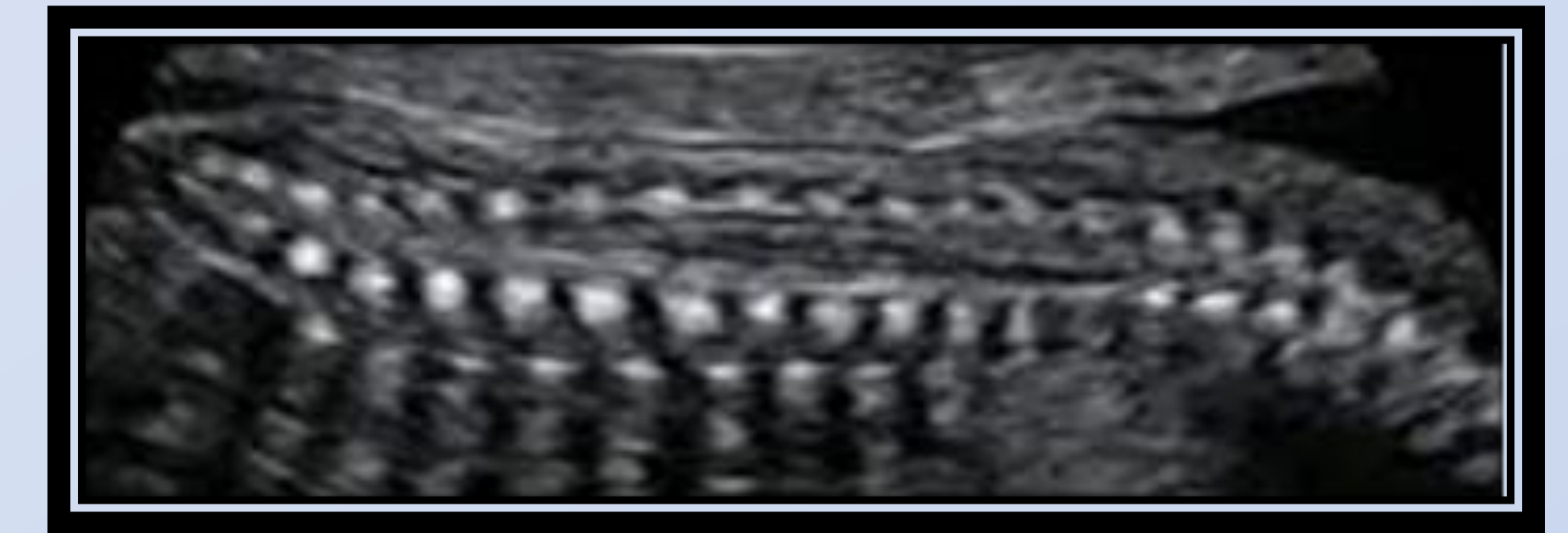


The Comparison Between Fetal Kidney and Sacral Length in Determining Gestational Age

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Introduction

Gestational age describes how far along a woman is in her pregnancy. The importance of having a correct gestational age can aid in determining if there are complications in a pregnancy such as growth restriction or macrosomia. Accurate measurements of fetal anatomy are essential in determining proper fetal growth and gestational age. Primarily, head circumference, bi-parietal diameter, abdomen circumference, femur length, cerebellum, amniotic fluid index and cervical length have been the key parameters to determine GA in an obstetrical ultrasound. The purpose of this study was to measure fetal kidney and sacral length to identify if the data correlated to gestational age and which parameter was most accurate. The results determined if each parameter should be incorporated into daily obstetrical ultrasound exams to determine gestational age.

Materials and Methods

Original research was performed using a GE Logic e9 ultrasound machine. IRB approval was granted from the Office of Institutional Research at MSU. Measurements were recorded transabdominally of the fetal kidney and sacrum length on each pregnant volunteer with a gestational age of 18-36 weeks. For this study 53 kidney lengths and 53 sacrum lengths were measured in millimeters. Gestational age of the pregnant volunteers were determined by their LMP. The measurements in this research of fetal kidney and sacral length were then compared to identify correlation to the predetermined gestational age. The data was studied along with findings in a literature review.

Results

Fetal kidney and sacral length were separately compared to gestational age using the data collected and then a Pearson correlation calculation was performed. A significance cutoff value of .01 was used in the calculation. The results from the calculation comparing length and gestational age are $r(51) = .82, p < .001$ for kidney and $r(51) = .67, p < .001$ for sacrum. Figure 1 represents the R^2 value of .67 for kidney and Figure 2 represents the R^2 value of .45 for sacrum.

