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The Role of Hepatitis C virus and Possible Risk factors in development of Hepatocellular carcinoma: 400 Patients based study

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Background and aims
Hepatocellular carcinoma (HCC) is one of the commonest tumors and considered the fifth most common malignant neoplasm and a major cause of death. Egypt has increased incidence of HCC cases, as Egypt has the highest prevalence of hepatitis C virus (HCV) infection. The aim was to study the epidemiological characteristics of HCC in Assiut, Egypt.

Patients and methods
A descriptive observational study design was applied for the present study. The studied population was 400 patients with HCC (288 of them were male and 112 were female) who fulfilled the diagnostic criteria for HCC. Data were analyzed for exploring the clinical, etiological, radiological, and tumor characteristics of the studied patients.

Results
The mean age of the patients was 59.85±9.1 years. Most cases (68%) were from rural areas, 38% of the patients were in agricultural occupation, and 32% of the patients were accidentally discovered to have HCC .The most frequent symptom was abdominal pain (15%). HCV antibody was present in 63% of the patients, HBV infection was recorded in 28%, coinfection was seen in 3%, and no viral infection was present in 6%. Diabetes mellitus was present in 37% and obesity in 24% of the patients. Right lobe of the liver was the most frequent affected lobe (61%), and 69% of the cases had a single lesion.

Conclusion
HCC incidence had been increasing in the past years in Egypt. The high prevalence of HCV infection in Egypt makes the surveillance strategies important for early detection of HCC in these patients to provide better curative treatment modalities in the early stages.

Keywords:
chronic liver disease, hepatitis B virus infection, hepatitis C virus infection, hepatocellular carcinoma

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Introduction

Hepatocellular carcinoma (HCC) is the fifth commonest malignancy worldwide. In Africa, it has been ranked as the fourth common cancer [1]. HCC is the third leading cause of cancer-related death, after lung and stomach cancer [2]. It is one of the fatal cancers owing to its convolutions, reoccurrence after surgical resection, and metastasis [3].

Viral hepatitis B and C infections are the major risk factors of HCC development, chronic alcohol consumption, and metabolic disorders (as diabetes and obesity), and age can contribute in HCC development and progression. Approximately 80% of HCC cases are produced by hepatitis B virus (HBV) and/or hepatitis C virus (HCV) infections, particularly in the setting of established cirrhosis or advanced fibrosis [1].

Because HCV infection is endemic in Egypt, more studies are needed to evaluate the risk factors of HCC and methods of prevention [4]. There is an increased incidence of HCC in Egypt [5]. The studies in Egypt show that there is an increase in HCC cases from 4% in 1993 to 7.3% in 2003 [5].

To study the characteristics of HCC in Egypt, we comprehensively analyzed patients with HCC especially regarding their clinical, etiological, and radiological profile.

Patients and methods

This is a descriptive study was conducted during the period of 2014–2016 At Assiut university hospital. The study populations included 400 HCC patients admitted to Assiut University Hospital-Internal Medicine Department-Gastroenterology and Hepatology unit and Rajhy liver hospitals which are both tertiary centers for referral of HCC and chronic liver disease (CLD) patients in Upper Egypt, during routine HCC surveillance including newly developed HCC or recurrent HCC after treatment.

Diagnosis of HCC cases done by appropriate imaging modalities.The diagnosis of HCC in those patients was done according to AASLD practice guidelines [6]. Child-pugh classification done to all patients. Tumor stage was assessed by Barcelona-Clinic Liver Cancer (BCLC) staging system [7].

A total of 400 HCC cases were interviewed with full medical history, clinical examination and laboratory investigation when they sought medical advice at outpatient clinic and the following items were collected:

(1) The clinical data including full medical history, the main presenting symptoms and signs.
(2) The demographic data: age, sex, residence either urban or rural, occupation and smoking status.
(3) Laboratory data including complete blood count, liver function tests (include alanine transaminase, aspartate aminotransferase, bilirubin and albumin), viral markers (including HCV antibody, hepatitis B surface antigen and anti-hepatitis B core antibody (Anti-HBc) when previous markers were negative) ,kidney function test and AFP.
(4) HCC was evaluated by imaging modalities either triphasic spiral CT abdomen with contrast or MRI abdomen with complete description of tumour site, number, size and extension, and staging was assessed by Barcelona Clinic Liver cancer (BCLC) which is based on tumor number, size, vascular invasion and metastasis ,also Doppler study was done to assess the presence of portal vein thrombosis and vascular patency.
(5) Classification of patients according to Child–Pugh classification [8] as well as staging system of Barcelona Clinic Liver Cancer [9].

