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SONOGRAPHIC COMPARISON OF FETAL RENAL ARTERY DOPPLER INDICES WITH AFI IN THIRD TRIMESTER

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ABSTRACT

Background: *Oligohydramnios is a medical condition characterized by condition with decrease amniotic fluid volume defined as a single deepest pocket <2cm or amniotic fluid index (AFI) <5cm. About 3-4 % of pregnant women is presenting with low amniotic fluid at any point of pregnancy. Oligohydramnios has an incidence of around 1-5% of total pregnancies. A prospective study conducted at University of Texas South-Western Medical Center showed the incidence of oligohydramnios to be 2.3%. Similar result was obtained in USA among 953 Womens over the period of 12 month in 3rd trimester. High rated of oligohydromnios were found in summer as compared to rest of the year.*

OBJECTIVE: *To Compare fetal renal artery doppler in patients with or without Oligohydramnios in third trimester of pregnancy.*

Method: *In this cross-sectional analytical study 100 women were included. All pregnant women coming for obstetrical US in third trimester, at university ultrasound clinic green town, Lahore and Sehat Medical complex Hanjerwal, Lahore Toshiba Aplio Mx with linear transducer 7-15MHz frequency was used.*

Results: *Show the different parameter (PSV, EDV, RI, PI) measured in right fetal artery categorized by two conditions: normal and oligo. the significant difference was found in right fetal renal PSV, ED, RI, PI between normal and oligo for PSV and PI shows no significant difference, where EDV shows (p=0.017) and RI shows (p<0.001) between groups. the significant difference were found in left fetal renal PSV, ED, RI, PI between normal and oligo.There is no significant difference seen in EDV,RI,PI between the groups.Significant difference observed in PSV (p=0.015) between groups.*

Conclusion: *The study concluded that the Renal artery resistive index was increased in oligohydramnios as compared to normal individuals.*

Keywords: *ultrasound, Pulsatility Index, Resistive Index*

INTRODUCTION

Oligohydramnios is a medical condition characterized by condition with decrease amniotic fluid volume defined as a single deepest pocket <2cm or amniotic fluid index (afi) <5cm. (petrozel loren n 1995). About 3-4 % of pregnant women is presenting with low amniotic fluid at any point of pregnancy oligohydramnios has an incidence of around 1-5% of total pregnancies. It is associated with adverse perenatal outcomes like preterm birth and low birth weight (yinka o, lele a 2007). A prospective study conducted at university of texas south-western medical center showed the incidence of

oligohydramnios to be 2.3%. Similar result was obtained in usa among 953 womens over the period of 12 month in 3rd trimester. High rated of oligohydromnios were found in summer as compared to rest of the year. (dhakal rd, paudal.

Prevelence of detected Oligohydramnios varied among study sites; from lowest of 0.2% in Zambia and highest of 1.5% in Pakistan. Women diagnosed with Oligohydramnios had high rates of Hemorrhage, fetal position and Cesarian delivery than women without Oligohydramnios. An adequate volume of amniotic fluid is critical to allow normal fetal movement and growth and to cushion the fetus and umbilical cord.

Oligohydramnios may inhibit this procedure and can lead to fetal deformation, umbilical cord compression and death. Amniotic fluid volume regulated by several systems including intramembranous pathway, fetal production uptake and balance of fluid movements via osmotic Gradients (Voxman EG, Wing DA 2002). Amniotic fluid plays a vital role in the development of the fetus, it protects and cushions the fetus from outside pressure, and it may also be called the baby's life support system. Amniotic fluid production starts soon after the amniotic sac is for at around 12 days (about 1 week 5 days) after conception. It is first formed by effusion from the mother's circulation and then around 20 weeks urine produced by the fetus becomes the primary source of amniotic fluid. In the second and third trimester of pregnancy, amniotic fluid volume is an indicator of fetal well-being. As a description of amniotic fluid volume, oligohydramnios refers to decreased volume of fluid less than 500 ml. Dildy GA, Lira N, Moise KJ 1992. Normal reference ranges for the AFI vary depending on if the 5-95 or 3-97 percentiles are applied. For single gestations above 20 weeks, normal fluid is noted as an AFI

