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ACKNOWLEDGEMENT

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The Antiemetic Drug Aprepitant as a Broad-Spectrum Anticancer Drug?

OPEN ACCESS

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Is it possible for a drug to exert the same antitumor effect against many different types of cancer? Bioactive peptides promote and counteract the development of tumors [1, 2]. Some endogenous peptides (galanin) promote or block tumor development, while others (substance P (SP)) generally favor its development. Thus, it is possible to inhibit the development of the tumor by blocking with antagonists the neurokinin-1 receptor (NK-1R) that facilitates the oncogenic signal mediated by SP, because the SP/NK-1R system promotes tumor development (tumor cell proliferation/migration, anti-apoptotic effect, angiogenesis) [1]. This occurs in many types of cancer where the overexpression of the NK-1R occurs, something that does not occur in normal cells. Therefore, many different tumors could be treated by applying the same therapeutic strategy: the administration of NK-1R antagonists.

Aprepitant (Emend, MK-869, L-754,030) a non-peptide NK-1R antagonist is administered orally as antiemetic drug to treat chemotherapy-induced nausea and vomiting and it is safe; it binds specifically to the human NK-1R, crosses the blood-brain barrier, and exerts antitumor effects (inhibits proliferation, promotes apoptosis, blocks migration/invasion, anti-angiogenic) against different types of human cancer cells as many as twenty-one [1, 3, 4]. That is, all the opposite effects that SP performs on cancer cells. If aprepitant is used in clinical practice as an antiemetic, why has an antitumor effect not been observed then? It seems that this is due to the dose administered in clinical practice (125 mg (day 1), 80 mg (days 2 and 3)); to observe an antitumor effect, the dose and the days of treatment with aprepitant would have to be increased (20-40 mg/kg/day; administered daily until a response to the treatment was observed) compared to the dose/days of treatment as an antiemetic. This dose must be increased since there is an overexpression of the NK-1R in tumors and hence the right dose to be administered is absolutely associated to such overexpression and to the size of the tumor (larger size, higher dose) [1]. The use of aprepitant as an antitumor drug alone or in combination therapy with chemotherapy or radiotherapy is a possibility that should be tested as soon as possible. And even more so when it is known that the combination of aprepitant with chemotherapy or radiotherapy favored a synergic anticancer effect, promoted chemosensitization and radiosensitization, and decreased the side-effects (cardiotoxicity, hepatotoxicity, nephrotoxicity) induced by both therapies [5]. Is there any drug on the market that can potentially act against so many different types of cancer? Aprepitant perfectly meets this requirement. Its repositioning is urgent, its use as an antitumor drug would open new promising and unsuspected doors to fight cancer, and its administration is independent of the tumor biology, clinical stage, location, and tumor type. The SP/NK-1R system opens the door to new tumor research avenues, cancer diagnosis, tumor predictive factors, and anticancer strategies.

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Original Article

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Exploring the Interplay between Academic Procrastination and Self-Generated Stress among Medical Students. A Multi-Institutional Cross-Sectional Study from KPK, Pakistan

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ABSTRACT

Academic procrastination is the deliberate postponement of assignments even when one is aware of the possible drawbacks. It is a common problem among students, especially in demanding professions like medicine, where procrastination is exacerbated by stress and a heavy workload. **Objective:** To investigate the connection between medical students' self-generated stress and academic procrastination. **Methods:** In KPK, Pakistan, 382 undergraduate medical students participated in a cross-sectional study. The Self-Generated Stress Scale, the Academic Procrastination Scale-Short Form, and a sociodemographic part were all included in the questionnaire. Using SPSS (version 27.0), descriptive and inferential statistical analysis, such as regression and correlation analyses, were carried out. P-values less than 0.05 were regarded as statistically significant. **Results:** Procrastination and stress exhibited a weak but significant positive correlation. A bidirectional relationship was observed, where procrastination predicted stress and vice versa, each explaining 3.4% of the variance. No significant differences in procrastination and stress were found across gender or academic years. **Conclusions:** Stress and procrastination among MBBS students in KPK were shown to be weakly but significantly correlated in this study, indicating that they have an impact on one another. The results highlight the necessity of techniques like time management training and cognitive-behavioral treatments to lessen stress from procrastination, notwithstanding the tiny effect size. Longitudinal studies should be used in future study to gain a deeper understanding of causality and other affecting factors.

INTRODUCTION

According to psychology, a human being is an entity whose nature is expressed in behavior that is impacted by emotional and psychological variables as well as habits and customs [1]. Academic procrastination is a common tendency in the educational setting. It refers to the tendency to consistently and unjustifiably delay academic tasks to avoid unpleasant feelings [2]. Procrastination is widespread among people of different nationalities, socioeconomic statuses, and educational backgrounds [3-5]. Academic procrastination, one of the many types of procrastination, is the widespread inclination to put off beginning or completing necessary academic assignments, even if doing so might have detrimental effects. A recent poll found that almost 55% of university-based medical students put off doing their assignments. According to a study by Kim and Seo (2015), procrastination is one of the most common bad habits that needs to be modified, with almost 80% of college students engaging in it, as it is the primary cause of academic failure [6]. According to a study that compared the prevalence of procrastination among university students in Malaysia (MY) and Pakistan (PK), 21% of Malaysian students and 19% of

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Pakistani students, respectively, showed mild procrastination. Moderate procrastination was exhibited by 70% of Pakistani students and 67% of Malaysian students, whilst severe procrastination was exhibited by 11% of Pakistani students and 12% of Malaysian students. Studies have demonstrated that a variety of factors have been associated with procrastination, including environmental, family-related, and personal matters [7, 8]. Other research has demonstrated it as a constant personality trait that is impacted by both internal and external influences such as emotional, cognitive, and personal issues [9]. Additionally, it is influenced by things like stress, environmental and social pressures, perfectionism, poor time management, and a lack of motivation [10]. Current studies are actively exploring the psychological factors driving this behavior. While some studies identify fear of failure as a central trigger, others link it to the lack of self-regulation skills [11, 12]. The term "self-generated stress" describes stress that results from a person's internal emotional, behavioral, or cognitive processes as opposed to external events. Self-imposed demands resulting from things like rumination, perfectionism, unreasonable expectations, or unhealthy coping mechanisms are what define it. Often unrelated to actual stresses, this kind of stress stems from how people interpret circumstances (e.g., perceiving neutral events as dangerous) or act in ways (e.g., procrastinating) that increase perceived demands [13-15]. The body's stress reaction is brought on by stress that is self-generated. The hypothalamic-pituitary-adrenal axis controls the release of cortisol, the stress hormone, as a result. One's physical and mental health may suffer as a result of these elevated cortisol levels [16]. Chronic stress was eventually brought on by this protracted self-generated tension. Stress is more common among medical students than in the general population [17]. According to different studies, its prevalence ranges from 20.9% to 94.5% [18-20]. Thus, the purpose of this study was to investigate how procrastination and stress interact among medical students, with an emphasis on the reciprocal link between these two factors.

Academic procrastination and self-generated stress are highly prevalent among medical students, yet their interrelationship remains inadequately explored, particularly in the Pakistani context. Most existing studies examine these constructs independently or focus on limited populations, with little emphasis on their bidirectional association. Furthermore, there is a lack of multi-institutional evidence and limited understanding of how these factors interact across different academic levels and demographics. Therefore, this study aims to examine the relationship between academic procrastination and self-generated stress among undergraduate medical students in Khyber Pakhtunkhwa, assess the strength and direction of this association, and explore whether a reciprocal (bidirectional) relationship exists to inform targeted interventions.

METHODS

A cross-sectional descriptive study design was used in this investigation. The sample size for the present research was 382, calculated using OpenEpi with a 95% confidence interval. The sample consisted of undergraduate medical students from 8 government medical colleges across the province. Between December 22, 2024, and February 22, 2025, a two-month period, the study was carried out. The inclusion criteria included MBBS students from their first year to their final year across the different medical colleges of Khyber Pakhtunkhwa (KPK). Additionally, the study included students who were eager to participate and who filled out the questionnaire completely. The following were the exclusion criteria: 1) Students who failed to give their informed consent; 2) those students who either did not complete the online questionnaire or provided incomplete responses; 3) participants with preexisting psychological, neurological, learning, or other impairments that could interfere with their academic performance to guarantee data fidelity. Of the participants, 43.2% were women and 56.8% were men. Students from various academic years were represented in the following proportions: 13.9% in the first year, 25.4% in the second, 17% in the third, 28.8% in the fourth, and 14.9% in the last year. Following ethical clearance from Khyber Medical College's Institutional Ethical Review Board (IREB) (Reference Number: 178/DME/KMC), Peshawar, data were collected from the representative sample using a standardized, structured, self-administered questionnaire. The data were then entered into the Google Forms, and its link was shared on the researchers' social media pages. To access the study's tools, participants' had to sign the Free and Informed Consent form on the first page, attesting to their voluntary involvement. Personal identifiers were removed from the questionnaire to ensure participants confidentiality and to minimize information bias. An equal number of participants were recruited from each medical college to ensure balanced representation across all the governmental medical colleges across the province and minimize potential selection bias in the required study sample. The sociodemographic questionnaire, the Self-Generated Stress Scale and the Academic Procrastination Scale were used. It took about eight to ten minutes on average to finish the online form. A simple, convenience sampling technique was used to gather the data from the representative sample. To evaluate the characteristics including age, sex,

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and study year, a sociodemographic questionnaire was created specifically for this study. The degree of procrastination among medical students was evaluated using the Academic Procrastination Scale Short Form, which is the abbreviated version of the Academic Procrastination Scale (APS). Five items on a five-point Likert scale (1 being strongly disagree, 2 being agree, 3 being uncertain, 4 being agree, and 5 being highly agree) made up this survey. This scale has a score range of 5 to 25. A higher degree of procrastination is indicated by higher scores on the scale. The Academic Procrastination Scale Short Form (APS-SF) was selected for its conciseness, validated unidimensional structure, and strong psychometric properties. It demonstrates good internal consistency (Cronbach's α 0.80) and convergent validity with other well-known established procrastination scales like the Tuckman Procrastination Scale.

