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ULTRASONOGRAPHIC EVALUATION OF MATERNAL RENAL ARTERY AND FETAL UMBILICAL ARTERY DOPPLER IN PREGNANT WOMEN OF GESTATION AGE IN BETWEEN 13 TO 40 WEEKS WITH OR WITHOUT OLIGOHYDRAMNIOS

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Amniotic fluid, Oligohydramnios, Resistive Index, Pulsatility Index, Systolic/Diastolic ratio

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Abstract

Background: *Oligohydramnios is state designated as decline in the volume of amniotic fluid for gestational age primarily cause by impediment in fetus,maternal body and placenta.This condition may leads toward growth restriction ,labor complicacy and impairment in lung functionality its prevalence is more than 4 percent in term pregnancies.*

Objective: *The aim of the study was to evaluated Doppler indices of the maternal renal artery and fetal umbilical artery in pregnant women with and without oligohydraminos.*

Material & Method: *Study was conducted at Gillani Ultrasound Center, Pakistan. Fifty participants were recruited using purposive sampling, excluding those with critical illnesses, diabetes, hypertension, or a history of congenital anomalies. The amniotic fluid index (AFI) criteria for Oligohydramnios were defined as AFI ≤5 cm, vertical pockets ≤2 cm, or <10th centile. Doppler ultrasound, performed using a Toshiba Xario 100 with a 5-7 MHz convex probe, measured Resistance Index (RI), Pulsatility Index (PI), and Systolic/Diastolic (S/D) ratio. Data was analyzed using SPSS 27.0, with statistical tests confirming significant differences in Doppler indices between normal and Oligohydramnios groups ($p < 0.05$).*

Results: *While Comparing of Doppler parameters (RI, PI, and S/D ratio) of the renal and umbilical arteries under normal and oligohydramnios conditions it was seen that renal Artery showed significantly higher mean values for RI (0.625 vs. 0.575), PI (1.475 vs. 1.200), and S/D ratio (2.975 vs. 2.500) in oligohydramnios. Similarly, the Umbilical Artery had elevated RI (0.865 vs.*

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0.705), PI (2.075 vs. 1.600), and S/D ratio (4.075 vs. 3.488). T-tests confirmed these differences as statistically significant, with p-values well below 0.05. These results emphasize the hemodynamic alterations in both arteries during oligohydramnios, with more pronounced changes in the Umbilical Artery, highlighting its clinical relevance in monitoring fetal health.

Conclusion: *Notably, renal artery indices exhibited greater changes compared to umbilical artery indices. These findings underscore the impact of Oligohydramnios on maternal and fetal circulatory dynamics, highlighting the utility of Doppler assessments in monitoring pregnancy complications.*

INTRODUCTION

Amniotic fluid, also known as liquor amnii, surrounds and protects the developing fetus during pregnancy, serving as a critical life-support system. Its volume plays an essential role in ensuring the healthy growth and development of the fetus. Monitoring amniotic fluid levels provides valuable insights into maternal and fetal health throughout pregnancy (StatPearls et al..,2024). Amniotic fluid begins forming approximately 12 days after fertilization, initially originating from maternal circulation. By around 20 weeks of gestation, fetal urine becomes the primary contributor to its production (Sarkar et al..,). This fluid serves multiple functions, including temperature regulation, cushioning the fetus from external trauma, facilitating proper growth, and aiding the fetus in adapting to uterine contractions. In clinical practice, the volume of liquor amnii acts as a key indicator for fetal health, forming a cornerstone of antenatal fetal surveillance (Qadir et Al..,2017)

One of the earliest recognizable signs of pregnancy is the presence of amniotic fluid (*liquor amnii*), which serves as a protective cushion and plays a vital role in promoting the growth and development of the fetal lungs. By term, the average volume of amniotic fluid is approximately 400 mL, though this varies based on gestational age. Monitoring amniotic fluid levels is essential for effective pregnancy management. While studies suggest that, the Amniotic Fluid Index (AFI) has limitations in predicting outcomes, the Single Deepest Pocket (SDP) method is widely regarded as a reliable tool for diagnosing oligohydramnios (Rabia et al..,2017). Regardless of the methodology used, detecting oligohydramnios is critical due to its implications for fetal health. Throughout pregnancy, amniotic fluid fulfills several crucial functions. It creates the physical space necessary for fetal mobility, enabling the proper development of the musculoskeletal system. Additionally, it facilitates fetal breathing and swallowing, processes that are essential for the maturation of the lungs and gastrointestinal tract, respectively (Ghimire et al..,2016)

Amniotic Fluid: Functions, Measurement, and Clinical Implications

Amniotic fluid serves as a vital protective cushion for the fetus, shielding it from trauma to the maternal abdomen. By acting as a buffer between the fetus and the umbilical cord, it minimizes the risk of compression against the uterine wall. Beyond protection, amniotic fluid stores essential nutrients such as vitamins, proteins, electrolytes, and immunoglobulins, all of which support fetal development. It also plays a critical role in the growth of key systems, including the pulmonary and gastrointestinal systems
(StatPearls et al..,2024).