Statistical analysis

The statistical package for the social sciences, version 16 (IBM_SPSS, Statistical Package for Social Science, Ver. 21, Standard version, Copyright © SPSS Inc., 2011–2012, NY, USA. 2012), was used for data entry and analysis. Qualitative data were presented in form of frequencies and percentages, whereas the quantitative data were presented as mean±SD.

Results

The demographic features of patients with HCC show that their mean age was 59.85±9.1 years. The study included 288 (72%) male and 112 (28%) female patients. Regarding occupation, agriculture was the most common work (38%), 30% of the patients were housewife, 27% of the patients were employees, 5% had industrial work, and 43% had farming-related works (which means work in farming beside his/her regular job). Most of the patients were from rural areas (68%) and 32% from urban areas (Table 1).

Overall, 37% of the patients with HCC were smokers, 18% were passive smokers, whereas 4% of the patients had a history of using recreational drugs. Exposure to pesticides was reported in 9% (Table 2).

Family history of cancer was present in 22% of the patients with HCC, and history of schistosomiasis was seen in 9% of cases. Most of the patients with HCC had a history of liver cirrhosis (74%), 56% of cases had a history of HCV infection, 28% of patients had a history

Table 1 Sociodemographic features of hepatocellular carcinoma cases

	HCC (*N*=400) [*n* (%)]
Age (mean±SD)	59.85±9.1
Sex	
Female	112 (28)
Male	288 (72)
Occupation	
Agricultural	152 (38)
Industrial	20 (5)
Housewife	120 (30)
Other jobs	108 (27)
Farming-related work[a]	172 (43)
Residence	
Rural	272 (68)
Urban	128 (32)

HCC, hepatocellular carcinoma. [a]Work in farming beside the original job.

Table 2 Risk factors of hepatocellular carcinoma cases

	HCC (*N*=400) [*n* (%)]
Smoking	148 (37)
Passive smoking	72 (18)
Recreational drugs	16 (4)
Pesticide exposure	36 (9)

HCC, hepatocellular carcinoma.

Table 3 Medical history of hepatocellular carcinoma cases

	HCC (*N*=400) [*n* (%)][a]
Family history of cancer	88 (22)
History of schistosomiasis	36 (9)
History of liver cirrhosis	296 (74)
History of blood transfusion	24 (6)
History of HCV infection	224 (56)
History of HBV infection	112 (28)

HCC, hepatocellular carcinoma; HBV, hepatitis B virus; HCV, hepatitis C virus. [a]Each variable presented in the table is calculated from the total studied population (those who answered yes).

of HBV infection, and 37% of the patients with HCC has a history of diabetes. Mean BMI of patients was 25 ±5.3, with 24% of the cases being overweight (Tables 3 and 4).

Regarding clinical presentations in patients with HCC, it was found that HCC was discovered accidentally in 32% of the patients during their regular surveillance, followed by 15% of patients who presented with abdominal pain, 11% hematemesis, 10% weight loss, 10% bleeding tendency, 10% fever, 7% uncontrolled ascites, and 5% easy fatigability (Table 5, Figs 1, 2).

Splenomegaly was the most frequent physical sign and was present in 76% of the patients with HCC followed by palpable liver in 52%, jaundice in 35%, ascites in 24%, lower limb edema in 14%, and other signs as clubbing, spider nevi, and parotid enlargement in 6% (Table 5, Fig. 2).

Regarding laboratory findings, the mean of alanine transaminase was 54.47±22.5, aspartate aminotransferase 57±38.6, alkaline phosphatase 132.52±68.8, hemoglobin 12.16±2.4, platelets 162.42 ±112.6, bilirubin 28.92±18.6, albumin 28.45±4.8, creatinine 87.40±42.1, and international normalized ratio 1.25±0.3 (Table 6).

HCV antibody was present in 63% of patients, HBV surface antigen was found in 28% of patients, coinfection was seen in 3%, and no viral infection in 6% of the HCC cases (including negative anti-hepatitis B core antibody) (Table 7).