RESULTS

A sample of 382 medical students from eight different government medical colleges throughout the province participated in this cross-sectional survey. The results of this study revealed that 217 (56.8%) of 382 participants were male and 165 (43.2%) were female. The representative sample from different medical colleges ranged from their first year to their final year of the study. The participants' Mean ± SD age was 21.69 ± 1.89. The Mean ± SD score for academic procrastination was 16.92 ± 3.7, with a median of 17. The scores ranged from 5 to 25. Self-generated stress scores varied from 7 to 35, with a median of 23 and a Mean ± SD of 22.5 ± 4.8. Figure 1 presents the gender distribution of study participants through descriptive statistics.

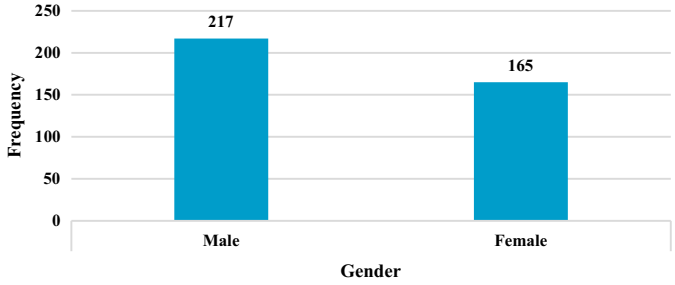

Figure 1: Descriptive Analysis of Participant Gender

Figure 2 presents the age distribution of study participants using descriptive statistics.

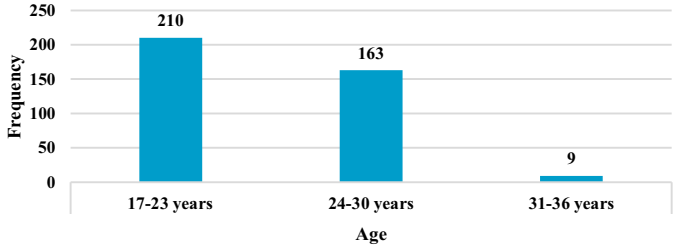

Figure 2: Descriptive Analysis of Participant Age

Figure 3 presents the Body Mass Index (BMI) distribution of participants through descriptive statistical analysis.

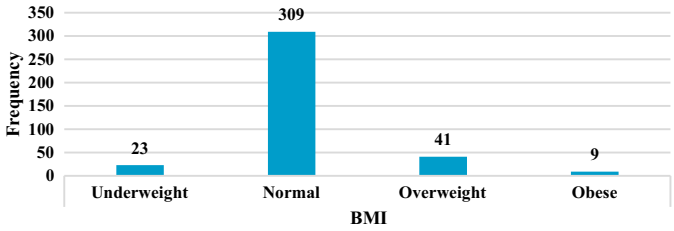

Figure 3: Descriptive Analysis of Participant BMI

Figure 4 presents the distribution of participants according to their year of study using descriptive statistics.

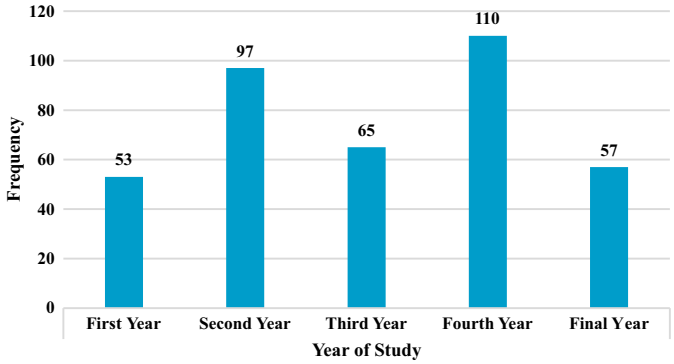

Figure 4: Descriptive Analysis of Participant Year of Study

Figure 5 presents the descriptive statistics of participants' living arrangements.

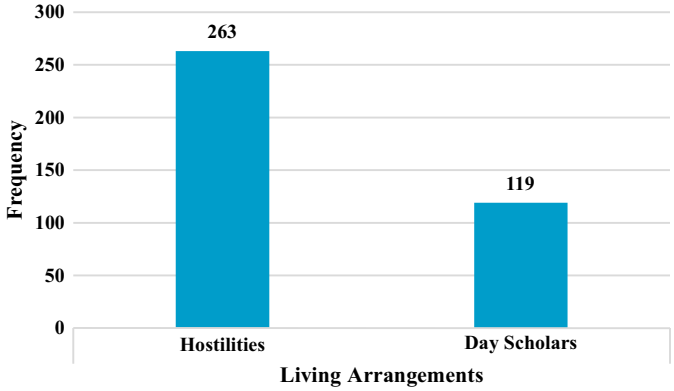

Figure 5: Descriptive Analysis of Participant Living Arrangements

Cronbach's alpha was used to evaluate the internal consistency of the Self-Generated Stress Scale (SGSS) and the Academic Procrastination Scale Short Form (APS-SF). All corrected item-total correlations were more than 0.40, and both scales showed strong reliability with α = 0.871 and α = 0.832 for the Academic Procrastination Scale Short Form and Self-Generated Stress Scale, respectively. The alpha coefficient did not increase when any items were removed from both scales.

Table 1: Reliability Analyses of Academic Procrastination and Self-Generated Stress Scales

Variables	Mean ± SD	Median	Cronbach's Alpha
Academic Procrastination	16.92 ± 3.7	17 (5-25)	0.871

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Self-Generated Stress	22.5 ± 4.8	23 (7–35)	0.832

For the necessary sample size (N=382), descriptive statistics for academic procrastination and self-generated stress were computed. Academic procrastination scores ranged from 20.0 to 100.0 with a Mean ± SD of 67.70 ± 14.79. Self-generated stress scores ranged from 25.71 to 100.0 with a slightly lower Mean ± SD score of 64.27±13.78. These findings show that the representative sample had moderate to high average levels of self-generated stress and academic procrastination, with significant participant heterogeneity.

Table 2: Academic Procrastination and Self-Generated Stress

Variables	N	Minimum	Maximum	Mean ± SD
Academic Procrastination	382	20.00	100.00	67.70 ± 14.79
Self-Generated Stress	382	25.71	100.00	64.27 ± 13.78

Non-parametric tests were used to investigate the association between self-generated stress, academic procrastination, gender, and academic year. While Kruskal-Wallis H tests assessed variations across academic years, Mann-Whitney U tests looked at gender differences in academic stress and procrastination. Additionally, the relationship between stress and procrastination was investigated using Spearman's rank-order correlation. The results of the Mann-Whitney U test showed that males exhibit slightly higher mean ranks in both academic procrastination (200.87 vs 179.17 in females) and stress (200.01 vs 180.31 in females) compared to females. These variations, however, did not reach statistical significance ($p > 0.05$). The effect sizes for both procrastination and stress were small, suggesting minimal practical differences between genders. Likewise, the Kruskal-Wallis test was used to show how academic years relate to academic stress and procrastination. Stress and academic procrastination did not differ statistically significantly between academic years. However, among the different years, students from the 4-year program exhibited the highest mean ranks for both procrastination and stress, indicating a non-significant inclination toward elevated levels in this respective group. The association between academic procrastination and self-generated stress in the representative sample was illustrated in Table 4 using Spearman's rank order correlation.

Table 3: Spearman's Correlation between Academic Procrastination and Self-Generated Stress

Variables	1. Academic Procrastination	2. Self-Generated Stress	N
1. Academic Procrastination	-	.178**	382
2. Self-Generated Stress	.178**	-	382

Where** represents a p-value of less than 0.01;
N = number of all students

Spearman's rank order correlation analysis revealed the following relationships:

Procrastination and stress were found to have a lowly positive Spearman's rank order association that was statistically significant ($r = 0.18$, $p < 0.001$). H1 is therefore supported. This indicates that higher levels of procrastination were associated with elevated stress among medical students.

To clarify how academic procrastination and stress that is created by oneself interact, two linear regression models were conducted. For the first model, self-generated stress was regressed on academic procrastination. Stress was strongly predicted by the regression model's results ($F(1,380) = 13.36$, $p < 0.05$). Additionally, the model explained 3.4% of the variance in stress, according to $R = 0.034$. Stress and procrastination showed a significant positive correlation ($\beta = 0.18$, $t = 3.66$, $p = <0.05$), suggesting that higher levels of procrastination were linked to higher levels of stress. Another regression model was run with procrastination as the dependent variable and stress as the independent variable in order to investigate the link in the opposite direction. The model's findings also showed that procrastination was strongly predicted by stress ($F(1380) = 13.36$, $p < 0.05$). Additionally, the model explained 3.4% of the variance in procrastination, according to $R = 0.034$. Stress exhibited a positive association with procrastination ($\beta = 0.18$, $t = 3.66$, $p < 0.05$), suggesting a bidirectional relationship.

