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A Study to assess the Correlation between Serum Alpha Fetoprotein and Radiological Image Finding in Patients with Malignant Liver Mass

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ABSTRACT

Malignant liver mass remains a major health problem worldwide. Patients with chronic liver disease, the accuracy of ultrasound scan (US), spiral computed tomography (CT), magnetic resonance imaging (MRI), and alpha-fetoprotein (AFP) in diagnosing hepatocellular carcinoma (HCC) and malignant liver disease is assessed in this study. This study helps to find out the significance of serum alpha protein in patients with malignant liver mass. Retrospective cross-sectional study was done on patients with malignant liver mass. A total of 62 patients were diagnosed with malignant liver mass, out of which 44 are male, and 18 were female. They were grouped into three age groups 30-50 years, 51-70 years and above 70 years. In this study, out of the radiologically diagnosed malignant liver mass, HPE has proven hepatocellular carcinoma where 67.7% and liver secondaries where 29.03%. 55% of malignant liver mass has raised alpha feto proteins. 74% of HCC diagnosed and confirmed on biopsy have elevated alpha feto proteins. Only 11% of multiple malignant liver lesions have elevated alpha feto proteins. AFP receptors are expressed only in the AFP-positive HCC tissues. In the AFP-negative HCC, the rate of tumour growth would probably be expected to be relatively slow, and tumour staging might be lower than in AFP-positive. Based on this study, radiological imaging has been very useful in the diagnosis of various malignant liver masses in both elevated and normal AFP.

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INTRODUCTION

Despite development in the medical industry Hepatocellular carcinoma (HCC) and other metastatic liver tumours remains a major health problem worldwide. The majority of cases occur in patients with chronic liver disease, such as hepatitis B-virus (HBV), hepatitis C-virus (HCV) infection, alcoholic liver diseases and non-alcoholic fatty liver diseases (Shin, 2013; El-Serag, 2011). Most of In patients with chronic liver disease, the accuracy of ultrasound scan (US), spiral computed tomography (CT), magnetic resonance imaging (MRI), and alpha-fetoprotein (AFP) in diagnosing hepatocellular carcinoma (HCC) and malignant liver disease like hepatoblastoma, angiosarcoma etc., are assessed in this study. Alpha-fetoprotein (AFP) is a glycoprotein encoded by the AFP gene, located in q arm of chromosome 4 in humans. Alpha-fetoprotein (AFP) is an alpha1 globulin normally present in high concentration in fetal serum but in only very small amounts thereafter. However, Serum alpha-fetoprotein (AFP) is used as a one of important screening and diagnostic marker in clinical practice.

The increased serum concentration of alpha-

fetoprotein (AFP) can be found in benign and malignant liver diseases, in yolk sac tumors, and in several nonhepatic neoplasms at an advanced stage. Serum alpha-fetoprotein (AFP) is also used for monitoring and evaluation of the effectiveness of certain therapy over malignant liver mass. Amniotic fluid alpha-fetoprotein (AFP) is used in antenatal diagnosis of anencephaly and spina bifida. This study helps to find out the significance of radiological imaging studies of malignant mass and also to find the significance of serum alpha feto protein in patients with malignant liver mass.

Table 1: Age distribution

Age category	No of patients with a malignant liver mass
30-50 years	14
51-70 years	38
Above 70 years	10

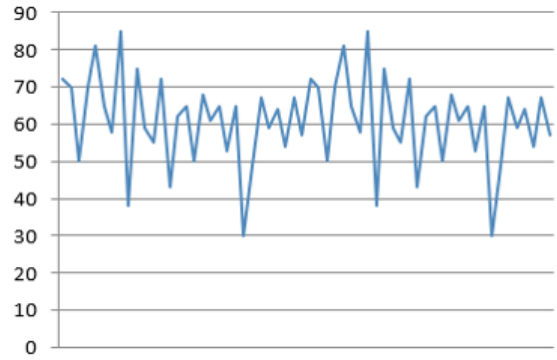

Figure 1: Age Distribution Graph

MATERIALS AND METHODS

Type of study: A retrospective cross-sectional study, conducted in the Radiology Department, Saveetha Medical College and Hospital. Duration -The data pooled for the study was from January 2018 to March 2020.Sample size: No specific sample size. All patients under inclusion criteria in above-mentioned duration.

Table 2: Sex distribution

Sex distribution	No of patients with a malignant liver mass
Male	44
Female	18

Inclusion criteria: Those who were predicted to have malignant liver mass with radiological imaging.

Exclusion criteria: Those who are not identified with malignant liver mass with the radiological assessment.

