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Original Article

Assessment of Liver Diseases Using Triphasic Computed Tomography

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ABSTRACT

The triphasic spiral liver computed tomography (CT) method is a standard way to find and describe a wide range of benign and cancerous liver lesions. This helps bring down the rates of death and illness among people with liver disease. **Objective:** To evaluate liver diseases in real time using Triphasic imaging procedure. **Methods:** A cross-sectional study was carried out at Al-Amin Diagnostic Center, Chattha Hospital, and Gondal Hospital. Before Triphasic CT Scan, each patient completed a form of written informed consent. A total of 65 people were examined. All diagnosed with various liver illnesses, as well as their findings were reviewed using Triphasic liver CT Scan. The typical patient was 53.5 years old. Patients' eligibility was determined using inclusion criteria. **Results:** The majority of data population was male 39 (60%) and female 26 (40%). The majority of the findings included Portal vein thrombosis 6 (9.2%) liver lesion 5 (7.7%), ascitis 3 (4.6%), cirrhosis of liver 6 (9.2%), Hepatocellular carcinoma 12 (18.46%), Dilated CBD 4 (6.2%), cholilithiasis 8 (12.3%), portal hypertension 5 (7.7%), hepatic Mets 6 (9.2%), Hepatic contusion 6 (9.2%), Right lobe nodules 3 (4.6%), segment 8 tumor 1 (1.5%). **Conclusions:** Computer tomography is a useful modality for identifying liver pathology. sixty-five patients in this study were aged 30-84 years (60%) male and (40%) female and were found to have a greater incidence of hepatic cellular carcinoma in the liver (12) (18.46%) and it is more affected in males than females.

INTRODUCTION

Although hepatic lesions are difficult to detect using only imaging criteria, certain localised liver lesions exhibit typical ultrasonic and computed tomographic (CT) characteristics. The role of multiphasic contrast-enhanced dynamic computed tomography (CT) of the entire liver has been studied in the assessment of patients with liver illness. It is crucial to remember that identifying benign, metastatic, and primary malignant lesions is the main objective of imaging the liver. The ideal imaging method for the treatment of localised liver disease is still up for debate [1]. The diagnostic performance of liver imaging is significant because the liver is a typical location of metastatic spread in patients with a history of known or suspected malignancy, as well as in patients with chronic liver disease who are at risk of developing carcinoma. The detection and classification of liver lesions should be a part of liver imaging techniques given the prevalence of benign liver lesions [2]. Due to its finest spatial resolution, CT can scan the entire liver in a single breath-hold. It is a fantastic approach to check the entire pelvis and abdomen. Recent developments in CT technology, such as helical CT and multidetector-row helical CT, have enhanced the performance of CT scanners in terms of acquisition speed, resolution, and the ability to image the liver more exactly throughout various stages of contrast enhancement than was previously possible [3]. The three-dimensional (3D)

