**ORIGINAL ARTICLE**

# To Determine the Frequency of Hepatocellular Carcinoma in Hepatitis C Patients on Computed Tomography

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## ABSTRACT

**Background:** HCC is the third most common cause for cancer death in the world and responsible for approximately one million deaths each year. The chronic hepatitis C virus infections is associated almost 80% of HCC cases. On CT we performed a triple-phase protocol which includes early arterial phase, late arterial phase and a portal venous phase.
**Aim:** To determine the frequency of hepatocellular carcinoma in hepatitis C patients on computed tomography.
**Methodology:** In this descriptive study, 138 patients of Hepatitis C with Hepatocellular carcinoma were selected with age and gender discrimination by convenient sampling at Department of Radiology, Gulab Devi Hospital Lahore. 64 slices Computed Tomography Toshiba Asteion machine was used.
**Results:** Out of 138 patients in which 57(41.3%) were females and 81(58.7) were males. 56(40.6%) patients out of 138 patients had ascites, 129(93.5%) patients had cirrhosis, 29(21%) patients had shrunken liver, 138 patients had hepatitis C, 51(37%) patients had portal hypertension, 119(86.2%) patients had hyper vascular Mets and 91(65.9%) patients had hepatocellular carcinoma.
**Conclusion:** In this study we conclude that males are detected more than females on computed tomography with hepatocellular carcinoma. Out of 138 hepatitis C virus patients, 91 patients had hepatocellular carcinoma.
**Keywords:** Hepatocellular carcinoma, Multi-detector Computed Tomography, Portal venous phase.

## INTRODUCTION

The fifth most common cancer as well as third most common cause of cancer death in the world is Hepatocellular carcinoma. The patients with chronic hepatitis C viral infection are the major cause of death which is approximately one million every year. The abnormal growth of hepatocyte cells leads to Hepatocellular carcinoma, hepatocyte derived from Greek word hepat or hepato which used for liver. Crossing epidemic lines indicates that the major risk factor that develops the HCC is the persistent infection with the hepatitis C virus. In the next two decades rate of HCC is expected to very high due to Hepatitis C infection, secondary cirrhosis. Its very difficult to detect HCC at an early stage for better clinical outcomes. Cholangio-carcinomas, hepato-blastoma are also liver cancer types but HCC almost contributes 90% of all liver cancers. HCC proceeded almost due to chronic liver inflammation, liver cirrhosis or hepatitis C or hepatitis B are the reasons behind it[2].

The background of HCC patients is chronic liver disease and cirrhosis approximately 70-90%. Alpha 1-antitrypsin deficiency and hemochromatosis increase the rate of development of HCC. Other major risk factors which can lead to HCC or increase the chances of developing HCC are alcoholic liver disease, intake of aflatoxin, diabetes, contaminated food, non-alcoholic steato-hepatitis, certain hereditary conditions, metabolic disorder, hormonal disorder[3].

Patients with cirrhosis or chronic hepatitis C require regular surveillance for HCC[4]. Usually HCC is a hypervascular tumor and our ability is increased to detect HCC by helical computed tomographic (CT) scanning of both hepatic arterial phase and portal venous phase[5]. Diagnosis of HCC is preferred by using non invasive methods which compromise the impact of histological diagnosis. In cirrhotic patients HCC can be diagnosed non-invasively due to radiological findings if imaging characteristics are present. HCC was diagnosed by biopsy and conventional angiography which is replaced by readily available diagnostic methods as CT, MRI and contrast enhanced Ultrasound[6]. Due to advancement and development of imaging modalities such as Ultrasound, CT and MRI, early diagnosis of HCC is possible in the screening patients which are at high risk for HCC[7].