The assessment of amniotic fluid volume is a fundamental aspect of obstetric management. While the invasive dye-dilution technique is considered the gold standard for measuring amniotic fluid volume, non-invasive methods such as the Amniotic Fluid Index (AFI), Single Deepest Pocket (SDP), and Two-Diameter Pocket (TDP) are widely used and validated (Rabia et al..,2017). The amniotic fluid environment provides a sterile space for fetal growth, regulates body temperature, protects against external injuries, and absorbs uterine contractions. Abnormal fluctuations in fluid levels, such as Oligohydramnios and polyhydramnios, can significantly affect pregnancy outcomes (Farouk et al.., 2022)

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Oligohydramnios: Causes, Consequences, and Management

Oligohydramnios, characterized by an AFI below 5 cm, a single deepest pocket of less than 2 cm, or levels below the 10th percentile, can arise from various conditions, including placental insufficiency, fetal urinary tract anomalies, chronic fluid leakage, and maternal hypertension. Persistent Oligohydramnios have been associated with complications such as limb deformities, impaired fetal growth, immaturity, and pulmonary hypoplasia due to inhibited lung development (Tripathi et al..,2019).

Late-onset oligohydraminos increase the likelihood of meconium-stained fluid, abnormal fetal heart rate patterns, low birth weight, low APGAR scores, NICU admissions, neonatal asphyxia, and cesarean delivery due to fetal distress. Clinical management often involves early detection and careful monitoring, as timely intervention can reduce perinatal morbidity and mortality (Peipert et al..,1991).

The etiology of Oligohydramnios varies but may include genetic abnormalities, congenital malformations, or ruptured membranes. Prognosis is poorer when the condition develops during the second trimester, particularly if accompanied by elevated maternal serum alpha-fetoprotein levels. Chronic Oligohydramnios can lead to structural deformities, amniotic band syndrome, and post-maturity-related complications (Taneja et al..,2017).

Oligohydramnios: Implications and Risk Factors

Oligohydramnios, characterized by excessive amniotic fluid volume, is often associated with maternal diabetes, fetal swallowing disorders, congenital infections, and placental abnormalities. It increases the risk of complications such as preterm labor, abnormal fetal presentation, cord prolapse, and postpartum hemorrhage. In some cases, the cause remains idiopathic, yet the condition is linked to higher rates of cesarean delivery and neonatal morbidity (Figueroa et al..,2020).

Role of Doppler Ultrasonography

Doppler ultrasonography is a crucial tool for assessing maternal and fetal health, particularly in high-risk pregnancies. It evaluates blood flow in the umbilical and renal arteries, providing insights into placental function and fetal well-being. Parameters such as the resistance index (RI), pulsatility index (PI), and systolic/diastolic (S/D) ratio are commonly used to detect abnormalities (Sadiq et Al..,2019). Doppler studies of the fetal renal arteries, though less frequently performed, have proven sensitive in identifying complications such as growth restrictions and fluid imbalances (Y.S Seyam et al..,2002)

High-Risk Pregnancies and Amniotic Fluid Variations

Pregnancies complicated by Oligohydramnios or Oligohydramnios pose significant risks to both the mother and fetus. High-risk pregnancies are associated with increased maternal morbidity and mortality, often due to conditions such as pre-eclampsia, gestational diabetes, infections, and placental insufficiency. Effective management requires a thorough understanding of the benefits and risks of early delivery and intervention (Dr.Pooja et al..,2019). Amniotic fluid is indispensable for fetal growth and development, and its assessment is a cornerstone of prenatal care. Variations in its volume, whether excessive or insufficient, have profound implications for maternal and fetal health. Advances in diagnostic tools such as Doppler ultrasonography have improved our ability to monitor and manage high-risk pregnancies. Continued research is essential to optimize outcomes and reduce the risks associated with amniotic fluid abnormalities (Y.S Seyam et al..,2002)

Objective:

The purpose of this research is to assess the clinical significance of Doppler ultrasonography as a diagnostic tool for evaluating maternal and fetal well-being in pregnancies affected by oligohydramnios, compared to those with normal amniotic fluid levels during 13 to 40 weeks of gestation in a local Pakistani population.This study aims to provide evidence-based insights for the early detection and management of potential complications in pregnancies complicated by oligohydramnios.

Research Question:

What are the differences in maternal renal artery and fetal umbilical artery Doppler indices between

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pregnancies with oligohydramnios and those with normal amniotic fluid levels?

Operational Definition

Amniotic Fluid Index (AFI):

The Amniotic Fluid Index (AFI) is a standardized method for quantitatively measuring the volume of amniotic fluid surrounding the fetus. It is determined by dividing the uterus into four quadrants and measuring the deepest vertical pocket of fluid in each quadrant (Phelan et al., 1987). These measurements provide the AFI, which helps assess the fetal environment.

Oligohydramnios:

Oligohydramnios refers to a condition in pregnancy characterized by a reduction in fluid surrounding the fetus. This condition is typically diagnosed when the AFI measures less than 5 cm, indicating a significant decrease in amniotic fluid (Berghella et al., 2015).

