Ali *et al.*
The Egyptian Journal of Internal Medicine (2023) 35:18
https://doi.org/10.1186/s43162-023-00201-8

The Egyptian Journal of Internal Medicine

RESEARCH

Open Access

Assessment of clinico-epidemiological profile of Hepatocellular carcinoma in the last two decades

Ahmed Abdel Kareem Ali[1], Salah El Gamal[1], Rokiah Anwar[1], Eman Elzahaf[2] and Dina Eskandere[1*]

Abstract

Background Hepatocellular carcinoma represents 85%—90% of primary liver tumors; it represents the 2nd leading cause of cancer-related death all over the world. There is a growing incidence of HCC worldwide and similarly, the incidence of HCC has almost doubled over the last decade in Egypt.

Aim of the work To assess clinico-epidemiological character of HCC in the last two decades and to compare between the first and second decade regarding these characters.

Patients and methods This retrospective study included 497 HCC patients' data collected from Clinical Oncology and Nuclear Medicine Department from 1999 to 2019, HCC patients were classified into 1st decade (from 1999 to 2009) and 2nd decade (2010 – 2019). Diagnosis of HCC was based on clinical, laboratory, (AFP), and radiological examinations (The abdominal US and triphasic CT scan).

Results The study revealed that the average age of HCC cases was 57 years, the majority of these were males (88%), residents in rural areas (70%), about one-fourth of them, were smokers (26.4%), DM was present in 14% of these while only 7% were hypertension. Thirty presents (30%) of them were represented by ascites and (20%) by hepatic encephalopathy of different grades. The majority of HCC patients (92.2%) have HCV Abs positive. HBS Ag was positive in 2.4% while mixed infection (HCV Abs + ve and HBS Ag + ve) was in 2% of patients only. The median level of AFP was 300 ng/ml.

The severity of underlying chronic liver disease was assessed by the Child–Pugh score the mean score was 7.5 (from 6–11) and the MELD score (the mean score was 18.8 (from 6–29).

Regarding tumor characteristics, HCC mass was located in the Right lobe of the liver in (63.8%), in the left lobe in (26.6%) and both lobes were affected in 9.6%. A single focal hepatic lesion was detected in about 60% of patients, 3 focal lesions in about 20%, and two focal lesions or multifocal HCC in the remaining percent. The median size of the largest tumor's diameter was 5 cm by the US and 5.3 cm by the triphasic CT. PVT, vascular invasion, LN, and distant metastasis were detected in (35.6%), (40%), (40%) and (54%) of patients respectively. In less than one-third of HCC cases, the tumors were within Milan criteria (30%).

Conclusion The 1st decade showed a significantly higher frequency of patients presented with marked splenomegaly and splenectomy, while the second decade showed a significantly higher frequency in patients who reside in rural areas. Higher frequency of DM, advanced hepatic encephalopathy grade III/ IV, and unfortunately more aggressive tumors with PVT, vascular invasion, LN metastasis, and distant metastasis were detected in the 2nd decade.

*Correspondence:
Dina Eskandere
dinaeskandere@mans.edu.eg
Full list of author information is available at the end of the article

Keywords HCC, Chronic liver disease, Tumor, PCR

Background

Hepatocellular carcinoma (HCC) is one of the most common cancers worldwide and accounts for considerable morbidity and mortality rates. HCC is the seventh most common cancer globally and the second most common cause of cancer-related death worldwide [1].

The global burden of HCC is increasing. World Health Organization (WHO) approximates that above 1 million people will die from HCC in 2030 [2]. Regarding the global cancer report in 2020, about 906,000 new cases and 830,000 deaths were reported [3].

The Africa Liver Cancer Consortium displayed a significant variance in the age of onset of HCC in Egypt compared with 11 other African countries. The mean age was 58 years in Egypt versus 46 years in other countries [4]. It is the fifth most common cancer in males and the ninth in women [5]. HCC occurs more in males irrespective of etiology in approximately all populations, with a male-to-female ratio ranging from 2:1 to 7:1 reliant on the geographical site. HCC in females is generally smaller and less advanced. Female cases also respond better to treatment [6].

The growing survival rate of cirrhotic patients due to the improvement in medical service and also the increase in the incidence and complications of hepatitis C virus (HCV) resulted in an increased chance of developing HCC in Egypt. HBV, environmental toxins, non-alcoholic fatty liver disease, alcohol, smoking, dietary factors, obesity, and hereditary liver diseases with genetic mutations (hemochromatosis, Wilson disease, alpha one antitrypsin deficiency, glycogen storage disease, and tyrosinemia) are other risk factors of developing HCC in Egypt [7].

The cornerstone surveillance of HCC in cirrhotic patients is the abdominal ultrasound; however, it has a sensitivity of less than 50% for early detection of HCC when utilized alone [8]. It is better to add alpha-fetoprotein in surveillance. Patients with positive surveillance tests should be referred for a diagnostic evaluation with CT or MRI [9].

The incidence of HCC has approximately doubled in Egypt over the last decade and it represents the main complications of cirrhosis; this growing incidence may be the result of the high prevalence of HCV. Moreover, Egypt is undergoing an epidemiologic transition like many other developing countries with an increase in environmental risk factors, smoking, and a high prevalence of HCV. So, HCC is supposed to increase within the next few years [10].

Our study aimed to report the epidemiological and clinical properties of HCC in the last two decades and to compare the last 2 decades regarding the clinico-epidemiological characteristics of HCC.

Methods

It is a Retrospective study based on the analysis of the database conducted by the Clinical Oncology and Nuclear Medicine Department. The current study included 497 patients. Patients were divided into 2 groups according to the period of HCC diagnosis: 1999–2009, and 2010–2019. All HCC patients were evaluated according to the clinical, laboratory (AFP), and radiological examinations (US, Tri-phasic CT). The following data were collected from their archive files.

All patients were subjected to the following: Thorough history taking (Age, Sex, Smoking, Alcoholism, Hypertension, diabetes mellitus, Residential history, and Occupational history), Complete physical examination (liver, spleen, ascites, and hepatic encephalopathy), laboratory investigations (Serum creatinine, serum albumin, bilirubin, international normalized ratio (INR), AFP level, HBsAg, and Hepatitis C antibody (HCV Ab)), and Radiological studies: Abdominal ultrasound and triphasic CT: Presence of liver cirrhosis, splenomegaly, ascites, tumor characteristics (site, size, and the number of focal lesions), presence of portal vein thrombosis and vascular invasion, lymph nodes metastasis and finally distant metastasis.

The severity of liver disease was assessed by CTP and MELD scores. CTP score categorizes the severity of chronic liver diseace into three grades based on the score points listed in Table 1.

