INTRICATE ASSESSMENT OF EFFECTIVENESS OF MRI & USG PROCEDURES FOR VARIOUS PATHOLOGIES RELATED TO FEMALE PELVIC: AN ORIGINAL RESEARCH STUDY

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ABSTRACT

Aim: To evaluate efficiencies of magnetic resonance imaging & ultrasonography procedures for various pathologies related to female pelvic region.

Materials & Methods: This study was performed on total sixty patients. All patients reported for various clinical issues of pelvic region. Magnetic resonance imaging & ultrasonography procedures were used as diagnostic imaging modality. Scanning outcomes of magnetic resonance imaging & ultrasonography have been categorized as group one and group two respectively. All suggestive findings of both imaging modalities were correlated with clinical diagnosis. Based on these existences of correlations, Results thus obtained was compiled and sent for basic statistical analysis. P value less than 0.05 was considered significant ($p < 0.05$).

Results: Among all sixty studied patients, females were 14 in age group of 25-28 years. 13 patients were seen in age range of 33-36 years. P value was reported to be significant for this (0.01). Magnetic resonance imaging confirmed Inborn Anomalies in 3 patients. Uterine Mutilation was confirmed in 16 patients by magnetic resonance imaging. Pathologies related to Adnexa were noted in 28 patients. P value was reported to be significant for this (0.002). Endometrial Malignancies were noted in 2 patients. P value was reported to be significant for

this (0.001). Pathologies related to Adnexa were noted in 25 patients by Ultrasonography. P value was reported to be significant for this (0.010).

Conclusion: Magnetic resonance imaging was able to detect and confirm almost all studied pathologies related to female pelvic region. Ultrasonography procedure was unable to detect few of those pathologies. Therefore, magnetic resonance imaging is superior and accurate option for scanning pelvis region.

Key Words: Magnetic Resonance Imaging, Ultrasonography, Pathology, Pelvis, Uterine

I. INTRODUCTION

As we all are aware that ultrasound is the chief method for estimation of structures of the female pelvis region. It enables clinician to study portable images of the uterus, ovaries, and other configurations at a realistic cost and without much exposure of x rays.[1,2] Literature has well evidenced about the significance of minimum radiation exposure especially during assessment of ovary. Since the ovary is highly susceptible to emission in their growing and active phases.[3,4] However, ultrasound is not that much accurate. It eventually fails to detect fluid accumulations inside the pelvic cavities. Also, it fails to depict the basic nature of accumulated fluid.[5,6] Magnetic resonance imaging of the abdomen and pelvis utilizes a potent magnetic field along with radio waves. With the help of computer software, it creates comprehensive images of the deeper and inaccessible structures.[7,8] It is commonly used for scanning pelvic region in females for various pathologies. It can be used to assist identify or observe treatment for different problems near the stomach and pelvis. In pregnant subjects, magnetic resonance imaging can be used to carefully observe child.[9,10] Magnetic resonance imaging with vigilant inspection technique and understanding enables more precise and comprehensive diagnosis and staging than ultrasound. This is particularly true in cases of pelvic endometriosis. In addition, magnetic resonance imaging may recognize implants in positions that may be otherwise complicated to detect by other techniques.[2,4,5,11] Therefore, keeping all these facts in mind this study was undertaken to evaluate efficiencies of magnetic resonance imaging & ultrasonography procedures for various pathologies related to female pelvic region.

II. MATERIALS & METHODS

This study was conducted female subjects of age range twenty five to forty years age. Total sixty patients were studied in detail. The study was planned, abstracted and executed on prospective basis. Simple random sampling procedure was employed for unbiased selection of study participants. Demographic details (including age, sex, race, economical status) of all subjects were recorded in detail. Additionally, detailed case histories were also recorded for all participants. This was ensured for medical record keeping and legal purposes. All patients reported for different pathologies and complaints of pelvic region. Two most common diagnostic imaging techniques i.e.; magnetic resonance imaging & ultrasonography procedures were utilized for all subjects those reported with pelvic issues. Scanning inferences of magnetic resonance imaging & ultrasonography have been categorized as group one and group two respectively. Before attempting the imaging step, comprehensive clinical examination was performed to rule out any gross anomaly of that region. Suggestive

pathologies as depicted by these two methods were compared with each other to finalize their correlation and accuracies. All patients had been explained about the study plan and expected results. All willing and cooperative subjects were integrated in study. Signed consent form was also obtained from all subjects. All imagings were completed in supine position with a clear bladder after fasting of minimum four hours to minimize the gut motility. As we all know that there are two fundamental types of MRI imagings. T1 weighted and T2 weighted images are usually called as T1 and T2. T1 sections were used for screening morphology, type of fluid accumulations. On the other hand, T2 sections were used specially for uterus and related pathologies. Uterus was scanned by imaging armamentarium in all possible angulations and planes. Gradient Recalled Echo (GRE) sequences were utilized for any possibilities of bleeding, ossification, iron precipitation and cancer staging. In magnetic resonance imagings, spin echo was performed for details of ovaries. All suggestive findings of both imaging modalities were correlated with clinical diagnosis. Based on these existences of correlations, efficiencies of magnetic resonance imaging & ultrasonography procedures were formulated. Positive predictive value and negative predictive value, sensitivity and other parameters was also considered during assessment of efficiencies. Results thus obtained was compiled and sent for basic statistical analysis. P value less than 0.05 was considered significant (p< 0.05).

