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PREVELANCE OF UMBILICAL HERNIA IN PATIENT UNDERGOING TRANSABDOMINAL ULTRASONOGRAPHY AT TERTIARY CARE HOSPITAL PESHAWAR

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Umbilical Hernia; Transabdominal Ultrasonography; Prevalence; Dynamic Ultrasonography; Valsalva Maneuver; Abdominal Wall Defects.

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Abstract

Background: *Umbilical hernia is a common abdominal wall defect that may be asymptomatic or clinically occult. Ultrasonography provides a non-invasive and dynamic method for detecting and characterizing umbilical hernias, including small defects that may not be apparent on physical examination.*

Objective: *To determine the prevalence of umbilical hernia among patients undergoing transabdominal ultrasonography and to describe its demographic and sonographic characteristics.*

Methodology: *A cross-sectional study was conducted among 281 symptomatic and asymptomatic patients undergoing transabdominal ultrasonography at a tertiary-care hospital. Demographic characteristics and sonographic findings, including hernia defect size and sac contents, were recorded. Dynamic assessment was performed where appropriate using coughing and the Valsalva maneuver.*

Results: *Umbilical hernia was detected in 274 (97.5%) of the 281 participants. Females constituted 74.0% of the study population, while males accounted for 26.0%. The mean age was 35.85 ± 11.81 years. Defects measuring 10–20 mm were most frequent (44.8%), followed by defects >20 mm (44.1%). Mixed hernia sac contents were the most common sonographic finding (40.9%), followed by omentum (30.2%), bowel loops (18.9%), and fluid (10.0%). Among the recorded cases, 109 (38.8%) showed sonographic evidence of bowel blockage.*

Conclusion: *Umbilical hernia was frequently detected among patients undergoing transabdominal ultrasonography in this tertiary-care setting. Ultrasonography, particularly with dynamic maneuvers, may be useful for detecting and characterizing umbilical hernias and their associated sonographic findings. Further multicenter studies using representative sampling are recommended to establish prevalence in the wider population.*

INTRODUCTION

Umbilical hernia is a common abdominal wall defect in which intra-abdominal contents protrude through a weakness at or around the umbilical ring. It is an important type of ventral hernia and may occur at any age, although acquired umbilical

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hernias are particularly common in adults. Reported risk factors include obesity, increasing age, pregnancy and multiparity, ascites, chronic cough, constipation, and activities associated with increased intra-abdominal pressure [1–3]. Patients may remain asymptomatic or present with an umbilical swelling, discomfort, or pain. In some cases, the hernia may become incarcerated or strangulated, resulting in bowel obstruction and other potentially serious complications [2,3]. Diagnosis of umbilical hernia is primarily based on clinical examination; however, small, occult, or asymptomatic hernias may be difficult to detect, particularly in patients with increased abdominal wall thickness. Ultrasonography is a useful imaging modality for evaluating abdominal wall hernias because it is non-invasive, relatively inexpensive, widely available, and does not involve ionizing radiation. Dynamic ultrasound examination during coughing or the Valsalva maneuver can improve visualization of small defects and allows assessment of the hernia sac, fascial defect, and its contents [4,5]. The increasing use of transabdominal ultrasonography for routine abdominal assessment provides an opportunity to identify umbilical hernias, incidentally, including cases that may not have been clinically suspected. High-resolution ultrasonography has demonstrated its usefulness in detecting paraumbilical and umbilical hernias during abdominal examinations [5]. Early identification of these defects may facilitate appropriate clinical assessment and referral, particularly in patients at risk of complications. Despite the clinical importance of umbilical hernia, limited information is available regarding its prevalence among patients undergoing transabdominal ultrasonography in Pakistan. Local epidemiological data are important because differences in demographic characteristics, obesity, pregnancy, occupational activities, and healthcare-seeking patterns may influence the occurrence and detection of abdominal wall hernias. Therefore, the present study aims to determine the prevalence of umbilical hernia among patients undergoing transabdominal ultrasonography at a tertiary-care hospital in Peshawar and to provide locally relevant evidence regarding this condition.

Objective

To determine the prevalence of umbilical hernia among patients undergoing transabdominal ultrasonography at a tertiary-care hospital in Peshawar.