Table 4: Procrastination and Stress Are Positively and Significantly Correlated

Regression Weights	Beta Coefficient	R^2	F-statistic	t-Value	p-Value
Procrastination → Stress	0.184	0.034	13.361	3.655	<0.05
Stress → Procrastination	0.184	0.034	13.361	3.655	<0.05

R^2 = Variance explained

DISCUSSION

Academic procrastination has emerged as a significant concern in higher education, with growing attention on its psychological underpinnings and academic consequences .Díaz-Morales emphasized the multidimensional nature of procrastination and how its measurement tools have evolved to assess both cognitive and behavioral aspects [1].Limone *et al.*, expanded this understanding using the self-regulated learning model, which links procrastination to deficits in time management, motivation, and metacognitive strategies [2]. Lu *et al.*, further contributed through a sociodemographic meta-analysis, establishing associations between procrastination and variables like gender, socioeconomic status, and cultural context [3]. In medical education, Cho and Lee showed that self-oriented perfectionism and fear of failure are key drivers of procrastination among students in rigorous academic programs [4]. Chehrzad *et al.*, supported this by identifying institutional workload and poor self-efficacy as contributing factors among medical students in Iran [5]. Kim and Seo conducted a meta-analysis that confirmed a

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consistent negative relationship between procrastination and academic performance, reinforcing the need to address this behavior early [6].Kosnin and Khan, through a comparative study of Malaysian and Pakistani students, highlighted the role of cultural and academic environments in shaping procrastination tendencies [7].Zakeri *et al.*, introduced a developmental perspective by linking parenting styles—particularly authoritarian and permissive approaches—to higher procrastination in youth [8].Zacks and Hen reviewed academic intervention programs and found that cognitive-behavioral strategies, time management training, and self-regulation workshops can be effective in reducing procrastination [9]. Rahimi *et al.*, offered longitudinal evidence demonstrating that negative emotional cycles can both result from and exacerbate procrastinatory behaviors in students over time [10]. Senécal *et al.*, provided foundational insight into how motivational deficits and low self-regulation drive procrastination [11]. Haghbin *et al.*, built on this by exploring the intricate relationship between fear of failure and emotional regulation, suggesting that avoidance behaviors may be both a symptom and a coping mechanism [12]. Hewitt and Flett introduced a broader personality framework, showing how both self- and socially-prescribed perfectionism correlate strongly with academic procrastination [13].A cross-sectional study exploring the relationship between academic procrastination, self-induced stress, and self-reported bruxism in medical and dental students.[14].Sirois and Pychyl argued that procrastination often serves as a form of short-term mood regulation, prioritizing immediate emotional relief over long-term goals [15].Zimmaro *et al.*, added a positive psychological dimension by demonstrating that mindfulness reduces cortisol levels and improves well-being, which may in turn reduce procrastination [16].Rtbey *et al.*, studied Ethiopian medical students and found high levels of psychological distress, which contributed to avoidance behaviors including procrastination [17]. Chowdhury *et al.*, reported similar findings among Indian students, citing academic pressure and sleep deprivation as major stressors [18].Amr *et al.*, examined Egyptian medical students and highlighted gender differences in stress levels that may influence procrastination patterns [19]. Flett GL *et al.*, introduced and validated the Self-Generated Stress Scale, examining its links with perfectionism, self-criticism, and psychological distress.

The study is limited by its cross-sectional design, which restricts the ability to establish causality, and the use of convenience sampling, which may reduce generalizability. Additionally, reliance on self-reported data may introduce response and reporting bias. Future research should employ longitudinal or experimental designs to better understand causal relationships and include more diverse, randomly selected samples. Intervention-based studies focusing on time management and cognitive-behavioral strategies are also recommended to evaluate effective methods for reducing procrastination and stress among medical students.

CONCLUSIONS

The study's findings indicated a marginally positive relationship between stress and procrastination. According to these findings, procrastination can both cause and exacerbate stress, suggesting a bidirectional relationship between these two variables. These findings suggest that procrastination-focused interventions may reduce the stress generated because of it, which carries significant implications. This study adds an important new understanding of how these variables interact, especially in the context of MBBS undergraduate students in Pakistan.

Authors' Contribution

Conceptualization: SK
Methodology: F
Formal analysis: MS
Writing and Drafting: EUH, KK
Review and Editing: EUH, KK, F, SK, MS

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

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Original Article

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Ultrasound Findings in Premenopausal Non-Pregnant Females Presented with Pelvic Pain

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ABSTRACT

Pelvic pain is a frequent complaint with gynecologic and non-gynecologic origins. Concerning the wide range of diagnoses, ultrasound is the gold-standard imaging modality of choice for premenopausal women. **Objectives:** To determine the ultrasonographic findings of pelvic pain and the association of pelvic pain accompanying symptoms with age groups and marital status. **Methods:** The analytic cross-sectional study was conducted at a Government Hospital in Gujrat, Pakistan, over four months, from October 2022 to February 2023. A sample size of 138 was considered by a convenient approach. All non-pregnant, premenopausal female patients with pelvic pain associated with the reproductive, urinary and gastrointestinal systems were included after informed consent. The Aplio 300 ultrasound machine was used to conduct the transabdominal scan, and SPSS-20 was used to analyze the data. **Results:** In the current study, 138 patients were ranged in age groups from 14 to 49 years, and the majority were between the ages of 26-31 years. There were 109 married patients and 29 unmarried. In 11.6% of the cases, the results were normal. There was no significant association of pelvic pain accompanying symptoms observed with age groups and marital status (p-value>0.05). Most of the findings were from the reproductive system (65.9%). Uterine fibroids were most frequently observed, 38 (27.5%), followed by complex ovarian cysts, 20 (14.5%). **Conclusions:** Pelvic pain in premenopausal women is most often linked to gynaecological causes, especially uterine fibroids, and occurs with or without other symptoms, regardless of age or marital status.

INTRODUCTION

Pelvic pain is a frequent complaint among women that is categorized into acute and chronic [1]. Acute pelvic pain is considered noncyclic discomfort that persists for less than three months. It is indeed a frequent clinical complaint of premenopausal women at an Emergency Department [2], which is usually sudden, intense, and brief. Chronic pelvic pain is considered noncyclic discomfort that lasts more than six months [3, 4]. Pelvic pain is a generic symptom with a variety of gynecologic and non-gynecologic origins, including urological, gastrointestinal and musculoskeletal causes. For assessing pelvic pain, it's indeed critical to inquire about the pain's onset, site, nature, intensity, radiation, durability, provoking and relieving variables, and any temporal changes over time. Pelvic pain is frequently accompanied by vague clinical indications such as vomiting, nausea, infection, diarrhea, fever, hematuria, dysuria, pyuria, urgency, frequency, vaginal discharge and vaginal bleeding. The medical health history includes the patient's last menstrual cycle, the age at which menarche began, obstetric history, sexual history and information about sexually transmitted infections [5, 6]. The physical assessment must focus on vital signs and abdominopelvic evaluation [7]. The pelvis is the lowest region of the trunk between the abdomen and the thighs. It includes the pelvic

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cavity and the bony pelvis. The pelvic cavity houses the terminal sigmoid colon, rectum, anal canal, distal ureters, urinary bladder, proximal urethra and reproductive organs [8]. The uterus is the pear-shaped organ in the female pelvis, measuring 6–8 cm in length and 3–5 cm in anteroposterior and transverse dimensions [9]. The adnexa are the areas next to the uterus that comprise the ovary and fallopian tube, along with related arteries, connective tissue and ligaments. The fallopian tubes attach the ovaries to the uterus. The ovaries are oval-shaped paired organs that measure around 3 cm in length and are frequently seen posterior to the uterus, near the cornua [10]. Concerning the organs residing in the pelvis and lower abdomen, whose pain could be regarded as the pelvis, we have to keep in mind that the illnesses most probably arise from these organs [11]. Pelvic pain arises from gynaecological and non-gynaecological origins, i.e., urological and gastrointestinal disorders [12]. Clinical presentations of these disorders vary greatly and frequently overlap [13]. Even though appendicitis, ureteral calculus and diverticulitis are among the more frequent non-gynaecological origins of pelvic pain [14, 15]. The most prevalent gynecologic disorders appearing as pelvic pain are hemorrhagic ovarian cysts, ruptured ectopic pregnancy, dysmenorrhea and salpingitis [16]. Other causes are pelvic inflammatory disease (PID), leiomyomas, endometriosis, adenomyosis and ovarian torsion [17-19]. Although ovarian cysts (ruptured) are self-limiting, serious illnesses that may require surgical interventions, such as PID, ovarian torsion, and appendicitis, may be explored when a premenopausal patient visits the physician [13, 20]. Given the wide range of possible diagnoses, ultrasonography is the primary investigative technique for pelvic pain and the most commonly acknowledged first gold-standard imaging modality of choice if there is significant clinical concern for obstetric or gynecologic causes. An early diagnosis enables possible life-saving interventions [11, 21]. Pelvic pain is indeed frequent in reproductive-age women and is therefore linked to morbidity and even death.[21]. It occurs in approximately 1 out of 7 women [22], affecting roughly 10% of all gynecologic patients [23]. The global prevalence of chronic pelvic pain ranges from 4 to 43.4%, while it is 8.8% and 5.2% in Pakistan and India, respectively [24]. Neglect regarding pelvic pain and its accompanying symptoms can lead to infertility and severe conditions like carcinoma [25]. Pelvic pain is a common yet diagnostically challenging condition among premenopausal women due to its diverse gynecological and non-gynecological causes. Although ultrasound is widely regarded as the first-line imaging modality, there is limited local evidence regarding the spectrum of ultrasonographic findings and their association with clinical symptoms in Pakistani populations. Existing studies often focus on specific etiologies or lack comprehensive evaluation across reproductive, urinary, and gastrointestinal systems. This study aims to use ultrasonography in predicting pelvic disease in premenopausal women with pelvic pain. Women often ignore the cause of their pain and turn to painkillers to alleviate it temporarily, which can lead to major complications later on. So, early detection using sonography and accurate assessment are possible to avoid complex pelvic pathologies using no radiation at all.