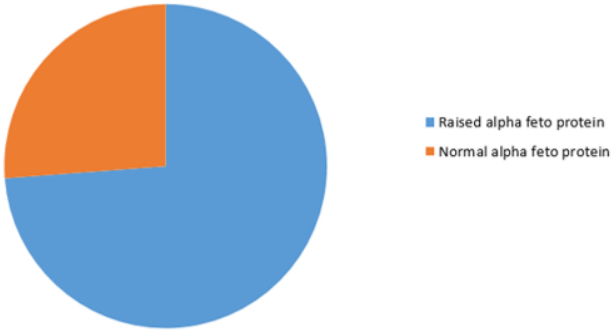

Figure 2: HCC Patient Correlation with Alpha Feto Protein.

After obtaining permission from the institutional ethical committee, the invigilator identified the cases of malignant liver mass patients diagnosed by radiological imaging. With the identified patient, we tried to correlate with alpha fetoprotein and histopathological examination. AFP values are obtained using the patient's serum specimen using CLIA methodology.

Table 3: Radiological finding on malignant liver mass

Radiological finding on malignant liver mass	No of a patient with the following radiological finding
Focal HCC	32
Multifocal lesions	30

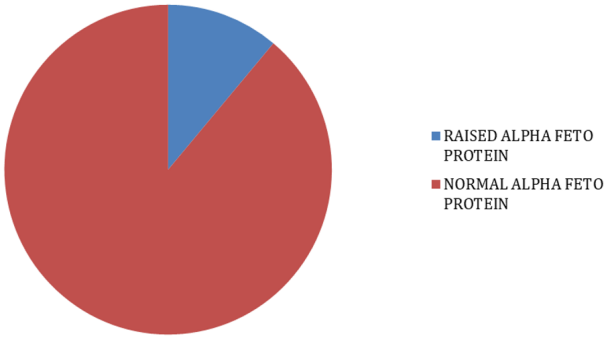

Figure 3: Multiple malignant liver lesions patients' correlation with alpha feto protein.

RESULTS AND DISCUSSION

There were 62 patients diagnosed with malignant liver mass, out of which 44 are male, and 18 were female. They were grouped into three age groups 30-50 years, 51-70 years and above 70 years. Out

of the study population, the proportion of male and female with malignant liver mass 2.44:1 (Tables 1 and 2) (Figure 1).

Table 4: Correlation between malignant liver mass and HPE

Malignant liver mass	No of patients diagnosed with HPE
A focal lesion with HCC	30
Multifocal lesions diagnosed as HCC	12
Multifocal lesions diagnosed as metastasis	18

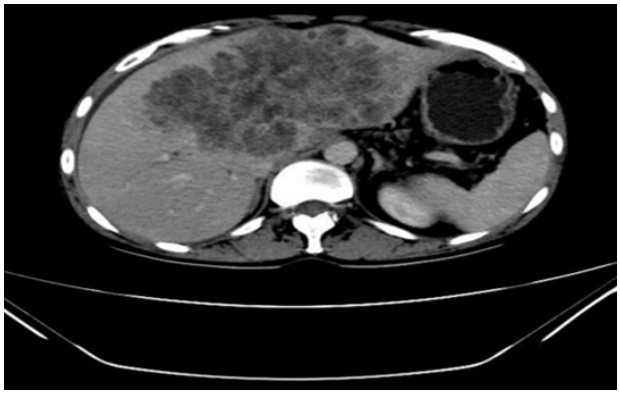

Figure 4: Radiological image of Focal HCC.

The malignant liver mass diagnosed based on radiological imaging are tabulated in Table 3. 30 out of 32 focal hepatic lesions diagnosed based on radiological findings were confirmed to have HCC on HPE, and 12 out of 30 multi-focal lesions have diagnosed to have HCC on HPE, rest of the 18 out of 30 multi-focal lesions where liver secondaries (Table 4). The correlation between alpha fetoprotein and malignant liver mass is tabulated in Table 5. Figure 2 indicates the HCC patient correlation with alpha fetoprotein. Figure 3 indicates multiple malignant liver lesions patients' correlation with alpha fetoprotein. Figure 4 indicates Radiological image of Focal HCC. Figure 5 indicates Radiological image of Multifocal HCC. Figure 6 indicates Radiological image of Multifocal lesions diagnosed as metastasis Malignant liver tumors are divided into primary and secondary malignant liver tumors. Primary liver cancer is a common malignant tumour. The primary malignant liver tumour is hepatoblastoma, angiosarcoma and hepatocellular carcinoma. Secondary liver tumors are metastatic tumors from the pancreas, colon, breast, etc., AFP is the most commonly used serological marker worldwide and is used to diagnose hepatocellular carcinoma (Sato *et al.*, 1993).

