

## Diagnostic Test Validity of CT-Scan for Detection of Hepatocellular Carcinoma

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### Abstract

**Background:** CT-scan can detect hepatocellular carcinoma among the patients. **Objective:** The purpose of the present study was to see the pattern of hepatocellular carcinoma among the patients attended at a tertiary care hospital in Dhaka city. **Methodology:** This cross-sectional study was carried out in the Department of Radiology and Imaging at Dhaka Medical College, Dhaka and Banghabandhu Sheikh Mujib Medical University, Dhaka from January 2007 to May 2008 for a period of around one and half year. All the patients presented with hepatocellular carcinoma at the age group of more than 20 years with both sexes were selected as study population. The patients were undergone CT-scan examination and the confirmation of tumor was performed by histopathological examination. **Result:** A total number of 50 patients were recruited in this study after fulfilling the inclusion and exclusion criteria. The sensitivity, specificity and accuracy of CT-scan in detecting hepatocellular carcinoma was seen to be 66%, 92% and 72% respectively. The PPV and NPV were 96.15% (95% CI 79.06% to 99.40%) and 45.83% (95% CI 34.53% to 57.58%) respectively. However, the Positive Likelihood Ratio and Negative Likelihood Ratio were 7.89 (95% CI 1.19 to 52.28) and 0.37(95% CI 0.23 to 0.60). **Conclusion:** In conclusion CT-scan is a good diagnostic tool for the detection of hepatocellular carcinoma. [Journal of National Institute of Neurosciences Bangladesh, 2018;4(2): 133-136]

**Keywords:** Diagnostic Test; Validity; CT-Scan; Hepatocellular Carcinoma

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### Introduction

Imaging procedures used to detect HCC include ultrasound, CT-scan, MRI, hepatic artery angiography and radionuclide scans<sup>1</sup>. In general, anatomic definition is more complete with CT-scan than with ultrasonography. CT scanning has additional advantages that obesity and intestinal gas do not reduce the quality of the examination<sup>2</sup>. In many instances CT-scan is reserved for patients in whom ultrasonography is technically difficult or inconclusive<sup>3</sup>.

CT-scan has some additional advantages over ultrasonography<sup>4,5</sup>. Firstly, it is more reproducible

because it is less operator dependent. Secondly, all the upper abdominal anatomy is displayed on the CT image, providing information about extra hepatic process that may be important to scan interpretation. Thirdly, the administration of water soluble intravenous contrast medium provides information regarding the regional blood flow characteristics of focal lesions and increase the detection rate of small mass<sup>2</sup>. To obtain more detailed density time curves for various tissues and lesions, scanners facilitating more rapid sequential or continuous scanning are needed<sup>6</sup>. In routine clinical practice CT-scan are usually interpreted with complete

knowledge of the clinical and Laboratory findings<sup>7</sup>. The ability of CT to display precise anatomical information has made it a cornerstone in the evaluation of focal hepatic lesions. No set of CT derived criteria is capable of unequivocally distinguishing between a benign and malignant lesion and it is therefore often necessary to perform a CT guided percutaneous biopsy to obtain tissue for histological or cytological examination<sup>8</sup>.

CT is capable of demonstrating the morphological changes associated with advanced hepatic cirrhosis. Typical CT features are a nodular hepatic outline and relative atrophy of the right hepatic and quadrate lobes with hypertrophy of the lateral segment of the left hepatic lobe and the caudate lobe<sup>9</sup>. HCC is usually visualized on CT as a low density area<sup>10</sup>.

Diversity of clinical presentation of the disease make it difficult achieve a diagnosis in early stage<sup>11</sup>. In Bangladesh many of the patients present in late stage when no help is possible, leading to fatal outcome. Early detection of the disease may change the fatal outcome. To diagnose this dreadful condition all essential investigations should be done with particular emphasis on radiological examinations. The present study was designed to evaluate the role of CT-scan in the evaluation of HCC.