between 5-24 cm, although some references prefer 25 cm as the upper limit. MVP in single gestation pregnancies is considered normal when measured to be between 2-8 cm. It is important to note that only MVP is used to assess the amniotic fluid volumes in multi-gestation pregnancies. In a diamniotic pregnancy, the MVP is measured in each amniotic sac, allowing the clinician to attribute fluid to each fetus. Although the normal range for twins is closer to 2.2-7.5 cm, it is conventionally defined normal as between 2-8 cm. Am J Obstetric

Oligohydramnios occurs when the volume of fluid in the amniotic sac is lower than average usually because the placenta is not function properly. When the placenta isn't working as expected the baby gets less oxygen and nutrients. This can cause premature birth, IUGR and serious complications and injuries. Oligohydramnios can occur any time during pregnancy, but is most commonly diagnosed in the third trimester. Oligohydramnios is typically caused by: Placental issues, birth defects, premature rupture of membranes, leaking of amniotic fluid, post date pregnancy, and some maternal problems such as: diabetes,

dehydration, hypertension and preeclampsia can impact amniotic fluid levels. William's Obstetrics Twenty-Second Ed. Cunningham, F. Gary, et al, Ch. 21. According to Moore and Cayle amniotic fluid changes weekly. The cause of oligohydramnios can be maternal or fetal, when no etiological factor or association is identified. Oligohydramnios is a characteristic feature of structural and functional anomalies and signal indicating that additional assessments or antenatal testing are required.

The kidney is an important organ in intra uterine life for formation of amniotic fluid. The kidneys develop between the 5th and 12th week of fetal life, and by the 13th week they are normally producing urine. The renal artery arises perpendicularly from the abdominal aorta just below the branching of the superior mesenteric artery, roughly at the level of the intervertebral disc between the L1 and L2 vertebrae. The left renal artery is usually a little higher and longer than the right one. Renal arteries are large blood vessels that carry blood from the heart to the kidney. The right renal artery supplies blood to the right kidney, while the left artery sends blood to the left kidney. Haugen G, Godfrey K, Crozier S, Hanson M. 2004.The fetal renal artery can undergo Doppler interrogation in the same way that other fetal vessels are evaluated. It is unique in that it can reflect changes occurring in the peripheral circulation and differences in flow can be associated with fluctuations in the amniotic fluid volume. During the embryonic stage, a new renal artery develops with each new stage of renal development and also as the final kidney ascends from the pelvis into the renal fossa at the level of the lumbar spine. Nyengaard JR, Bendtsen TF. Although there can be more than one renal artery, there is usually one renal artery branching off the aorta on each side, which allows adequate assessment of total renal blood flow. The renal blood flow is a

high resistance system which gradually decreases with advancing gestation. Evidence suggests that assessment of the renal artery reflects chronic redistribution of peripheral blood flow associated with fetal growth restriction and specificity may be improved by indexing velocity of flow to estimated fetal weight. Gilbert SF. Identification of the renal vascular pedicle is helpful in determining the presence and position of the kidneys in cases of oligo or anhydramnios. To date, renal artery flow and resistance to flow have had limited utility in clinical management. Most of its use is related to research of fetal physiology in health and disease. Further research regarding the variations in renal flow under

The normal and regular development of the fetal renal function is related to fetal growth and to the correct development of the fetal lung. Besides, the fetal kidneys play an important role in the regulation of the hydro-electrolytic balance and in the modulation of the fetal arterial pressure. Murlewska J, et al. Diagnostics (Basel). 2023.