MELD score depends on the three parameters: bilirubin, creatinine, and INR as in the following equation: $\text{MELD} = 3.78 \times \text{loge (bilirubin mg/dl)} + 11.2\text{xloge (INR)} + 9.57 \times \text{loge (creatinine mg/dl)} + 6.43$ [12].

Table 1 CTP classification of chronic liver disease

Measure	Point 1	Point 2	Point 3
Total bilirubin (mg. per 100 ml)	< 2	2–3	> 3
Serum albumin (g. per 100 ml)	> 3.5	3.5–2.8	< 2.8
Ascites	None	Mild	Moderate to marked
Hepatic encephalopathy	None	Grade 1–2	Grade 3–4
INR	< 1.7	1.7–2.3	> 2.3

Child–Pugh class A: 5–6 points; Child–Pugh class B: 7–9 points, Child–Pugh class C: 10–15 points [11]

All HCC patients were classified according to Milan criteria to either within or outside Milan as follows:

(1) A single tumor diameter of less than 5 cm.
(2) No more than three foci of tumors, each one not exceeding 3 cm.
(3) No vascular invasion.
(4) No extrahepatic involvement [13].

Ethics and considerations

This study was ethically approved by the Mansoura university ethics committee.

Statistical analysis

Data were collected and analyzed by utilizing IBM-SPSS software (IBM Corp. Released 2017 for Windows, Version 25.0. Armonk, NY).

Qualitative data were evaluated as frequency and percent. Quantitative data were evaluated for normality by utilizing Kolmogorov–Smirnov as well as Shapiro–Wilk's tests and data were considered normal in distribution if $p > 0.050$. Quantitative data were expressed as mean ± standard deviation (SD) in cases with normal distribution while median and interquartile range (IQR) were used if not.

For qualitative data, the Chi-Square test was utilized. For quantitative data of 2 groups, the Independent-Samples t-test was utilized for data with normal distribution in the studied groups with no significant outliers; otherwise, the nonparametric Mann–Whitney U test was utilized. For quantitative paired data, the Paired-Samples test was used for normally distributed data in both results with no significant outliers; otherwise, the non-parametric Wilcoxon Signed Ranks test was utilized.

Spearman's rank-order correlation is measuring the strength as well as the direction of the association/relationship among two continuous or ordinal variables.

Regarding all used tests, the result was considered if the p-value was less than or equal to 0.05.

Results

This retrospective study included 497 patients with HCC. The study reviewed the patient files with stress on the epidemiological and clinical characteristics.

Clinico-demographic data of the studied cases showed that the median age was 57 years ranging from 28 to 83 years. Male cases were 439 (88.3%) with a male-to-female ratio of 8:1 (This difference was statistically significant (One-Sample Chi-Square test, $P < 0.0005$)). Rural residence was in 340 cases (68.4%). Current and ex-smokers were 112 cases (22.5%) in this study. The involved cases with hypertension were 37 (7.5%). Diabetic patients in the study were 72 (14.4%). The patients with mild ascites were 97 (19.5%), while those with moderate to marked ascites were 49 (9.9%). The remaining cases with no ascites were 351 (70.6%). The involved patients who did not have hepatic encephalopathy 365 (73.4%). Patients with grade I or II hepatic encephalopathy were 92 (18.5%), while those with grade III or IV were 40 in number (8%).

HCV antibody was positive in 458 cases (92.2%) (235 cases (90%) in the 1st decade and 233 cases (93%) in the 2nd decade). Of those cases, about 115 (44.7%) cases in the 1st decade and 98 cases (41.1%) in the 2nd decade were diagnosed with HCC along with HCV for the first time in the facility. Cases with HBV were 12 (2.4%). Cases with HBV alone were 2 (0.4%), while cases with HBV and HCV infection were 10 (2%). All the registered cases with HBV were diagnosed later as HCC. The highest frequency of HCV patients who developed HCC was reported in 2006 (Fig. 1). As can be seen from the figure, there is an obvious correlation between the HCV cases and occurrence of HCC. The correlation between HCV and HCC reached 0.999 in the 1st decade and 0.995 in the 2nd decade of the study. On the other hand, a very weak correlation was estimated between HBV and occurrence of HCC that reached—0.18 in the 1st decade and 0.085 in the 2nd decade. This is due to prevalence of HCV over HBV cases in Egypt during the investigated period.

The laboratory data detected in the study were as follows. Mean ± FSD of serum creatinine (1.03 ± 0.75). Mean ± FSD of serum albumin (3.8 ± 0.47). Mean ± FSD of INR (2.8 ± 1.2). Median and range of serum bilirubin (0.7 (0.5–0.9)). The study showed a significantly high level of AFP in patients with HCC. Median AFP (IQR) was 300 ng/ml (24.75—1000). The highest level of AFP was detected in 2017 (1700 ng/ml) (Figs. 2 and 3). CTP score was assessed in the study and the mean CTP score was 7.5 with a range from 6 to 11 (Fig. 4). The mean classic MELD score in the involved cases was 18.8 and the range was from 6 to 29 (Fig. 5).

The imaging findings by the US and the triphasic CT presented in the study are as follows. 422 of cases were cirrhotic (84.9%). 43 cases had coarse liver by US and CT and did not fulfill criteria of cirrhosis (8.6%). 19 cases developed HCC on top of nonalcoholic fatty liver disease NAFLD (3.8%). 10 cases with HBV developed HCC without background of cirrhosis (2%). 3 cases were diagnosed as fibrolamellar HCC (0.6%). The liver size in involved cases was average in 268 cases (53%), enlarged in 189 (39%), and shrunken in 40 cases (8%). 52.9% of cases had normal-sized spleen ($N = 263$) while 223 cases (44.9%) had enlarged spleen (Mildly enlarged in 120 cases (24.2%), moderately enlarged in 94 cases (18.9%), and hugely enlarged in 9 cases (1.8%)).