Table 8 show that AFP was <20 ng/ml in 13% , 20–200 ng/ml in 35%, and >200 ng/ml in 52% of HCC cases.

Child Pugh classification showed that in HCC patients (39%) of them was Child A, (49%) of them Child B and (12%) of them Child C classification (Table 9), whereas in the CLD group, 37.9% were in Child A,

Table 4 History of diabetes mellitus and obesity in hepatocellular carcinoma cases

	HCC (*N*=400)[a]
History of DM [*n* (%)]	148 (37)
Obesity	
BMI (mean±SD)	25.00±5.3
Obesity (BMI>25) [*n* (%)]	96 (24)

DM, diabetes mellitus; HCC, hepatocellular carcinoma. [a]Each variable presented in the table is calculated from the total studied population (those who answered yes).

Table 5 Clinical data of patients with hepatocellular carcinoma in Assiut, Egypt 2016

Variables	Category	*N*=400 [*n* (%)]
The main presenting symptom	Accidental discovery	128 (32)
	Abdominal pain	60 (15)
	Weight loss	40 (10)
	Fever	40 (10)
	Hematemesis	44 (11)
	Easy fatigability	20 (5)
	Bleeding tendency	40 (10)
	Uncontrolled ascites	28 (7)
Signs[c]	Jaundice	140 (35)
	LL edema	56 (14)
	Ascites	96 (24)
	Palpable liver	208 (52)
	Palpable spleen	304 (76)
	Others[a]	24 (6)
Imaging tool[b]	CT	340 (85)
	MRI	60 (15)

CT, computed tomography; LL, lower limb. [a]Clubbing, spider nevi, and parotid enlargement. [b]*N*=400. [c]More than one sign were included in the studied patients.

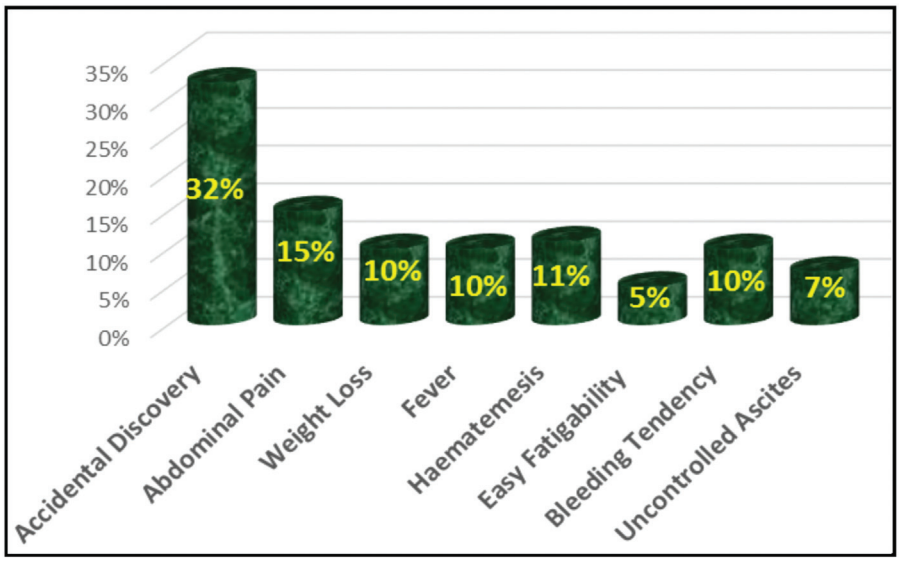
40.5% were in Child B, and 21.6% were in Child C classification.

The tumor characteristics including tumor size showed that 58% of the patients with HCC had a tumor size of more than 5 cm, 36% of patient has a tumor size of 2–5 cm, and 6% of cases had a tumor size less than 2 cm. Most of HCC cases had a single lesion (69%), whereas 19% of the patients had two lesions and 12% of the patients had multiple lesions (Table 10, Fig. 3).

The most frequently affected lobe was the right lobe (61%), followed by left lobe (25%), then bilobar affection in (14%) of cases. Most of the cases presented with stage A (49%), followed by stage B (45%) and lastly stage C (6%). Portal vein thrombosis was present in 19% of cases (Table 9, Fig. 4).