MATERIALS AND METHODS

This study will be conducted using a cross-sectional study design at a tertiary-care hospital over a period of 4–6 months. The sample size will be calculated using the Cochran formula, $n = p(1-p)(z/e)^2$, using an expected prevalence of 24.1%, a 95% confidence level, and a 5% margin of error, resulting in a calculated sample size of 281 participants [3]. A non-probability convenience sampling technique will be used. All patients undergoing abdominal ultrasonography during the study period who have adequate sonographic visualization of the umbilical region will be included. Patients with previous umbilical or abdominal wall hernia repair, postoperative abdominal scars or large dressings obscuring the umbilical region, and severe obesity resulting in inadequate ultrasound penetration will be excluded. After obtaining ethical approval from the Internal Graduate Study Committee and permission from the relevant hospital authorities and radiology departments, secondary data will be collected from hospital records using a structured data collection proforma. The collected data will be entered and analyzed using appropriate statistical software. Descriptive statistics will be used to summarize the study variables, with categorical variables presented as frequencies and percentages and continuous variables as mean ± standard deviation or median with interquartile range, as appropriate. The prevalence of umbilical hernia will be calculated as the proportion of patients diagnosed with umbilical hernia on transabdominal ultrasonography. Where appropriate, associations between umbilical hernia and demographic variables such as age and gender will be assessed using suitable statistical tests, with a p-value of <0.05 considered statistically significant.

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RESULTS

A total of 281 symptomatic and asymptomatic patients referred to for transabdominal ultrasonography were included. Umbilical hernia was detected in 274 (97.5%) patients, while 7 (2.5%) had no sonographic evidence of hernia. The study population comprised 73 (26.0%) males and 208 (74.0%) females, with females representing the majority of participants.

Table 1. Gender Distribution of Study Participants

Gender	Frequency (n)	Percentage (%)
Male	73	26.0
Female	208	74.0
Total	**281**	**100.0**

The study included 281 participants with a mean age of 35.85 ± 11.81 years. The youngest participant was 2 years old, while the oldest was 63 years old, indicating that the study population covered a broad age range. The standard deviation of 11.81 years indicates a moderate variation in age around the mean.

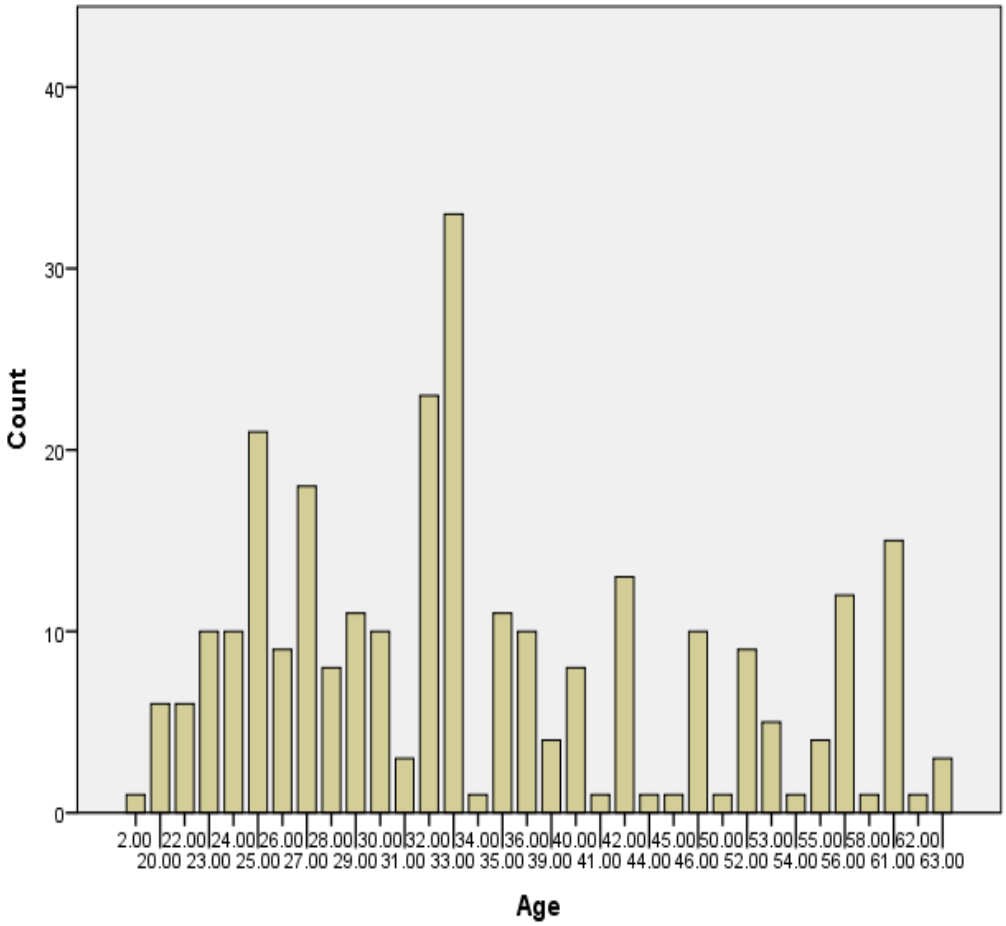


Figure 3.1: Frequency Histogram Illustrating the Age Distribution and Spread of Participants

Figure 3.1 visually demonstrates that the age distribution of the study cohort (N = 281) is heavily concentrated within young adulthood, showing a distinct peak between the ages of 25 and

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35. The distribution tapers off significantly toward both ends of the age spectrum, recording an isolated baseline instance near 0 years and a steady decline past the age of 40. This skewed distribution pattern indicates that the sample primarily captures an active age demographic where physical abdominal strain is common. Consequently, the histogram layout provides a highly relevant clinical baseline to analyze the immediate prevalence of umbilical hernias before age-related tissue degeneration becomes the primary compounding variable.