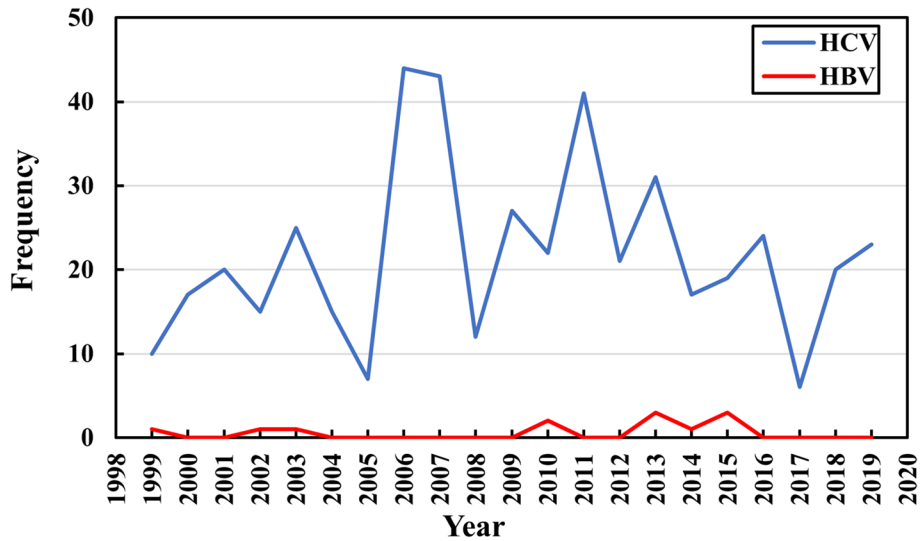

Fig. 1 Frequency of viral hepatitis C and B by years. The frequency of HCV is much higher in HCC patients in Egypt compared to HBV. The highest frequency of HCV patients which developed HCC was reported in 2006

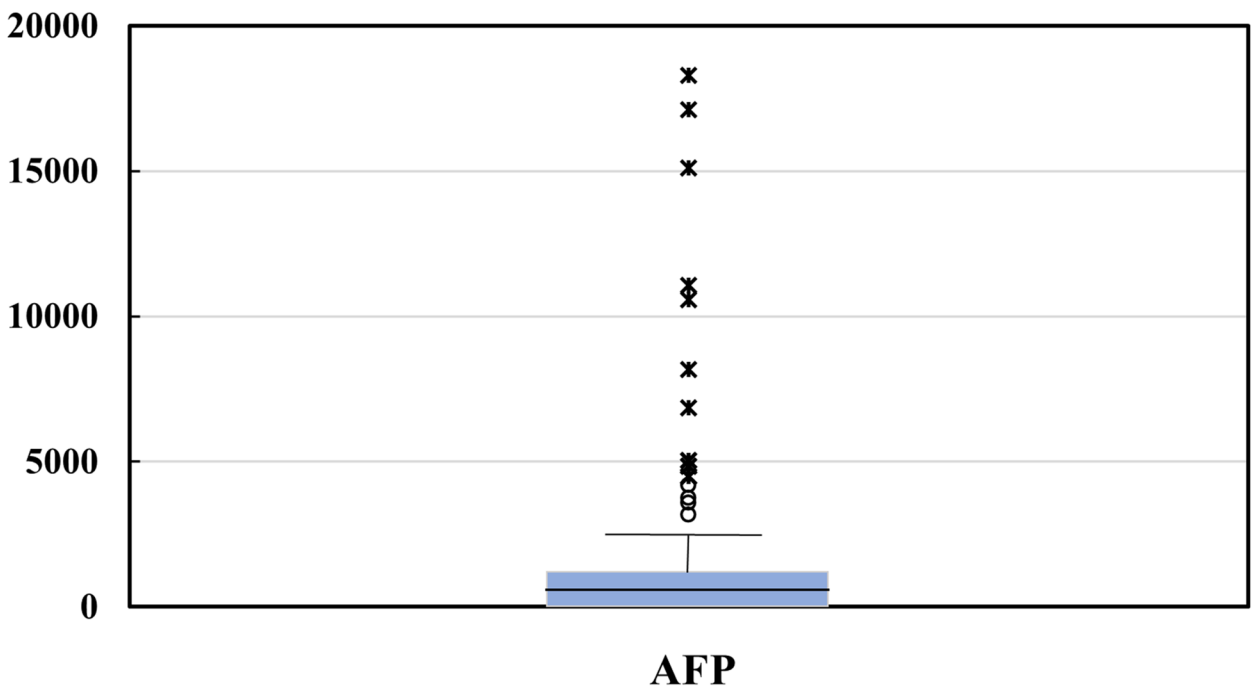

Fig. 2 Median and range of AFP Fig. 2 showed a significant high level of AFP in patients with HCC. The median AFP (IQR) was 300 ng/ml (24.75—1000)

63.8% of cases ($N=317$) had tumors in the right lobe of the liver, while left lobe tumors were detected in 132 (26.6%), and the remaining 48 cases (9.6%) had tumors in both lobes. Only one focal lesion was detected in about 60.2% of cases ($N=299$), while two focal lesions were identified in 50 patients (10.1%), and 3 focal lesions were detected in 116 cases (23.3%). The remaining 32 cases (6.4%) had multifocal tumors (more than 3 focal lesions). The correlation between the number of focal lesions by US and CT is presented in Fig. 6 and shows a statistically significant positive correlation. The median size of the tumor was 5 cm by US (Range: 3–7) and by CT was 5.35 (Range:4–8). The correlation between the size of focal lesions by US and CT is shown in Fig. 7 and indicates a