METHODS

An analytical cross-sectional study was conducted at a Government Hospital in Gujarat, Pakistan. The study was conducted over four months, from October 2022 to February 2023. A sample size of 138 patients was determined by calculating the mean sample size using a convenient sampling approach from previous published articles [12, 13, 25] related to this study. The data of 138 patients was considered after permission and informed consent from participants, and the researcher followed the University's ethical guidelines and permission. All non-pregnant, premenopausal female patients with pelvic pain associated with the reproductive system, urinary system, and gastrointestinal system were included in the current study. All pregnant, non-cooperative, post- menopausal women and patients with musculoskeletal system pathologies were excluded from the current study. The examination was initiated using the Aplio 300 ultrasound machine with the patient lying supine for the transabdominal scan. The SPSS version 23.0 was used to analyze the data. Variables were summarized using descriptive statistics like percentages and frequencies. The chi-square test was used to evaluate the association between age groups, marital status with pelvic pain accompanying symptoms. A p-value of less than 0.05 was considered significant.

RESULTS

The current study investigated 138 premenopausal, non-pregnant female patients with pelvic pain ranging in age from 14 to 49 years for ultrasonographic findings. The majority was between the ages of 26 and 31 years. Out of 138 patients, 109 were married and 29 were unmarried. The majority of patients, 90 (65.2%), had acute pelvic pain, whereas the remainder, 48(34.8%), had chronic pelvic pain. Most of the origin of ultrasonographic findings were from the reproductive system, 91(65.9%), followed by the urinary system, 22 (15.9%), and the gastrointestinal system, 9 (6.5%). There were no findings in 11.6% of the cases (Table 1).

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Table 1: The Frequency of Age Groups, Marital Status, Pelvic Pain, and Origin of Ultrasound Findings

Variables		Frequency (%)	Valid Percent	Cumulative Percent
Age Groups	14-19	21 (15.2%)	15.2%	15.2%
	20-25	23 (16.7%)	16.7%	31.9%
	26-31	32 (23.2%)	23.2%	55.1%
	32-37	30 (21.7%)	21.7%	76.8%
	38-43	24 (17.4%)	17.4%	94.2%
	44-49	8 (5.8%)	5.8%	100.0%
	Total	138 (100%)	100.0%	–
Marital Status	Unmarried	29 (21%)	21.0%	21.0%
	Married	109 (79%)	79.0%	100.0%
	Total	138 (100%)	100.0%	–
Pelvic Pain	Acute	90 (65.2%)	65.2%	65.2%
	Chronic	48 (34.8%)	34.8%	100.0%
	Total	138 (100%)	100.0%	–
Ultrasound Findings	Normal	16 (11.6%)	11.6%	100.0%
	Reproductive System	91 (65.9%)	65.9%	65.9%
	Urinary System	22 (15.9%)	15.9%	81.9%
	Gastrointestinal System	9 (6.5%)	6.5%	88.4%
	Total	138 (100%)	100.0%	-

The clinical symptoms accompanied with pelvic pain observed were vaginal bleeding, burning micturition, dysuria and hematuria (13, 25, 23 and 19 cases, respectively) (Table 2).

Table 2: The Frequency of Pelvic Pain Accompanying Symptoms

Pelvic Pain Accompanying Symptoms	Yes	No	Total
Vaginal Bleeding	13 (9.4%)	125 (90.6%)	138 (100%)
Burning Micturition	25 (18.1%)	113 (81.9%)	138 (100%)
Dysuria	23 (16.7%)	115 (83.3%)	138 (100%)
Hematuria	19 (13.8%)	119 (86.2%)	138 (100%)

The chi-square test was used to check the relationship between age groups and pelvic pain accompanying symptoms. The association of age groups with vaginal bleeding (p=0.399), burning micturition (p=0.062), dysuria (p=0.246) and hematuria (p=0.420) was not found to be statistically significant. The association between marital status and pelvic pain accompanying symptoms was also observed. Although a near-significant relationship was observed between vaginal bleeding and marital status (p=0.051), this is not statistically significant, whereas burning micturition (p=0.136), dysuria (p=0.076), and hematuria (p=0.224) also did not show a statistically significant association (Table 3).

Table 3: Association Between Age Groups and Pelvic Pain Accompanying Symptoms and Marital Status and Pelvic Pain Accompanying Symptoms

Symptoms	df	Calculated χ^2	p-Value	Set Level of Significance
Association Between Age Groups and Pelvic Pain Accompanying Symptoms				
Age Groups * Vaginal Bleeding	5	5.143	0.399	0.05
Age Groups * Burning Micturition	5	10.513	0.062	0.05
Age Groups * Dysuria	5	6.677	0.246	0.05
Age Groups * Hematuria	5	4.962	0.420	0.05
Association Between Marital Status and Pelvic Pain Accompanying Symptoms				
Marital Status * Vaginal Bleeding	1	3.818	0.051	0.05
Marital Status * Burning Micturition	1	2.220	0.136	0.05
Marital Status * Dysuria	1	3.152	0.076	0.05
Marital Status * Hematuria	1	1.482	0.224	0.05

The most prevalent finding observed was uterine fibroids 38 (27.5%), followed by complex ovarian cysts 20 (14.5%), cystitis 19 (13.8%), appendicitis 9 (6.5%), PID 8 (5.8%), simple ovarian cysts 6 (4.3%), adenomyosis 6 (4.3%), ureterovesical junction stones 3 (2.2%), hydrosalpinx 3 (2.2%), and endometriosis 2 (1.4%). The other least significant findings observed were dermoid cyst, complex adnexal cyst, endometrial polyps, endometrial hyperplasia, adnexal mass, ovarian torsion, uterovaginal prolapse, and complex cystic ovarian mass, which were found in similar percentages (0.7%) (Table 4).

Table 4: Description of Ultrasonographic Findings in Patients

Ultrasonographic Findings		Frequency (%)	Valid Percent	Cumulative Percent
Valid	Normal	16 (11.6%)	11.6%	67.4%
	Uterine Fibroid	38 (27.5%)	27.5%	27.5%
	Complex Ovarian Cyst	20 (14.5%)	14.5%	42.0%
	Cystitis	19 (13.8%)	13.8%	55.8%
	Appendicitis	9 (6.5%)	6.5%	73.9%
	PID	8 (5.8%)	5.8%	79.7%
	Simple Ovarian Cyst	6 (4.3%)	4.3%	84.1%
	Adenomyosis	6 (4.3%)	4.3%	88.4%
	Ureterovesical Junction Stone	3 (2.2%)	2.2%	90.6%
	Hydrosalpinx	3 (2.2%)	2.2%	92.8%
	Endometriosis	2 (1.4%)	1.4%	94.2%
	Dermoid Cyst	1 (0.7%)	0.7%	94.9%
	Complex Adnexal Cyst	1 (0.7%)	0.7%	95.7%
	Endometrial Polyp	1 (0.7%)	0.7%	96.4%
	Endometrial Hyperplasia	1 (0.7%)	0.7%	97.1%
	Adnexal Mass	1 (0.7%)	0.7%	97.8%
	Ovarian Torsion	1 (0.7%)	0.7%	98.6%
	Uterovaginal Prolapse	1 (0.7%)	0.7%	99.3%
	Complex Cystic Ovarian Mass	1 (0.7%)	0.7%	100.0%
	Total	138 (100%)	100.0%	-

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DISCUSSION

The current study was conducted among 138 premenopausal, non-pregnant female patients who presented with pelvic pain for ultrasonographic examination. Patients ranged in age groups from 14 to 49 years, and the majority was between the ages of 26–31 years. A similar study was conducted by E. Ajok, in which 150 patients participated, their ages ranging from 15 to 49 years. His study also found the majority of the affected population to be between the ages of 21 and 30 years [25]. In the current study, out of 138 patients, 109 were married and 29 were unmarried. The majority of patients (65.2%) had acute pelvic pain, whereas the remainder (34.8%) had chronic pelvic pain. The clinical symptoms accompanied with pelvic pain were vaginal bleeding, burning micturition, dysuria and hematuria. There was no statistically significant association of pelvic pain accompanying symptoms observed with age groups and marital status (p-value>0.05). Hence, regardless of age group and marital status, a woman who presents with pelvic pain is equally likely to have or not have pelvic pain accompanying symptoms. In the current study, the majority of ultrasonographic findings were observed in the 26–31 and 32–37 age groups, with fewer diagnoses observed before and after the 26 31 and 32–37 age groups. The majority of the findings came from the reproductive system (65.9%), followed by the urinary system (15.9%) and gastrointestinal system (6.5%). 11.6% of the cases were normal. The current study's results aligned with the previous published study by Bahabara et al., which analyzed 94 female patients, ages 13 to 45 years, who complained of pelvic pain. According to his findings, pelvic pain was more prevalent among women of reproductive age, and gynecological reasons were likewise the most significant [2]. The current study observed 15% of cases in the urinary system. The urinary system findings correspond well with the previous published study by Boccatonda *et al.*, in 2016, in which 100 patients were studied, with their ages ranging from 4 to 56 years. He also found 15% of cases with the urinary system [12]. In the current study, the most prevalent cause of pelvic pain was of gynecological origin, from which uterine fibroids were most commonly observed in 38 (27.5%) of cases, and complex ovarian cysts, at 14.5%, were the second leading cause of pelvic pain. These results were consistent with the study conducted by Waseem *et al.*, in which the most prevalent cause of pelvic discomfort was a uterine fibroid, which was seen in 30.1 percent of cases, accompanied by simple ovarian cysts (20.2%) and hemorrhagic cysts (14.1%) [13]. It also correlates well with a similar previous study conducted by EBO Ahmed, in which uterine fibroids and ovarian cysts were ranked the most significant among the gynecological origins of pelvic pain [4]. In the current study, 13.8% cases were of cystitis, followed by appendicitis 9 (6.5%), PID 8 (5.8%), simple ovarian cysts 6 (4.3%), adenomyosis 6 (4.3%), ureterovesical junction stones 3 (2.2%), hydrosalpinx 3 (2.2%), and endometriosis 2 (1.4%). The other least significant findings observed in the current study were dermoid cyst, complex adnexal cyst, endometrial polyps, endometrial hyperplasia, adnexal mass, ovarian torsion, uterovaginal prolapse, and complex cystic ovarian mass, which were found in similar percentages (0.7%). These findings were also consistent with the findings of a previous study conducted Waseem *et al.*, in which 1% of cases of endometrial hyperplasia were observed. PID, adenomyosis, and endometrial polyps were found in 4.3% of women. According to his study, the least observed findings were simple adnexal cysts, follicular cysts, and complicated adnexal cysts, which accounted for 1.8% of all cases, with ovarian endometrioma and dermoid cysts accounting for 0.6% [13]. Thus, in the current study, premenopausal women had the highest prevalence of gynecological causes of pelvic pain.