Polyhydramnios:

Polyhydramnios is the condition where there is an excessive accumulation of amniotic fluid during pregnancy. It is usually diagnosed when the AFI exceeds 25 cm, which may be associated with various maternal or fetal conditions (O'Sullivan et al., 2018).

Fetal Umbilical Artery Doppler:

Fetal umbilical artery Doppler is a non-invasive ultrasound technique used to assess the blood flow through the umbilical artery. This test is essential for evaluating fetal well-being by examining the resistance and velocity of blood flow in the vessel, which can indicate placental function and fetal health (Arias et al., 2017).

Maternal Renal Artery Doppler:

Maternal renal artery Doppler ultrasound measures blood flow in the renal arteries of pregnant women. It is used to assess maternal cardiovascular health and its potential effects on pregnancy outcomes, such as pre-eclampsia or fetal growth restriction (Mahmood et al., 2019).

Material & Method:

This study was conducted at Gillani Ultrasound Center over three months following synopsis approval. A cross-sectional design was employed, with a total sample size of 50 patients, comprising 25 with normal pregnancies and 25 with oligohydramnios. Convenience sampling was used, and participants met specific inclusion criteria: women aged under 35 years, between 13 to 40 weeks gestation, non-diabetic, non-hypertensive, and with no fetal congenital anomalies. Exclusion criteria included hypertensive women, those aged over 35 years, diabetics, women with gestational age under 13 weeks, or fetuses with congenital anomalies.

All participants underwent sonographic examinations using a Siemens Grayscale/Doppler Ultrasound machine. The scanning was performed in both transverse and longitudinal planes to evaluate the Amniotic Fluid Index (AFI) and various Doppler parameters of the maternal renal and fetal umbilical arteries. Informed verbal and written consent was obtained from all participants prior to data collection. The data collected included maternal and fetal variables, such as age and last menstrual period (LMP), as well as Doppler indices (resistance index [RI], pulsatility index [PI], and systolic-to-diastolic [SD] ratio).

The Institutional Ethics Committee granted ethical approval for the study, and the rights of the participants were upheld throughout. Informed consent was obtained, and participant anonymity and confidentiality were maintained. Data was securely stored and only accessible to authorized personnel.

Data analysis was conducted using IBM SPSS Statistics 27, employing descriptive statistics to summarize quantitative variables, including the Doppler indices. Comparisons of RI, PI, and SD ratios for both renal and umbilical arteries were made to assess significance.

RESULTS

Evaluation of Maternal Renal Artery & Umbilical Artery Doppler with or without Oligohydramnios in Pregnant Women of a local (Pakistan) population with gestational age between 13 to 40 weeks results. The results of this study are mentioned here in demographic variables.

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Table #1: Frequency Table

Variables		Frequency	Percentile
Gestating Women			
	Normal	150	50%
	Oligohydramions	150	50%
Maternal & Fetal Doppler Parameter	Renal Artery Doppler	150	50%
	Umbilical Artery Doppler	150	50%
Dopplar Indeces	Resistive Index	100	33%
	Pulsatility Index	100	33%
	Systolic / Diastolic Ratio	100	33%

The frequency table presents data on gestating women, maternal and fetal Doppler parameters, and Doppler indices. Among the gestating women, 50% (n = 150) had normal conditions, while 50% (n = 150) had Oligohydramnios. For maternal and fetal Doppler parameters, 50% (n = 150) were assessed using Renal Artery Doppler and 50% (n = 150) with Umbilical Artery Doppler. Regarding Doppler indices, 33% (n = 100) were evaluated using the Resistive Index, 33% (n = 100) with the Pulsatility Index, and 33% (n = 100) with the Systolic/Diastolic Ratio.

Table # 2 :Descriptive Statistics of Normal and Oligohydramnios factor

Gestating women	Dopplar Indeces		Mean	S.D
Normal	Renal Artery Doppler	Resistive Index	.56	.06
		Pulsatility Index	1.01	.70
		Systolic/ Diastolic Ratio	2.27	.51
		Total	1.27	.88
	Umbilical Artery Doppler	Resistive Index	.60	.07
		Pulsatility Index	.95	.33
		Systolic/ Diastolic Ratio	2.74	.57
		Total	1.43	1.02
	Total	Resistive Index	.58	.07
Oligohydraminos	Renal Artery Doppler	Resistive Index	.78	.08
		Pulsatility Index	1.74	.98
		Systolic/ Diastolic Ratio	2.80	1.03
		Total	1.77	1.16
	Umbilical Artery Doppler	Resistive Index	.65	.07
		Pulsatility Index	.95	.43
		Systolic/ Diastolic Ratio	2.56	.46
		Total	1.39	.92
	Total	Resistive Index	.72	.09
		Pulsatility Index	1.34	.85
		Systolic/ Diastolic Ratio	2.69	.80
		Total	1.58	1.07
Total	Renal Artery Doppler	Resistive Index	.67	.13
		Pulsatility Index	1.37	.92
		Systolic/ Diastolic Ratio	2.54	.85
		Total	1.53	1.06
Total	Renal Artery Doppler	Resistive Index	.67	.13
		Pulsatility Index	1.37	.92
		Systolic/ Diastolic Ratio	2.54	.86