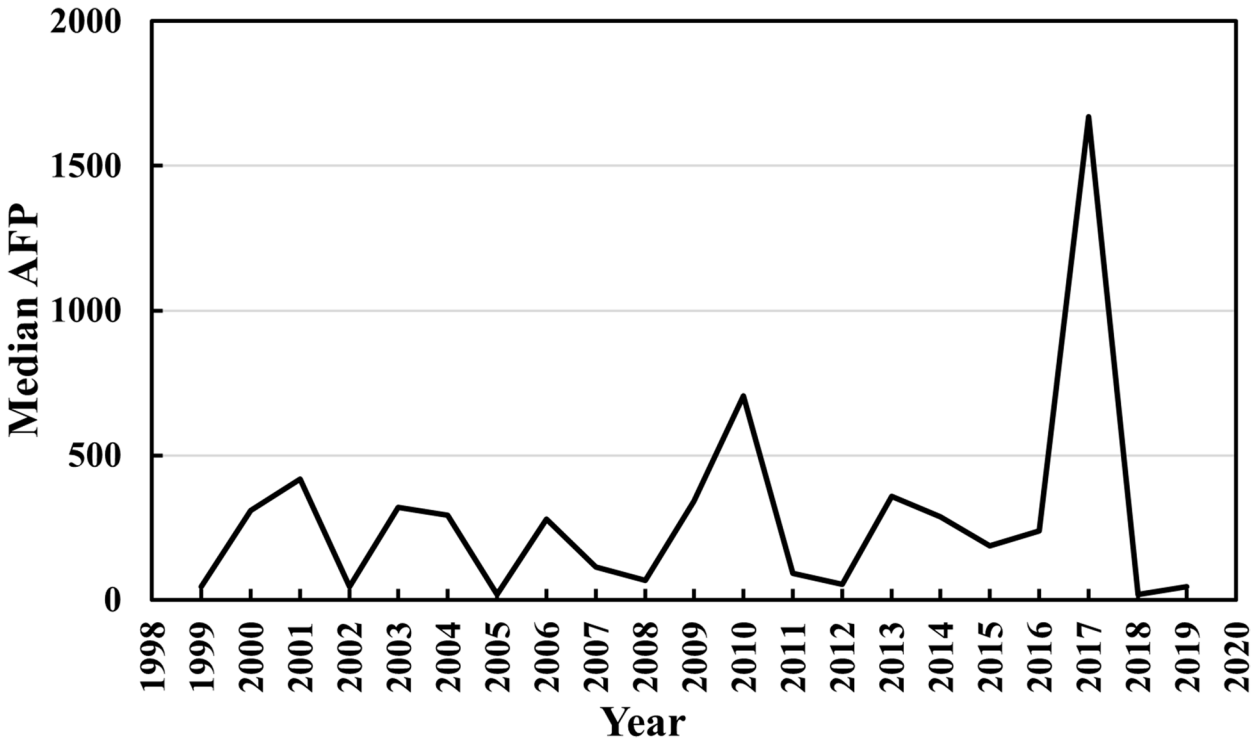

Fig. 3 Median AFP level by yearL Fig. 3 This figure showed that the highest level of AFP was in 2017

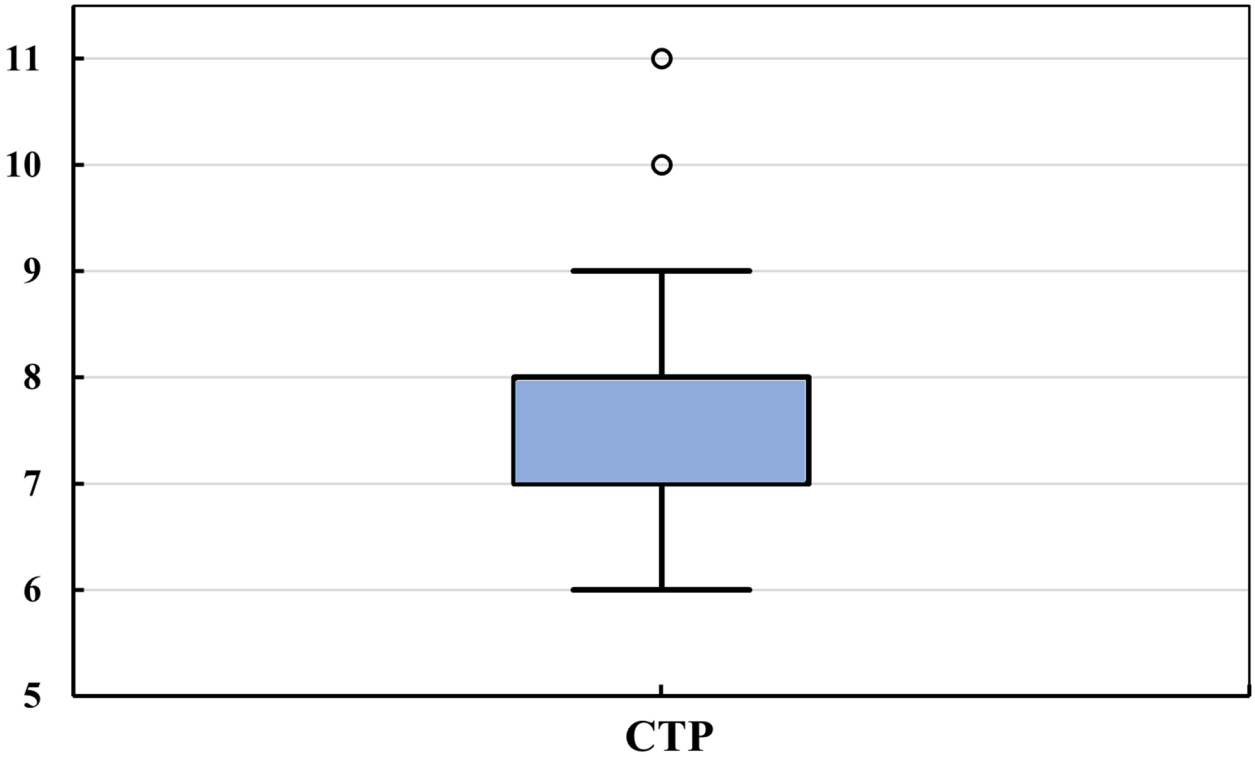

Fig. 4 CTP assessment in the study Fig. 4 This figure showed that the mean CTP score was 7.5 and the range was from 6 to 11