The study is limited by its small sample size and use of convenience sampling, which may limit the generalizability of the findings. The cross-sectional design also restricts the ability to establish causal relationships between pelvic pain and underlying conditions. Additionally, reliance on a single-center setting may not reflect broader population variations. Future research should include larger, multi-center studies with randomized sampling and longitudinal designs to better understand causal pathways and improve diagnostic accuracy and management strategies.

CONCLUSIONS

It was concluded that the most significant causes of pelvic pain in premenopausal women were of gynecological origin, of which uterine fibroids and complex ovarian cysts were the most common. Regardless of age group and marital status, a woman who presents with pelvic pain is equally likely to have or not have symptoms associated with pelvic pain.

Authors' Contribution

Conceptualization: MM
Methodology: MM, MAN, AJ
Formal analysis: MAN
Writing and Drafting: MM
Review and editing: MM, MAN, AJ

All authors approved the final manuscript and take responsibility for the integrity of the work.

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Original Article

Characterization of Placenta Using Ultrasound

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ABSTRACT

The placenta is an organ which grows in the uterus when one is pregnant. It aids in the transport of nutrients, oxygen, and eliminates waste products. The placenta is attached to the uterus wall, and the baby's umbilical cord will grow out of it. Usually, it is attached to the top, side, front or back of the uterus. **Objectives:** To determine placenta, placental thickness, and echotexture and correlate them with gestational age using ultrasonography. **Methods:** The research was conducted at the Radiology Department, the private sector, Tehsil Kharian, District Gujrat, Pakistan. The mixed-method sampling approach was applied to collect the data between December 2023 and March 2023. The data were collected on a sample size of 107 patients. The data were taken with the informed consent of the patients in adherence to the ethical norms. SPSS-20.0 was utilized as the data were entered and analyzed. **Results:** This study shows 37.4% of female with an anterior, 32.7% of female with a posterior, 7.5% with a left lateral placental location, and 22.4% with a fundal placenta. The study shows a weak positive relationship between placental thickness and gestational age. **Conclusions:** It was concluded that ultrasonography is reliable for the accurate determination of placental location, thickness, and its correlation with gestational age.

INTRODUCTION

The placenta is one of the organs that develops in the uterus; it grows. It allows it to eliminate carbon dioxide and other products of metabolism and obtain oxygen and nutrients in the blood of the mother [1, 2]. The placenta starts to develop at around week 5 of the pregnancy as the chorionic villi start growing around the area of implantation [3]. By the ninth or tenth week, the placenta appears to have a diffuse granular echo texture on sonography [4]. The uterus has a placenta, which is replaced by the fetus, and the placenta by the umbilical cord [5]. The placenta may be described as mostly anterior, posterior, fundal, right or left lateral [6]. Some placental abnormalities could include placenta previa, percreta, or vasa previa, which have serious consequences on the mother and fetus [7]. One of the studies focused on the correlation between the age of the fetus and the placenta thickness among Sudanese mothers and concluded that the placenta thickness grows along with the age of the fetus. Researchers aimed at finding out the mean placental thickness in millimeters as sonographically calculated at the second-trimester scan (18 weeks to 22 weeks 6 days). They determined that gestational age and possibly placental location must be taken into account when calculating placental thickness was being calculated. The anterior placentas are about 7 mm thicker than the posterior or fundal placentas [8, 9]. Anterior placentas over 33 mm and posterior placentas over 40 mm should be considered as a possibility [10]. Marwa SA (2018). The Statistical Package for Social Science (SPSS) was applied by US scholars to establish a correlation between fetal weight estimates of Sudanese women and the placenta thickness of these women. Fetal movement influences the estimation of fetal age based on biparietal diameter (BPD), femur length (FL), head circumference (HC), and abdominal

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circumference (AC), in the third trimester. The current research is an effort to determine the age of a fetus based on the features of the placenta that are used in a normal birth. The study's major goal is to use ultrasound to describe the placenta, determine echo texture, calculate the placenta's thickness, to relate fetal weight, gestational age, and placenta thickness, to compare the placental thickness and femur length to correlate the accuracy of age assessment, abdominal circumference, menstrual cycle, and biparietal diameter.

This study aims to determine the nourishment of the placenta and fetus through the echo texture of the placenta.Through the early diagnosis of placental anomalies, this research helps to improve patient circumstances. Also, to treat placental abnormalities using ultrasonography.

METHODS

A retrospective study was conducted in the private sector in Kharian, Pakistan. Data were collected from existing patient records between December 2022 and March 2023. The sample size of 107 was considered as per convenience. The data were collected using a mixed-method scanning method after informed consent and following the ethical guidelines described by the research committee of the university. Formal permission to access and utilize the anonymized patient records was obtained from the management of the healthcare facility before data collection. No direct patient interaction occurred, and all identifying information was kept confidential to maintain privacy and adhere to ethical standards. The obstetric scans that were done in the study were at the second and third trimesters, (between 17 to 38 weeks of gestation). Pregnant women having a previous history of intrauterine growth retardation, uterine or adnexal masses, diabetes mellitus or hypertension were not to participate. The obstetric sonography was performed using a MINDRAY® DC7 ultrasound scanner (3.8 5.0 MHz convex transducer and Doppler function; Shenzhen Mindray Biomedical Electronics, Nanshan and Shenzhen, China). Every patient was scanned in a supine position with a moderately distended urinary bladder. The abdominopelvic area was well exposed, and an acoustic gel was used. Several longitudinal and transverse sections were done to show the placenta in its entirety. The thickness of the placenta was determined in a representative area at right angles to the chorionic plate at the cord insertion level. They measured three fetal biometric parameters, and these are BPD, AC, and FL. The measurements of placental thickness were taken at the place of cord insertion and correlated with the fetal biometric parameters.

RESULTS

Results illustrate the frequency distribution of placental location, liquor status, placental outline, and placental echogenicity. They reveal that 37.4% of females have an anterior placenta, 32.7% have a posterior placenta, 7.5% have a left lateral placental location, and 22.4% have a fundal placenta(Table 1).

Table 1: Frequency Distribution of Placental Location

Placenta Location		Frequency (%)
Valid	Anterior	40 (37.4%)
	Posterior	35 (32.7%)
	Left Lateral	8 (7.5%)
	Fundal	24 (22.4%)
	Total	107 (100.0%)

In our study, there are 93.5% of females have normal liquor status while 6.5% of female have abnormal liquor status. The placental outline of the patient is normal in 93.5% and abnormal in 6.5% of female. The homogeneous pattern of the placenta is seen in 85% of females, while 15% of female have a heterogeneous echo-pattern(Table 2).

Table 2: Frequency Distribution of Liquor Status, Placental Outline, and Placental Echogenicity

Liquor Status	Frequency (%)	Placental Outline	Frequency (%)	Placental Echogenicity	Frequency (%)
Normal	100 (93.5%)	Regular	100 (93.5%)	Homogeneous	91 (85%)
Abnormal	7 (6.5%)	Irregular	7 (6.5%)	Heterogeneous	16 (15%)
Total	107 (100%)	Total	107 (100%)	Total	107 (100%)

Maternal age included in the study were analyzed(Figure 1).

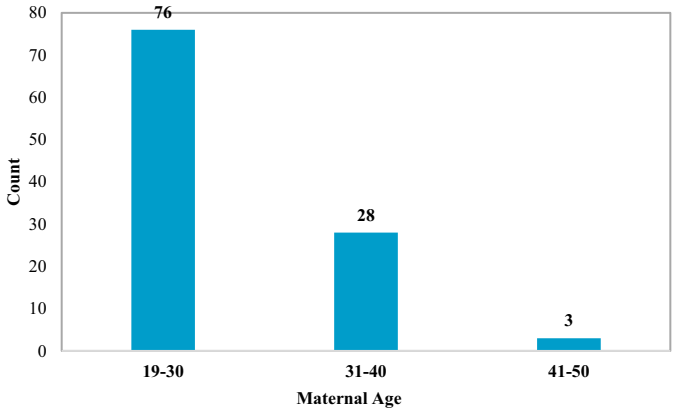

Figure 1: The Count of Maternal Ages Included in the Study

The Count of Maternal Status Included in the Study Is Calculated(Figure 2).

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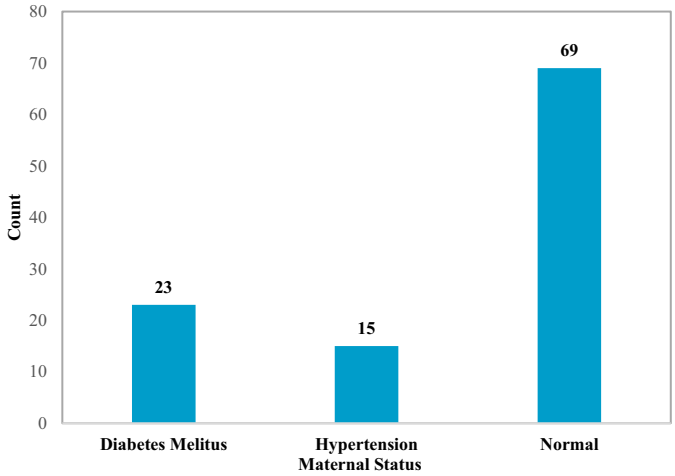

Figure 2: The Count of Maternal Status Included in the Study

The correlation above is done on the age of gestation and the placental thickness. The correlation calculated is 0.923 that gestational age and placental thickness have a weak positive relationship.Positive correlation has been documented earlier, although the correlation between the placenta thickness and the gestational age was not found to be significant in the current study. This suggests that further research with larger samples and more controlled variables is needed to better understand this relationship (Table 3).