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images of the liver vasculature can now be obtained during CT angiography in order to map the hepatic vascular architecture and define the volume of the liver and tumour. This is made possible by improvements in image post-processing and reconstruction technologies. Intravenous iodinated contrast agents are frequently used in liver imaging [4]. By increasing the contrast between focal liver lesions and healthy liver, they make it simpler to spot focal liver lesions. They also serve to describe liver lesions based on the enhanced patterns of those lesions throughout different stages of contrast circulation in the liver [5]. CT is sufficient for the majority of clinical indications when performed properly. One of its drawbacks is that it requires a lot of radiation and only has a small amount of sensitivity for identifying and describing tumours smaller than 1 cm [6]. People with a history of contrast agent allergies or renal insufficiency shouldn't undergo contrast-enhanced CT scans. A cutting-edge tool for liver lesion biopsies is CT fluoroscopy [7]. Currently available multiline CT fluoroscopy systems provide real-time needle monitoring during biopsies, which may increase the yield of biopsies and shorten the time required to complete a biopsy while maintaining an acceptable radiation dosage [8]. Focal hepatic lesions are any liver lesions that aren't the typical parenchyma and might vary in size. Both malignant and benign tumours are possible. The frequency of various liver lesions varies significantly by population and area [9]. Despite the fact that the background of hepatic imaging has recently changed as a result of the advancement of diagnostic radiologic techniques, patients may not be able to receive effective therapy if an early disease diagnosis is inappropriate [10]. Diagnostic performance for both early identification and characterization of small liver lesions is insufficient, even when using computed tomography (CT) and magnetic resonance (MR) imaging modalities. Therefore, it is critical to improve morphology-based CT and MR imaging with contrast agents for the quick identification and diagnosis of hepatic disease [11]. Because it allows for picture acquisition at maximum enhancement of the hepatic cells during a single breath-hold, spiral computed tomography (CT) has quickly become the preferred CT technique for routine liver assessment. The quick data collection permits for successive scanning of the entire liver at various stages following contrast material injection, allowing for the performance of a multiphase hepatic CT as well [12]. Recent studies have shown that adding arterial phase imaging to portal venous imaging enhances lesion recognition, especially in the presence of hypervascular lesions like hepatocellular carcinoma (HCC) [13]. Using computed tomography has tremendously aided in the diagnosis of liver problems (CT). The underlying mechanisms that enable the CT detection of hepatic cancers, however, have received very little attention. The relationship between the CT number and the different kinds of lesions in the liver tissue hasn't obtained much attention in the literature. Such lesions have traditionally only been subjected to pathologic analysis during CT exams [14]. In the current study, the Hounsfield number was investigated in connection to liver lesions. The Hounsfield number is a standardized value of the computed x-ray absorption of a pixel and a standardised indication of x-ray attenuation used in CT imaging. We also examined the relationship between CT findings and underlying reasons in the current investigation, as well as a triphasic spiral CT method that permitted imaging of the liver in arterio, portals, and stability phases [15]. Numerous studies have been carried out in various regions of the world to learn how triphasic CT scans can recognise and categorise lesions. We carried out this research to explain the function of triphasic CT scan in localised liver lesions and to assess its diagnostic usefulness because, as far as we are aware, no data have been published locally [16]. The complete liver parenchyma and hepatic lesions can be imaged using a triphasic spiral CT technique in the current study. This technique can scan the liver in arterial, portal, and equilibrium phases [17]. The phase's sensitivity for lesion identification and the additional information on lesion vascularity that may help to define the nature of lesions were the basis for the protocol's justification. To describe various liver lesions, the study used triphasic spiral liver CT [18]. The complete liver may be imaged in the arterio, port, and equilibria phases using the triphasic spiral CT technique that was examined in this work [19]. According to the protocol, the portal phase is crucial. The lymphatic phase is the least sensitive phase, and the arterial phase is the most sensitive phase for detecting lesions. The vascularity of the lesion can be better understood through the phases of equilibrium, which may help in determining the type of lesion. It is crucial to recognise and categorise hypervascular lesions using vascular hemodynamics [20].

METHODS

The data were collected from gondal hospital and al-amin diagnostic center Gujranwala pakistan in time since may 2022 to august 2022. The research includes gujranwala population. 65 patients, both male and female, ranging in age from 30 to 90 years, completed the triphsic scan protocol. A 16-detector row CT scanner (general electoral (GE)) was used to scan all patients. Assess the clinical condition and medical history, including the study's

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indication. contrast allergies renal failure, etc. The total quantity of contrast is which automatically determines the weight factor dosing technique is used to determine the contrast medium dose for each patient based on their weight.. Scan the region from the diaphragm's lower border to the pubic symphysis. The patient is supine. foot first Raise your hands over your head. The scan is carried out during normal inspiration. zero gantry angle The slice thickness was set at 10 mm throughout the abdomen. To obtain the best HU from the ROI, the arterial phase was performed 30-35 seconds following the contrast injection and the port venous phase was performed 50-60 seconds after bolus monitoring and delayed phase was performed after 5 10 minutes following contrast administration utilising SMART PREP.

RESULTS

A 16-detector row CT scanner (general electoral (GE)) was used to scan all patients. Assess the clinical condition and medical history, including the study's indication. contrast allergies renal failure, etc. The total quantity of contrast is which automatically determines the weight factor dosing technique is used to determine the contrast medium dose for each patient based on their weight. The age group of patients show that 52-62 years old are more frequent. The patients include more males than females. The patients with weight group between 56-66 having the highest weight percentage (41.54%) and the weight group between 89-99 having the lowest weight percentage (1.538%). The frequency distribution of pathology finding in our study the patients with HCC having the highest percentage (18.46%) and patients with segment 8 tumor having the lowest percentage(1.53%)(Table 1).