Patients with HCC are preferred to visualize on ultrasound which have chronic liver disease and if there is any detection of lesion/lesions can be seen by advance imaging tests as CT scan or MRI etc. The benefits to use US are as it is of low cost, non-invasive, high specificity and high availability but on the other hand it also has some disadvantages as low sensitivity which is depends on the operator. So ultrasound should always consider as screening test for suspected HCC or chronic liver disease patients. CT and MRI are used to diagnose HCC but contrast enhanced ultrasonography also be a option to diagnose HCC. Imaging structures of HCC may be appeared variable as mostly small focal HCC appears hypoechoic compared with normal liver, larger lesions which are heterogeneous due to fibrosis, calcification, fatty changes and necrosis. A peripheral halo of hypo-echogenicity may be seen with focal fatty sparing, mostly diffused lesions are very difficult to distinguish or identify from background cirrhosis. To evaluate HCC in patients with liver lesions detected by abnormal ultrasonography go for MRI. Appearance of HCC on MRI varies depending upon multiple factors as hemorrhage, histological patterns,

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degree of fibrosis, degree of necrosis as well as amount of fatty changes[8].

At this time, it is easy to achieve acquisition time from two to eight times faster than previously available equipment due to multi-detector row helical CT scanners and almost whole liver can be examined in 10 seconds approximately[9].

The appearance of HCC on non-enhanced CT is variable and depends on the parenchyma of liver surrounding and etiolgy of chronic liver disease. According to standard a liver should be examined tri-phasically as a plain, a late-aterial and porto-venous phase. Delayed phase start after giving contrast agent within 3 to 5 minutes to demonstrate pathologic tumors or pathologies.[10] On non-enhanced CT images liver appear hypo-dense or iso-dense to liver and may appear hyper-dense when they developed in the fatty liver background. PVTT portal vein tumor thrombosis modifies typical imaging features because it is a well known complication of HCC[6]. Multi-detector CT allow the fast imaging, thin section imaging, high quality imaging and 3D reconstruction with higher spatial regulation than that MRI. Fast injection rate 4-8ml/s gives more appropriate enhancement during hepatic arterial phase and also increased the liver lesions sensitivity of CT scan.[11]

## METHODS

This descriptive study was conducted in Gulab devi hospital. In this study we include 138 male and female patients aged between 26 to 100 years were performed the tri-phasic CT scan. In this scan we performed hepatic arterial phase, portal venous phase, and delayed phase by using a multidetector row helical scanner (64 slice Toshiba Asteion) with the 0.5 seconds of the gantry rotation time. To every patient we gave them approximately 600 mL of tap water to drink as an oral contrast agent before CT scan. We gave every patient nonionic contrast material intravenously by power injector at a rate of 5 mL/sec.[12] Pre-tested questionnaire was used to collect data while Microsoft excel and SPSS version 21.0 were used to record and analyze the data.

## RESULTS

Out of 138 patients in which 57(41.3%) were females and 81(58.7) were males. 56(40.6%) patients out of 138 patients had ascites, 129(93.5%) patients had cirrhosis, 29(21%) patients had shrunken liver, 138 patients had hepatitis C, 51(37%) patients had portal hypertension, 119(86.2%) patients had hyper vascular Mets and 91(65.9%) patients had hepatocellular carcinoma. Table 1 shows the mean age of the patients was 58.29±11.96 years. The minimum age was 26 and the maximum age was 100. Table 2 shows the frequency distribution of hepatocellular carcinoma comprise of total number of 138 patients with hepatitis C virus in which 91(65.9%) patients had shown hepatocellular carcinoma and 47(34.1%) had not hepatocellular carcinoma. Graph 1 shows the frequency distribution of cirrhosis comprise out of total number of 138 patients in which 129(93.5%) had cirrhosis and 9(6.5%) had not cirrhosis. In Table 3 from 138 patients, 29 (56.9%) patients had HCC and portal hypertension, 22 (43.1%) patients had portal hypertension but didn't have HCC, 62 (71.3%) patients had HCC but didn't have portal hypertension and 25 (28.7%) patients didn't have HCC and portal hypertension. Graph 2 shows the frequency distribution of shrunken liver comprise out of total number of 138 patients in which 29(21%) had shrunken liver and 109(79%) had not shrunken liver.