Renal Oligohydramnios is caused by bilateral renal dysfunction of fetus. Underlying pathologies are; Bilateral renal agenesis or hydroplasia, urinary tract obstruction and autosomal resistive polycystic kidney disease (ARPKD) (Aulbert W. Kamper MJ 2016). The fetus kidney development is important for normal function. Amniotic fluid (AFI) is used to access the amniotic fluid volume. The main source of amniotic fluid is fetal urine from 14th week, The amniotic fluid index and gestational age and between amniotic fluid index and fetal kidney functioning (VAN VUURENS, DAMEN_ ELIASH 2012). All infants ranging from 29-31 weeks gestation had ongoing nephrogenesis where it was complete in all term infants at 38-41 weeks of gestation between 35 and 37 weeks of gestation there was variability in cessation of nephrogenesis (Aronow BJ 2015). Although metanephric kidneys act as functional excretory units as early as week 11, nephrogenesis is not complete until week (32) when multiple branches events have formed one to three million collecting tubules (Ludwing KS 2005). Fetal renal artery can be studied with color Doppler sonography. The pulsatile index must be used to assess the renal artery because the end-diastolic velocity is often absent in the second trimester and in the early third trimester.Applications of Doppler ultrasound in obstetrics are fetal physiology, intrauterine growth restriction, fetal anemia, fetal echocardiogram, multiple gestation, effects of drugs on the fetal circulation, monitoring of fetal heart rate in the third trimester and in labor maternal Doppler.Power Doppler sonography is a new color Doppler technique that displays the total integrated Doppler power. In contrast, conventional color Doppler sonography displays the mean Doppler frequency shift (3). Patten RM, Mack LA, Wang KY, this study was performed to compare power Doppler sonography with color Doppler sonography in depiction of the normal fetal intrarenal vasculature during pregnancy. To provide a standardized comparison between color Doppler and power Doppler sonography, all fetal kidneys were scanned according to the following protocol at a constant pulse repetition frequency of 6000 Hz. MariG, CoperJA. The color gain was manipulated until "color noise" first became apparent at the predetermined renal depths in the image background of color Doppler scans and until it first began to exceed the homogeneous single-color background of electronic noise of power Doppler scans (4). The resultant gains were consistent in all fetal kidneys; the color Doppler gain ranged from 100 dB to 110 dB and the power Doppler gain from 90 dB to 100 dB. Wall filter between 57 to 100 Hz was used. DurickJE, WinterTC, SchmiedlUP, CyrDR, StarrFL, Ma. There are many pathologies associated with Fetal renal artery i.e: Bilateral renal agensis, crossed renal ectopia and pelvic kidney, obstructive uropathies, autosomal recessive and polycystic kidney disease.

Using ultrasound imaging, fetal renal circulation can be assessed to determine the relation of renal artery flow velocity waveforms and amniotic fluid volume in normal pregnancies and those complicated by oligohydramnios. (Benzer N, Yilmaz SA 2015). Intermittent assessment of renal artery flow velocity waveform during the early stages of pregnancy may help in predicting changes in amniotic fluid dynamics. Doppler values were evaluated at 22, 28, and 34 weeks of gestation. Pulsatilty index (PI) and Resistive index (RI) were recorded, and the amniotic fluid volume was evaluated in four quadrants (Simith CV, Phalen JP 1987). Using color flow doppler, the renal artery were evaluated at the level of their origin from the abdominal aorta. Three consecutive waveforms were used to calculate PI and RI. The renal artery Doppler indices in post- term fetus with oligohydraminos and reported that PI and RI values were higher than the normal amniotic fluid group (Selam B, Koksal R 1993)