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	Total	1.53	1.06
Umbilical Artery Doppler	Resistive Index	.63	.078
	Pulsatility Index	.95	.39
	Systolic/ Diastolic Ratio	2.65	.53
	Total	1.41	.97
Total	Resistive Index	.65	.12
	Pulsatility Index	1.16	.74
	Systolic/ Diastolic Ratio	2.59	.71

Descriptive statistics were calculated for Doppler indices in gestating women with normal conditions and Oligohydramnios. For normal cases, the mean values for Renal Artery Doppler indices were as follows: Resistive Index (M = .5552, SD = .06152), Pulsatility Index (M = 1.0016, SD = .70578), and Systolic/Diastolic Ratio (M = 2.2652, SD = .51072). The Umbilical Artery Doppler indices for normal cases were: Resistive Index (M = .6096, SD = .07834), Pulsatility Index (M = .9484, SD = .33813), and Systolic/Diastolic Ratio (M = 2.7308, SD = .57751), with a total mean of 1.4296 (SD = 1.01224). In contrast, for oligohydramnios, the Renal Artery Doppler indices showed higher mean values: Resistive Index (M = .7760, SD = .08651), Pulsatility Index (M = 1.7316, SD = .98367), and Systolic/Diastolic Ratio (M = 2.8044, SD = 1.03400), resulting in a total meanof 1.7707 (SD = 1.16567). The Umbilical Artery Doppler for Oligohydramnios showed a resistive Index (M = .6548, SD = .07125), Pulsatility Index (M = .9464, SD = .43201), and Systolic/Diastolic Ratio (M = 2.5560, SD = .46311), with a total mean of 1.3857 (SD = .91658). Combined data for all cases revealed a Renal Artery Doppler mean Resistive Index of .6656 (SD = .13400), Pulsatility Index of 1.3666 (SD = .92404), and Systolic/Diastolic Ratio of 2.5348 (SD = .85182), with a total mean of 1.5223 (SD = 1.06007). For Umbilical Artery Doppler, the combined mean values were: Resistive Index (M = .6322, SD = .07755), Pulsatility Index (M = .9474, SD = .38394), and Systolic/Diastolic Ratio (M = 2.6434, SD = .52554), yielding a total mean of 1.4077 (SD = .96260).

Figure #1: Doppler indices of Maternal and Fetal Parameter:

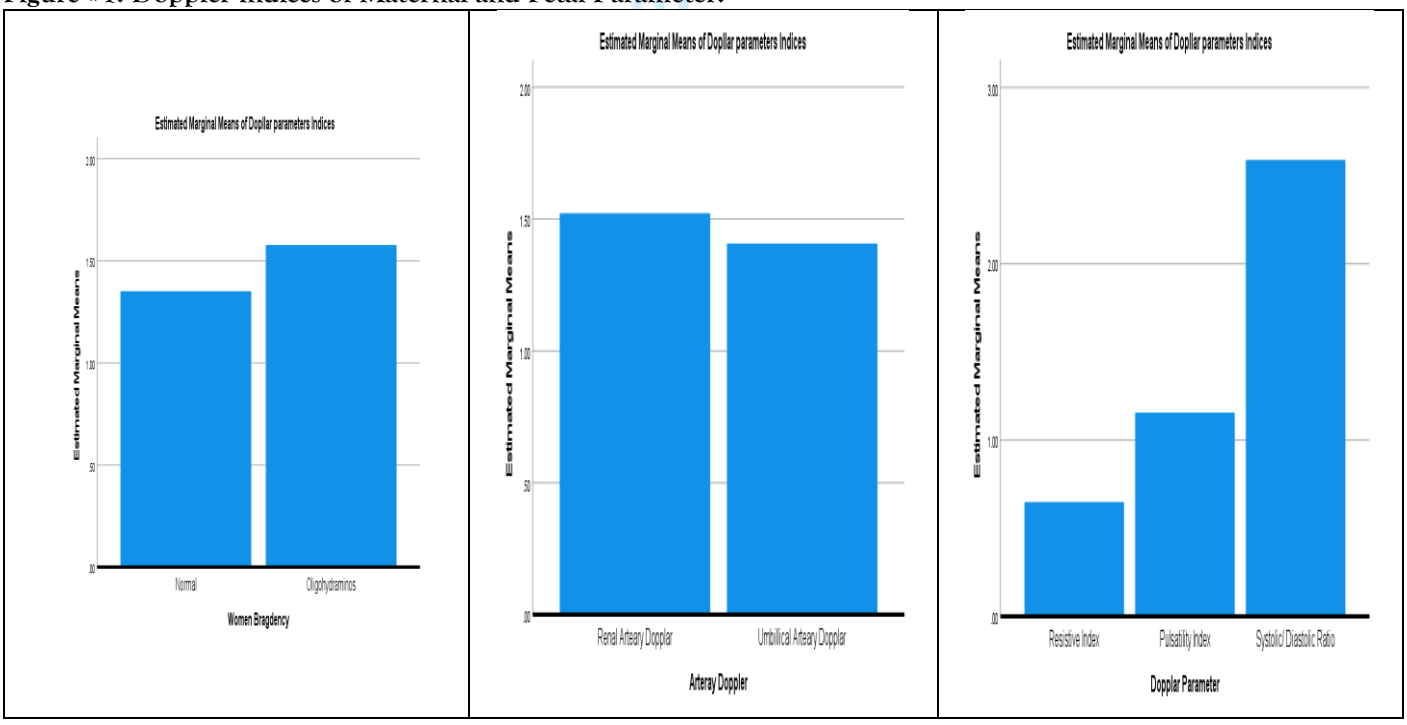

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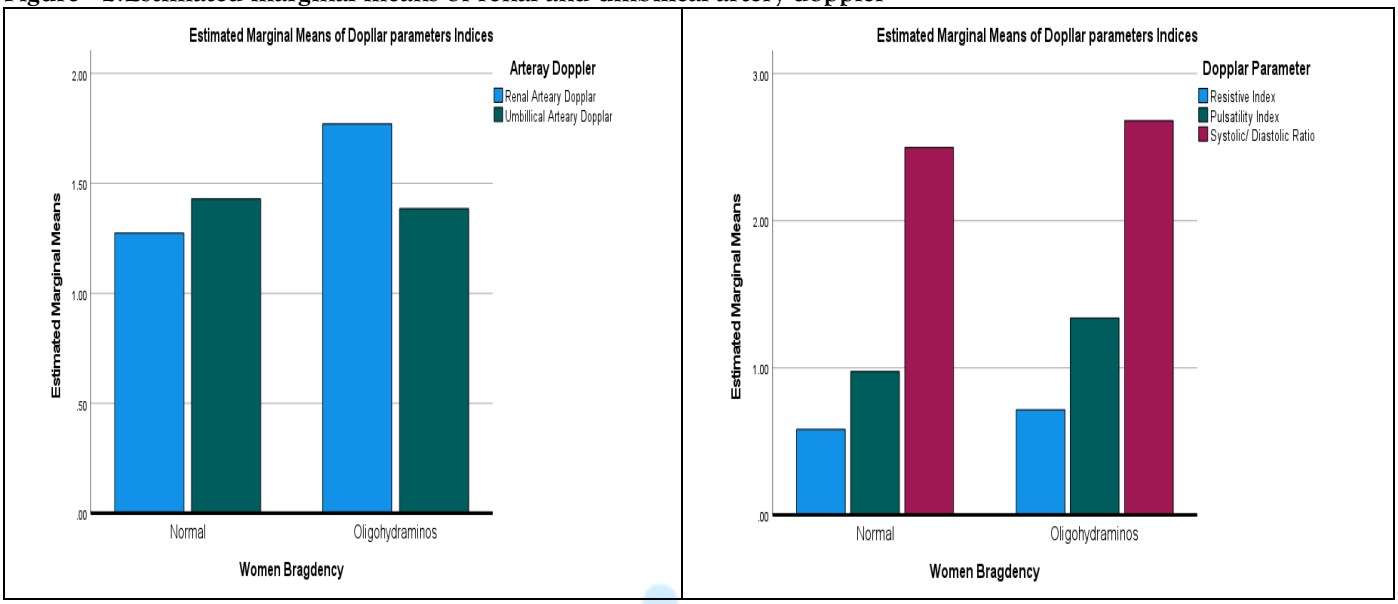
Figure #2:Estimated marginal means of renal and umbilical artery doppler



The Doppler Parameters Of both RENAL And UMBILICAL ARTERY is more pronounced in women with OLIGOHYDRAMNIOS than normal. Resisitive And Pulatility Index of is elevated in oligohydramnios Than normal S/D ratio remain same in both Normal and Oligohydramnios.

Table # 3: Comparative Doppler Indices

Resistive index and Pulsatility index of renal artery doppler is more elevated Than Umbilical artery in women with oligohydramnios.

Doppler indices	(J) Doppler indices	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound	(I) Doppler indices	(J) Doppler indices
Resistive Index	Pulsatility Index	-.50*	.078	.000	-.69	-.32	Resistive Index	Pulsatility Index
	Systolic/ Diastolic Ratio	-1.94*	.078	.000	-2.12	-1.76		Systolic/ Diastolic Ratio
Pulsatility Index	Resistive Index	.50*	.078	.000	.32	.69	Pulsatility Index	Resistive Index
	Systolic/ Diastolic Ratio	-1.43*	.078	.000	-1.62	-1.25		Systolic/ Diastolic Ratio
Systolic/ Diastolic Ratio	Resistive Index	1.94*	.078	.000	1.76	2.12	Systolic/ Diastolic Ratio	Resistive Index
	Pulsatility Index	1.43*	.078	.000	1.25	1.61		Pulsatility Index

This table highlights the significant differences in Doppler indices among the Resistive Index (RI), Pulsatility Index (PI), and Systolic/Diastolic (S/D) ratio in women with oligohydramnios. The mean differences between these indices were analyzed using

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Tukey's HSD test, showing significant results ($p < .05$). The RI was significantly lower than the PI (Mean Difference = -0.5081, p = .000) and S/D ratio (-1.9402, p = .000). Similarly, the PI was lower than the S/D ratio (-1.4321, p = .000). These findings underscore that the Resistive Index and Pulsatility Index of the renal artery are more elevated than those of the umbilical artery in women with oligohydramnios, reflecting compromised blood flow in such cases.