Among the 281 patients undergoing transabdominal ultrasonography, 274 (97.5%) had sonographic evidence of umbilical hernia, while 7 (2.5%) had no evidence of hernia. Abdominal pain was the most common referral indication, accounting for 221 patients, of whom 220 (99.5%) were diagnosed with umbilical hernia. Among patients referred for swelling around the umbilicus, 40 of 43 (93.0%) had an umbilical hernia, while 14 of 17 (82.4%) patients undergoing regular inspection were positive. Overall, umbilical hernia was detected in the vast majority of the study population, with the highest proportion of positive findings observed among patients referred for abdominal pain.

Table 3. 2. Overall Prevalence of Umbilical Hernia and Distribution According to Ultrasound Referral Indication

Purpose of Ultrasound	Umbilical Hernia Present, n (%)	Umbilical Hernia Absent, n (%)	Total, n (%)
Swelling around the umbilicus	40 (93.0)	3 (7.0)	43 (100)
Abdominal pain	220 (99.5)	1 (0.5)	221 (100)
Regular inspection	14 (82.4)	3 (17.6)	17 (100)
Overall	**274 (97.5)**	**7 (2.5)**	**281 (100)**

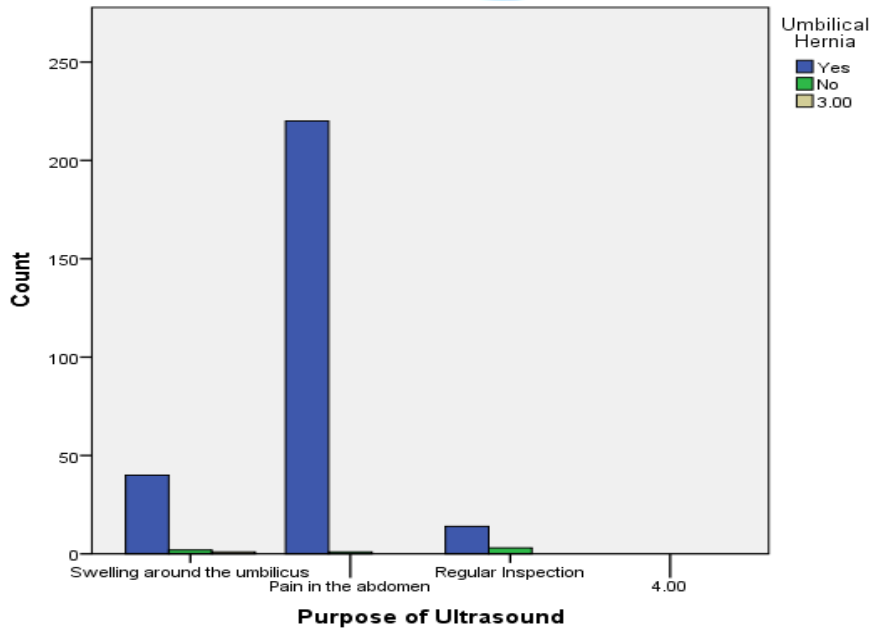


Figure 3.2: Frequency Distribution of Ultrasonography Diagnoses Segmented by Clinical Indications for Referral

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Umbilical hernia was detected in 67 (91.8%) males and 207 (99.5%) females. The Pearson chi-square test indicated a statistically significant association between gender and umbilical hernia status (χ^2 = 17.779, df = 2, p < 0.001). Thus, females had a higher proportion of sonographically detected hernia than males in this study population.

Table 3.3. Association Between Gender and Umbilical Hernia

Gender	Hernia Present, n (%)	Hernia Absent, n (%)	Total, n
Male	67 (91.8)	6 (8.2)	73
Female	207 (99.5)	1 (0.5)	208
Total	**274 (97.5)**	**7 (2.5)**	**281**

Among the 281 evaluated cases, defects measuring 10–20 mm were the most frequent (44.8%), closely followed by defects >20 mm (44.1%). Defects ≤10 mm accounted for 11.0%. Regarding hernia sac contents, mixed contents were most commonly observed (40.9%), followed by omentum (30.2%), bowel loops (18.9%), and fluid (10.0%).