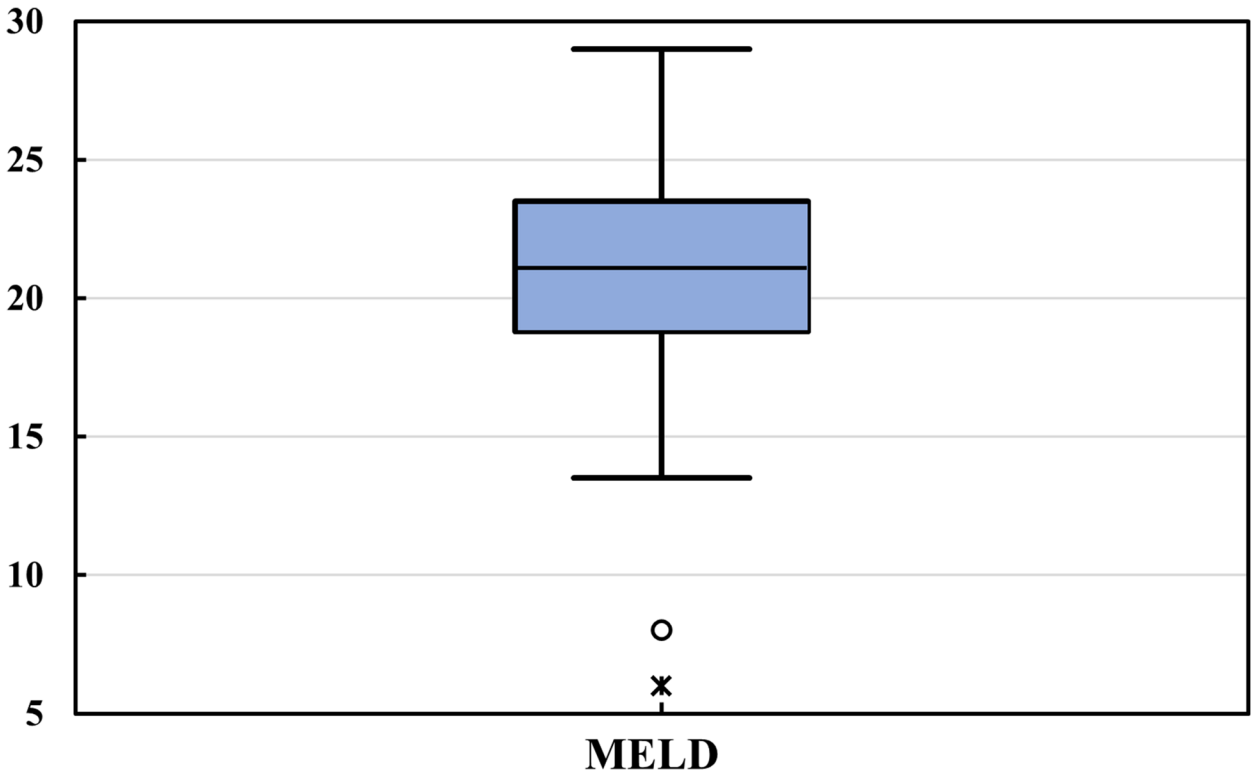

Fig. 5 MELD score assessment in the study Fig. 5 This figure showed that, the mean MELD was 18.8 and the range was from 6 to 29

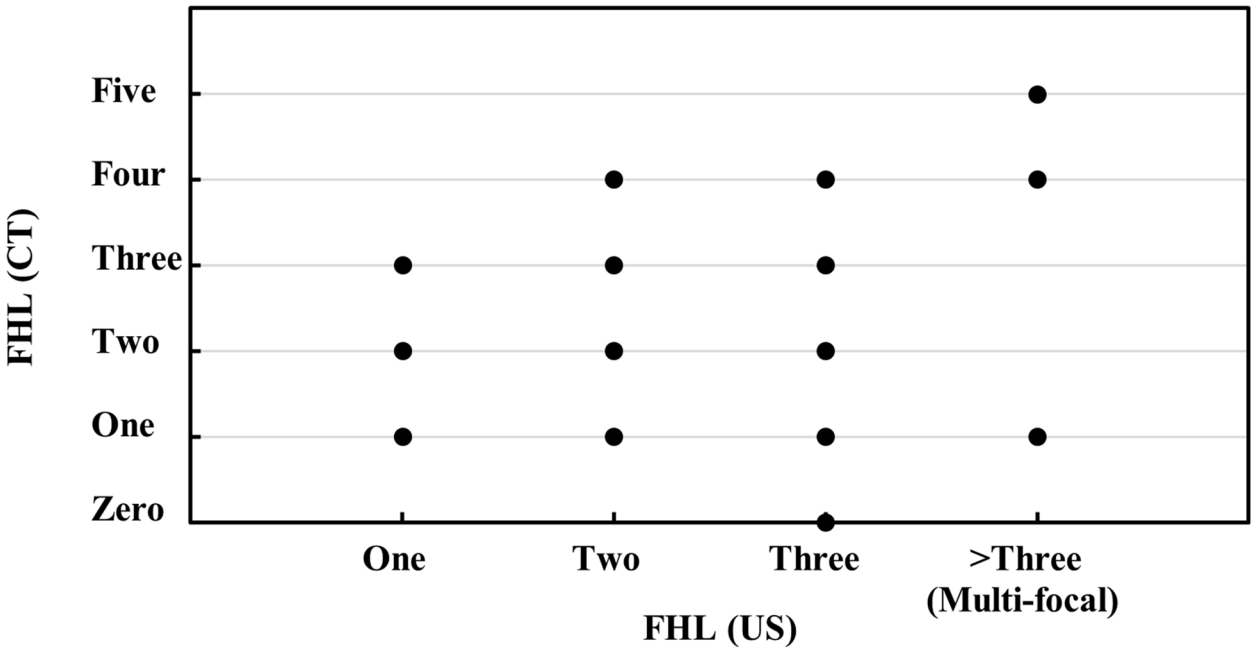

Fig. 6 Correlation between number of hepatic focal lesions by US and CT Fig. 6 There was statistically significant positive correlation between number of FHL by US and by CT scan (Spearman's correlation coefficient = 0.912, *p* value < 0.0005)

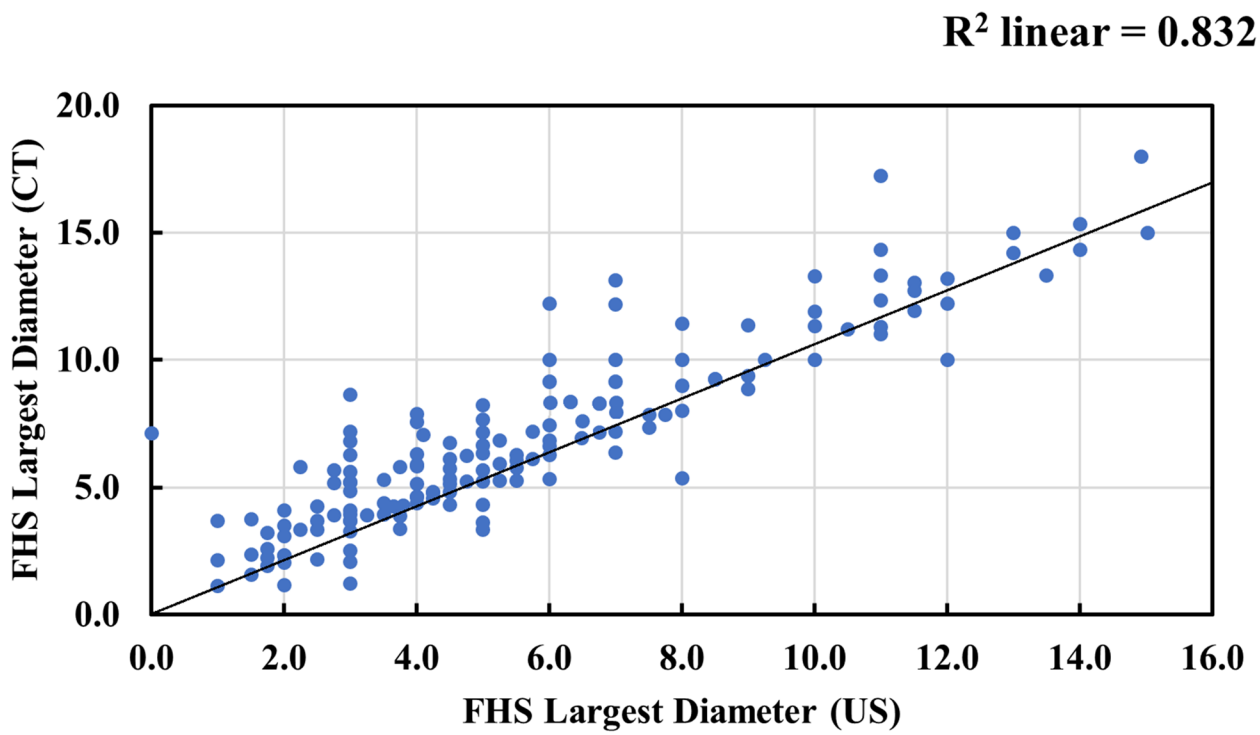

Fig. 7 Correlation between size of hepatic focal lesions by US and CT Fig. 7 There was statistically significant positive correlation between the largest tumor diameter by US and by CT scan (rs = 0.896, $P < 0.0005$)

statistically significant positive correlation Only 35.6% of cases had portal vein thrombosis ($N = 177$). 54.3% of cases at the time of diagnosis had distant metastasis ($N = 270$). Only 30.2% of cases were within Milan criteria ($N = 150$). The percentage of cases within Milan criteria per year was shown in Fig. 8.

