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ULTRASONOGRAPHIC MEASUREMENT OF MATERNAL RENAL PELVIS DURING 20TH TO 40TH WEEKS OF PREGNANCY IN ASYMPTOMATIC WOMEN

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Abstract:

Background: *Renal pelvis dilation (RPD) during pregnancy is a common physiologic process and should be differentiated from pathological dilation. Ultrasound can be used as an initial imaging modality in the evaluation of renal pelvis measurement.*

Objective: *To find the ultrasonographic measurement of maternal renal pelvis at 20th to 40th week of pregnancy in asymptomatic women.*

Methodology: *A descriptive study was conducted among 262 individuals. All were pregnant within the gestational age of 20th -40th weeks. Sonotech 2019 was used to perform this research to determine the measurement of maternal renal pelvis. Renal pelvis dilation was evaluated trans-abdominally by using convex array multi-frequency probe 5 MHz*

Results: *Dilation was more prominent in right renal pelvis than left renal pelvis. The maximum renal pelvis measurements were 29 mm on the right side in the 2nd trimester and 32 mm in the 3rd trimester. Similarly, the maximum renal pelvis measurements were 9 mm on the left side in the 2nd trimester and 7.3 mm in the 3rd trimester. Renal pelvis dilation increases with gestational age. Fetus who had cephalic presentation and anterior placenta implantation were seen with more maternal RPD.*

Conclusion: *The current research concluded that renal pelvis dilation is common in pregnancy and it is more prominent on right side than the left side. Cephalic presentation of fetus could be a factor of RPD.*

Key words: *Ultrasound (US), Renal Pelvis Dilation (RPD), Maternal, Gestational Age(GA)*

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INTRODUCTION:

Renal Pelvis Dilation (RPD) refers to the dilation of the renal pelvis. Hydronephrosis is a process that involves the dilation of a renal pelvis and calyces. [1] Due to its psychological nature, the RPD process, which is experienced at the time of pregnancy needs to be differentiated from Pathology, that can be dangerous for mother and unborn fetus. [2] In most cases, about eighty to ninety (80%-90%) of the pregnancies, the asymptomatic dilation of the maternal renal collecting system occurs. The issue of dilation in pregnancy comes as a result of some factors. These are; first; the occurrence of physiological changes in pregnancy happens as a result of nature. The development of the fetus initiates the development of hormones that are necessary for giving birth. According to clinical studies, stasis is a condition that arises from the growth of the uterus. There are two forms in which urinary stasis occurs; these are asymptomatic hydronephrosis or symptomatic. Some developments arising from stasis may mimic symptoms of a disease or influence the normality of the psychological conditions in clients. The clinicians should understand the difference between the disease and normal psychological conditions. [3] A urinary tract refers to a contiguous hollow-organ. There are four main functions of the urinary tract. These are; collecting, transporting, storing and expelling of urine. The release of urine from the urinary tract happens in a periodical and highly coordinated manner. The constant removal of urine from both the upper and lower urinary arteries provides a cleansing mechanism for the urinary tract and the overall kidney system. [4]

The renal pelvis can vary in location and size. [5] It is assumed that regular ultrasounds can help to identify pregnancy complications in case of any. [6] Under normal circumstances; measurement of the pelvis is done transversely from the anterior to the posterior end on a plane. The caliper is placed or fitted on the inner wall or side where the fluid is collected. [7] In the case of a renal pelvis, an ultrasound scan is highly recommended to measure the anteroposterior (AP) diameter in an axial scale. The renal pelvis measurement by the ultrasound enables the medical practitioners to determine the difference between the pathological condition and the renal pelvis dilation.

MATERIAL AND METHODS:

This descriptive study was done in Sahiwal diagnostic Center, Sahiwal. And the study was conducted among 262 individuals. All were pregnant within the gestational age of 20^{th} -40^{th} weeks. Sonotech 2019 was used to perform this research to determine the measurement of maternal renal pelvis. Renal pelvis dilation was evaluated trans-abdominally by using convex array multi-frequency probe 5 MHz

RESULTS:

This descriptive study was done in Sahiwal diagnostic Center, Sahiwal. There were total 262 women enrolled in this research after confirmation of pregnancy by USG examination. The number of scans at a given gestational age expresses the normal distribution of client's presentation to our service, with intended peaks at the time of second-trimester anatomic evaluation and fetus's growth examination in the third-trimester. In current study, the minimum maternal age was 18 and the maximum age was 38. The mean of the maternal age came out to be 26.7 ± 4.331 with range 20 (table 1)

Table 1

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Maternal Age	262	20	18	38	26.74	.268	4.331
	262						

The minimum and maximum GA with mean and standard deviation shown in the table given below (table 2).