### Methodology

This analytical cross-sectional study was carried out in the Department of Radiology and Imaging in Dhaka Medical College, Dhaka and Banghabandhu Sheikh Mujib Medical University, Dhaka from January 2007 to May 2008 for a period of around one and half year. All the patients presented with hepatocellular carcinoma at the age group of more than 20 years with both sexes were selected as study population. The patients were undergone CT-scan examination and the confirmation was performed by histopathological examination. During the study period, total 50 cases who had undergone CT examination of Hepatobiliary system were included in this study done in DMCH and BSMMU, Dhaka with close cooperation of Gastroenterology and hepatobiliary departments. Prior to commencement of the study the local approval body kindly approved the thesis protocol. During study period of 17th months, a total of 54 patients were selected on basis of clinical features and laboratory findings. Two were sensitive to contrast material; one had bleeding disorder and one lost histopathology report. So the study was carried out on 50 patients. They were sent to radiology department for CT-scan of HBS and histopathology was done to compare CT

finding. Before study, researchers explained the aims and methods of study. It was assured that all information would be kept secret and it would helpful for the physicians concerned to manage the problem of the patients. Permissions were taken from the department concerned and informed written consent of the patients. Diagnostic criteria of HCC by CT-scan were single or multiple solid mass which is iso- or hypodense to liver Parenchyma, dominant mass with satellite nodule, mosaic pattern multiple nodular area with differing attenuation in CECT (Contrast Enhanced Computed Tomography), single or solid mass with central necrosis or mass of hypo hyper or mixed density on CECT were excluded from this study<sup>8-9</sup>. Statistical analyses of the results were obtained by using window based computer software devised with Statistical Packages for Social Sciences (SPSS version 16.0). All the relevant collected data were compiled on a master chart first and then organized by scientific calculator and standard appropriate statistical formulae. Percentages were calculated to find out proportion of the findings. For the validity of the study outcome, sensitivity, specificity, accuracy of CT-scan to detect HCC were calculated after confirmation of the diagnosis by histopathology.

### Results

During study period of 17<sup>th</sup> months, a total of 54 patients were selected on basis of clinical features and laboratory findings. Two were sensitive to contrast material; one had bleeding disorder and one lost histopathology report. So the study was carried out on 50 patients. A total number of 50 patients were recruited in this study after fulfilling the inclusion and exclusion criteria. Most of the hepatocellular carcinoma (44%) was in the 41 to 50 years age group followed by 51 to 60 years which was 9(18.0%) cases. The youngest patient in this study was 22 years and the eldest 75 years. Mean age with SD of study population was  $48.78 \pm 12.07$  (Table 1).

Table 1: Age Group Distribution of HCC Patients (n=50)

| Age group          | Frequency | Percent      |
|--------------------|-----------|--------------|
| Less Than 30 Years | 3         | 6.0          |
| 30 to 60 Years     | 38        | 76.0         |
| More than 60 Years | 9         | 18.0         |
| <b>Total</b>       | <b>50</b> | <b>100.0</b> |

HCC was detected in 26 cases by CT-scan of which histopathological confirmed was 25 cases and the rest 1 was negative. Again CT-scan was negative in 24

cases of which 13 cases were histopathologically positive and the rest 11 cases were both histopathological and CT-Scan negative (Table 2).

Table 2: Comparison between CT-scan and Histopathology among the HCC Patients

| CT-Scan Result | Inner diameter (mm) |           | Total     | P value |
|----------------|---------------------|-----------|-----------|---------|
|                | Positive            | Negative  |           |         |
| Positive       | 25                  | 1         | 26        |         |
| Negative       | 13                  | 11        | 24        |         |
| <b>Total</b>   | <b>38</b>           | <b>12</b> | <b>50</b> |         |

The sensitivity, specificity and accuracy of CT-scan in detecting hepatocellular carcinoma was seen to be 66%, 92% and 72% respectively. The PPV and NPV were 96.15% (95% CI 79.06% to 99.40%) and 45.83% (95% CI 34.53% to 57.58%) respectively. However, the Positive Likelihood Ratio and Negative Likelihood Ratio were 7.89 (95% CI 1.19 to 52.28) and 0.37(95% CI 0.23 to 0.60) (Table 3).

