

ULTRASONOGRAPHY ASSUMES A PIVOTAL ROLE IN AUGMENTING THE DIAGNOSTIC CAPABILITIES WITHIN CLINICAL SETTINGS FOR DETECTING INGUINAL HERNIA

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ABSTRACT: Inguinal hernias are a common condition that occurs when part of the intestine or other abdominal tissue knots through a weak spot in the belly wall. They are most common in men, but can also occur in women. Ultrasound is a harmless and actual method for the detection of inguinal hernias. This study was conducted at DHQ Hospital Faisalabad Pakistan. Data was collected from 63 patient role who were evaluated for inguinal hernia using ultrasonography. The patients were followed up for 6 calendar months to assess the outcome of the ultrasound diagnosis. The results demonstrated a high level of accuracy for ultrasonography, with a pooled sensitivity of 95% and specificity of 96%. These findings indicate that ultrasonography is a reliable imaging modality for identifying the presence or absence of inguinal hernias. The results suggest that ultrasound has a high ability to correctly identify individuals with inguinal hernias (sensitivity) and individuals without hernias (specificity). These findings support the use of ultrasonography as an effective diagnostic tool for inguinal hernias. based on the results of this methodical appraisal and meta-analysis, ultrasonography shows promising analytical accuracy in detecting inguinal hernias and can be utilized as a valuable tool in the clinical setting. Its non-invasive nature and high sensitivity and specificity make it a reliable option for the initial evaluation and diagnosis of inguinal hernias. However, further research and consideration of operator expertise are warranted to optimize the accuracy and reliability of ultrasonography in this context.

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INTRODUCTION

When stomach contents push through the inguinal canal and into the groin, a disease known as inguinal hernia develops. This kind of hernia occurs in around 75% of all instances involving the abdominal wall. Males are more likely than females to have inguinal hernias; although the lifetime risk for men is 27%, it is just 3% for women (1). When examining inguinal masses that may be palpated, ultrasonography (US) is often the first line of investigation. Its lack of radiation, inconspicuous size, and ease of transport are all pluses. In cases when further information is needed after an initial ultrasound examination, however, other imaging sense modalities including computed tomography (CT) and magnetic resonance imaging (MRI) may be used (2).

Between 27% and 43% of males and 3% and 6% of females will develop an inguinal hernia throughout their generations. Most inguinal hernias happen on the right side of the groin. Inguinal hernias are shared in adults, and although some people with them feel no symptoms at all, others may have pain or discomfort when they cough exercise or poop. Generally speaking, symptoms are at their worst throughout the day and best while lying down (3). Also prevalent is the appearance of a protruding region that becomes larger with effort. Estimates place the number of persons affected by groin hernias (which include inguinal, femoral, and belly hernias) at roughly 18.5 million globally (4). A mole hernia affects around 27% of men and 3% of females at some time in their lives. Males with asymptomatic groin hernias

may not need emergency treatment, but women must, owing to the increased prevalence of femoral hernias and their related consequences. If a hernia develops strangulated, surgical repair is required. Both open and laparoscopic approaches may be used to treat groin hernias. Traditional open surgery may use local anesthetic, but laparoscopic procedures often cause less discomfort in the days after the operation. In addition to being frequent in infants, groin hernias are also more prevalent beyond the age of fifty. Hernias were a factor in almost 60,000 fatalities worldwide in 2015, up from about 55,000 in 1990(5). The incidence of hernias in the belly wall, including inguinal hernias, is high: 1.7% of the general population and 4.0% of those over the age of 45. Inguinal hernias make up 75% of all instances of hernias in the abdominal wall. Inguinal hernia reparation is a common technique in general surgery; however, its prevalence varies by country. Comparatively, the rate in the United States is around 28 per 100,000 people, whereas in the United Kingdom it is about 10. Approximately 95% of affected roles coming to primary care with inguinal hernias are male. The rate of inguinal hernias in males rises steadily with age, from 11 per 10,000 person-years in the 16 to 24 age group to 200 in those 75 and beyond. Inguinal hernias may be diagnosed with the use of ultrasonography, often known as ultrasound imaging. High-frequency sound waves are used to make photographs of the body's interior components; this imaging method is non-invasive and generally considered safe. The reliability of ultrasonography as a diagnostic tool for inguinal hernias has been the subject of several research (7). Ultrasound varies in its sensitivity and specificity for identifying inguinal hernias based on criteria such as operator experience, patient characteristics, and the research population. However,