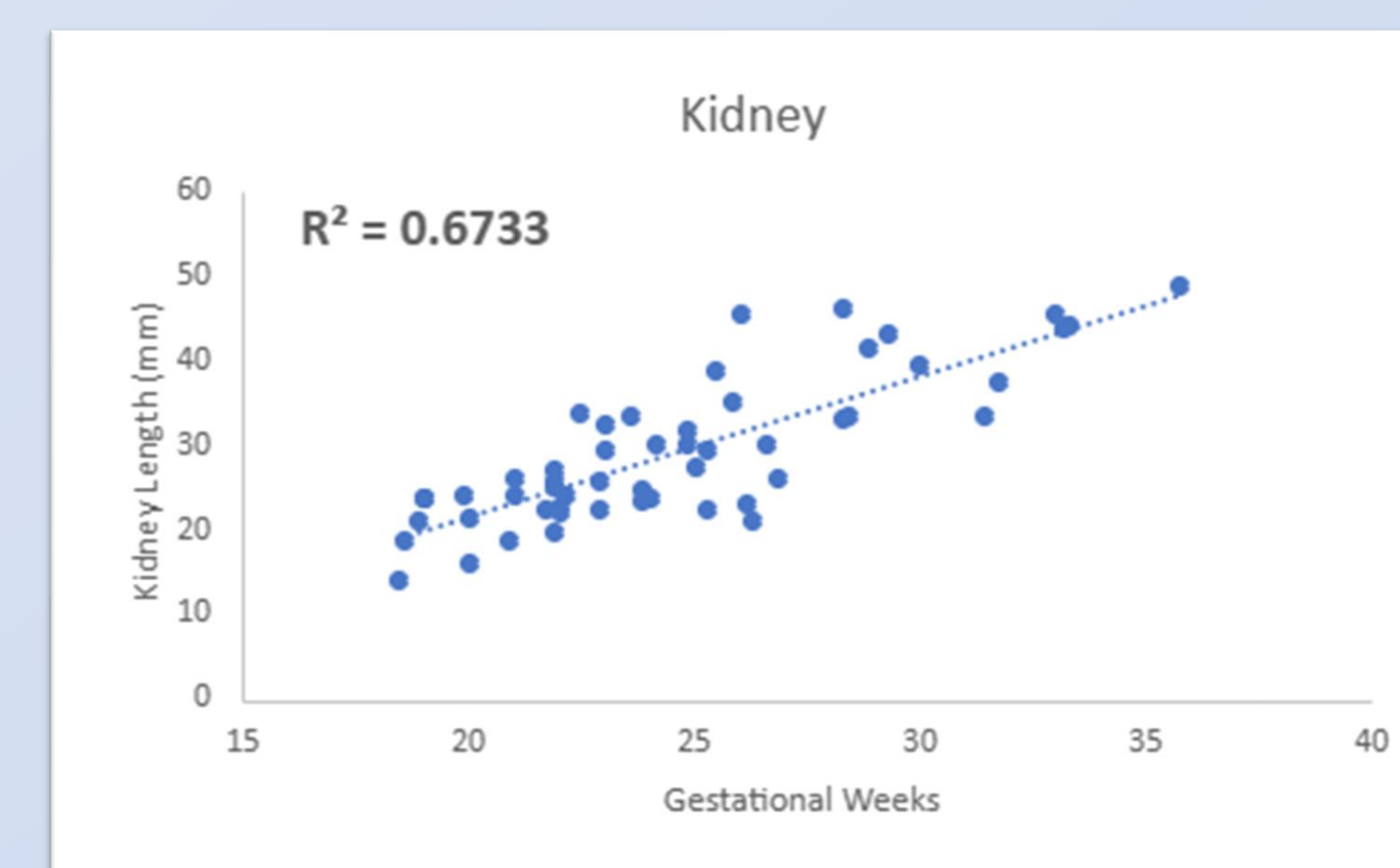


Figure 1. Scatterplot of Gestational Age and Kidney Length Data

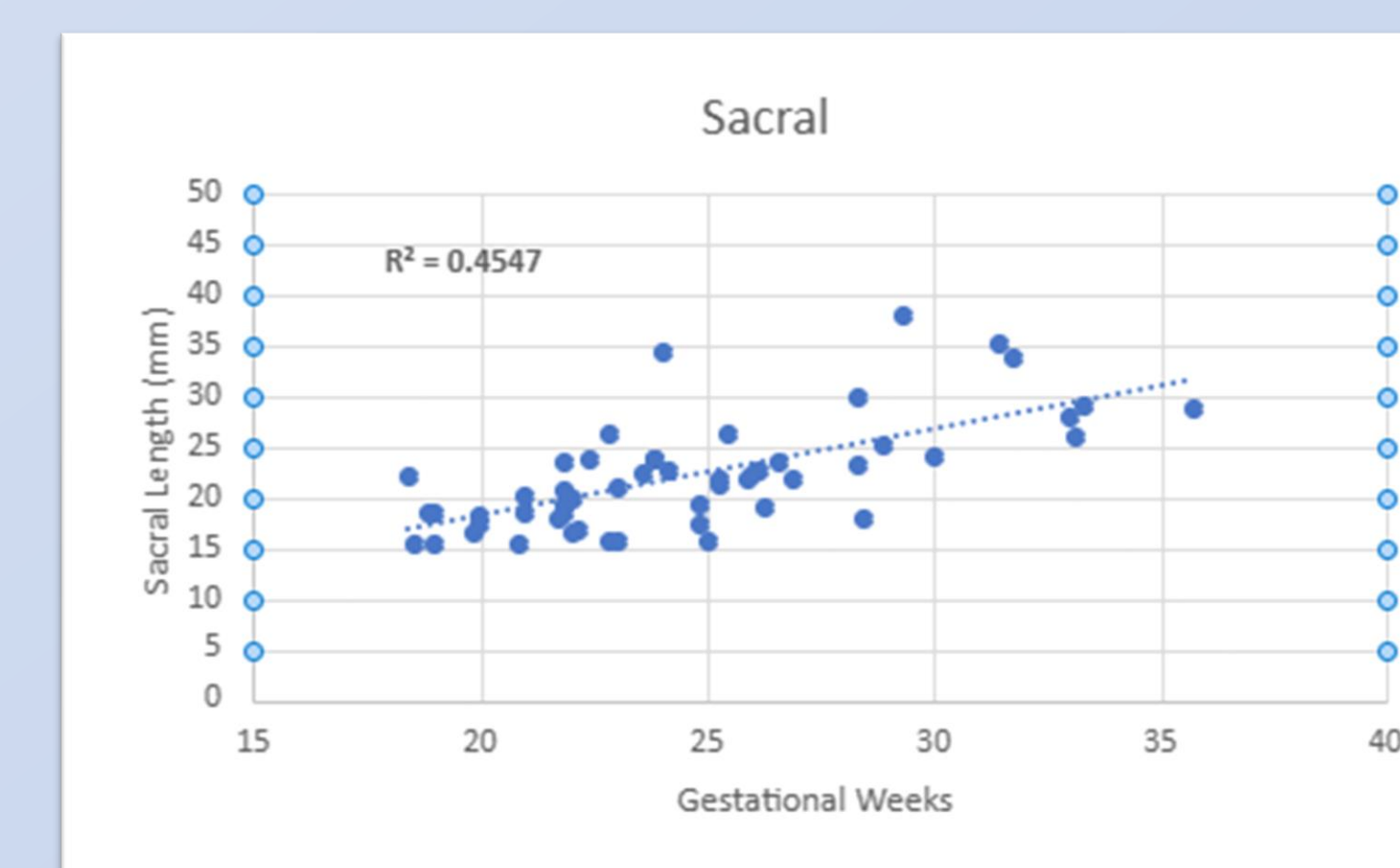


Figure 2. Scatterplot of Gestational Age and Sacral Length Data.

Discussion and Conclusion

Based on the results of the research, fetal kidney length shows a strong, positive correlation to gestational age compared to fetal sacrum length which supports the purpose for this research. Fetal kidney length would be an excellent parameter to include in an obstetrical ultrasound exam to determine gestational age. Other studies have researched fetal kidney and sacral length but have not compared the two in the same study to determine which best correlate to gestational age (Karabulut et al., 2001) (Abdelrazek Abo-Donia & Shalaby, 2019).

Discussion and Conclusion Cont.

It would be beneficial to measure the kidney as an alternative to other parameters because fetal kidney growth is constant and not affected by growth disorders (Ugur et al., 2016). Standard parameters to determine gestational age will be affected by congenital abnormalities such as anencephaly and dwarfism. Although kidney length evidenced a stronger correlation to gestational age, sacral length is a good parameter to measure due to it being an easily identifiable structure and providing a reproducible plane for measuring with ultrasound (Sherer et al., 1993). Measurements of the kidney and sacrum will not reflect a true correlation to gestational age when abnormalities such as infantile polycystic kidney disease, renal agenesis, caudal regression and spina bifida are present.

- Exclusions from the study were women who did not know their LMP, women who had diabetes, fetus' with renal anomalies or neural tube defects.
- Kidney length was measured in sagittal plane excluding the adrenal gland. Sacral length was measured in sagittal plane counting the last 5 vertebrae of the spine.

Literature Cited

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