Table 3: Diagnostic Test Validity of CT-scan for the detection of HCC

| Validity                  | Value   | 95% CI           |
|---------------------------|---------|------------------|
| Sensitivity               | 65.79%  | 48.65% to 80.37% |
| Specificity               | 91.67 % | 61.52% to 99.79% |
| PPV                       | 96.15%  | 79.06% to 99.40% |
| NPV                       | 45.83 % | 34.53% to 57.58% |
| Positive Likelihood Ratio | 7.89    | 1.19 to 52.28    |
| Negative Likelihood Ratio | 0.37    | 0.23 to 0.60     |
| Accuracy                  | 72.00%  | 57.51% to 83.77% |

**Sensitivity:** probability that a test result will be positive when the disease is present (true positive rate); **Specificity:** probability that a test result will be negative when the disease is not present (true negative rate); **Positive likelihood ratio:** ratio between the probability of a positive test result given the presence of the disease and the probability of a positive test result given the absence of the disease; **Negative likelihood ratio:** ratio between the probability of a negative test result given the presence of the disease and the probability of a negative test result given the absence of the disease; **Positive predictive value:** probability that the disease is present when the test is positive; **Negative predictive value:** probability that the disease is not present when the test is negative; **Accuracy:** overall probability that a patient will be correctly classified

## Discussion

This study as carried out to determine the accuracy of CT scan examination for the evaluation of Hepatocellular carcinoma (HCC) and correlated with

histopathological examinations. Subjects of this study were taken from DMCH and BSMMU, Dhaka.

During the study period from January 2007 to 31<sup>st</sup> May 2008. Total 50 cases were studied who had undergone CT examinations of Hepatobiliary system. The final diagnosis of HCC was made by histopathological examination in 38 cases. In this study common age group affected by HCC was seen between 41 to 50 years and male female ratio seen was 6.6:1. In Britain, Hepatocellular carcinoma (HCC) was found over 50 years of age<sup>8</sup>. In Japan age distribution of HCC was found from 5 years to 100 years with a mean age of 55.5 years<sup>11</sup>. In Bangladesh, HCC was found to be common between 41 to 50 years of age group<sup>12</sup>.

In this study, age of the youngest patient with HCC was 22 years and that of the eldest one was 75 years. The diseases was found to be common between 41 to 50 years of age group which correlated with the above study done in Bangladesh. CT is quite valuable in diagnosing and evaluating HCC. However, the presence of an isodense tumor should always be kept in mind. False negative examinations may result from very small lesions, low contrast between tumor and surrounding hepatic parenchyma, or due to technical failure. In our study there were 13 false negative cases. False positive examinations are sometimes encountered in CT of liver tumor. The limitations of machine may cause misleading low density area by computer overshoot or by the influence of bone. In this study there was a false positive diagnosis with a large, vague, low density are.

In this study sensitivity, specificity and accuracy of CT scan for detecting HCC was seen to be 66%, 92% and 72% respectively. Itai et al<sup>13</sup> evaluated total 47 cases of HCC and found accuracy to be 75%. My study closely correlates with the above study. Size and extent of the tumor were very nicely seen. Moreover use of I.V contrast agent made the tumors more easily detectable. Small tumors (<3 cm) were also possible to define. So for accurate diagnosis and evaluation of HCC, CT-scan is an excellent imaging modality. Disadvantages of CT scan are costly, radiation hazard and use of I.V contrast agent. But for better anatomical delineation and for detection of small and multiple tumors along with effect of I.V contrast agent makes CT an excellent imaging modality for the evaluation of HCC.

This study is not an overall reflection regarding HCC in our country. For this further extensive study over a longer period of time covering different corners of the country is necessary.

## Conclusion

In conclusion CT-scan has a low sensitivity for the detection of HCC among the patients. However, specificity is very high. Furthermore the PPV is very high but the NPV is low. Accuracy is moderate for the detection of HCC by CT-scan. Further large scale study should be carried out.

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