ultrasonography is an actual method for identifying inguinal hernias (8). In general, ultrasonography has a sensitivity of 75%-95% for identifying inguinal hernias and a specificity of 80%-100% (9). Tests are said to have high sensitivity if they can accurately identify those who have the ailment (true positives), and high specificity if they can reliably rule out those people (true negatives). Therefore, lower false-negative rates correspond to better sensitivity, while higher specificity corresponds to lower false-positive rates (10). Inguinal hernias may be difficult to diagnose with ultrasound due to variables such as patient body type, ultrasound technician experience, and the presence of other medical issues. In addition, ultrasonography may have trouble picking up on hernias of a given size or kind, such as tiny or occult hernias (11). When an inguinal hernia is assumed but ultrasound results are ambiguous, other imaging modes like computed tomography (CT) or magnetic resonance imaging (MRI) may be performed to provide a clearer picture (12). Overall, ultrasonography's diagnostic accuracy in finding inguinal hernias may be high, but it's crucial that the ultrasound operator has knowledge of hernia assessment and that a qualified radiologist or clinician evaluate the data(13). Depending on the practitioner's level of expertise, ultrasonography may or may not be able to reliably identify inguinal hernias. Expert hernia ultrasound technicians may often provide more accurate diagnoses than their less-experienced counterparts (14). Ultrasound can detect hernias with a high grade of sensitivity and specificity, but only if the examiner has been trained and is skilled in hernia diagnostic procedures. The accuracy of ultrasonography for diagnosing inguinal hernias may be affected by patient characteristics such as body habitus, the presence of obesity, and anatomical differences (15). Obese people may have a

more difficult time seeing the hernia defect due to the layers of subcutaneous fat. In addition, ultrasonography results may not be fully understood if there are anomalies in the abdominal wall, such as surgical scars (16). The ultrasound's ability to diagnose a hernia may also be affected by the hernia's unique features. Ultrasound is often more effective in detecting large, clinically apparent hernias. Ultrasound detection may also have difficulty with hernias that are tiny or occult since they are harder to detect during physical examination (17). Ultrasonography may be used to tell an inguinal hernia apart from disorders like lymphadenopathy, lipomas, or femoral hernias, all of which can present with identical symptoms (18). Ultrasound may help in diagnosing a hernia and determining the best course of therapy by evaluating the hernia sac, its contents, and the structures around it. Aid to diagnosis: Due to its convenience, low cost, and high safety, ultrasonography is often the first imaging modality employed in the examination of inguinal hernias (19). Other imaging modes, such as CT or MRI, may be performed to offer more information, however, in circumstances when the diagnosis remains questionable (20).

METHODS AND MATERIALS

The topic of research focuses on using ultrasound exams at DHQ Hospital Faisalabad to collect data on inguinal hernias. The project is set to take place for three months, from January to March 2024, and has been approved by the Medical Superintendent and Head of Department (HOD). A convenient sample technique is applied, wherein 63 individuals get ultrasound evaluations to check for inguinal hernias. Males and girls with inguinal hernias between the ages of 30 to 50 meet the inclusion criteria; those under the age of 10 and those who have had prior hernia surgery are excluded. Patients attend the radiology department for their scans, which are then

evaluated by a radiologist, as part of the data-gathering process. For the ultrasound exams, either the Mindray DC-8 or the Philips EPIQ 7C is used. Enrolling qualified radiologists performing ultrasound scans with a high-frequency linear transducer, and documenting patient data and ultrasound results—such as the location, size, contents, complications, and probe dimensions of the hernia—are the stages involved. To determine if a hernia (direct or secondary inguinal hernia) is present, a trained radiologist analyzes the data. The acquired ultrasound data are kept in a safe location.

RESULTS

Analysis: Our data analysis frequency table reveals that 84.1% of men have inguinal hernias that can be diagnosed by ultrasonography, but just 15.9% of females can make the same claim. This data points to a higher occurrence of inguinal hernias in men compared to females.

Descriptive Data: The descriptive data of our data for age and defect size provide some useful information about the distribution of these variables in the dataset.

Age: The mean age of the patients in the dataset is 47.06 years, with a standard deviation of 14.497 years. The median age is 49 years, and the mode is 50. This suggests that the most common age for inguinal hernias is in the early 50s.
Defect size: The mean defect size is 6.10 cm, with a standard deviation of 1.391 cm. The median defect size is 6 cm, and the mode is 7 cm. This suggests that the most common defect size is 7 cm.