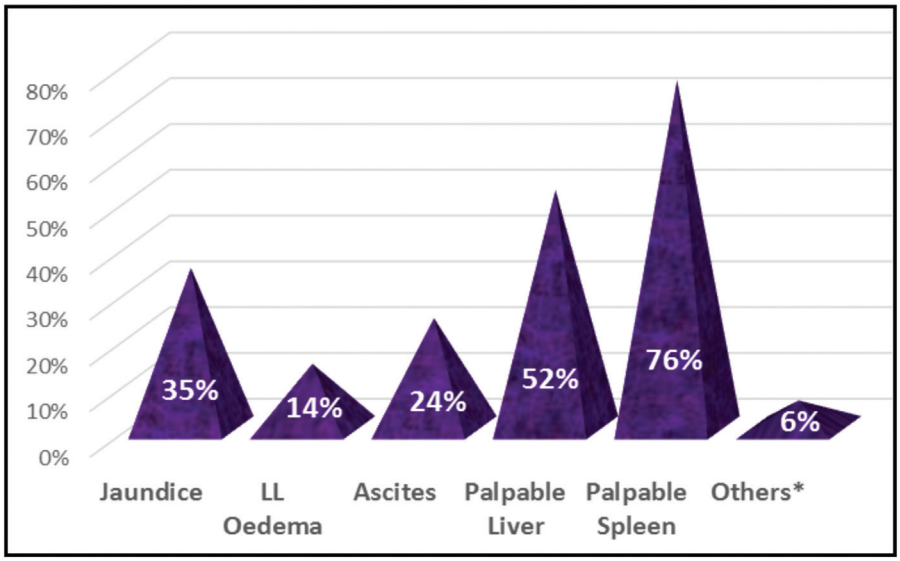
Imaging tool used was triphasic spiral CT abdomen in 85% of the patients and MRI abdomen in 15% of the patients (Table 10).

Fig. 1



Clinical symptoms in patients with HCC. HCC, hepatocellular carcinoma.

Fig. 2



Signs in patients with HCC. HCC, hepatocellular carcinoma.

Overall, 92% of the HCC cases were new cases and 8% were previously diagnosed as having HCC. Regarding management of patients with HCC, 36% were on conservative management, 29% of the patients had undergone transarterial chemoembolization, 29% of patients had undergone radiofrequency ablation, 4% of the patients had undergone liver resection, and 2% of the patients had undergone alcohol injection (Table 11, Fig. 5).

Discussion

HCC is one of the commonest malignancy worldwide and the third leading cause of death [10]. In Egypt, HCC occurs in 4.7% of the patients with liver cirrhosis [11]. In 2005, El-Zayadi *et al.* [5] explained that there is a significant increase of HCC, and this is related to high prevalence of HCV infection in addition to HBV infection, increased rate of diabetic and obese patients, and improvement in screening programs [12].

The mean age of patients with HCC was 59.85±9.1 years. This is in agreement with Tang *et al.* [13] who explain that HCC is usually diagnosed after the age of 50 years. The age distribution of HCC varies between regions and countries. In China, the mean age interval at diagnosis is 55–59 years and in Europe and North America, 63–65 years.

Table 6 Laboratory findings of hepatocellular carcinoma cases

Findings	HCC (*N*=400) (mean±SD)
ALT	54.47±22.5[+]
AST	57.00±38.6
ALP	132.52±68.8
Hemoglobin	12.16±2.4
Platelet	162.49±112.6
Bilirubin	28.92±18.6
Albumin	28.45±4.8
Creatinine	87.40±42.1
INR	1.25±0.3

ALT, alanine transaminase; AST, aspartate aminotransferase; ALP, alkaline phosphatase; HCC, hepatocellular carcinoma; INR, international normalized ratio.

Table 7 Hepatitis markers among patients with hepatocellular carcinoma

	HCC (*N*=400) [*n* (%)]
HCV antibody	252 (63)
HBV surface antigen	112 (28)
Coinfection	12 (3)
Non-C–Non-B[a]	24 (6)

HCC, hepatocellular carcinoma; HCV, hepatitis C virus. [a]Anti-hepatitis B core antibody was negative.