Age	n(%)
30-40	15(23.1)
41-50	13(20.0)
52-62	20(30.8)
63-73	12(18.5)
74-84	5(7.7)
Total	65(100)

Table 1: Showed the age distribution of all patients with liver diseases

In our study, the age group between 52 and 62 had the highest patient frequency (30.77%), while the age group between 74 and 84 had the lowest patient frequency (7.69%), Figure 1.

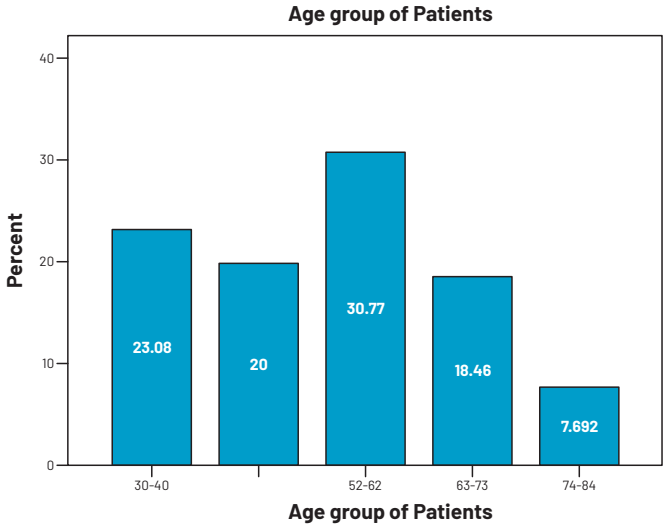

Figure 1: Patients' age groups were depicted on an X-axis, and percentages were shown on a Y-axis

Gender	n(%)
Female	26(40)
Male	39(60)
Total	65(100)

Table 2: Showed the gender distribution of all the patients with liver disease

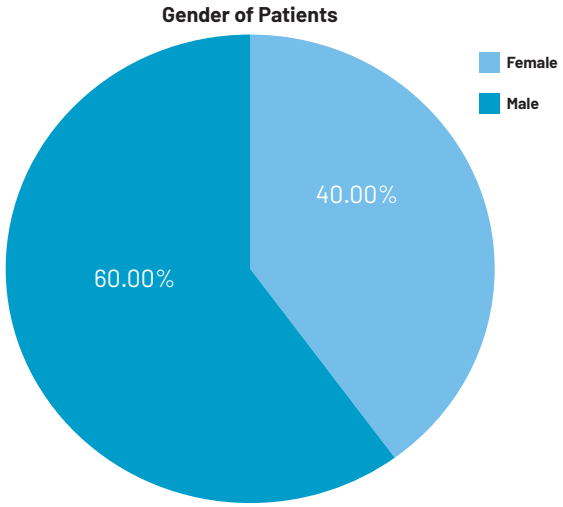

Figure 2: Show gender distribution of patients with liver diseases.in our study males (60.00%) are more afflicted than females(40.00%)

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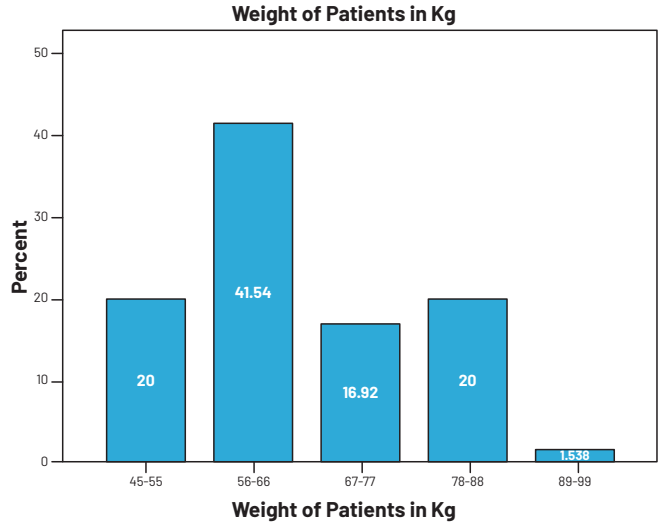

Figure 3: Representing the weight of all patients on X-axis and their percentageon Y-axis.in our study the patients with weight group between 56-66 having the highest weight percentage (41.54%) and the weight group between 89-99 having the lowest weight percentage(1.538%).