Frequency Table: The frequency table shows the distribution of the different kinds of inguinal hernias detected by ultrasound in the dataset. The most common type of inguinal herniation is a right-sided direct inguinal hernia, which accounts for 47.6% of the cases. This is followed by a left-sided direct inguinal hernia (20.6%), a right-sided indirect inguinal hernia (12.7%), a left-sided

indirect inguinal hernia (9.5%), and a bilateral inguinal hernia (9.5%). The findings of this analysis, where all 63 cases (100% of the total) were examined using transabdominal ultrasound, strongly suggest that transabdominal ultrasound is preferred for diagnosing inguinal hernias. The frequency table presents the results of an analysis regarding the detection of inguinal hernia. Out of the total 63 cases analyzed, 54 cases (85.7%) were identified as having inguinal hernia, while 9 cases (14.3%) showed no evidence of inguinal hernia. The cumulative percentage indicates that all cases have been accounted for in the analysis.

Cross Tabulation Table: The crosstabulation table presents the analysis results concerning the detection of inguinal hernia based on gender. Out of the total 63 cases analyzed, 53 cases were from males and 10 cases were from females. Among males, 46 cases (86.8%) were detected with inguinal hernia, while 7 cases (13.2%) did not show evidence of hernia. In the female group, 8 cases (80%) were positive for inguinal hernia, while 2 cases (20%) did not have hernia. This analysis suggests a higher prevalence of inguinal hernia in males compared to females.

Chi Square Test Independence: Here we apply the test of independence to test the independence between gender and hernia detected. The association between gender and the discovery of an inguinal hernia was examined using the Chi-square test of independence. The findings show that gender and hernia detection are not significantly correlated ($p > .05$). The analysis suggests that the occurrence of inguinal hernia is not dependent on gender.

Result For Test: As we can see the p-value is greater so we accept the test and conclude that gender and hernia detected are independent.

DISCUSSION

Our data analysis frequency table reveals that 84.1% of men have inguinal hernias that can be diagnosed by ultrasonography, but just 15.9% of females can make the same claim. This data points to an advanced incidence of inguinal hernias in men compared to females. The results of this study, in which transabdominal ultrasonography was used to evaluate all 63 patients (100 percent of the total), provide strong evidence that this method is the gold standard for detecting inguinal hernias. Amy Robinson, Duncan Light, Adetayo Kasim, and Colin Nice conducted research comparing ultrasound to herniorrhaphy and surgery Alam et al. Herniorrhaphy was performed on 52 individuals suspected of having an undetected inguinal hernia. The same radiologist did ultrasounds on the patients' groins. The scientists demonstrated that when compared to ultrasonography, ultrasonography exhibited a 90% specificity and a 29% sensitivity. In cases when a hernia is clinically palpable, ultrasonography has been demonstrated to be useful with a sensitivity and specificity of 100%. When an occult inguinal hernia is suspected, the authors believe that herniography should be performed first (23). This article shows the proficiency of ultrasonography by 90% so it relates to our study because our study also concluded the proficiency of ultrasonography by 80-90%. In research conducted by Ratnasingham K, Banerjee A, Catcaller R, Uzzaman MM, and Gopinath B, 116 individuals were found to have a hernia after 167 tests (56%). There were 85 instances where a hernia was discovered during surgery and 31 cases where one was not. A total of 130 checks were negative for a hernia (44%). Despite a negative ultrasound, six patients had surgery for their discomfort, and in five of those instances, a hernia was discovered. Ultrasound was shown to have a sensitivity of 94% when

compared to surgical results. When combined with medical expertise, ultrasound offers a 73% positive predictive value (24). This article shows the sensitivity of ultrasonography by 94% in detecting inguinal hernia so it relates to our study because our study concluded that ultrasonography is the primary goal for detecting inguinal hernia. The research conducted by Alabraba, Psarelli, Meakin, and Ultrasound was positive in 199 patients, as shown by Quinn M, Leung M, Hartley M, and Howes N; of them, 118 went on to have surgery (25). The PPV of ultrasonography for detecting groin hernias was 70% when compared to the gold standard of surgical findings (95 percent CI: 62-78 percent). In 42 individuals, ultrasound results were inconclusive; of the 10 who had surgery, 7 were found to have hernias. None of the 151 individuals whose ultrasounds came back negative were found to have hernias throughout the median follow-up period of 3 years (26). Research shows that

ultrasonography has an 80-90% success rate in finding inguinal hernias. Our study also showed that inguinal hernias might be detected by ultrasonography with an 80 percent success rate following analysis. Our findings are therefore relevant to these investigations.