Table 2

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Gestational Age	262	20	20	40	30.85	.340	5.501
Valid N (list wise)	262						

From total sample size, 255 (97.3%) women had singleton pregnancy and seven women had twin pregnancy (2.7%) (97.3%) women had singleton pregnancy and seven women had twin pregnancy (2.7%). The frequency of fetus position described in table 4. According to fetus position; there were 61 (23.3%) breech, 133 (50.8%)

cephalic, 2 (.8%) breech/cephalic, 52 (19.8%) transverse, 5 (1.9%) oblique and 2(.8%) transverse/cephalic. 105 (40%) women had anterior placenta, 73 (27.9%) posterior, 27(10.3%) right lateral wall, 13(5%) left lateral wall, 11(4%) marginal, 10(3.8%) low lying, 6(2.3%) complete previa, 2(0.8%) anterior/anterior, 1(0.4%) anterior/left lateral wall, 1(0.4%) posterior/left lateral wall, 1(0.4%) posterior/posterior and 1(0.4%) had posterior/right lateral wall placental position (table 5). RPD was measured for both right and left kidneys. In our study, right RPD was seen in 115 (43.9%) cases and the mean of right renal pelvis dilation come out as 7.83 ± 9.04. Similarly, 5 (1.9%) had left RPD and the mean of left RPD was 0.211 ± 1.59. The remaining 147 (56.1%) in right and 257 (98.1%) in left had no renal pelvis dilation. Frequency of right and left renal pelvis represented in pie charts. According to the trimester, total 89 patients were examined in 2nd trimester, out of which 39 patients had right RPD and 2 patients had left RPD. In third trimester, total 173 patients were examined, out of which 76 patients had right RPD and 3 patients had left RPD. The maximum renal pelvis measurements were 29 mm on the right side in the 2nd trimester and 32 mm in the 3rd trimester. Similarly, the maximum renal pelvis measurements were 9 mm on the left side in the 2nd trimester and 7.3 mm in the 3rd trimester. In accordance to our study out of 262, 111 singletons and 4 twins had RRP Dilation and in case of LRP dilation only 5 singleton cases were seen. According to fetus position, both right (57 patients) and left (3 patients) renal pelvis dilation was commonly observed in cephalic position. According to placenta position, both right (45 patients) and left (3 patients) renal pelvis dilation was commonly observed in anterior placenta.

DISCUSSION:

There were total two hundred and sixty-two women enrolled in this research after confirmation of pregnancy by USG examination [8]. The number of scans at a given gestational age expresses the normal distribution of client's presentation to our service, with intended peaks at the time of second-trimester anatomic evaluation and fetus's growth examination in the third-trimester [9, 10]. Maternal renal collecting system dilation is a well-documented phenomenon in pregnancy. From the second to the third trimester of pregnancy [11], dilation is more pronounced on the right side and usually resolves by several weeks postpartum. [12] All patients included in the present study were free of renal or ureteral pathology. None of the individual was symptomatic on affected side. Watson and Brost previously showed that the presence of hydronephrosis correlated poorly with the symptoms of flank pain. [13] Our study confirms that maternal renal dilation is a dynamic process related to pregnancy.

According to current study 56 % women had RPD during second to third trimester. This ratio is lower than the previously described study by Katharine L Cheung. [14] The gestational age ranges from 20th to 40th weeks that is similar to a research conducted by Maged Costantine related to physiological hypotension in 2014. [15] The gestational age and birth weight of the babies in the breech group were lower than in the cephalic group. [16] current study shows that renal pelvis dilation is more commonly seen in cephalic positioned fetus than breech and transverse. As previously reported, right-sided renal pelvis measurements are significantly larger than the left. Published theories to explain the greater predisposition for right renal pelvis dilatation include crossing of the ureter by the ovarian vein at the pelvic brim on the right while running parallel on the left, dextrorotation of the uterus, and the relative protection of the left ureter provided by the sigmoid colon. [17] Our study confirm that renal pelvis dilation is more prominent on right side (43%) than left side (1.9%). In some studies, the incidence of hydronephrosis has been shown to increase with gestational age, which may be the result of fetal growth (ie, an increase in uterus size and pressure on the ureters). Erickson and colleagues have reported an increase in the severity of hydronephrosis from the 21st week up to the 30th gestational week in 449 pregnant women. [18] Our study showed that pressure of the fetus's head on the pelvis in those with cephalic presentation could be an additional factor in RPD during pregnancy. Further studies are recommended to determine the relationship between fetal presentation and hydronephrosis during pregnancy.

CONCLUSION:

The current research concluded that renal pelvis dilation is common in pregnancy and it is more prominent on right side than the left side. Cephalic presentation of fetus could be a factor of RPD.

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