Table 8 AFP levels of studied patients

Alpha-fetoprotein	No. (%)
Mean±SD	3230.66±921.23
<20 ng/ml	52 (13%)
20–200 ng/ml	140 (35%)
>200 ng/ml	208 (52%)

Table 9 CHILD-Puch Classification of HCC patients

CHILD -Puch Classification	No. (%)
Class (A)	39%
Class (B)	49%
Class (C)	12%

Table 10 Radiological and pathological characteristics of patients with hepatocellular carcinoma in Assiut, Egypt

Variables	Category	*N*=400 [*n* (%)]
Tumor size (cm)	<2	24 (6)
	2–5	144 (36)
	>5	232 (58)
Tumor number	Single lesion	276 (69)
	Two lesions	76 (19)
	Multiple lesions	48 (12)
Tumor site	Right	244 (61)
	Left	100 (25)
	Bilobar	56 (14)
Tumor stage (BCLC)	A	196 (49)
	B	180 (45)
	C	24 (6)
PVT	No	321 (81)
	Yes	76 (19)

BCLC, Barcelona Clinic Liver Cancer; PVT, portal vein thrombosis.

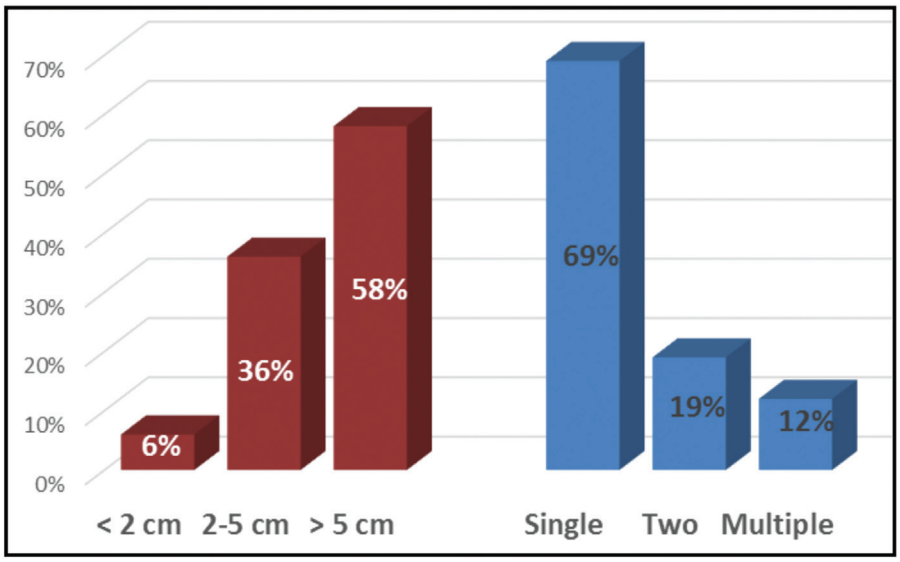
In this study, there was a striking sex inequity in HCC incidence, with a higher prevalence for males, regardless of geographic area and etiologic factors. Male to female ratio was ~3 : 1 across this study. These discrepancies are not merely explained by the sex-specific variances in relation to cirrhosis risk factors (e.g. viral hepatitis or other risk factors), as experimental models of chemically induced HCC also demonstrate a clear male predominance, although the molecular mechanisms behind this sex bias remain unidentified. This is in agreement with a study by McGlynn *et al.* [14] which stated that the incidence rates of HCC are typically two to four times higher in men than in women. The interpretation of sex disparity in the incidence rates of HCC is not well understood.

We investigated the occupations in patients with HCC, and it was found that agricultural occupation is the most common work (38%), 30% of patients were housewives, 27% of patients were employees, 5% had industrial work, and 43% had farming-related works. So patients with HCC in this study have a high proportion to be in agricultural work who may be also subjected to pesticides. This agrees with Ezzat *et al.* [15] who suggested that agricultural pesticides might have an increased risk of HCC among rural males. Another study by van den Berg [16] concluded the role of Dichlorodiphenyltrichloroethane (DDT) in the development of HCC. This occurs through different mechanisms not yet completely understood. Moreover, this was approved by Rapisarda *et al.* [17], who reported that exposed workers to organic solvents contained in products such as agricultural products and pharmaceuticals have increased risk of developing HCC. This disagrees with Soliman *et al.* [18] who explain that workers with exposure to pesticides seemed not to have an elevated risk of HCC.