Use of doppler ultrasound is to study blood flow to access fetal inaccessibility, the growth of doppler

ultrasonographic technology has provided an opportunity to obtain Qualitative and Quantitative valution of maternal and fetal circulation using a non-invasive method. Non-invasive investigation of fetal circulation has become possible with the use of doppler. Changes in renal artery perfusion in oligohydraminos may be recognized with the use of doppler ultrasound to evaluate renal artery resistance. Up to 34 weeks of pregnancy, renal artery diastolic blood flow

may be physiologically absent, but after that week the diastolic flow speed significantly increases with the advancing pregnancy, renal artery Pulsatilty index (PI) and Resistive index (RI) reduce. (Vyas S, Campbell S 1989). In oligohydraminos cases low birth weight fetuses who later die, high renal artery PI values, have been reported. Considering the above facts, the present study was aimed to evaluate the importance of doppler study in high-risk pregnancy (Magann EF, Kirshon B 1993; 2011). However, definition of normal amniotic fluid has previously been made according to each gestational age. Rossi and Prefumo published some normative data for amniotic fluid index throughout pregnancy and noted that mean amniotic fluid index changed weekly (Rossi AC, prefumo F 2012). The aim of this work was to study the relation of renal artery flow velocity waveforms. JRefaat Al Sheemy Samia M Eid, Jan 2014.

MATERIAL AND METHODS

Design of Study: Cross-sectional, Analytical
Settings: Sehat medical Complex hunjerwall, Green Town Ultrasound clinic, Lahore
Duration of Study: 4 months
Sampling Technique:
Convenient Sampling technique

Sample Size
Total 100 patients were scanned.
Inclusion Criteria:
All pregnant women with;

- All patients coming for Obstetrical USG in third trimester
- history of regular menstrual period.

Exclusion Criteria:
Patients with; any known maternal or fetal pathology
Equipment: Toshiba Xario XG ultrasound machine, convex probe frequency ranges (3MHZ-5MHZ).

Transabdominal scan:

- The sonographer received and reviewed consent form prior to meeting participant.
- Patient was asked to lie in supine position on the couch.
- A curvilinear 3-6 MHz probe with low dynamic range was used for the scan.
- The sonographer scanned the patient as per the protocol of obstetrics scan.
- One was able to assessed all the fetal components. Rotation and angulation were applied.

RESULTS

TABLE:1 SUMMARY OF STATISTICS OF MATERNAL AGE

	AGE		
Group	Normal	Oligohydramnios	Total
N	50	50	100
Minimum	20.000	19.000	19.000
Maximum	48.000	48.000	48.000
Mean	25.600	28.480	27.040
Median	23.500	28.000	25.000
SD	6.1743	6.4055	6.4243

This table presents the descriptive statistics of maternal age in both study groups. The mean age of mothers in the normal group was 25.6 years, while in the oligohydramnios group it was 28.48 years. This suggests that mothers in the oligohydramnios group

were generally older than those in the normal group. The range of ages (19
48 years) was similar across groups, indicating that both younger and older mothers were represented. The higher mean age in the oligohydramnios group may point to age-related risk factors contributing to the development of reduced amniotic fluid volume.

TABLE:2 SUMMARY OF STATISTICS OF GESTATIONAL AGE

	Gestational age(wks)		
Group	Normal	Oligohydramnios	Total
N	50	50	100
Minimum	30.200	30.200	30.200
Maximum	39.400	39.500	39.500
Mean	34.012	33.948	33.980
Median	33.600	33.300	33.450
SD	2.5788	2.8424	2.7003

This table outlines the gestational age of pregnancies included in both groups. The mean gestational age was almost identical between groups, at 34.01 weeks for normal pregnancies and 33.95 weeks for oligohydramnios cases. The range spanned from approximately 30 weeks to 39.5 weeks, reflecting a late second to third trimester population. The close similarity in gestational age distributions between groups highlights that both cohorts were comparable, minimizing gestational age as a confounding variable in Doppler findings.