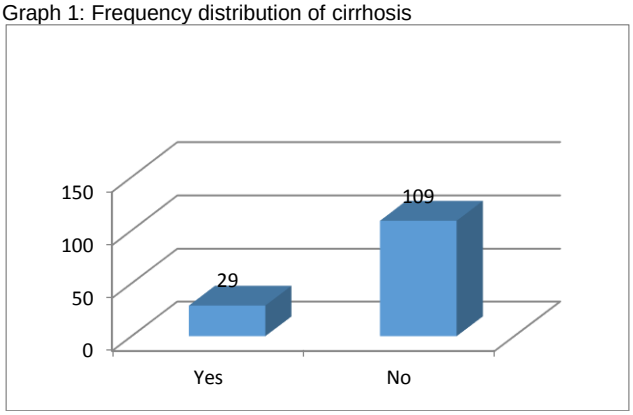
Table 1: Frequency distribution of Age descriptive statistics

| N | Range | Min. | Max. | Mean | Std. Deviation |
|---|---|---|---|---|---|
| 138 | 74.00 | 26.00 | 100.00 | 58.2971 | 11.96187 |

Table 2: Frequency distribution of Hepatocellular carcinoma

| | Frequency | Percent |
|---|---|---|
| No | 47 | 34.1 |
| Yes | 91 | 65.9 |
| Total | 138 | 100.0 |

Graph 1: Frequency distribution of cirrhosis




Graph 2: Frequency distribution of Shrunken Liver

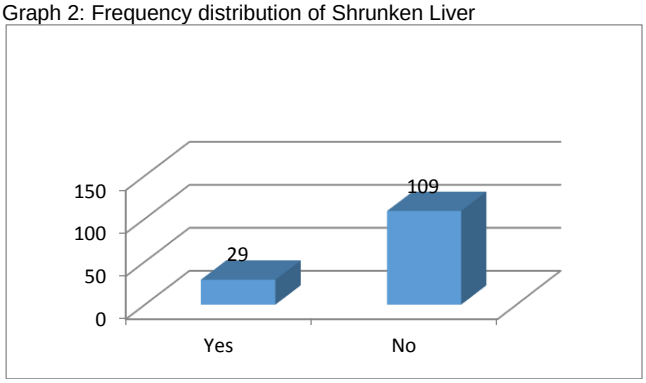



Figure 1: Arterial/Venous Phase of abdominal scan shows cirrhosis/ascites/ shrunkrn liver/portal hypertension/hypervascular mets/ HCC

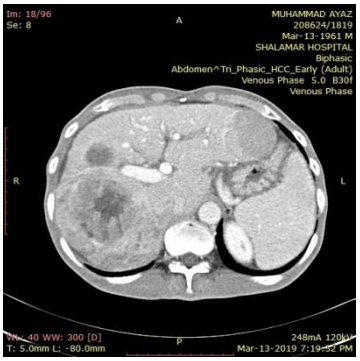


Figure 2: Arterial / Venous Phase of abdominal scan shows cirrhosis/ ascites/ shrunkrn liver/ portal hypertension/ hypervascular mets/ HCC

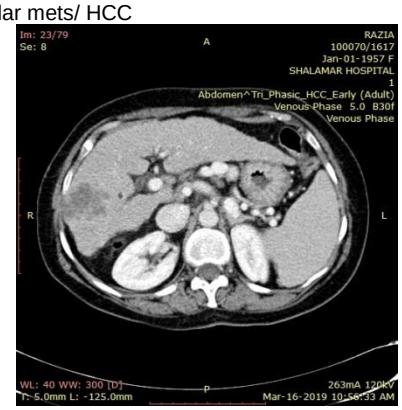



Figure 3: Arterial / Venous Phase of abdominal scan shows cirrhosis/ ascites/ shrunkrn liver/ portal hypertension/ hypervascular mets/ HCC