Table 3: Correlation Between Placental Thickness and Gestational Age

Correlations		Placenta Thickness	Gestational Age
Placenta Thickness (cm)	Pearson Correlation	1	-0.010
	Sig. (2-tailed)	–	0.923
	N	107	107
Gestational Age (Weeks)	Pearson Correlation	0.010	1
	Sig. (2-tailed)	-0.923	–
	N	107	107

DISCUSSION

The placenta is a special organ that grows in the uterus when one is pregnant. It is extremely important in the exchange of nutrition, oxygen and waste products between the mother and the unborn fetus [12]. The placenta is not a nerve organ [13]. The organ is usually attached at the top, side, front or back of the uterus. In normal pregnancy, the correlation between placental thickness and gestational age is linear, and in most of the studies, the correlation between thickness (in millimeters) and gestational age (in weeks) exists. A total of 107 pregnant women in their 2nd and 3rd trimesters the aged between 17-38 weeks of gestation, were included in the current research. In this study, it is evident that the placental position is more often anterior in the majority of the pregnancies. A research report found that the most frequent placental position was anterior and posterior [14]. The given study proves that there is a weak positive correlation between the placental thickness and the gestational age. The study of the subject, released by Angus Sunday Azagidi, concluded: The close relation and significant correlation with GA (in weeks) at all trimesters, most of them during the 2nd trimester [15]. Another study has similar results, that there is an association between gestational age and placental thickness [16]. This indicates that as gestational age grows, the placenta also grows in its thickness, thus accurately determining gestational age. Another research study reveals the same results that placental thickness has a correlation with the age of gestation [17, 18]. Placental thickness is an important additional factor that can be utilized along with other factors to estimate gestational age [19, 20]. All these studies show that there is a high likelihood (92.3%) that this weak correlation occurred by random chance.

The study is limited by its small sample size and use of convenience sampling, which may limit the generalizability of the findings. The cross-sectional design also restricts the ability to establish causal relationships between pelvic pain and underlying conditions. Additionally, reliance on a single-center setting may not reflect broader population variations. Future research should include larger, multi-center studies with randomized sampling and longitudinal designs to better understand causal pathways and improve diagnostic accuracy and management strategies.

CONCLUSIONS

It was concluded that ultrasonography is a very strong and sensitive indicator towards accurate measurement of the placental location, thickness and its relationship with the gestational age. In the current study carried out in Kharian, Pakistan, it has been revealed that there is a weak positive correlation between placental thickness and gestational age.

Authors' Contribution

Conceptualization: AN
Methodology: AN, SI, NA
Formal analysis: NA
Writing and Editing: SM, NA
Review and Editing: SM, NA, AN, SI, NA

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

The authors declare no conflict of interest.

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Original Article

Focused Assessment with Sonography in Trauma (FAST)

OPEN ACCESS

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ABSTRACT

FAST scan is a protocol of ultrasound used to evaluate patients with free intraperitoneal fluid suffering from blunt trauma to the chest and abdomen. The FAST has become the source of a great deal of attention. **Objectives:** To diagnose free fluid in intraperitoneal, intrathoracic, and pericardial regions in blunt abdominal traumatic patients by using ultrasound. **Methods:** This retrospective cross-sectional study was carried out at Aziz Bhatti Hospital in Gujarat, Pakistan, over three months from Dec 2022 to Feb 2023. A sample size was collected retrospectively with the permission of the relevant authorities. The convenient sampling technique was used. The size of the sample was chosen by looking at previous research. The scan was performed on an Ultrasound Machine (Toshiba Aplio 300) to examine the free fluid. Data were analyzed by SPSS-26. **Results:** The rate of trauma increased in male patients is 37 (67.3%), ranging from 10-70 years of age, rather than in females, which is 18 (32.7%), ranging from 15 to 68 years out of 55. About 50.9% of studies are negative, and 49.1% of the studies are positive. Falls, Vehicle accidents, and blunt Trauma are the most common trauma consequences in patients. **Conclusions:** FAST is a safe, quick, and accurate technique that is helpful in the early assessment of patients with trauma. This use of FAST scan played a vital role in the less use of abdominal CT performed. It is useful in detecting the free fluid in various regions of the body.

INTRODUCTION

The advanced trauma life support (ATLS) training includes a FAST. A recommendation made by an international group of experts for treating trauma patients [1]. Emergency doctors typically perform it to see whether any free fluid is present, since it might be haemoperitoneum [2]. This could enable quick referral to further imaging, such as a computed tomography (CT) scan or surgery [3]. Ultrasound equipment is currently available in most large trauma centers because of the widespread adoption of FAST [4]. In cases of traumatic abdominal injuries, emergency ultrasonography reduces the need for computerized tomographic scans according to a recent Cochrane Review [5]. The FAST test identifies instability that causes pathological disorders such as hemoperitoneum, hemopericardium, hemothorax, and pneumothorax [6]. The FAST examination is a modern and adequate approach employed in emergency treatment. It provides fast and more precise details of the blunt trauma outcomes in the fluid collection in different locations in the body [7]. FAST has been the standard of care and screening tool in several algorithms of both blunt and penetrating trauma in people since the 1990s [8]. Previously, medical practitioners employed diagnostic peritoneal lavage (DPL) to locate hemoperitoneum. Although DPL is an invasive intervention, with a complication rate of 1%, it is also highly sensitive (96% to 99%) and specific (98%) [9]. The sensitivity (95% confidence interval) was 100% (69.2%-100%), and the specificity (55.5%-99.8%) was 90%. Our results indicate that automated detection of free fluid on abdominal ultrasound images could be sensitive and

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specific enough to aid physicians in the interpretation of a Fast [10]. The ultrasonography inspection has, since the 1970s, regularly increased in significance in the prompt evaluation of traumatized patients, and currently, as suggested by ATLS. The examination and treatment of patients have been greatly changed by the use of point-of-care ultrasonography. [11]. In Europe, the use of ultrasonography to detect intraperitoneal fluid was first mentioned in the 1970s [12]. None of the adoptions took until the 1990s to become widely accepted in the US [13]. Some investigations that examined the detection of hemoperitoneum throughout the 1990s reported sensitivities ranging from 69% (11 of 16) to 98% (52 of 53) and specificities from 95% (18 of 19) to 100% (259 of 259) [14]. Several articles on ultrasonography (US) application in trauma emerged in German literature in the 1980s [15]. Trauma is the most common cause of illness and death in Pakistan's emergency and intensive care facilities. While FAST scans are a timely diagnosis of traumatic patients with internal bleeding and injured organs over CT scan. FAST scan is a non-invasive technique. There is limited regional data on how specific sonographic findings correlate with clinical severity among people. This study aims to fill that gap by evaluating the diagnostic value of FAST scan in detecting the fluid in traumatic patients. By analyzing sonological patterns and their association with clinical indications, the study supports more accurate, early diagnosis and better-informed treatment decisions in resource–constrained healthcare.

Trauma remains a leading cause of morbidity and mortality, particularly in emergency settings where rapid diagnosis of internal bleeding is critical. Although FAST (Focused Assessment with Sonography for Trauma) is widely used as a quick, non-invasive diagnostic tool, there is limited regional evidence regarding its diagnostic value and correlation with clinical findings in trauma patients. Existing studies primarily focus on sensitivity and specificity without adequately exploring local sonographic patterns and their clinical implications. . This study aims to assess the diversity of FAST assessments conducted by clinicians and how that affected the utilization of abdominal computed tomography in infants with severe core injuries who were hemodynamically stable [16]. Children with BTT may or may not receive the FAST [17]. FAST's goal is to locate free fluid, which is always blood in severe trauma patients in three different possible body areas, like the pericardial, pleural, and peritoneal spaces. The purpose of focused assessment is to identify the hemoperitoneum in a patient with suspected intra-abdominal injury.

METHODS

This retrospective study was conducted at Aziz Bhatti Hospital, Gujarat, Pakistan. The size of the sample was taken from a previous study [18]. A total of 55 traumatic patients diagnosed were included in this retrospective study conducted at the Gujarat Radiology Department, Pakistan, over three months (December 2022 to February 2023). The sample size was derived from reviewing methodologies from previously published studies. SPSS version 26 was used to analyze the association between the traits and traumatic injuries and internal bleeding of patients. Before enrolling participants, we observed 55 patients with positive and negative FAST scans for free fluid [19]. The convenient sampling approach was utilized to collect data with the permission and subsequent ethical guidelines illustrated by the university research community. The sample size was calculated by the open Epi software. The inclusion criteria were patients of all genders, presented to the emergency department with trauma and suspected internal bleeding. Nontraumatic patients, pregnant women, and those with insufficient clinical records were excluded from the study. All FAST scans were performed independently by two experienced radiologists and skilled sonologists who were blinded to the clinical history of the patients. Discrepancies in interpretations were resolved by consensus. Real-time B-mode imaging is employed in the FAST assessment [20]. The ultrasound machine utilized in carrying out the examination was (Toshiba Aplio 300, curvilinear probe whose frequency range is 2- 5 MHz. SPSS version 26.0 was applied to analyze the data. Descriptive statistics were employed to sum up demographic data, clinical symptoms and results.