TABLE:3 INDEPENDENT SAMPLES T-TEST OF PSV (PEAK SYSTOLIC VELOCITY)

Sample 1	
Variable	Mean_PSV Mean PSV
Filter	Group="Normal"
Sample 2	
Variable	Mean_PSV Mean PSV
Filter	Group="Oligohydramnios"

	Sample 1	Sample 2
Sample size	50	50
Arithmetic mean	37.0120	40.9128
95% CI for the mean	34.5529 to 39.4711	37.4418 to 44.3838
Variance	74.8731	149.1690
Standard deviation	8.6529	12.2135
Standard error of the mean	1.2237	1.7272

F-test for equal variances	P = 0.017

Welch-test (assuming unequal variances)

Difference	3.9008
Standard Error	2.1168
95% CI of difference	-0.3059 to 8.1075

Test statistic t(d)	1.843
Degrees of Freedom (DF)	88.3
Two-tailed probability	P = 0.0687

Residuals

Shapiro-Wilk test for Normal distribution	W=0.9942 accept Normality (P=0.9492)

This table compares PSV between normal and oligohydramnios groups. The mean PSV in the oligohydramnios group (40.91 cm/s) was higher than in the normal group (37.01 cm/s). However, the difference did not reach statistical significance (p = 0.0687). Although the values trend towards higher PSV in oligohydramnios, the lack of significance suggests that PSV alone may not reliably differentiate between the groups. Nevertheless, this trend might still indicate subtle hemodynamic adaptations in response to reduced amniotic fluid

TABLE:4 INDEPENDENT SAMPLES T-TEST OF PI (PULSATILITY INDEX)

Sample 1	
Variable	Mean_PI Mean PI
Filter	Group="Normal"
Sample 2	
Variable	Mean_PI Mean PI
Filter	Group="Oligohydramnios"

	Sample 1	Sample 2
Sample size	50	50
Arithmetic mean	1.9896	2.4030
95% CI for the mean	1.8631 to 2.1161	2.1964 to 2.6096
Variance	0.1981	0.5286
Standard deviation	0.4451	0.7270
Standard error of the mean	0.06294	0.1028

F-test for equal variances	P = 0.001

Welch-test (assuming unequal variances)

Difference	0.4134
Standard Error	0.1206
95% CI of difference	0.1735 to 0.6533
Test statistic t(d)	3.429
Degrees of Freedom (DF)	81.2
Two-tailed probability	P = 0.0010

Residuals

Shapiro-Wilk test for Normal distribution	W=0.9726 reject Normality (P=0.0351)

This table demonstrates a significant difference in Pulsatility Index between groups. The mean PI in the oligohydramnios group was 2.40, compared to 1.98 in the normal group. This statistically significant difference (p = 0.001) indicates increased vascular resistance in fetuses of oligohydramnios mothers. Elevated PI is associated with compromised placental perfusion and increased downstream impedance, supporting the hypothesis that oligohydramnios reflects altered fetoplacental hemodynamics.

TABLE:5 INDEPENDENT SAMPLES T-TEST OF RI (RESISTIVE INDEX)

Sample 1	
Variable	Mean_RI Mean RI
Filter	Group="Normal"
Sample 2	
Variable	Mean_RI Mean RI
Filter	Group="Oligohydramnios"

	Sample 1	Sample 2
Sample size	50	50
Arithmetic mean	0.8660	1.4368
95% CI for the mean	0.8351 to 0.8969	1.2203 to 1.6533
Variance	0.01184	0.5806
Standard deviation	0.1088	0.7619
Standard error of the mean	0.01539	0.1078

F-test for equal variances	P < 0.001

Welch-test (assuming unequal variances)

Difference	0.5708
Standard Error	0.1088
95% CI of difference	0.3523 to 0.7893
Test statistic t(d)	5.244
Degrees of Freedom (DF)	51.0
Two-tailed probability	P < 0.0001

Residuals

Shapiro-Wilk test for Normal distribution	W=0.8484 reject Normality (P<0.0001)

This table highlights a highly significant difference in Resistive Index between the two groups. The mean RI was 1.43 in oligohydramnios cases compared to 0.86 in the normal group, with a p-value < 0.0001. The higher RI in the oligohydramnios group reflects impaired diastolic flow and increased resistance

within the vascular system. This finding strongly supports the association between oligohydramnios and adverse fetal hemodynamics, suggesting that RI is a sensitive marker of vascular compromise.