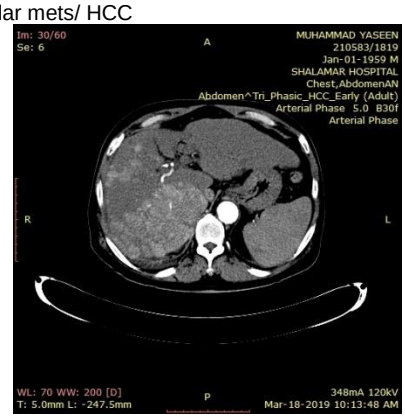



Table 3: Frequency distribution of Portal Hypertension * Hepatocellular carcinoma Crosstabulation

| Portal hypertension | | Hepatocellular carcinoma | | Total |
|---|---|---|---|---|
| | | No | Yes | |
| No | Count % within Portal Hypertension | 25(28.7%) | 62(71.3%) | 87(100%) |
| Yes | Count % within Portal Hypertension | 47(34.1%) | 91(65.9%) | 138(100%) |

## DISCUSSION

Our study was designed to determine the frequency of hepatocellular carcinoma in hepatitis C patients on computed tomography. On the basis of diagnostic performance patient with inclusion criteria and detection of HCC in hepatitis patients, Computed tomography is most reliable method for detection of HCC.

In current study attempt was made to determine the frequency of hepatocellular carcinoma in hepatitis C patients. Data were collected according to the age, gender and patient with hepatitis C. Data of 138 patients were collected in which 57(41.3%) were females and 81(58.7) were males. All patients were clinically suspected HCC. According to the result out of total number of patients, 91(65.9%) patients had shown hepatocellular carcinoma and 47(34.1%) had not hepatocellular carcinoma. According to the study that was conduct in 2002 by Brancatelli Giuseppe et al. In Japan almost 90% of HCC lesions were mostly found in cirrhotic livers and this cirrhosis are always occurred due to the chronic viral hepatitis C or B with or without toxins such as alcohol. Those patients which didn't have cirrhosis in liver they must have history of chronic injury from viral infection, alcohol or other toxins. HCC was found in 180 patients in the duration of study period. 39 ( 21.6%) patients didn't have any cirrhosis. 37 patients have the history of non specific liver injury i.e inflammation, fibrosis or steatosis, but 64% patients had not specifiable risk factor for the HCC or cirrhosis.[13] But in this our study out of 138 patients the 85(65.9%) patients have HCC and history of cirrhosis or any inflammation but the 6 patients out of 138 patients have HCC but had not any history of cirrhosis but 17(58.6%) patients have HCC and also have shrunken liver but 74(67.9%) patients had HCC but didn't have the history of any shrunken liver. According to another study that was conducted in 2013 by Hsu, Chia-Yang, et al. In this study they said the indication of portal hypertension is ascites. The large tumors and invasion of HCC may also be associated with ascites. The cause of ascites should be tumoral and cirrhotic factors. Due to the development of liver cirrhosis, ascites may create further complications to management of HCC. In that study we conclude that ascites was found in one-forth (23%) of HCC patients and 288 (13%) patients were found with grade 1 ascites.[14] But in our study the 35(62.5%) patients was detected with ascites and have HCC but in 56(68.3%) patients have HCC but didn't have the history of ascites. According to the another study that was conducted in 2004 by Yaqoob J. et al. they said that the early hepatocellular carcinoma is hypo-vascular and intra-nodal portal blood flow decrease than the grade of malignancy increases. Further the poorly defined HCC was hyper-vascular, whereas well-defined HCC was hypo-vascular in small-sized tumors. In this study the biphasic contrast-enhanced helical CT was performed and the hyper-vascular HCC in arterial phase was 85% (72 out of 85 patients).[15] But in this our study the detection of HCC with hyper-vascular lesions or mets are 86.2% (119 out of 138) and detection of HCC on CT is 65.9% (91 out of 138). By Baron and Ohashi et al. said that the hepatic or portal venous invasion is considered to be cause for HCC associated with poor prognosis. The venous invasion frequency is vary from 33 to 48%.[15] But in this our study the portal hypertension with HCC was detected in 29(56.9%) patients out of 138 but 62(71.3%) patients had HCC but didn't have portal hypertension.

## CONCLUSION

In this study we conclude that male patient ratio is more than female patients. Out of 138 patients all patients had hepatitis C virus and 91(65.9%) patients had hepatocellular carcinoma. We conclude in our society those patients had hepatocellular carcinoma, the reason behind HCC is hepatitis C virus.

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