In the current study, 5% of the patients with HCC were in industrial works. There is a debate in different studies about the risk of industrial exposure in HCC development. Abaza *et al.* [19] found that there is no significant relation of HCC with industrial exposure, such as asbestos. However, this is in disagreement with Soliman *et al.* [18] and Wallace *et al.* [20] who explained that industrial works have increased risk of HCC progression, whereas farming-related activities did not appear to be risk factors of HCC.

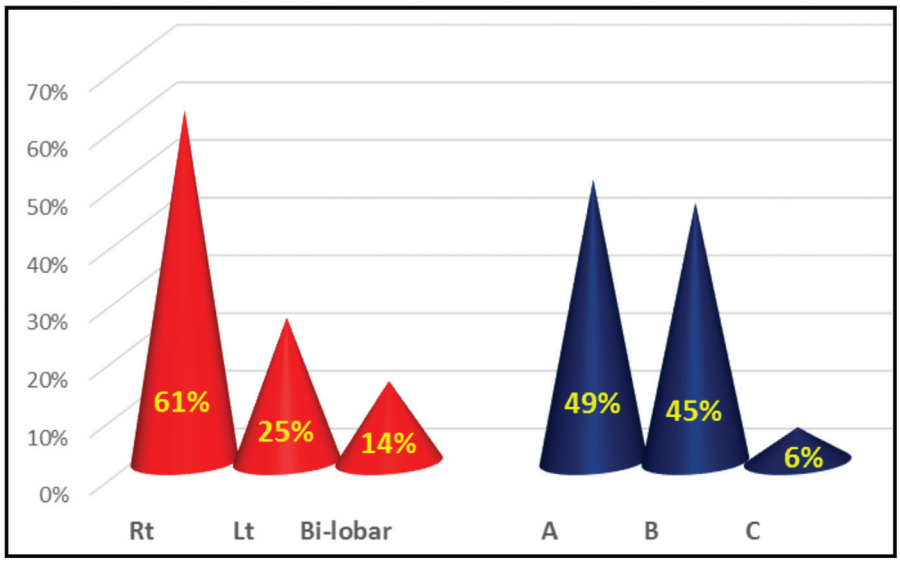
In this study, 68% of the HCC cases resided in rural areas and 32% in urban areas. This agrees with an Egyptian

Fig. 3



Distribution of HCC cases according to tumor size and number. HCC, hepatocellular carcinoma.

Fig. 4



Distribution of HCC cases according to tumor site and BCLC stage. BCLC, Barcelona Clinic Liver Cancer; HCC, hepatocellular carcinoma; RFA, radiofrequency ablation; TACE, transarterial chemoembolization.

study from National Cancer Institute by Mohmad *et al.* [21] which revealed that 97% of HCC cases came from around the Nile banks. This disagrees with Soliman *et al.* [18] who reported that after adjusting for viral infection and schistosomiasis, rural residence did not show independent effect related to HCC, which suggested that residential variations were largely explained by the individual medical condition.

In this study, 37% of HCC cases were smokers, and 18% were passive smokers. This indicates that smoking may has a contribution in developing HCC. This agrees with a meta-analysis of Lee *et al.* [22] who reported that smokers had a higher risk of developing HCC than never smokers. Similarly, Ziada *et al.* [23] stated that smoking increases HCC risk with viral hepatitis, and this mainly owing to the presence of carcinogenic substance called aminobiphenyl. Moreover, White *et al.* [24] demonstrated that smoking can increase the risk of HCC development beside obesity.

In this study, family history of liver cancer was present in 22% of the patients with HCC, so we can suggest that genetics may have a role in HCC development. This agrees with Turati *et al.* [25], who conclude that

family history of cancer with chronic hepatitis increases the risk by 70 times than others. Moreover, Yang *et al.* [26] reported that first degree relative with a history of liver cancer has a more risk of developing HCC.

Our study showed that 74% of the HCC cases had a history of liver cirrhosis, which is one of the most significant factors of developing HCC. El-Serag [27] reported that HCC usually occur on top of liver cirrhosis, as it can be considered a carcinogenic factor. Moreover, Tang *et al.* [13] conclude that patients with HCC mostly have previous history of liver cirrhosis.

History of schistosomiasis was present in 9% of cases of HCC. A lot of controversies have been found between studies about the role of schistosomiasis in HCC.