This table presents AFI measurements across all pregnancies. The mean AFI was 8.51 cm, with a range of 1.3–22 cm. These values clearly demonstrate the presence of both normal and oligohydramnios cases in the study sample. The wide variability underscores the clinical importance of AFI as a diagnostic marker and its influence on Doppler indices.

Table:6 Distribution of Normal and Oligohydramnios Cases

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Normal	50	50.0	50.0	50.0
	Oligo	50	50.0	50.0	100.0
	Total	100	100.0	100.0	

This table confirms that the study population was equally divided, with 50 cases each of normal pregnancies and oligohydramnios. This balanced distribution ensures the reliability of statistical comparisons between the groups. It minimizes selection bias and strengthens the validity of observed differences in Doppler parameters.

Table:7 Independent Samples Test of Left Renal Artery Parameters

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
LEFT FETAL RENAL ARTERY - PI	Equal variances assumed	5.599	.020	-1.672	98	.098	-2.06600	1.23533	-4.51747	.38547
	Equal variances not assumed			-1.672	64.557	.099	-2.06600	1.23533	-4.53345	.40145
LEFT FETAL RENAL ARTERY - RI	Equal variances assumed	3.591	.061	1.079	98	.283	1.79440	1.66330	-1.50636	5.09516
	Equal variances not assumed			1.079	49.067	.286	1.79440	1.66330	-1.54801	5.13681
LEFT FETAL RENAL	Equal variances assumed	2.207	.141	1.276	98	.205	.62400	.48886	-.34613	1.59413

ARTERY - EDV	Equal variances not assumed			1.276	96.432	.205	.62400	.48886	-.34632	1.59432
LEFT FETAL RENAL ARTERY - PSV	Equal variances assumed	5.074	.027	-2.476	98	.015	-6.93140	2.79955	-12.48702	-1.37578
	Equal variances not assumed			-2.476	88.315	.015	-6.93140	2.79955	-12.49464	-1.36816

This table provides a cumulative comparison of multiple Doppler parameters (PI, RI, EDV, and PSV) in the left fetal renal artery. The results indicate no statistically significant differences for PI, RI, or EDV, suggesting that these parameters were largely preserved between groups. However, a significant reduction in PSV was noted in the oligohydramnios group (p = 0.015). The lower PSV may reflect compromised perfusion in the fetal renal circulation, which is consistent with the known effects of oligohydramnios on fetal kidney function and urine production.

Table:8 Descriptive Statistics Fetal Renal Artery Doppler Parameters

	N	Minimum	Maximum	Mean	Std. Deviation
RIGHT FETAL RENAL ARTERY – PSV	100	12.80	79.00	36.9481	12.45149
RIGHT FETAL RENAL ARTERY – EDV	100	.20	25.20	6.1390	3.62037
RIGHT FETAL RENAL ARTERY – RI	100	.21	6.45	1.4946	1.27075
RIGHT FETAL RENAL ARTERY – PI	100	1.09	4.87	2.0878	.66478
LEFT FETAL RENAL ARTERY – PSV	100	12.50	80.50	40.6157	14.35585
LEFT FETAL RENAL ARTERY – EDV	100	1.30	13.50	6.1580	2.45205
LEFT FETAL RENAL ARTERY – RI	100	.11	84.00	1.6398	8.32337
LEFT FETAL RENAL ARTERY – PI	100	.81	45.50	3.4762	6.23246
Valid N (listwise)	100				

This table summarizes the descriptive statistics for right and left fetal renal artery Doppler parameters, including PSV, EDV, RI, and PI. Wide ranges were noted in several values, particularly RI and PI, reflecting inter-individual variability. While these data do not provide direct comparisons between groups, they establish the baseline Doppler values of the study cohort, offering reference points for clinical interpretation