The 1st decade (1999–2009) included 257 cases with HCC and the 2nd decade (2010–2019) included 238 cases with HCC. A comparison of data between 1ST and 2nd decades is illustrated in Table 2. This table shows that most of the cases in the 2nd decade were from the rural areas, which is statically significant. The frequency of DM was statistically significantly higher in 2nd decade. Splenectomy and large-sized spleen were significantly higher in 1st decade, while normal-sized spleen was higher in 2nd decade (Fig. 9). Hepatic encephalopathy in different grades was statistically significantly higher in 2nd decade. Though not statistically significant, positive HBsAg was more frequent in 2nd decade (3.8% vs. 1.2%). Figure 10 shows the comparison between the 1st and 2nd decades regarding cases with positive HCV antibodies. The number of hepatic focal lesions in both decades is represented in Fig. 11. The state of vascular invasion in both decades is shown in Fig. 12.

Discussion

Primary liver cancer is the seventh-most frequently occurring cancer in the world and the second-most common cause of cancer mortality. The highest incidence rates in the world are found in Asia and Africa [1].

Hepatocellular carcinoma (HCC) is the fourth most common cancer in Egypt. the Egyptian health authorities consider HCC as the most challenging health problem. The number of HCC patients increased twofold over a decade [7].

This retrospective cohort study included 497 HCC patient databases collected from patients' files in the Clinical Oncology and Nuclear Medicine Department at Mansoura University Hospital from 1999 to 2019, HCC patients were divided into the first decade from 1999 to 2009 and the second decade from 2010 to 2019. HCC was diagnosed in all patients based on clinical, laboratory (AFP), and radiological examination (US and triphasic CT).

In the current study, the mean age of HCC patients was 57 years. and the majority of our cases were males (88.3%). These are in agreement with McGlynn et al. [1] study which reported that there is a significant difference in median age at diagnosis between Egypt (58 years) and

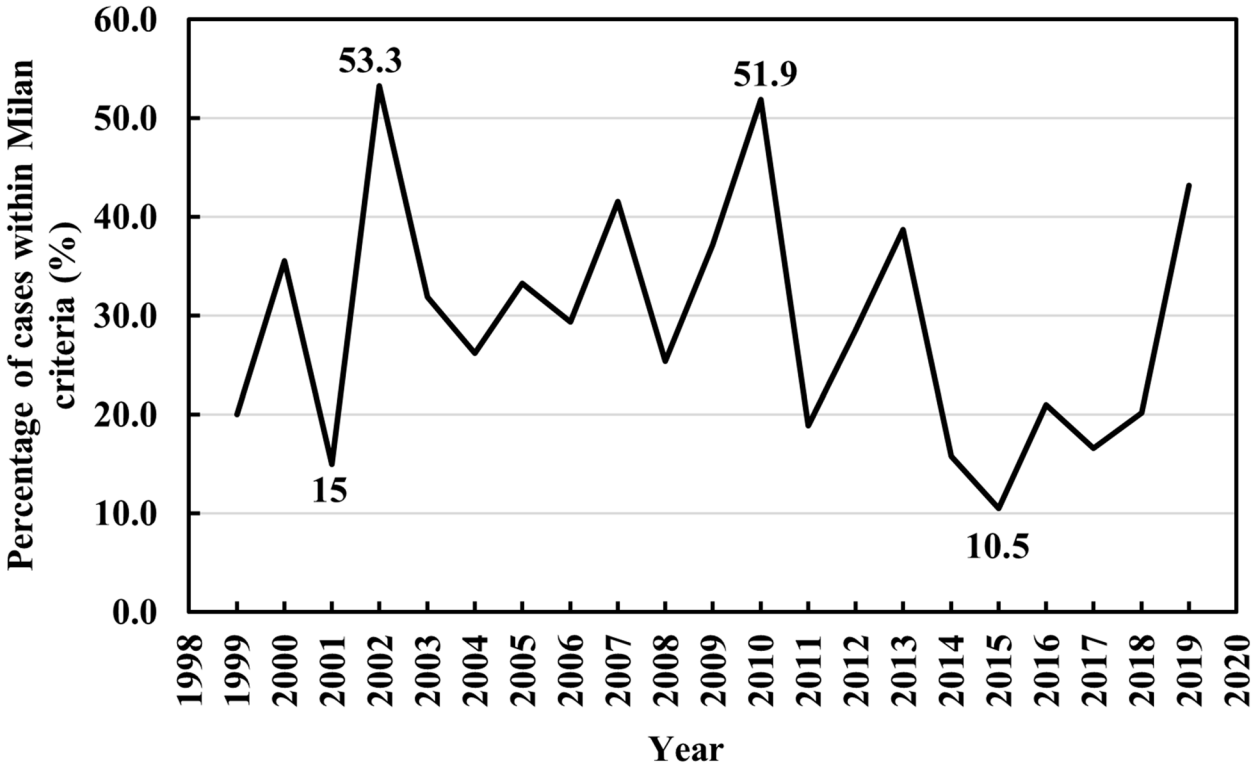

Fig. 8 The percentage of cases within Milan criteria per year Fig. 8 This figure showed that, the highest percentage was 53.3% in 2002 and the lowest was 10.5% in 2015

other African countries (46 years). They also showed that the incidence rates of HCC in most countries among men are 2- to fourfold higher than rates among women.

In developing countries, viral hepatitis is the first leading cause of HCC. In concordance with this, above ninety percent (92.2%) of our HCC cases were HCV-positive. Sayiner et al. [14] study also reported that 84% of HCC cases in Egypt were due to HCV. The highest prevalence of HCV infections worldwide is among Egyptians with estimates ranging from 6 to 28% of the whole population. Therefore, HCV infection in Egypt is considered a major health problem [15].