Table# 4: Renal and Umbilical Artery Parameters

Resistive index and Pulsatility index of renal artery doppler is more elevated Than Umbilical artery in women with oligohydramnios.

This table compares Doppler parameters (RI, PI, and S/D ratio) of the renal and umbilical arteries under normal and oligohydramnios conditions. The Renal Artery showed significantly higher mean values for RI (0.625 vs. 0.575), PI (1.475 vs. 1.200), and S/D ratio (2.975 vs. 2.500) in oligohydramnios. Similarly, the Umbilical Artery had elevated RI (0.865 vs. 0.705), PI (2.075 vs. 1.600), and S/D ratio (4.075 vs. 3.488). T-tests confirmed these differences as statistically significant, with p-values well below 0.05. These results emphasize the hemodynamic alterations in both arteries during oligohydramnios, with more pronounced changes in the Umbilical Artery, highlighting its clinical relevance in monitoring fetal health.

Doppler indices	(J) Doppler indices	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	Upper Bound
Resistive Index	Pulsatility Index Systolic/ Diastolic Ratio	-.51* -1.95*	.079 .079	.000 .000	-.69 -2.15	-.32 -1.76
Pulsatility Index	Resistive Index Systolic/ Diastolic Ratio	.51* -1.44*	.079 .079	.000 .000	.32 -1.62	.69 -1.25
Systolic/ Diastolic Ratio	Resistive Index Pulsatility Index	1.94* 1.43*	.078 .078	.000 .000	1.76 1.25	2.13 1.62

Conclusion:

All the tests show statistically significant differences between the normal and oligohydramnios groups for both Renal and Umbilical artery indices, with p-values well below 0.05 across all metrics. The differences are particularly pronounced in the renal artery measurements.

Discussions:

This study compared Doppler parameters in normal pregnancies and those complicated by oligohydramnios, revealing significant differences in vascular resistance and blood flow. The key Doppler indices measured—Resistive Index (RI), Pulsatility Index (PI), and Systolic/Diastolic (S/D) ratio—showed elevated values in pregnancies affected by oligohydramnios, indicating altered hemodynamics.*In 2013 Ibrahim Akin et,al...*studied similar paramer RI & PI of Renal artery & Umbilical artery and the result of these parameter was simililar with current study .Both paremeter of these two arteries were elevated in oligohydraminos .*(Ibrahim Akin al., 2013)*

The elevated Doppler indices in pregnancies with oligohydramnios suggest compromised placental perfusion and increased resistance, potentially affecting fetal growth and development. The differences in Doppler parameters between the two groups are statistically significant, reinforcing the importance of regular Doppler monitoring in high-risk pregnancies. The wider confidence intervals in oligohydramnios pregnancies further highlight the variability and severity of the condition, emphasizing the need for individualized care.*In 2021 Zara Jabeen, et,al...* study was conducted to determine the hemodynamic changes in Umbilical Artery & Middle Cerebral Artery with oligohydraminos . The result was similar to the current study oligohydraminos increase 11vascular resistance which in turn increase fetal

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distress which leads to high risk pregnancies and increased risk of cesarian. *(Jabeen et al., 2021).*

The clinical implications of these findings are critical for managing pregnancies complicated by oligohydramnios. Increased vascular resistance, as indicated by higher RI and PI values, may signal fetal distress or growth restriction, necessitating closer monitoring and timely intervention. Healthcare providers should consider more frequent ultrasounds and potentially early delivery for pregnancies with significantly elevated Doppler indices. Additionally, these findings may guide obstetricians in making decisions about labor induction or cesarean delivery when placental perfusion is impaired.*In 2014 Nilgun Benzer et,al...* studied the indices of fetal renal artery in idiopathic oligohydraminos .While examining the previous studies ,see that significant association are observed in renal artery doppler indices with pregnancies complicated with oligohydraminos ((Benzer et al., 2014).

Understanding the relationship between Doppler indices and oligohydramnios can aid in better counseling for patients, encouraging compliance with medical recommendations and improving maternal and fetal outcomes. Furthermore, these results may contribute to the development of updated clinical guidelines for managing oligohydramnios, and prompt further research to explore the long-term implications for fetuses exposed to abnormal Doppler findings.Ultimately, the increased vascular resistance and altered blood flow patterns observed in oligohydramnios highlight the significance of Doppler ultrasound in assessing and managing these pregnancies. Regular monitoring and timely interventions are essential for optimizing outcomes for both mothers and their babies.However , there's no study in the published work evaluating the both Maternal renal artery & fetal umbilical artery doppler indices collectively .