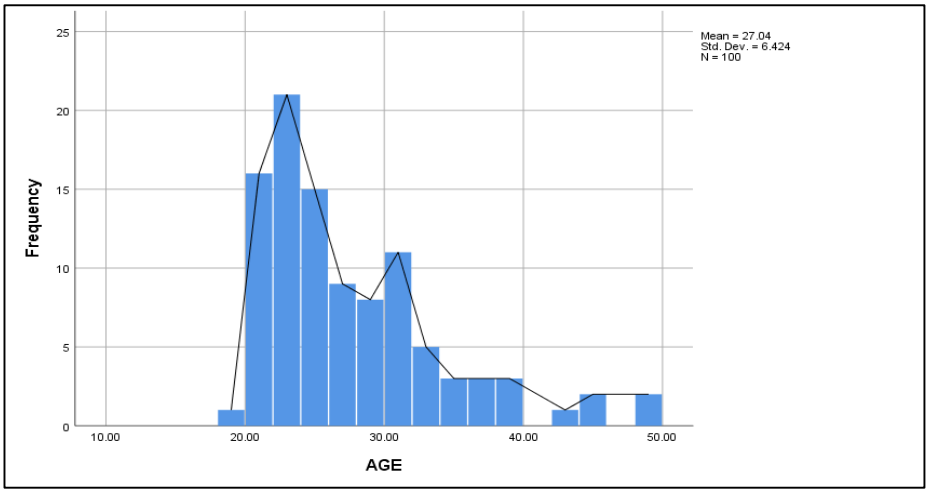

Figure 1: This Figure shows the relation between AGE and Frequency.

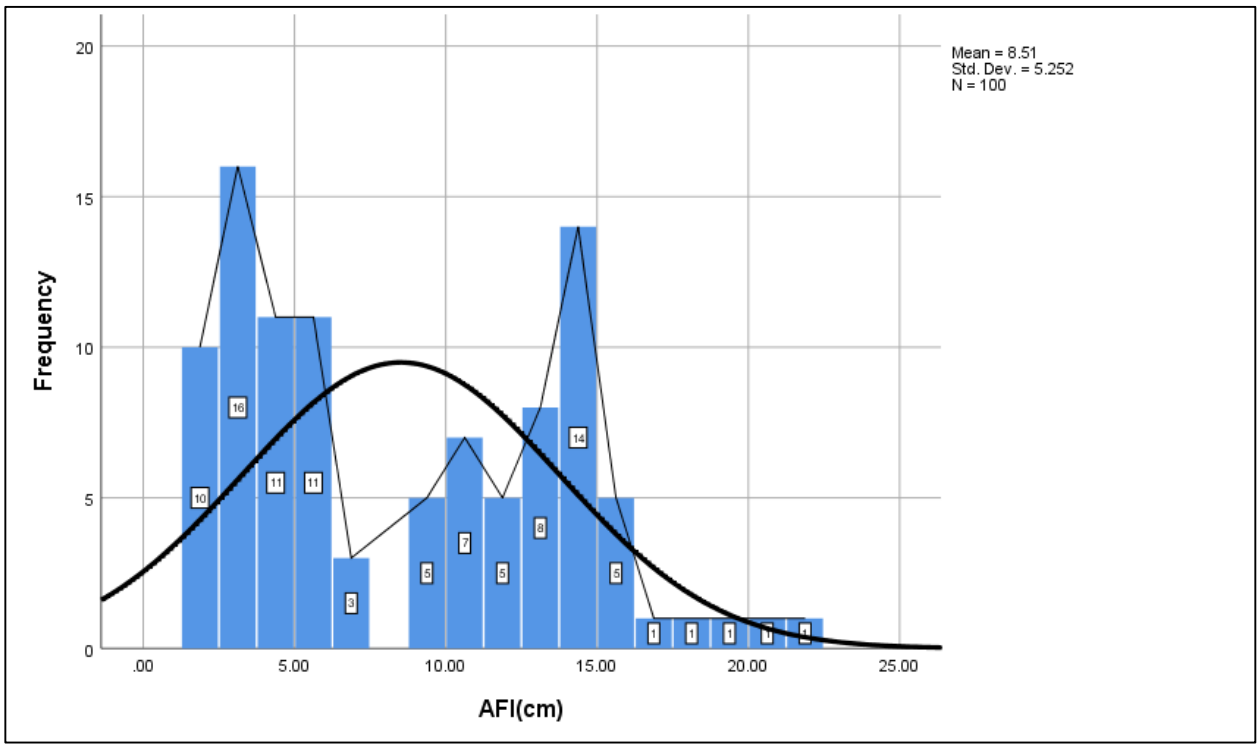

Figure 2: This Figure shows the relation between AFI and Frequency.