Table 3.4. Sonographic Characteristics of Umbilical Hernia

Sonographic characteristic	n (%)
Defect size	
≤10 mm	31 (11.0)
10–20 mm	126 (44.8)
>20 mm	124 (44.1)
Hernia sac contents	
Bowel loops	53 (18.9)
Omentum	85 (30.2)
Mixed contents	115 (40.9)
Fluid	28 (10.0)

The cross-tabulation showed that bowel blockage was identified in 48 (59.3%) of reducible hernias and 61 (30.5%) of non-reducible hernias. Overall, sonographic evidence of blockage was present in 109 (38.8%) cases, while 172 (61.2%) showed no evidence of blockage.

Table 3.5. Hernia Reducibility and Sonographic Evidence of Bowel Blockage

Hernia Reducibility	Blockage Present, n (%)	Blockage Absent, n (%)	Total, n
Reducible	48 (59.3)	33 (40.7)	81
Non-reducible	61 (30.5)	139 (69.5)	200
Total	**109 (38.8)**	**172 (61.2)**	**281**

DISCUSSION

The present study investigated the prevalence and sonographic characteristics of umbilical hernia among patients undergoing transabdominal ultrasonography. A high proportion of patients were diagnosed with umbilical hernia, highlighting the potential value of ultrasound in detecting both symptomatic and clinically unsuspected defects. Previous studies have reported lower prevalence rates of approximately 6–14% based mainly on clinically diagnosed cases, suggesting that symptom-based estimates may underestimate the actual burden of abdominal wall defects [41]. Ultrasonography can identify small or occult fascial defects that may not be apparent on routine clinical examination [42,43]. The study population was predominantly female, and a significant association was observed between

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gender and umbilical hernia. The higher occurrence among females may be related to pregnancy, childbirth, and associated changes in the abdominal wall. Previous research has similarly reported an increased risk of umbilical hernia among younger women [44]. In older adults, age-related weakening of connective tissue and changes in collagen structure may further contribute to abdominal wall vulnerability [45].

Obesity was also identified as an important factor associated with umbilical hernia and larger defect size. Increased intra-abdominal pressure associated with excess abdominal adiposity may place continuous stress on the umbilical region and contribute to enlargement of existing fascial defects. Similar associations between obesity, hernia formation, and defect size have been reported previously [43].

Sonographically, medium- and large-sized defects were frequently observed, while mixed hernia sac contents were the most common finding in the present study. The predominance of omental or mixed contents may partly explain the absence of severe symptoms in some patients. Dynamic ultrasonography, including coughing and the Valsalva maneuver, is particularly useful for detecting small or occult hernias that may not be visible during static examinations. Previous work has demonstrated that dynamic scanning can increase the detection and visualization of abdominal wall hernias [46].

CONCLUSION

This study established the epidemiological profile of incidental adult umbilical hernias detected on routine transabdominal ultrasound. The prevalence was higher than reported in physical examination and surgical studies, indicating that many hernias remain asymptomatic and undiagnosed. A significant association was observed with age, sex, parity, and body mass index. Younger multiparous women and older men showed higher frequencies, suggesting both mechanical and age-related factors in hernia development. Increased body mass index was also associated with larger fascial defects. Transabdominal ultrasound, especially when combined with dynamic maneuvers such as the Valsalva technique, proved effective for detecting small defects, most of which contained pre-peritoneal fat or omentum. Routine assessment of the umbilical region during abdominal ultrasound can help identify hernias early and support preventive counseling to reduce future complications.

RECOMMENDATIONS

1. Patients with suspected umbilical hernia or relevant symptoms should undergo timely ultrasonographic evaluation.
2. Ultrasonography should be considered an appropriate first-line imaging modality for suspected umbilical hernia because it is safe, accessible, cost-effective, and allows dynamic assessment.
3. Radiologists and sonographers should receive appropriate training in abdominal wall ultrasonography to improve detection and characterization of umbilical hernias.
4. Awareness regarding the symptoms and potential complications of umbilical hernia should be promoted to encourage early clinical assessment.
5. Future multicenter studies with larger and more representative samples are recommended to improve the generalizability of findings.
6. Further studies comparing ultrasonography with CT and MRI may help establish their relative diagnostic roles in the assessment of umbilical hernia.

LIMITATIONS

This study was conducted at a single tertiary-care hospital using a non-probability convenience sampling technique, which may limit the generalizability of the findings and introduce selection bias. The relatively limited sample size may not adequately represent all demographic and clinical variations. The study was based primarily on ultrasonographic findings without surgical or long-term clinical validation. Detailed assessment of all potential risk factors and complications was also limited by time and available resources. Finally, the cross-sectional design prevented the establishment of causal relationships between

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potential risk factors and the occurrence of umbilical hernia.

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