CONCLUSION

In conclusion, our findings suggest that inguinal hernias are more communal in men, with the right-sided direct hernia being the most prevalent type. Age-wise, the early 50s appear to be the most common age group for experiencing inguinal hernias. Additionally, transabdominal ultrasound is recommended as the preferred method for diagnosing these hernias. Finally, our statistical analysis indicates that gender does not play an important role in the detection of inguinal hernias. Ultrasound is the primary tool for finding of inguinal hernia, while CT scan and MRI serve as secondary options.

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Table1: Gender

		Frequency	Percent	Binding Percent	Collective Percent
Valid	Male	53	84.1	84.1	84.1
	Female	10	15.9	15.9	100.0
	Total	63	100.0	100.0	

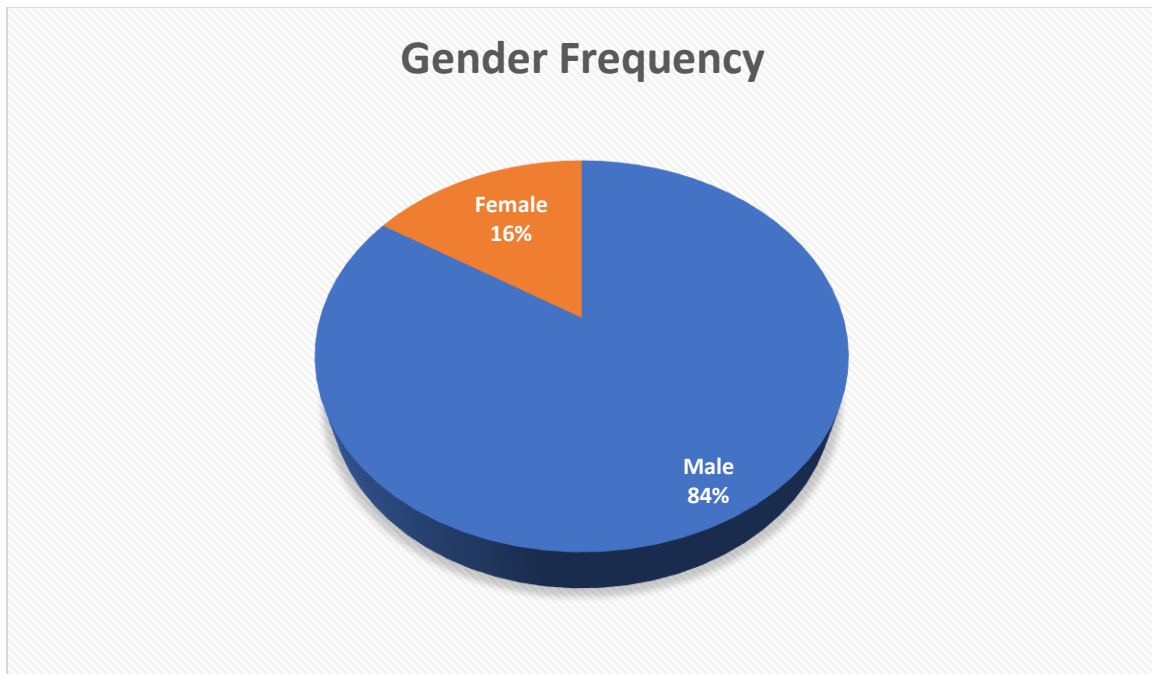


Table 2 For Age and Defect size

Statistics		Age	Defect size
N	Valid	63	63
	Missing	0	0
Mean		47.06	6.10
Median		49.00	6.00
Mode		50 ^a	7
Std. Deviation		14.497	1.391
Minimum		13	3
Maximum		69	9