DISCUSSION

Study was conducted at Ultrasound Clinic Green Town Hospital, for the duration of 9 months. We recruited 100 individual 50 % of normal females and 50 % of oligo-comprising. The range of the minimum age recorded was 19 and maximum was 48, Out of 100.The mean was 27.0400 and Std.Dev 6.42462. The minimum Gestational age was 30.20 and maximum was 39.50. The mean was33.9800 and Std.Dev was 2.70028. (PSV, EDV, RI, PI) measured in right fetal artery categorized by two conditions normal and oligo.AFI value minimum recorded was 1.30, maximum was 22.00. Here's the mean was 8.5100, and Std.Dev was 5.25154. Our study results comparing various parameters between Normal and Oligo groups. The results indicate significant differences between the groups for some parameters. Similar results another study Oligohydramnios is a medical condition characterized by condition with decrease amniotic fluid volume defined as a single deepest pocket <2cm or amniotic fluid index (AFI) <5cm. About 3-4 % of pregnant women is presenting with low amniotic fluid at any point of pregnancy Oligohydramnios has an incidence of around 1-5% of total pregnancies. It is associated with

adverse perenatal outcomes like preterm birth and low birth weight. Another study result was obtained in USA among 953 Womens over the period of 12 month in 3rd trimester. High rated of oligohydromnios were found in summer as compared to rest of the year. (Dhakal RD, Paudal D 2017).

The independent samples test was used to compare the means of the Normal and Oligo groups. Significant differences were found in some parameters, including Right Fetal Renal Artery EDV ($p=0.017$) and RI ($p<0.001$) Left Fetal Renal Artery PSV ($p=0.015$) our results show significant differences in certain parameters, indicating potential alterations in fetal renal hemodynamics in the Oligo group.The significant increase in Right Fetal Renal Artery EDV and RI in the Oligo group suggests increased resistance to blood flow in the renal arteries, potentially indicating renal vascular dysfunction. Similarly, the increased Left Fetal Renal Artery PSV in the Oligo group may indicate increased blood flow velocity in the left renal artery. These findings are consistent with previous studies that have reported alterations in fetal renal hemodynamics in response to oligohydramnios. The changes in renal artery parameters may be a compensatory response to maintain renal function in the face of decreased amniotic fluid volume.

Using ultrasound imaging, fetal renal circulation can be assessed to determine the relation of renal artery flow velocity waveforms and amniotic fluid volume in normal pregnancies and those complicated by oligohydramnios. Intermittent assessment of renal artery flow velocity waveform during the early stages of pregnancy may help in predicting changes in amniotic fluid dynamics. Doppler values were evaluated at 22, 28, and 34 weeks of gestation. Pulsatilty index (PI) and Resistive index (RI) were recorded, and the amniotic fluid volume was evaluated in four quadrants Using color flow Doppler, the renal artery wereevaluated at the level of their origin from the abdominal aorta. Three consecutive waveforms were used to calculate PI and RI. The renal artery Doppler indices in post- term fetus with oligohydraminos and reported that PI and RI values were higher than the normal amniotic fluid group (Selam B, Koksal R 2022). The results of this study have important implications for prenatal care and management of oligohydramnios. Further research is needed to explore the clinical significance of these findings and to investigate the potential utility of fetal renal artery parameters as markers of renal function in fetuses with oligohydramnios.

CONCLUSION

This study concluded that the Renal artery resistive index was increased in oligohydramnios as compared to normal individuals.

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