RESULTS

The highest frequency of trauma was in male patients, who were 37 (67.3%), with an age group ranging from 10 to 70 years and the rest of the blunt trauma was found in the female, who were 18 (32.7%), with an age group ranging from 15 to 68 years. The commonest fluid accumulation found in various organs or areas of the body of the traumatic patient is Pelvic Ascites 10 (18.2%), Hepatorenal Ascites 2 (3.6%), Abd-pelvic Ascites 11 (20.0%), and Spleenorenal Ascites 4 (7.3%). It also included several patients having no fluid accumulation, 28 (50.9%). There are around 50.9% of studies negative, meaning there is no fluid buildup in various bodily parts. On the other hand, 49.1% of studies are positive. The most occurring trauma causes were fall history 15 (27.3%), Road traffic accidents 23 (41.8%), and blunt Trauma 17 (30.9%) (Table 1).

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Table 1: Gender, Findings of the Scan and History of the Patient

Variables		Frequency (%)
Gender	Male	37 (67.3%)
	Female	18 (32.7%)
	Total	55 (100%)
Findings of the Scan	Pelvic Ascites	10 (18.2%)
	Hepatorenal Ascites	2 (3.6%)
	Abd-Pelvic Ascites	11 (20.0%)
	Spleenorenal Ascites	4 (7.3%)
	Unremarkable	28 (50.9%)
	Total	55 (100.0%)
History	Fall	15 (27.3%)
	Accident	23 (41.8%)
	Blunt Trauma	17 (30.9%)
	Total	55 (100.0%)

DISCUSSION

FAST scan has been the accepted sonographic assessment for trauma victims for approximately 20 years [21]. It has transformed the first care of trauma patients by enabling the early diagnosis of hemoperitoneum and hemopericardium [22]. This scan is quickly taking over the assessment of blunt abdominal injuries [23]. The fundamental FAST scan approach was characterized as the real-time examination of the four thoracic zones (four Ps): pericardial, perisplenic, perihepatic (Morison pouch), and pelvic (Douglas pouch) [24]. The investigation entailed putting the probe in the right upper quadrant of the patient to detect the liver, kidney, and diaphragm, and also checking for blood in the Morison's pouch [25]. Several articles on the application of ultrasonography (US) in traumatology were published in German literature throughout the 1980s [15]. American use then extended to other countries in Europe, including Norway and England, as well as internationally [19]. After blunt trauma, pneumothorax (PTXs) are the most frequent major intra-thoracic injuries. They are a significant cause of avoidable mortality for whom very easy procedures may be life-saving. At least one in five serious blunt trauma patients who are discovered alive have PTXs [26]. Trauma sonography might be used to diagnose problems in space because it was successfully conducted during experimental weightlessness [27]. A positive FAST exam should trigger an exploratory laparotomy due to the increased likelihood of intra-abdominal damage [28]. If the initial FAST exam is ineffective in diagnosing penetrating trauma, additional diagnostic procedures such as LWE, CT, DPL, or laparotomy should be performed [29]. The fluid collection is mostly seen at the sites of the Morison pouch, splenic area, xiphoid area, and a pouch of doglus [30]. FAST has good sensitivity and specificity when screening for free fluid in the abdominal, pleural, and pericardial cavities. For the quick diagnosis of pneumothorax, an expanded FAST scan was created more recently [8]. It is believed that ultrasonography is a trustworthy way to find hemoperitoneum and provides a useful non-invasive way to look at blunt abdominal injuries. The hepatorenal pouch provides the best view of free intraperitoneal fluid [31]. Abdominal computed tomography (CT) was performed after targeted abdominal sonography for trauma-indicated fluid in the splenorenal recess that was problematic for intra-abdominal damage [32]. Recognizing the damaged organ enables a well-planned procedure [33]. On ultrasound, free fluid localization within the context of acute abdominal trauma, and even if additional areas collect fluid on a therapeutically meaningful basis, has been the subject of less investigation. Current FAST scanning techniques indeed have certain limits, especially when it comes to closed renal damage, pelvic fractures, and duodenal injuries [34].

The study is limited by its small sample size, retrospective design, and use of convenience sampling, which may affect the generalizability and reliability of the findings. Additionally, being a single-center study, the results may not represent broader clinical settings. The lack of comparison with gold-standard imaging techniques such as CT scan may also limit diagnostic validation. Future research should involve larger, multi-center prospective studies with standardized protocols and comparative analysis to enhance the accuracy, reliability, and clinical applicability of FAST in trauma care.

CONCLUSIONS

It was concluded that FAST is an easy, rapid, and very helpful diagnostic technique for traumatic patient's treatment and diagnosis. This ultrasound strategy was created to check for hemoperitoneum and hemopericardium. A convenient ultrasound approach called FAST was developed to treat common life-threatening wounds in traumatized individuals. In our sample, we discovered that the absence of a significant cause of damage, hypotension, or an urgent need for intubation disqualified this diagnosis. Adult trauma patients with positive FAST results usually have free fluid in the LUQ.

Authors' Contribution

Conceptualization: AAA
Methodology: MA, AAA
Formal analysis: TAA
Writing and Drafting: UTK, MA
Review and Editing: MA, AAA, TAA, UTK, MA

All authors approved the final manuscript and take responsibility for the integrity of the work.

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Conflicts of Interest

The authors declare no conflict of interest.

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Original Article

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High-Resolution Computed Tomography in the Detection of Lung Abnormalities

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ABSTRACT

Lung disease is a major global issue. High-resolution computed tomography is the best modality for detecting lung abnormalities. **Objective:** To evaluate lung abnormalities on high-resolution computed tomography (HRCT) and assess the progression of fibrosis. **Methods:** It was a retrospective analysis of HRCT Findings in Lung Abnormalities at a tertiary Care Centre in Sargodha. A sample size of 50 was collected, reviewed retrospectively. The convenient sampling technique was used. This research included patients who visited the CT department for the diagnosis of lung disease. The study included emphysema, bronchiectasis, chronic obstructive disease, interstitial lung disease, and fibrosis, and the study excluded pneumonia, sarcoidosis, bronchitis, pulmonary hypertension respiratory tract infections. **Results**: A statistical analysis using SPSS version 23.0 was conducted to examine the relationshipsbetween these variables and the occurrence of lung abnormalities. The majority were 50 patients, of whom 54% were males and 46% were females. In the current study, interstitial fluid was 14%, Bronchiectasis and pneumonia were 22%, and fibrosis and pulmonary nodules were 14%. A significant relationship was noted between bronchiectasis and the patient according to age. **Conclusions:** The study concluded that the lung cancer that affects the lungs and alters the tissues and airways of the respiratory system is bronchiectasis. High-resolution computed tomography provides an accurate diagnosis of lung diseases.

INTRODUCTION

Unhealthy disease is a condition that affects the lungs and prevents them from functioning normally [1]. The airways are the tubes that transport oxygen and other gases into and out of the lungs. Hence, diseases of the airways impact these tubes. Asthma, chronic obstructive pulmonary disease (COPD), bronchitis, and bronchiectasis are among the diseases of the airways, which are also the main disorders for persons with cystic fibrosis [2]. Lung tissue diseases have an impact on the tissue's structure. Scarring or tissue inflammation prevents the lungs from expanding completely. Lung circulation disorders influence the blood vessels in the lungs. They appear as a result of inflammation, scarring, or blood vessel clotting. The lungs' ability to take in oxygen and expel carbon dioxide is impaired by them [3]. A CT scan is diagnostic imaging that captures pictures of the interior of the body using X-ray technology. CT has many different views of the same organ or structure and provides much greater detail [4]. High-resolution computed tomography, or HRCT, is a form of CT that uses certain methods to improve picture resolution. HRCT imaging parameters are chosen to maximize spatial resolution, and a narrow slice width is used (typically 1-2 mm) at intervals of 10mm to 20mm throughout the lungs [5]. For the identification of diffuse lung illness, high-resolution CT (HRCT) scans taken with patient's supine are frequently sufficient. Nevertheless, to identify or rule out mild illness in the posterior region of the lung, further scans taken while the patient is prone may be required. The scan could be carried out during both inspiration and expiration, depending on the probable diagnosis [6]. The scan for an

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expiratory HRCT is performed while lying flat. An HRCT of the lungs is used for the evaluation of clinically suspected diffuse lung disease and suspected small airway disease [7]. The HRCT of the lungs has no definite limitations. Lung infection is obliterating millions of families around the world. Many people are enduring lung diseases [8]. CT is used to diagnose the most frequent lung disease by assessing the lung parenchyma. Interstitial lung illnesses, including pulmonary fibrosis, interstitial pneumonitis, and other generalized lung diseases like emphysema, are diagnosed on HRCT. Emphysema damages the air sacs in the lungs. Bronchiectasis is a condition where the airways of the lungs become widened, leading to a buildup of excess mucus that can make the lungs infected. Chronic obstructive pulmonary disease is caused by obstructed airflow from the lungs. Lung abnormalities are diagnosed and evaluated by using HRCT [9]. HRCT uses thin-section CT images (1.5-mm slice thickness) with a high spatial frequency reconstruction algorithm used to determine the diseases that involve the pulmonary parenchyma and narrow airways [10]. The advancement of multi-detector CT is used by machines that can gather near-isotropic data across the complete thorax in a single breath-hold [11]. HRCT is done by using MDCT scanners that can image at full resolution while maintaining extremely quick coverage, overcoming this dependency. High-Resolution Computed Tomography (HRCT) is an important diagnostic tool for lung abnormalities because it can generate high-quality, high-resolution images of the lung parenchyma. HRCT has the advantage of being able to identify subtle alterations in the structure of the lungs, unlike conventional chest X-rays, and is thus exceedingly useful in the early diagnosis and description of interstitial lung diseases (ILDs), emphysema, bronchiectasis, and small airway disease [12]. Its accuracy enables clinicians to recognize the type, degree, and pattern of abnormalities, which is important for proper diagnosis, tracking disease progression, and assessing treatment response. HRCT also plays a vital role in discriminating among a range of lung pathologies that can present with similar symptoms, thus influencing proper clinical management. Being non-invasive and comparatively expeditious, HRCT markedly increases diagnostic accuracy and aids in more informed clinical decision-making in respiratory medicine [13]. HRCT gives meticulous visualization of lung parenchyma, alveoli, bronchioles, and interstitial tissues and is therefore uniquely capable of assessing conditions like ILD, pulmonary fibrosis, sarcoidosis, emphysema, and bronchiectasis. HRCT is also very important in guiding clinical management by enabling clinicians to decide on the nature and extent of lung abnormalities, choose further investigative procedures such as biopsy, follow disease progression or response to therapy, and determine prognosis. Being non-invasive and a rapid imaging modality, HRCT provides a patient-friendly experience while providing accurate diagnostic information. Additionally, it helps in differential diagnosis by differentiating among lung diseases with almost identical clinical presentation, thereby enhancing overall diagnostic accuracy and leading to better outcomes for the patients [14].