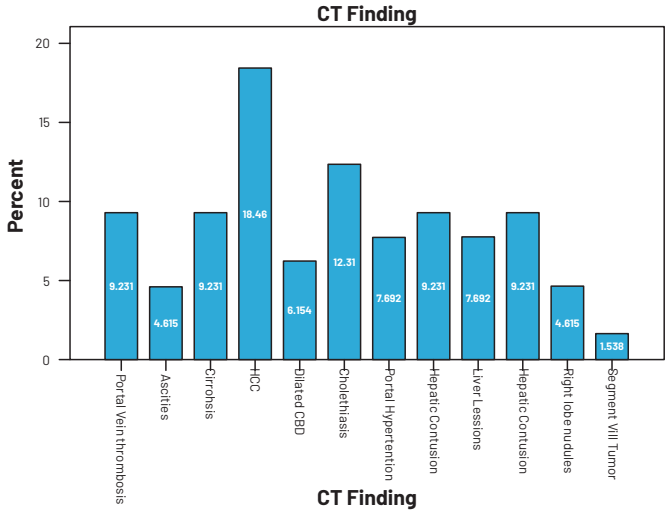

Figure 4: Show frequency distribution of pathology finding in our study the patients with HCC having the highest percentage (18.46%) and patients with segment 8 tumor having the lowest percentage(1.53%).

DISCUSSION

This study evaluated the Triphsic abdominal (liver) protocol in order to determine the best time to conduct the contrast investigation. The liver and any associated diseases are scanned using the triphasic CT abdomen protocol (arterial phase, portal venous phase in addition to the delayed phase). This study was conducted in Gujranwala, Pakistan, from January 1st to July 15th. A total of 65 patients were chosen at random from the research population to constitute the sample unit in this investigation. The majority of of the affected age in this study is between 52-62 years. in our study age group between 52-62 (30.77%) having the highest patient frequency and the age group between 74-84 (7.69%) having the lowest patient frequency.and the age group between 30-40, 41-51 and 63-73 having the patient frequencies 23.08%, 20% and 18.46% respectively.In current study the weight groups of the patients which are affected by liver diseases are between (45-55), (56-66), (67-77), (78-88), (89-99) having frequencies of 20%, 41.54%, 16.92%, 20%, 1.538% respectively. The weight group between (56-66) 41.54% has the highest frequency and the weight group between (89-99) 1.538% has the lowest frequency. In this study the volume of contrast media which is used having the range between 70-80(26.15%), 81-91(41.54%), 92-102 (32.31%). The volume group between 81-91(41.54%) has the maximum frequency and the volume group between 70-80 (26.15%) has the minimum frequency. The majority of data population was male 39 (60 percent) and female 26 (40%), and most published publications said that males are more likely than females to have live tumours and illnesses as mentioned by Ismail *et al.*, in the investigation of liver diseases using Computed Tomography in sudanese patients.[21] Whereas this study demonstrated that the majority of the findings included Portal vein thrombosis 6 (9.2%) liver lesion 5 (7.7%), ascitis 3 (4.6%), cirrhosis of liver 6 (9.2%), hepatocellular carcinoma 12 (18.46%), dilated CBD 4 (6.2%), cholilithiasis 8 (12.3%), portal hypertension 5 (7.7%), hepatic Mets 6 (9.2%), hepatic contusion 6 (9.2%), right lobe nodules 3 (4.6%), segment 8 tumor 1 (1.5%). The current study agreed with Karahan *et al.*, who found that hepatocellular carcinoma is common in Sudan. Which was agreed with current [22]. According to Hafeez *et al.*, they wanted to find out how well triphasic spiral CT could distinguish between benign and malignant liver lesions with localised tumours. According to the current study, liver lesions (N=05) were the least common findings in triphasic liver ct-protocol, and 45 individuals were identified to have 11 benign and 125 malignant liver lesions utilize different enhancing approaches [23]. Also Torres *et al.*, found the cirrhosis of liver as a common finding in triphasic CT-Scan in 4% patients which are selected for study which was in line with the most recent study, which demonstrated that cirrhosis is common in 4 patients having frequency of 6.2% [24].

CONCLUSIONS

A useful modality for detecting liver pathology is computed tomography. It was discovered that men had a higher incidence of hepatic cellular carcinoma in the liver than women.

Conflicts of Interest

The authors declare no conflict of interest

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