III. STATISTICAL ANALYSIS AND RESULTS

All the measured data and points were complied and sent for statistical evaluation using statistical software Statistical Package for the Social Sciences version 22 (IBM Inc., Armonk, New York, USA). The noteworthy data was subjected to appropriate statistical tests to obtain p values, mean, standard deviation, chi- square test, standard error and 95% CI. Table 1 and Graph 1 show that out of sixty patients, females were 14 in age group of 25-28 years. P value was reported to be significant for this (0.01). 17 patients noticed in age range of 29-32 years. 13 patients were seen in age range of 33-36 years. P value was reported to be significant for this (0.01). 16 patients were identified in age range of 37-40 years. P value was non significant here. Table 2 shows basic statistical description with level of significance assessment using pearson chi-square test for group I (magnetic resonance imaging). Magnetic resonance imaging confirmed Inborn Anomalies in 3 patients and it was successfully correlated with clinical also. Uterine Mutilation was confirmed in 16 patients by magnetic resonance imaging. Pathologies related to Adnexa were noted in 28 patients. Therefore, Adnexa Anomalies are noted in roughly half of the studied patients. P value was reported to be significant for this (0.002). Endometrial Malignancies were noted in 2 patients. P value was reported to be significant for this (0.001). Malignancies of Ovary were noted in 4 patients. P value was reported to be non significant for this. Malignancies of Cervix were noted in 6 patients. Only 1 case could not be related by magnetic resonance imaging (Non-Related/Unmatched). Table 3 shows basic statistical description with level of significance assessment using pearson chi-square test for group II (ultrasonography). Ultrasonography confirmed Inborn Anomalies in 2 patients and it was effectively correlated with clinical parameters also. Uterine Mutilation was confirmed in 13 patients by Ultrasonography. Pathologies related to Adnexa were noted in 25 patients. P value was reported to be

significant for this (0.010). Endometrial Malignancies were noted in 2 patients. P value was reported to be nonsignificant for this (0.500). Malignancies of Ovary were noted in 3 patients. P value was reported to be non significant for this. Malignancies of Cervix were noted in 5 patients. Total 10 cases could not be related using Ultrasonography (Non-Related/Unmatched).

Table 1: AGE & GENDER WISE ALLOCATION OF PATIENTS

Age Group (Yrs)	Female	Total %	P value
25-28	14	23 %	0.01*
29-32	17	28 %	0.80
33-36	13	22 %	0.01*
37-40	16	27 %	0.08
Total	60	100 %	*p<0.05 significant

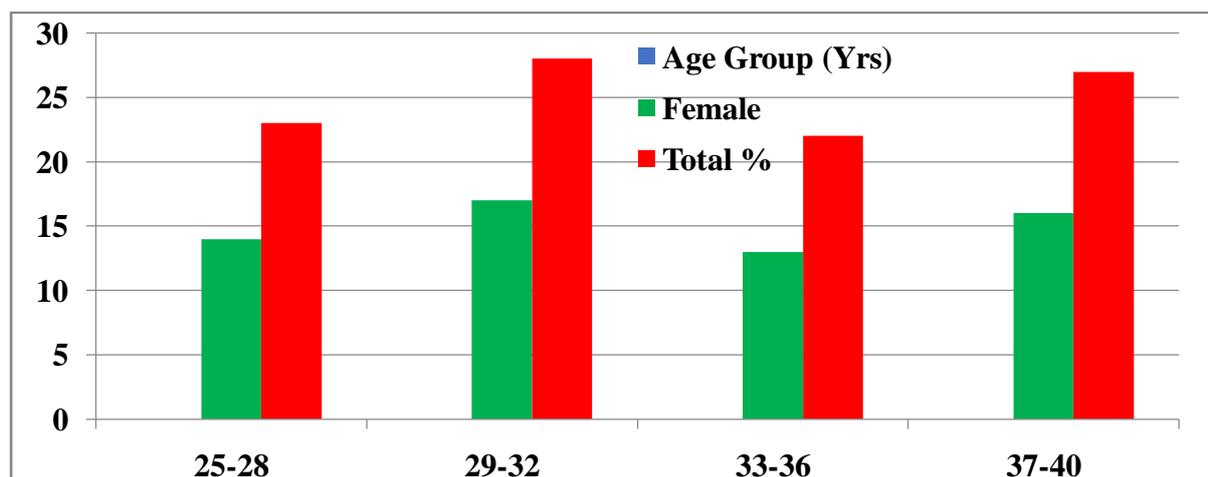**Graph 1: AGE & GENDER WISE ALLOCATION OF PATIENTS**