Table 11 Distribution of cases, and plan of management of HCC patients in Asyut, Egypt 2016*

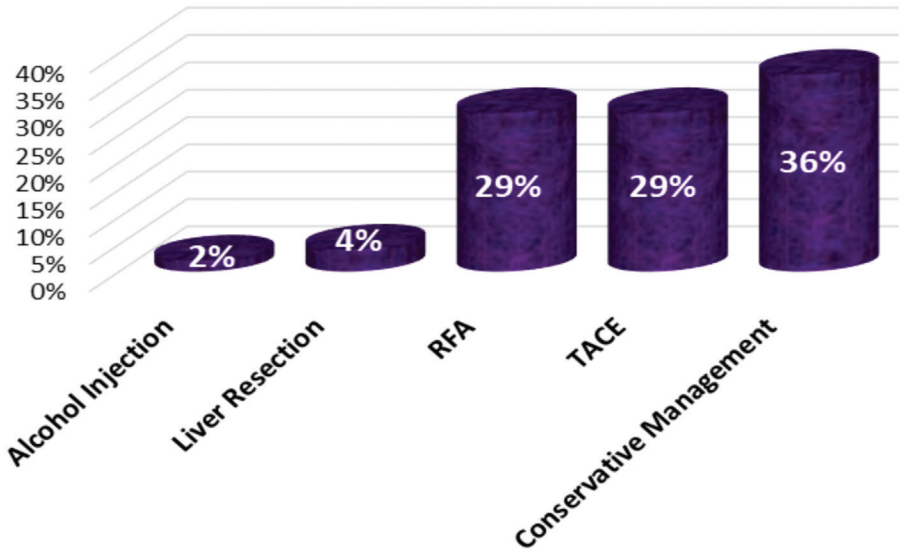
Variables	Category	*N*=400 [*n* (%)]
Case type	Newly diagnosed	366 (92)
	Previously diagnosed	34 (8)
Plan for management	Alcohol injection	8 (2)
	Liver resection	16 (4)
	RFA	116 (29)
	TACE	116 (29)
	Conservative management	144 (36)

RFA, radiofrequency ablation; TACE, transarterial chemoembolization.

Shaker *et al.* [28] agree that the role of schistosomiasis on HCC is still not confirmed. El-Zayadi *et al.* [5] disagree with it and explain that the presence of schistosomal infection may increase the risk of developing HCC. However, El-Tonsy *et al.* [29] conclude that combined HCV and schistosomiasis can increase the risk of HCC in comparison with cases with HCV infection alone.

In this study, HCV infection was present in 63% of patients with HCC, HBV infection was found in 28% of patients with HCC, coinfection was seen in 3%, and no viral infection in 6% of HCC cases. Viral hepatitis is considered one of the major risk factors of HCC. This is in agreement with the study by Shaker *et al.* [28] which showed that HCV infection was present in most cases (91%), HBV infection in 2.5% of cases, combined infection in 2.67%, and no viral infection was detected in 3.5% of cases. Mohmad *et al.* [21] found that HCV was seen in 64.4%, HBV in 17.5% and combined infection in 11.2%. Similar results were reported by El-Serag [4] who found that HCV infection has an increased risk for HCC development by 15–20 times. In addition, White *et al.* [24] found in a meta-analysis of 21 case–control studies that there is an increase of HCC by 17 times in HCV-positive patients in comparison with HCV-negative persons. On the contrary, Kanwal *et al.* [30] concluded that other factors besides HCV infection may have role in HCC development such as old age, longer duration of infection, male sex, heavy alcohol intake, diabetes, obesity, and fatty liver disease. Regarding HBV infection, Thiele *et al.* [31] reported

Fig. 5



RFA (radiofrequency ablation), TACE (Trans arterial chemoembolization)

Plan for management of HCC among the studied patients. HCC, hepatocellular carcinoma.

that HBV infection can increase the risk of HCC development by 5–15 fold and usually occurs on background of cirrhosis.

In this study, viral hepatitis markers were negative in 3% of patients with HCC. El-Serag [4] found that 14.5% of HCC cases had no viral infection and were diagnosed as having nonspecific cirrhosis. This can be explained by the presence of occult or mutant viral infection or exposure to risk factors as such smoking, alcohol abuse, or aflatoxins.

AFP was found to be normal in many cases, up to 40%, especially in early HCC [32]. In the current study, 13% of HCC cases had AFP level less than 20 ng/ml, and AFP level more than 200 ng/ml was detected in 53% of the cases, whereas the study by Kumar *et al.* [33] found that serum AFP was diagnostic in only 46% of patients (>400 ng/ml).

