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Evaluation of the Ultrasound Results in Rural Clinics in Thi Qar Governorate

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Abstract: This study aimed to Evaluation of the Ultrasound Results in Rural Clinics in Thi Qar Governorate and compare it with hospitals that rely on ultrasound diagnosis of the patient. A demographic study was conducted in Thi Qar Governorate, Iraq, involving 120 patients. Of these, 90 underwent ultrasound diagnosis, and 30 did not. The objective of the study was to gain insight into the potential benefits and risks associated with ultrasound technology, particularly in the context of its use in rural areas where ultrasound diagnosis is not readily available. A questionnaire was distributed to patients in order to ascertain the reasons for the non-use of ultrasound. Furthermore, the study evaluated the quality of life of the patients and identified the associated risk factors. The data were analyzed using IBM SPSS and Microsoft Lexus 2013 software. The use of ultrasound procedures has been demonstrated to enhance patient satisfaction and improve quality of life outcomes. The available evidence indicates that skeletal muscle ultrasound is associated with increased confidence in the efficacy of treatments and greater trust in healthcare providers. The utilization of ultrasound-guided interventions in knee procedures has been demonstrated to result in enhanced pain relief and patient satisfaction. The sequence of radiological procedures is also a factor.

Keywords: Ultrasound, Increased, Technology, Evaluation, Questionnaire, Treatments, Rural.

INTRODUCTION

Since the inception of the Ultrasound Implementation Project in 2009, a significant number of family doctors have incorporated ultrasound as a diagnostic technique into their daily medical practice. This integration has been on the rise, [www.radiologytoday.net; Mengarelli, M. *et al*., 2018] reflecting the growing efficacy of ultrasound in addressing common diseases and directing referrals to the appropriate level of care. This has expanded the capabilities of primary care physicians, offering solutions that were previously unimaginable [Micks, T. *et al*., 2016].

Previous studies have demonstrated a strong correlation in ultrasound interpretation between family physicians and hospitalists, with a logistic regression of up to 93% (95% CI: 87-99%). Furthermore, the kappa indices for radiologists reached 0.89 (CI 0.95: 0.82-0.98), demonstrating a sensitivity exceeding 75% and a specificity above 90%. [Probst, J. *et al*., 2019]

In Iraq, there is a discrepancy in the availability of ultrasound technology between rural and urban regions, with rural communities exhibiting poorer health outcomes [James, C. V. *et al*., 2017]. Despite 20% of the population residing in rural areas, only 9% of physicians are based there [Bolin, J. N. *et al*., 2015]. Furthermore, rural residents report higher prevalence rates of poor health, Psychological distress, disability, functional limitations, injuries, and hypertension. Access to affordable healthcare is a significant concern for rural residents [Singh, G. K. *et al*., 2014].

This study compares the utilisation of ultrasound in rural and urban areas of Iraq with a view to evaluating access to technology and the disparity in benefit and affordability [Maeda, K, 2013; Gillman, L. M. *et al*., 2012].

Compared to urban areas, rural areas lack unrestricted entry to perinatal care services as well as scanning services. Alarm on imaging equipment quality and durability was raised by the Senate in 2018 [Jain, A. R. *et al*., 2008]. This has necessitated delayed arrival of patients at hospitals in rural areas, thus affecting diagnosis and treatment, including perinatal ultrasounds, which require specialized personnel like ultra-sonographers [Whitson, M. R. *et al*., 2016].

There has been a rise in unexpected out-of-facility childbirths and poor results as a result of the closure of maternity services in remote regions [Moore, C. L. *et al*., 2011]. This condition could be dealt with through prescription-based training and telemedicine technologies that allow image transmission from a distance [Nelson, B. P].

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PATIENTS AND METHOD

A demographic study was conducted in Thi Qar Governorate, Iraq, where data were collected from several different hospitals. In this study, 120 patients were collected (90 patients who underwent ultrasound diagnosis and 30 patients who did not undergo ultrasound diagnosis). The purpose of this distribution was to know the negative and positive differences that are due to the patient and the doctor, in addition to knowing the negative effects on patients who live in rural areas and who did not undergo ultrasound diagnosis. A cross-sectional study was designed for 120 patients who were distributed into two groups according to their use of ultrasound. The first group included (90 patients who underwent ultrasound diagnosis) and the second group included (30 patients who did not undergo ultrasound diagnosis due to hospitals located in rural areas). In this study, a questionnaire was distributed to 120 patients to know the negative and positive aspects of ultrasound. In addition, the results of the reasons for not using ultrasound for patients from the point of view of doctors (70 samples) were evaluated. Patients' results and future implications in rural areas that do not rely on ultrasound diagnosis were also identified. In this study, patients' results were evaluated according to their quality of life to know the results that improved. In addition, the logistic regression coefficient was identified to know the risk factors in this study.

Statistical Analysis

In this study, demographic data and information were analyzed according to the IBM SPSS program and the Microsoft Lexus 2013 program.