Lung diseases remain a major global health burden, requiring accurate and early diagnostic tools for effective management. Although High-Resolution Computed Tomography (HRCT) is considered highly sensitive for detecting lung abnormalities, there is limited local evidence regarding its diagnostic patterns and disease distribution in Pakistani populations. Existing studies often use small sample sizes and lack detailed correlation between HRCT findings and demographic or clinical variables. Therefore, this study aims to evaluate the spectrum of lung abnormalities detected on HRCT and assess their association with patient characteristics to improve early diagnosis and clinical decision-making.

METHODS

It was a retrospective study conducted at Sargodha, Pakistan. A sample size of 50 was considered from the relevant published studies [15]. In this study, the convenience sampling method was used. This research comprised the patients who visited the CT department for the diagnosis of lung disease. Data were gathered over six months, from November 2022 to March 2023, under approval of the University Research Committee's Ethical guidelines. Patients registered their age, gender, and type of examination, and procedure details were to be recorded. The study included emphysema, bronchiectasis, chronic obstructive disease, interstitial lung disease, and fibrosis, and the study excluded sarcoidosis, bronchitis, pulmonary hypertension respiratory tract infections. A Toshiba Alexion 16 CT Scanner was used. Data were analyzed using SPSS version 23.0. Graphs and tables were used for data summarization.

RESULTS

In the present investigation, CT was used to analyze 50 individuals with lung abnormalities to look for other illnesses that were present. Utilizing SPSS, the associations between these traits and the incidence of lung abnormalities were examined using statistical analysis. There are 50 patients in this research, of whom are men and of whom are women. The gender of the patients (46%) was female, and (53%) were male (Figure 1).

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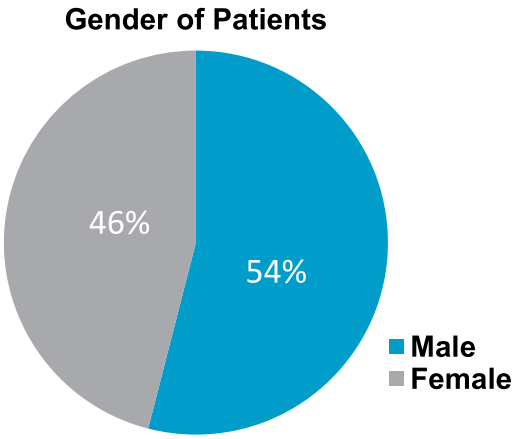

Figure 1: Gender of Patients

The Frequency distribution of the patients indicates that most are middle-aged, particularly the age group of 35–55 years (26%). Both the age groups 25–35 and 55–70 account for 22% each. There are fewer patients in the youngest (16%) and oldest (14%) age groups (Table 1).

Table 1: Frequency Distribution of Age of Patients

Age of Patients	Frequency (%)
Less Than 25	8 (16.0%)
25-35	11 (22.0%)
35-55	13 (26.0%)
55-70	11 (22.0%)
More Than 70	7 (14.0%)
Total	50 (100.0%)

Frequency distribution of indications in which 14 patients (28% of patients) which affected by chest pain, 5 patients (10 patients) which affected by shortness of breath, 10 patients (20% of all patients) which affected by cough, and 5 patients (10 patients) which affected by fever (Figure 2).

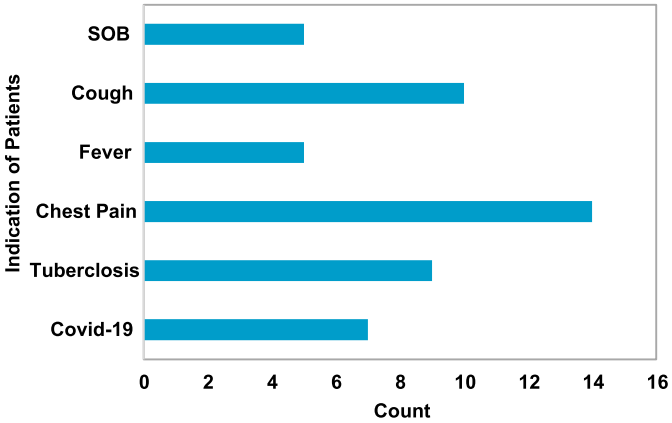

Figure 2: Frequency Distribution of Indications of the Patient

14% had intestinal fluid, 22% had bronchiectasis and pneumonia, and 14% had fibrosis and pulmonary nodules 14%. A significant relationship was noted between bronchiectasis and the patient's age (Table 2).

Table 2: Frequency Distribution of Diseases of the Patient

Diseases	Frequency (%)
Fibrosis	7 (14.0%)
Interstitial Fluid	7 (14.0%)
Bronchiectasis	11 (22.0%)
Pulmonary Nodules	7 (14.0%)
Pneumonia	11 (22.0%)
Perihilar Brachial Wall Thickening	7 (14.0%)
Total	50 (100.0%)

The age group was descriptive analysis of bronchiectasis, 11 out of 50 patients had bronchiectasis, with the majority in the age group 55–70 (5 cases) and 35–55 (4 cases). Single 1-case appearance was in the "less than 25" and "over 70" groups, and none in the 25–35. This speaks of increased prevalence among middle-aged and elderly adults (Table 3).

Table 3: The Age Group with Bronchiectasis

Age of Patients	The Age Group with Bronchiectasis		Total
	Yes	No	
Less Than 25	1	7	8
25-35	0	11	11
35-55	4	9	13
55-70	5	6	11
More Than 70	1	6	7
Total	11	39	50

DISCUSSION

Lung illnesses are affecting millions of people worldwide. There are various kinds of lung diseases, but the most common diseases are Asthma, chronic obstructive pulmonary disease (COPD), bronchitis, and bronchiectasis. Interstitial lung illnesses, including pulmonary fibrosis, interstitial pneumonitis, and other generalized lung diseases like emphysema [15]. High-resolution CT is carried out with standard CT scanning. The choice of imaging settings, however, maximizes spatial accuracy. CT with high clarity is called high-resolution computed tomography, or HRCT. Although most frequently used to diagnose pulmonary illnesses, it is also used to diagnose several other health issues. It entails evaluating the lung tissue using specialized computed tomography scanning methods [16]. The investigation revealed that computed tomography was advantageous in evaluating lung diseases, structure, and anatomy due to its accessibility, lack of need for a contrast agent, and high clarity. Radiology techs also benefit from focusing on skills and understanding the differences between pathological and typical lung characteristics [17]. The researcher will go into more detail about the results of this study, which was conducted to measure the accuracy of CT in the diagnosis and classification of lung abnormalities. Table 1 and Figure 1 exhibit the subject and gender according to the age of the group. Similar findings indicate that the most common

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high-resolution lung CT findings are bronchiectasis (22%), fibrosis (14%), pneumothorax (22%), and pneumonia (22%). 27 male (54%) and 23 female (46%) make up the distribution [18]. The present study shows that the majority of patients, 11(22%), suffer from bronchiectasis as compared to the pulmonary nodules. In the current study, 14 patients (28% of patients) which affected by chest pain, 5 patients (10 patients) which affected by shortness of breath, 10 patients (20% of all patients) which affected by cough, 5 patients (10 patients) which affected by fever, and 19 patients (14% of all patients) which affected by covid-19 are the signs and symptoms of the study [19]. As shown in the table, bronchiectasis is more common in age groups greater than 55 years in high-resolution chest CT [5]. According to earlier investigations, axial and coronal HRCT were used to diagnose lung abnormalities, and the findings demonstrated that these scans were quite clear and offered a great deal of information. The most common lung disorders are more likely to occur between the ages of 25 and 70, as shown in the table. This pneumonia is large in terms of percentage. In our study, bronchiectasis (22%) is significant owing to a variety of environmental factor [20]. The study is limited by its small sample size, single-center design, and use of convenient sampling, which may affect generalizability of the findings. Additionally, the retrospective nature restricts causal inference and detailed clinical correlation. Future studies should involve larger, multicenter populations with prospective designs to enhance validity and reliability. Incorporating advanced imaging techniques and correlating HRCT findings with clinical outcomes and pulmonary function tests is also recommended for more comprehensive evaluation

CONCLUSIONS

In conclusion, computed tomography is reliable for the detection of lung abnormalities. The current investigation, done on patients in Sargodha, Pakistan, discovered that bronchiectasis is the main disease that affects the lungs and changes the tissues and airways of the respiratory system.

Authors' Contribution

Conceptualization: MA
Methodology: MA
Formal analysis: AAA
Writing and Drafting: MJ, MA
Review and Editing: MA, AAA, MJ

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

The authors declare no conflict of interest.

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