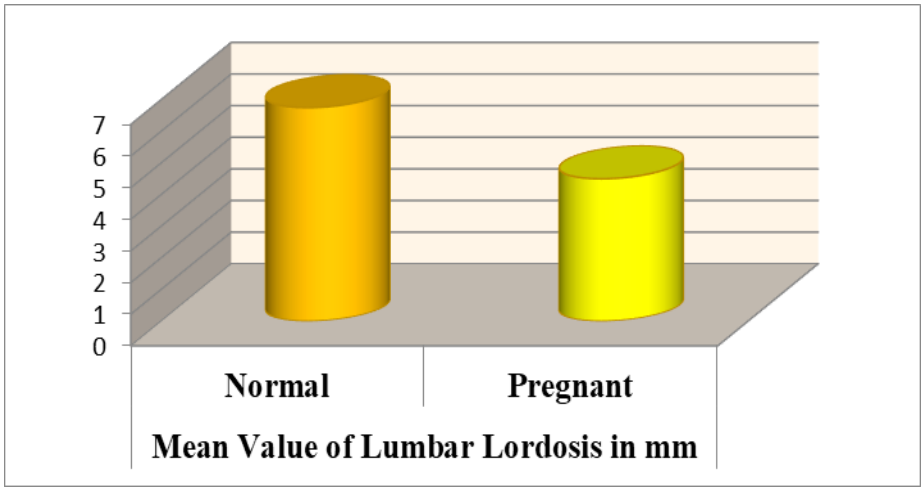
3. Data Analysis and Results

1. In this pilot study, no interventions were given to the participating subjects.
2. Lumbar lordosis was measured in degrees by using corel draw software.
3. Reporting of the Data was done.
4. Because it is a pilot study, here only reporting of data was only done.
5. Further it can be established with randomization and proper experimental design.

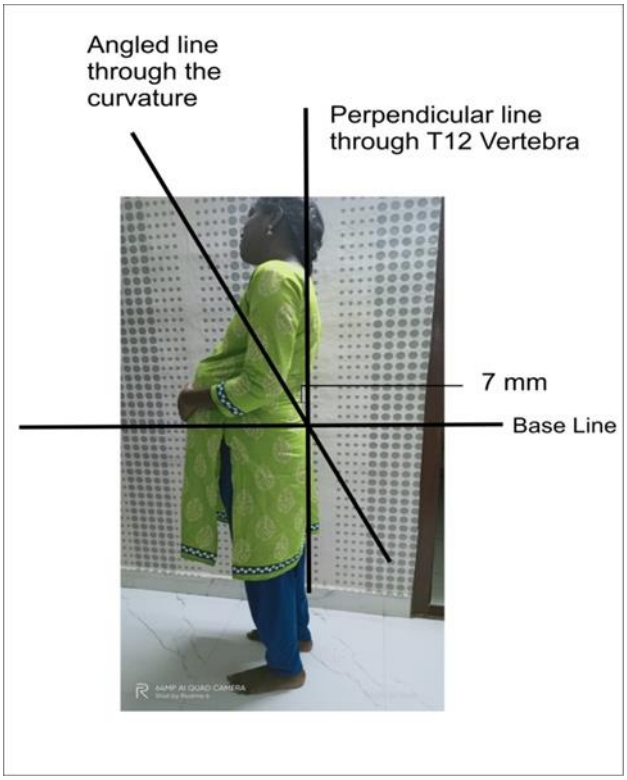
Mean Value was calculated for the subjects and it was related with normal counter parts.

Table 1: Mean Value of Lumbar Lordosis.

No of Subjects	Mean Value of Lumbar Lordosis in mm	
	Pregnant Women	Normal Counter Part
4	6.75	4.5



Graph 1: Mean Value of Lumbar Lordosis.



Graph 1: Lordotic Angle (in mm) Measurement by using Corel Draw Software.

4. Discussion

Data analysis and result of this study shows that there is statistically significant increase in mean value of lumbar lordotic curve in third trimester of pregnant women with mean value of 6.75 in 4 subjects when compared to the normal counterpart 4 female subjects with mean value of 4.5 mm (Table 4.3.1).

Increase lordotic angle is a result of poor understanding of posture and postural awareness during pregnancy. In India the awareness regarding positioning, exercises which has to be followed in pregnancy is very much less and limited, due to that there is growing increase in demand for cesarean section now a days. This study results even though it is a pilot, it direct us to move in right direction to improve the overall health of women and particularly during pregnancy to limit unwanted anatomical and physiological hindrance over pregnancy and delivery.

This study results echoing the view of **Moore et a1** found a significant relationship (r=0.49) between that used a validated and reliable posture assessment instrument, change in lordosis during 16 to 24 and 34 to 42weeks of pregnancy and an increase in low back pain.[29]

This study reinforcing the results of **Ostgaard et a1** found that abdominal sagittal diameter (r = 0.15), transverse diameter (r = 0.13), and depth of the lordosis (r = 0.11) were related to the development of back pain during pregnancy.[29,30]

Limitations

1. Limited number of subjects.
2. Short duration.
3. Subjects selected from limited geographical area.
4. Technical flaw in measurement with corel draws software.

Future Recommendations & Suggestions

1. Subject population can be increased,
2. The study can be done for proper study design,
3. Interventions can be added,
4. Geographical area can be increased,
5. Other measurements can be selected.

5. Conclusion

It is concluded that in third trimester of pregnancy, there shall be statistically significant increased lumbar lordosis when compared to normal counterpart women.

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