Study Period

Written consent was obtained from the patients for the purpose of conducting this study, as the period of this study was one full year, ranging from 1-5-2023 to 1-4-2024.

RESULTS

Table 1: Distribution of patients according to age

Variable	F	P%
20-29	33	27.5
30-39	60	50
40-49	27	22.5

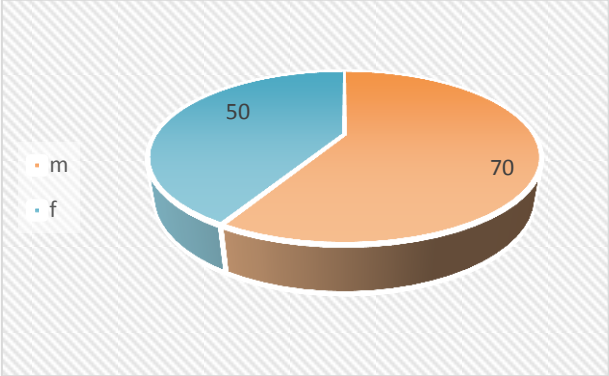

Fig 1: Distribution of patients according to sex

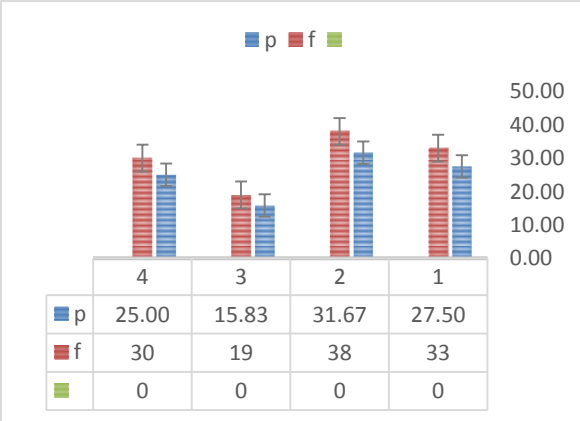

Fig 2: Distribution of patients according to comorbidities

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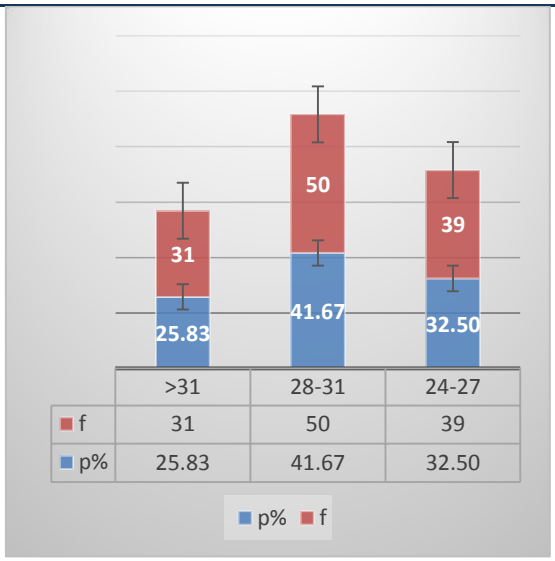

Fig 3: Classification of body mass index into patients

Table 2: Distribute patients according to their primary use of ultrasound of 90 patients

v	F	P%
Examination of the uterus and ovaries during pregnancy	30	25.00
Diagnosis of gallbladder diseases	22	18.33
Blood flow assessment	10	8.33
Breast lump examination	10	8.33
Thyroid examination	26	21.67
Detect problems with the reproductive organs and prostate	8	6.67
Evaluation of arthritis	14	11.67
Not used	30	25

Table 3: Evaluate the results to reasons for not using ultrasound of patients According to doctors' points of view

v	F	P%
Lack of standardized training requirements,	15	21.43
High costs of equipment and training	8	11.43
Difficulty maintaining skills	10	14.29
Inadequate quality assurance methods	11	15.71
Unstable power supply and long distances to healthcare facilities	12	17.14
The need for comprehensive strengthening of the health system	14	20.00

Table 4: Distribution of patients according to the results represented by the effects of delayed use of ultrasound

v	f	P%
Ignore diagnoses	8	26.67
Unnecessary additional imaging	6	20.00
Transferring patients to referral centers	5	16.67
Challenges in maintaining skills and ensuring quality	11	36.67

Table 5: Assessment QOL of 90 patients according to SF-36

V	MEAN	SD
Decrease Pain levels	66.7	10.9
Empathy	70.1	9.44
Psychological aspects	60.943	5.934
Mental health	60.45	6.32
Depression	70.1	5.934

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Table 6: Evaluation of quality-of-life outcomes for patients who did not use ultrasound

V	MEAN	SD
Decrease Pain levels	44.5	7.34
Empathy	39.9	6.22
Psychological aspects	40.3	4.92
Mental health	42.2	4.23
Depression	39.92	5.1