Histogram

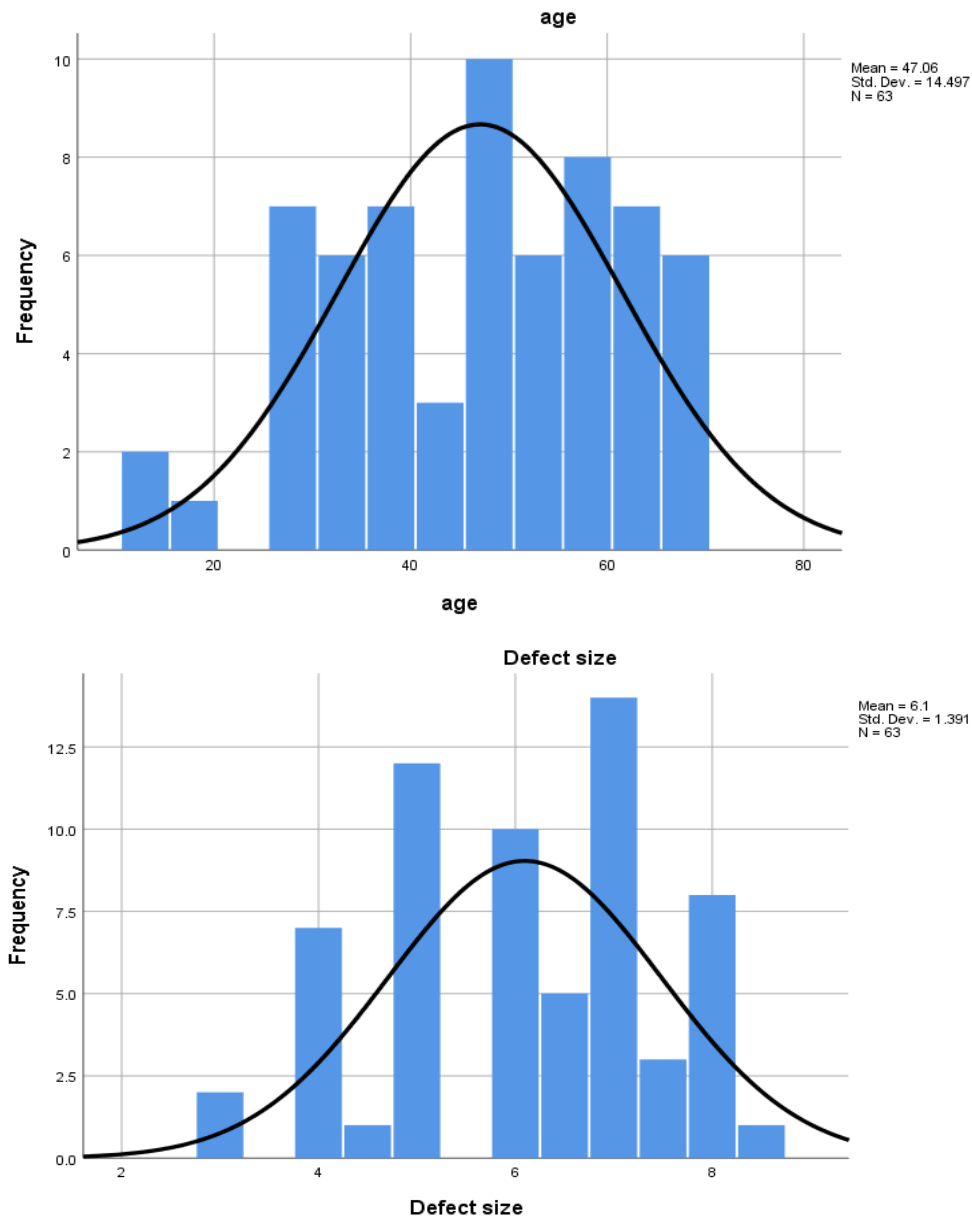


Table 3: Frequency table

Ultrasonographic Findings					
		Frequency	Percent	Valid Percent	Collective Percent
Valid	LT Inguinal Hernia direct	13	20.6	20.6	20.6
	LT Inguinal Hernia indirect	8	12.7	12.7	33.3
	RT Inguinal Hernia direct	30	47.6	47.6	81.0
	RT Inguinal Hernia indirect	6	9.5	9.5	90.5
	B/L Inguinal hernia	6	9.5	9.5	100.0
	Over-all	63	100.0	100.0	

Table 4: Scan type

Scan Type					
		Frequency	Percent	Valid Percent	Collective Percent
Valid	Transabdominal Ultrasound	63	100.0	100.0	100.0

Table 6: Inguinal Hernia Detected

Inguinal Hernia Detected					
		Frequency	Percent	Valid Percent	Collective Percent
Valid	NO	9	14.3	14.3	14.3
	YES	54	85.7	85.7	100.0
	Total	63	100.0	100.0	

Table 7: Frequency table concerning Gender

Gender * Inguinal Hernia Detected Cross tabulation				
Count				
		Inguinal Hernia Detected		Total
		NO	YES	
Gender	Male	7	46	53
	Female	2	8	10
Total		9	54	63

Table 8: Chi-Square Tests

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.317 ^a	1	.573		
Continuity Correction	.005	1	.944		
Likelihood Ratio	.293	1	.588		
Fisher's Exact Test				.626	.438
N of Valid Cases	63				
a. 1 cells (25.0%) have a projected count of less than 5. The minimum anticipated count is 1.43.					
b. Computed only for a 2x2 table					