Conclusions:

Ultrasonography remains the preferred method for assessing amniotic fluid levels and evaluating Doppler indices in pregnancies. It is a reliable, non-invasive tool with no known health risks. This study highlights the significant differences in Doppler parameters between the maternal renal artery and fetal umbilical artery, with renal artery Doppler indices showing variations that are more pronounced in pregnancies complicated by oligohydramnios. Elevated Resistive Index (RI) values in both arteries indicate impaired placental perfusion, which is associated with complications such as placental insufficiency, preterm labor, and an increased risk of cesarean section. Therefore, it is crucial to closely monitor pregnancies with suspected oligohydramnios, particularly as gestational age progresses, to prevent unfavorable outcomes. Amniocentesis may also be considered to diagnose amniotic fluid leakage and further assess the condition.

Recommendations

Utilize advanced ultrasound equipment:

High-frequency ultrasound systems should be used to improve diagnostic accuracy and reduce false positives and negatives.

Comprehensive assessment:

In addition to Doppler ultrasound, a full fetal evaluation, including the fetal biophysical profile (FBP), non-stress test (NST), fetal growth ultrasound, and maternal serum screening for fetal anomalies, is essential to assess the severity of oligohydramnios and avoid complications.

3D/4D ultrasound imaging:

The use of advanced ultrasound techniques, such as 3D/4D imaging, can provide detailed visualization of amniotic fluid levels, fetal anomalies, and placental function.

Early intervention:

Given the association between Doppler parameters and adverse pregnancy outcomes, regular monitoring and early intervention should be prioritized in high-risk pregnancies.

Limitations

Expertise required for Doppler assessment:

Accurate interpretation of renal artery Doppler requires expertise to overcome potential artifacts and ensure reliable results.

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Longer scan duration:
Doppler ultrasound can be time-consuming, potentially causing discomfort for patients during extended scans.

Equipment limitations:
Not all ultrasound machines are equipped with Doppler functionality, limiting the accessibility of this diagnostic tool.

Study sample limitations:
The study sample was drawn from a single ultrasound center, which limits the generalizability of the results to the broader population.

Exclusion of other conditions:
The study excluded patients with other potential causes of elevated Doppler indices, such as fetal distress, maternal hypertension, or decreased fetal movement, which may limit the findings' applicability to all cases of elevated Doppler indices.

Conflict of Interest:
Authors proclaim no conflict of interest

REFERENCES

1-Akin, I., Ahmet Uysal, Muzaffer Sanci, Secil Kurtulmus, Cigdem Ispahi, Fatma Uysal, Ozgur Oztekin, & Gungor, A. (2013). Applicability of fetal renal artery Doppler values in determining pregnancy outcome and type of delivery in idiopathic oligohydramnios and polyhydramnios pregnancies. Ginekologia Polska, 84(11). https://doi.org/10.17772/gp/1665

2-Fahmy, K., Sanad, Z., Abdel Gaied, A., Dawod, R., & Mahmoud, H. (2019). Predictive value of fetal renal artery Doppler indices in idiopathic oligohydramnios and polyhydramnios. Menoufia Medical Journal, 32(2), 476. https://doi.org/10.4103/mmj.mmj_220_18

3-Benzer, N., Tazegül Pekin, A., Yılmaz, S. A., Seçilmiş Kerimoğlu, Ö., Doğan, N. U., & Çelik, Ç. (2014). Predictive value of second and third trimester fetal renal artery Doppler indices in idiopathic oligohydramnios and polyhydramnios in low-risk pregnancies: A longitudinal study. Journal of Obstetrics and Gynaecology Research, 41(4), 523–528. https://doi.org/10.1111/jog.12601

4-Rossi, A. C., & Prefumo, F. (2013). Perinatal outcomes of isolated oligohydramnios at term and post-term pregnancy: a systematic review of literature with meta-analysis. European Journal of Obstetrics & Gynecology and Reproductive Biology, 169(2), 149–154. https://doi.org/10.1016/j.ejogrb.2013.03.011

5-Deodhar, Dr. P., & Rajoriya, Dr. M. (2019). To compare perinatal outcome in normal and high risk (Oligo & Poly) pregnancies. International Journal of Clinical Obstetrics and Gynaecology, 3(1), 27–29. https://doi.org/10.33545/gynae.2019.v3.i1a.07

6-Figueroa, L., McClure, E. M., Swanson, J., Nathan, R., Garces, A. L., Moore, J. L., Krebs, N. F., Hambidge, K. M., Bauserman, M., Lokangaka, A., Tshefu, A., Mirza, W., Saleem, S., Naqvi, F., Carlo, W. A., Chomba, E., Liechty, E. A., Esamai, F., Swanson, D., & Bose, C. L. (2020). Oligohydramnios: a prospective study of fetal, neonatal and maternal outcomes in low-middle income countries. Reproductive Health, 17(1). https://doi.org/10.1186/s12978-020-0854-y

7-Farouk, H., Assar, T., & Elsawy, S. (2022). Fetal Renal Artery Indices of Second and Third Trimesters of Pregnancy in Idiopathic Oligohydrominos by Pulsed Wave Doppler Ultrasonography. Evidence Based Women's Health Journal, 12(2), 202-208. doi: 10.21608/ebwhj.2022.127319.1170