Table 2: BASIC STATISTICAL DESCRIPTION WITH LEVEL OF SIGNIFICANCE ASSESSMENT USING PEARSON CHI-SQUARE TEST [GROUP I: MAGNETIC RESONANCE IMAGING, n=60]

Parameters	n	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Sig. (p value)
Inborn Anomalies	3	1.736	1.349	0.334	1.41	1.035	1.0	0.100
Uterine Mutilation	16	0.905	0.564	0.705	1.99	0.439	1.0	0.500
Adnexa Anomalies	28	1.425	0.968	0.653	1.32	1.377	1.0	0.002*
Endometrial Malignancies	2	1.104	1.516	0.085	1.82	1.753	1.0	0.001*

Malignancies of Ovary	4	0.386	0.726	0.332	1.80	0.129	1.0	0.060
Malignancies of Cervix	6	0.303	0.584	0.083	1.37	0.541	1.0	0.120
Non-Related/Unmatched	1	0.937	0.038	0.937	1.69	0.038	1.0	0.820
							*p<0.05 Significant

Table 3: BASIC STATISTICAL DESCRIPTION WITH LEVEL OF SIGNIFICANCE ASSESSMENT USING PEARSON CHI-SQUARE TEST [GROUP II: ULTRASONOGRAPHY, n=60]

Parameters	n	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Sig. (p value)
Inborn Anomalies	2	1.636	1.583	0.123	1.22	1.546	1.0	0.200
Uterine Mutilation	13	0.036	0.349	0.745	1.01	0.947	1.0	0.100
Adnexa Anomalies	25	1.125	0.938	0.059	1.17	1.113	1.0	0.010*
Endometrial Malignancies	2	1.014	1.112	0.537	1.49	1.056	1.0	0.500
Malignancies of Ovary	3	0.068	0.735	0.847	1.06	0.359	1.0	0.810
Malignancies of Cervix	5	0.409	0.357	0.255	1.23	0.631	1.0	0.090
Non-Related/Unmatched	10	0.647	0.938	0.746	1.08	0.937	1.0	0.700
								*p<0.05 Significant

IV. DISCUSSION

Ultrasound and Magnetic resonance imaging are probably the most commonly advised modality to investigate different pathologies in the pelvic region. Several common clinical conditions like, Inborn Anomalies, Uterine Mutilation, Adnexa Anomalies, Endometrial Malignancies, Malignancies of Ovary and Malignancies of Cervix can be recognized by these imaging techniques. Ultrasound usages have extensively increased in past few decades.[12] This can be attributed to the shifting trend of practice in obstetrics and gynaecology. For most of the pelvic pathologies, ultrasound is the first choice of imaging. It is economical, quick and reliable method which enables the practitioners to see the desired area without a significant complication. Many of the gynecologists depend solely upon ultrasound equipment to finalize major diagnosis for their patients.[13] Both of these imaging techniques have their own advantages and disadvantages. Also, magnetic resonance imaging is considered more

accurate in detecting deeper details of lower abdominal region.[14,15] Ultrasound technology has revolutionized fabulously in recent past and now includes advanced applications like three dimensional imaging, instantaneous assessment of pelvic structures and doppler blood flow mapping without any contrast.[16,17,18] Such facilities literally make ultrasound distinctive for scanning the pelvis region. Ultrasound is the first imaging technique of choice in the estimation of an adnexal mass. It is mainly because of its high precision in assessing the possibility of cancer.[12,16,17] Magnetic resonance imaging is a non-invasive method used by medical professionals for different purposes. Majorly, magnetic resonance assessments are based on T2-weighted magnetic resonance imaging.[19,20,21] This readily enables recognition of the uterus spaces, rectum spaces and vaginal spaces.

V. CONCLUSION

Within the limitations of the study authors have drawn very significant inferences. In our study, magnetic resonance imaging was able to detect and confirm almost all studied pathologies related to female pelvic region. Only one case was left undetected. Additionally, magnetic resonance imaging offers better tissue contrast than ultrasonography and can discriminate better between different consistencies of fluids. On contrary, ultrasonography procedure was unable to detect few of the studied pathologies of the similar region. Despite this, ultrasonography remains the initial, economical and principal imaging modality for the assessment of clinically so-called pelvic pathologies. Our study results must be treated as evocative for assuming outcomes for comparable clinical situations.

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