Although HBV infection is represented as a major predisposing factor for hepatic cirrhosis and subsequent HCC worldwide, only 2.4% of HCC patients in the present study had HBs Ag positive. This result disagreed with Fathy Barakat et al. [16] which showed the overall prevalence of HBV in patients having HCC in Egypt was about 34.04%. This difference could be explained by the difference in sample size. Our study included the last 2 decades, whereas the latter one involved just one year.

Mixed infections (HCV + HBV) were found in 2% of HCC patients in the current study. A similar result was reported by Al-Haimi et al. [17]. Approximately 1.7% of HCC patients were found to have a combination of HCV and HBV infections.

Only 14% of HCC patients in our study were diabetic. However, a meta-analysis of 21 cohort studies showed that patients with chronic liver disease and type 2 diabetes mellitus had a higher HCC risk than those with a chronic liver disease without diabetes. Patients with diabetes mellitus were nearly twice as likely to develop HCC than control subjects [18].

Regarding tumor characteristics in the studied HCC patients, a tumor mass was located in the right lobe of the liver in about 63.8% of patients. 26.6% of the cases had tumor masses in the left hepatic lobe, whereas both lobes were affected by malignancy in 9.6% of patients. Similar results were documented in another study in Greece done by Markakis et al. [19].

In our study, the number of focal lesions in the first decade (1999–2009) was as follows: 223 cases (87.1%) had 3 lesions or less, while 33 cases (12.9%) had more than 3 lesions. On the other hand, 228 cases (96.3%) in the second decade (2010–2019) had lesions or less, whereas 9 cases (3.8%) had over 3 lesions. This is in agreement with Markakis et al. [19]. It was reported that 99 HCC cases (80.5%) with HBV etiology, 54 cases (77.1%) with HCV etiology, and 69 cases with non-viral

Table 2 Comparison of demographic, clinicopathological and radiological data between the 1st and 2nd decade

Parameter	Decade		Test of significance
	1st decade (1999-2009) (*n*=257)	2nd decade (2010-2019) (*n*=238)	*P* value
Age (years):	57 (51-63)	57 (53-63)	0.496
Sex:			
Male:	227 (87.6%)	212 (89.1%)	
Female:	32 (12.4%)	26 (10.9%)	0.620
Residency:			
Rural	161 (62.2%)	179(75%)	0.002
Urban	98(37.8%)	59(24.8%)	
Smoking	57(22%)	55(23.1%)	0.769
Positive HBsAg:	3 (1.2%)	9 (3.8%)	0.057
Positive Anti-HCV:	235 (90.7%)	223 (93.7%)	0.220
AFP level:	268 (32-868.5)	300 (22.5-1000)	0.854
Presence of DM	27 (10.4%)	45 (19%)	0.007
Presence of hypertension:	14 (5.4%)	23 (9.7%)	0.071
Spleen			
Splenectomy	9 (3.5%)	2 (0.8%)	
Normal-sized	125 (48.3%)	138 (58%)	
Mild enlargement	61 (23.6%)	59 (24.8%)	0.009
Moderate enlargement	56 (21.6%)	38 (16%)	
Marked enlargement	8 (3.1%)	1 (0.4%)	
Hepatic encephalopathy			
No	216 (83.4%)	159 (66.8%)	<0.0005
Mild	31 (12%)	47 (19.7%)	
Moderate to severe	12 (4.6%)	32 (13.4%)	
Liver size:			
Average	129 (49.8%)	139 (58.4%)	
Mild enlargement	69 (26.6%)	65 (27.3%)	0.055
Moderate enlargement	34(13.1%)	21 (8.8%)	
Shrunken	27 (10.4%)	13 (5.5%)	
Site of the tumor:			
Right lobe	155 (67.4%)	133 (59.9%)	
Left lobe	57 (24.8%)	64 (28.8%)	0.214
Both lobes	18 (7.8%)	25 (11.3%)	
Number of focal lesions:			
One	159(62.1%)	145(61.2%)	
Two	21(8.2%)	21(8.9%)	0.001
Three	43(16.8%)	62(26.2%)	
>three	33(12.9%)	9(3.8%)	
Size of FHL (cm):			
Largest diameter	5 (4-7)	4.8 (3.9-8)	0.3334
Portal vein thrombosis	73 (28.2%)	104 (43.7%)	<0.0005
Vascular invasion	72	108	<0.0005
LN metastasis	74	110	<0.0005
Distant metastasis	111	88	0.008
Within MILAN criteria	84 (32.4%)	66 (27.7%)	0.254
BCLC staging			
0	15 (5.8%)	9 (3.7%)	0.04
A	69 (26.8%)	57 (23.9%)	
B	8 (3.1%)	8 (3.3%)	
C	79 (30.7%)	122 (51.2%)	
D	48 (18.6%)	82 (34.4%)	

Table 7 showed significant *P* value regarding residency, presence of DM, splenic size, hepatic encephalopathy, number of hepatic focal lesions, presence of portal vein thrombosis, vascular invasion, lymph node metastasis and distant metastasis