8-Ghimire, S., Ghimire, A., Chapagain, S., & Paudel, S. (2016). Pregnancy outcome in cases of oligohydramnios after 28 weeks of gestation. International Journal of Advanced Medical and Health Research, 3(2), 68. https://doi.org/10.4103/2349-4220.195939

9-Haugen, G., Godfrey, K., Crozier, S., & Hanson, M. (2004). Doppler blood flow velocity waveforms in the fetal renal arteries: variability at proximal and distal sites in the right and left arteries. Ultrasound in

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Obstetrics and Gynecology, 23(6), 590–593. https://doi.org/10.1002/uog.976

10-Hamza, A., Herr, D., Solomayer, E., & Meyberg-Solomayer, G. (2013). Polyhydramnios: Causes, Diagnosis and Therapy. Geburtshilfe Und Frauenheilkunde, 73(12), 1241–1246. https://doi.org/10.1055/s-0033-1360163

11-Jagatia, K., Singh, N., & Patel, S. (2013). Maternal and fetal outcome in oligohydramnios- Study of 100 cases. International Journal of Medical Science and Public Health, 2(3), 724. https://doi.org/10.5455/ijmsph.2013.070520132

12-Jabeen, Z., Bacha, R., Zain-ul-Hassan, Fatima, M., Manzoor, I., Ramzan, I., & Iyaz, M. (2021). Hemodynamic Changes in Umbilical Artery and Middle Cerebral Artery With Oligohydramnios in Third Trimester of Pregnancy. Journal of Diagnostic Medical Sonography, 875647932110519. https://doi.org/10.1177/87564793211051978

13-Pawanpareet Kaur.,Deepak A .Desi., Aartee Taraiya.,(2016).A study on the perinatal outcome in cases of oligohydraminos International Journal of Reproduction, Contraception, Obstetrics and Gynecology, vol. 5,https://doi.org/10.18203/2320-1770.ijrcog20151608

14-Moses., Vibha., and Sarita Thakre.,(2016). A study of maternal and fetal outcome in third trimester diagnose case of oligohydramnios. International Journal of Reproduction, Contraception, Obstetrics and Gynecology, vol. 5, no. 9, https://doi.org/10.18203/2320-1770.ijrcog20162969

15-Medhat M. Refaa.t, Hamada M. Khater.,Marian H. Helmy., (2022) Value of Fetal Renal Artery Doppler Indices in Idiopathic Oligohydramnios and Polyhydramnios .Benha Medical Journal, vol. 39, special issue (radiology) doi.org.10.21608/bmfj.2021.67624.1397

16-PEIPERT, J. F., & DONNENFELD, A. E. (1991). Oligohydramnios. Obstetrical & Gynecological Survey, 46(6), 325–339. https://doi.org/10.1097/00006254-199106000-00002

17-Iqbal, M., Clement-Pervaiz, M.-V., Ansari, M. J., Pervaiz, S., Sheikh, S., Katpar, S., Meo, S. A., Sattar, K., Schofield, S., Karabulut, A. K., Memon, A. I., Memon, F. N., Ahmed, H., Rahman, A. A., Ujjan, I. D., Ahmed, M., Altaf, J., Mahesar, M. A., Jatoi, T., & Sunder, J. (2017). Proceedings of the 1st Liaquat University of Medical & Health Sciences (LUMHS) International Medical Research Conference. European Journal of Medical Research, 22(S1). https://doi.org/10.1186/s40001-017-0296-3

18-Rabie, N., Magann, E., Steelman, S., & Ounpraseuth, S. (2017). Oligohydramnios in complicated and uncomplicated pregnancy: a systematic review and meta-analysis. Ultrasound in Obstetrics & Gynecology, 49(4), 442–449. https://doi.org/10.1002/uog.15929

19-Fitzsimmons, E. D., & Tushar Bajaj. (2019, May 6). Embryology, Amniotic Fluid. Nih.gov; StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK541089/

20-Tripathi, M., Gurung, T., Ghale, T., Gurung, B., Pandit, C., Shrestha, R., . . . Sherchan, K. (2019). Pregnancy Outcome in Women Having Oligohydramnios in Gandaki Medical College Teaching Hospital, Pokhara, Nepal. Gandaki Medical College Teaching Hospital & Research Centre Pvt. Ltd.Journal of Gandaki Medical college- Nepal.vol. 5,no. 1,https://doi.org/10.3126/jgmcn.v12i1.22599

21-Taneja, A. (2017). Pregnancy Outcomes in Isolated Oligohydramnios during Second Trimester: A Case Series. JOURNAL of CLINICAL and DIAGNOSTIC RESEARCH. https://doi.org/10.7860/jcdr/2017/27722.10502

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

22-Seyam, Y. S., Al-Mahmeid, M. S., & Al-Tamimi, H. K. (2002). Umbilical artery Doppler flow velocimetry in intrauterine growth restriction and its relation to perinatal outcome. International Journal of Gynecology & Obstetrics, 77(2), 131–137. https://doi.org/10.1016/s0020-7292(02)00027-9