Metabolic comorbidities were found recently to have a great effect on the development of HCC and progression. In the present study, it was found that diabetes mellitus was present in 37% of HCC cases. This agrees with El-Serag *et al.* [34] who reported that diabetes mellitus was associated with a great risk of HCC development. Moreover, Chen *et al.* [1] agree that patients with CLD having type 2 diabetes had increased risk of HCC in comparison with CLD alone. In addition, Simon *et al.* [35] concluded that patients with type 2 diabetes mellitus and metabolic comorbidities (obesity, hypertension, and dyslipidemia) had increased risk of HCC by eight-fold.

Our study shows that 24% of patients with HCC were overweight. Larsson and Wolk [36] and Tang *et al.* [13] agreed that obesity is considered as a major risk factor for HCC development, and there is significant relation between BMI and HCC mortality. Moreover, Streba *et al.* [37] stated that both obesity and diabetes increase the risk of HCC progression. Similarly, the study by Setiawan *et al.* [38] showed that increased BMI in men was associated with a higher risk of developing liver cancer.Regarding the clinical presentations of HCC in the studied patients, 32% of the patients with HCC were discovered accidentally, and this may be attributed to screening programs. This is agreement with Sherman [39] who stated that most of the patients were being discovered at an early stage when asymptomatic because of the frequent use of imaging for complaints unrelated to liver disease. Meanwhile the current study showed that 15% of HCC cases presented with abdominal pain, 11% presented with hematemesis, 10% presented with weight loss, 10% presented with fever, and 10% presented with bleeding tendency. On the contrary, the study of Shaker *et al.* [28] showed that the most frequent symptom was the newly developed right hypochondrial pain by 66.3%, whereas the findings of Mohmad *et al.* [21] reported that abdominal pain was present in 80% of cases followed by loss of weight in 43.6% and fever in 18.8% of cases.

It is noticed that 7% presented with uncontrolled ascites, and 5% presented with easy fatigability. This agrees with Emam *et al.* [40] who stated that in patients with uncontrolled ascites, HCC should be considered.

Tumor characteristics were also evaluated, which revealed that right lobe of the liver was mostly involved, represented by 61% of the cases, left lobe only in 25% of cases, and bilobar in 14% of cases. Tumor stage was evaluated using BCLC staging system, and it showed that 49% of cases were in stage A, 45% of cases in stage B, and 6% of cases in stage C. This agreed with El-Zayadi *et al.* [5] who found that the right lobe was frequently affected, represented by 65%, followed by affection of both lobes in 21.6%, and left lobe affection was seen in 13.4% of cases. Similar results were obtained by Shaker *et al.* [28] who reported that the right lobe was mostly affected, as seen in 75.4% of the patients.

The study revealed that most of the patients had single lesion (69%), two lesions were seen in 19%, and multiple lesions in 12% of cases, and this finding is comparable to the study by Shaker *et al.* [28] who showed that the most frequent presentation was a single lesion in 61.5% of cases followed by three or more lesions being found in 21.5% of HCC cases. Moreover, Kumar *et al.* [33] found that a single lesion was the most common presentation in patients with HCC.

The study showed that portal vein thrombosis was present in 19% of cases. This disagrees with Shaker *et al.* [28] who found that main portal vein thrombosis was seen in 78.9% of cases, whereas in an Indian study by Kumar *et al.* [33], portal vein invasion was seen in 45% of cases.

Conclusion

Most patients with HCC have a history of HCV infection, which has a high prevalence in Egypt, followed by HBV infection, so the prevention of HBV by active immunization in early childhood and high-risk patients is of paramount importance.

Metabolic comorbidities and smoking can add to the risk of HCC development. HCC usually occurs in old age, and male sex is more affected. Environmental and occupational factors may have a role in HCC progression, as rural areas have a higher percentage of patients with HCC than urban ones. Family history of liver cancer should be investigated as a risk factor of HCC. As most of the patients are diagnosed at a late stage, so screening programs are of great importance for early detection to provide curative treatment. Owing to limited descriptive study design applied in the current research, it is recommended to conduct further analytic study design studies to evaluate risk factors in Egyptian patients for HCC other than viral infections.

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Conflicts of interest
There are no conflicts of interest.

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