Table 7: Logistic regression risk model analysis to ultrasound

	CS (OI)	P VALUE
They are not effective in imaging body parts that contain gas	1.1 (0.9-1.4)	0.94
It is not effective in imaging parts of the body that are hidden by bones, such as the lungs or the head	1.3 (0.82-1.7)	0.843
Ultrasound is unable to see objects located deep within the human body.	0.92 (0.63-1.2)	0.993
Severe bleeding resulting from mechanical treatments	1.62 (1.1-1.98)	0.73
Thermal effects	1.432 (1.1-1.98)	0.63
Outcomes	1.33 (0.88-1.4)	0.811

DISCUSSION

The absence of standardized training requirements, difficulties maintaining skills, and difficulties achieving quality assurance are all common pitfalls in rural clinic ultrasound evaluation. Additionally, [Maeda, K, 2013] these dangers are exacerbated by a lack of global regulation, unclear standards for training and competency assessment, and restricted access to professional development. Additionally, the lack of familiarity of healthcare providers with cutting-edge ultrasound technology and women's misperceptions and fears about ultrasound procedures that could harm them or their unborn child pose significant obstacles to the efficient use of ultrasound in rural settings where Standardized training programs, strengthening regulatory frameworks, community education to dispel myths, and ongoing professional development for healthcare providers are crucial steps to addressing these issues and improving ultrasound findings in rural clinics and patient care outcomes [Gillman, L. M. *et al*., 2012].

Ultrasound, also known as sonography or diagnostic medical ultrasound, uses sound waves to obtain images of the body. There are three main groups: pregnancy ultrasound, diagnostic ultrasound, and guided ultrasound. Pregnancy ultrasound is used to monitor a woman's pregnancy, fetal growth, and the condition of surrounding tissues. Diagnostic ultrasound helps prevent and diagnose diseases, while guided ultrasound assists medical personnel in biopsies and tissue extraction procedures. [Jain, A. R. *et al*., 2008; Whitson, M. R. *et al*., 2016]

Ultrasound is a rapid, widely available, painless, and non-invasive diagnostic imaging technique that allows monitoring of the condition of different organs and systems within the body [Moore, C. L. *et al*., 2011; Nelson, B. P. *et al*., 2008]. This procedure is based on ultrasound, a series of mechanical waves whose frequency is higher than the audible capacity of the human ear, to create two- or three-dimensional images [Burgner, D. *et al*., 2005; Balk, D. S. *et al*., 2018].

Ultrasound therapy uses ultrasound, that is, very high-frequency sound waves that can reduce inflammation, contractures, and the presence of excess fluid in the tissues.

Ultrasound waves are emitted from the head of the device through the piezoelectric effect of a quartz or ceramic disc. The piezoelectric effect is a series of compressions and expansions of quartz obtained by exposing the crystal to an alternating electric field.

The ultrasound therapy device basically consists of an alternating current generator that powers the head. Inside this is a transducer (piezoelectric disc or quartz plate), which converts electrical energy into mechanical energy (sound vibrations). This energy is then transmitted to biological tissue thanks to a specific conductive gel for ultrasound waves. [Pereda, M. A. *et al*., 2015]

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Ultrasound is a non-invasive diagnostic technique with numerous advantages, including being painless, easy to perform, safe, and providing clearer images than X-rays. It is particularly useful for evaluating pregnant women and fetuses and can guide various medical procedures. However, it has limitations [Rea, G], such as difficulty in seeing structures behind bones or in areas with gas or air, and may not penetrate bones. Additionally, it may be less effective in obese patients due to difficulty in penetrating fatty tissue. Despite these limitations, ultrasound remains a widely used diagnostic technique worldwide due to its widespread availability and ease of implementation [Tsou, P. Y. *et al*., 2019].

In this study there are a number of ways in which rural clinics differ from their urban counterparts with regard to the treatment of patients and the outcomes achieved. Notwithstanding the potential for greater health needs, patients in rural clinics exhibit a poorer health status and utilise fewer outpatient services than those in urban clinics. There were disparities in patient perceptions of care between urban, non-FAR, and FAR-affiliated rural hospitals. However, over time, there was an improvement in patients' willingness to recommend rural hospitals. Furthermore, geospatial analysis indicates that rural counties have diminished access to point-of-care ultrasound in comparison to urban areas, suggesting that ultrasound access and utilisation are markedly disparate in Iraq. To enhance patient care and outcomes, these findings underscore the imperative of addressing healthcare disparities between rural and urban regions, particularly in rural areas that are underserved.

CONCLUSION

In Iraq, rural clinics are characterised by less favourable health status and a reduced provision of outpatient services in comparison to their urban counterparts. Notwithstanding these discrepancies, the patients' inclination to recommend rural hospitals has exhibited an upward trajectory over time. Nevertheless, rural counties are characterised by a reduction in the availability of point-of-care ultrasound in comparison to urban areas. It is of the utmost importance to address the disparities in healthcare between rural and urban regions, particularly in the case of underserved rural areas, in order to improve patient care and outcomes.

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