Liu *et al.* (2013) states HCC differentiation, size and macrovascular invasion are strongly associated with AFP; low differentiation and HCC size $\geq$ 10 cm are independent predictors of elevated AFP (Liu *et al.*, 2013). The level of elevated serum AFP is highest in hepatocellular carcinoma (HCC) and yolk sac tumors. AFP has also elevated in the following tumors Testicular teratocarcinoma, Pancreatic carcinoma, Gastric carcinoma, Colonic carcinoma, Bronchogenic carcinoma, Breastcarcinoma, Nonhepatic benign lesions. Low levels of AFP are found to occur during pregnancy and certain periods of noncancerous diseases of the liver.

Table 5: Correlation between malignant liver mass and alpha fetoprotein

Malignant liver mass	No of patients diagnosed	No of patients with raised alpha feto protein
HCC	30	24
Multifocal lesions diagnosed as HCC	12	7
Multifocal lesions diagnosed as metastasis	18	2

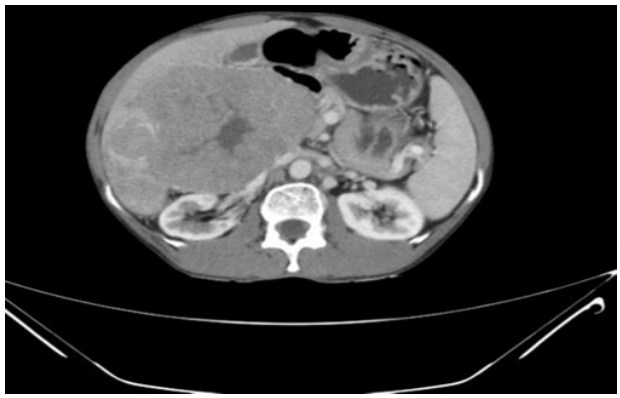

Figure 5: Radiological image of Multifocal HCC.

In this study, out of the radiologically diagnosed malignant liver mass, HPE has proven hepatocellular carcinoma where 67.7% and liver secondaries where 29.03%. 55% of malignant liver mass has raised alpha feto proteins. 74% of HCC diagnosed and confirmed on biopsy have elevated alpha feto proteins. Only 11% of multiple malignant liver lesions have elevated alpha feto proteins. Well defined heterodense lesion in segment V of liver with predominant heterogenous enhancement in the arterial phase. (Figure 4). A large lobulated well-defined exophtyic lesion showing enhancement in arterial phase with a central scar and adjacent well-

defined smaller satellite lesions (Figure 5). Multifocal heterogeneously enhancing lesions in liver in a case of pancreatic periampullary region carcinoma (Figure 6).

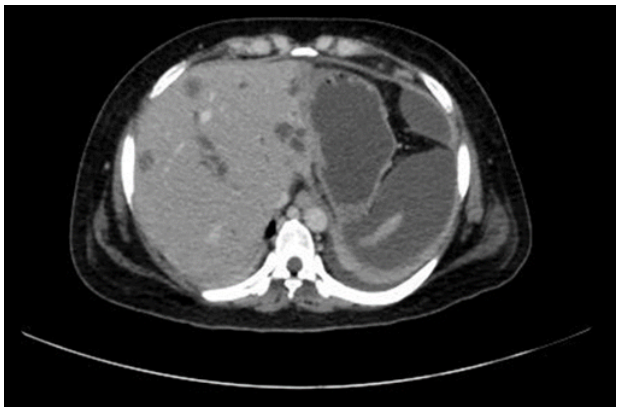

Figure 6: Radiological image of Multifocal lesions diagnosed as metastasis.

A number of studies have shown an increase in AFP with HCC over the past decades (Ruoslahti *et al.*, 1972; Purves *et al.*, 1970). There are two views for the production of AFP in HCC. In the first view, the ability to synthesize a-fetoprotein is felt to be the property of specialized cells of the liver parenchyma. The second view is AFP is produced by all hepatocytes at a particular stage of differentiation. As the hepatocytes mature they no longer produce AFP. In this view, patients with hepatocellular carcinoma have a failure of differentiation or dedifferentiation of hepatocytes to the stage of maturation where AFP is produced. Whatever view is taken, it is clear that the majority, but not all hepatocellular carcinomas in man is associated with the production of the oncofetal protein, AFP (Abelev, 1968; Uriel, 1969). From pathological studies, there is literature showing that in normal liver tissue and serum AFP-negative HCC, AFP and AFP receptors are not expressed; AFP receptors are expressed only in the AFP-positive HCC tissues (Li, 2011). In the AFP-negative HCC, the rate of tumour growth would probably be expected to be relatively slow, and tumour staging might be lower than in AFP-positive (Ma *et al.*, 2013).

CONCLUSIONS

This study clearly indicates the role of alpha fetoprotein with malignant liver masses. In most of the cases of HCC, alpha fetoprotein levels were raised. However, AFP negative HCC has to be taken into consideration to diagnose HCC. Based on this study, radiological imaging has been very useful in the diagnosis of various malignant liver masses in both elevated and normal AFP.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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