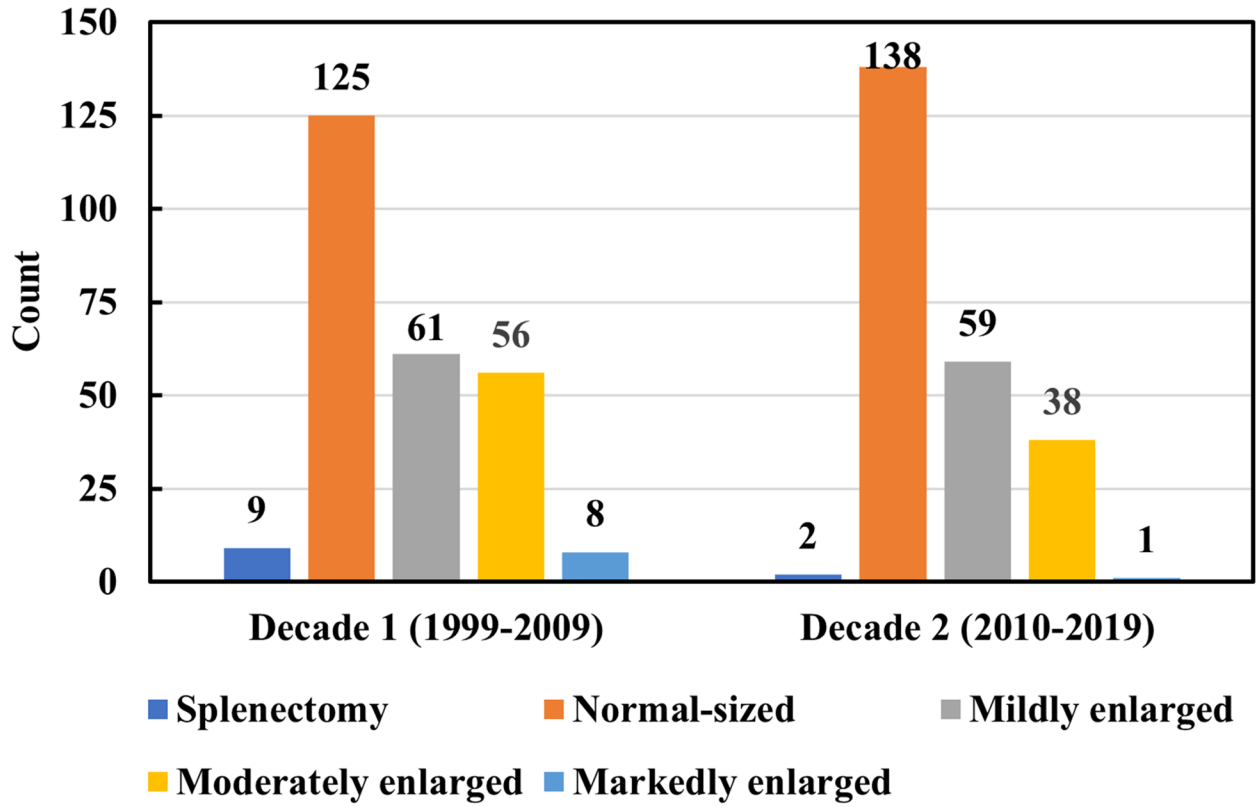

Fig. 9 Ultrasonographic criteria of spleen in both decades involved in study Fig. 9 showed that, splenectomy & huge spleen were statistically significantly higher in 1st decade while normal-sized spleen was statistically significantly higher in 2nd decade

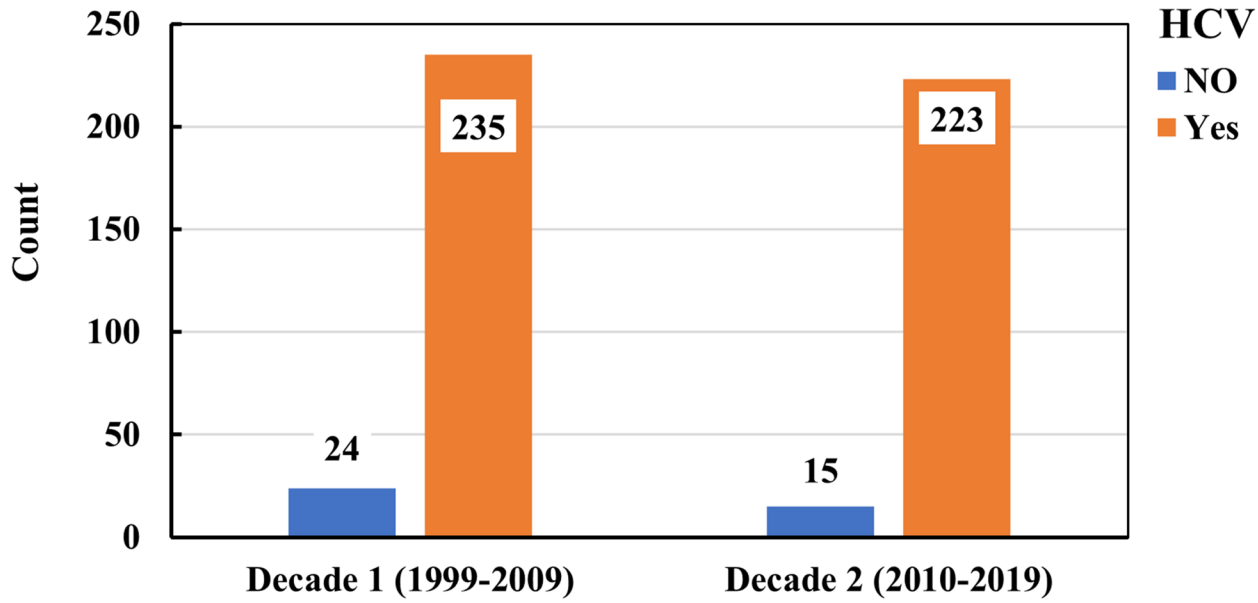

Fig. 10 Comparison between the 1st and 2nd decade regarding cases with positive HCV antibody Fig. 10. This chart showed that, anti –HCV AB was 235 cases (90%) in the 1st decade and 233 cases (93%) in the 2ndecade with no statistically difference between two decades (*P* value = 0.220)

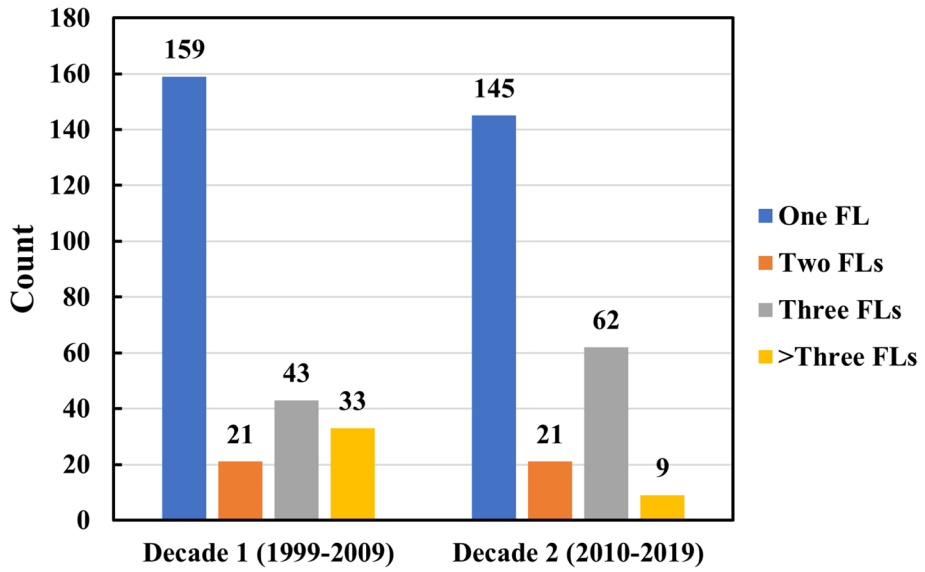

Fig. 11 Comparison between the 1st and 2nd decade regarding the number of hepatic focal lesions Fig. 2. This chart showed that, there is no significant difference in 1and 2 FHL between two decades, 3 focal lesions were more in 2nd decade while > 3 FHL were more in 1st decade which is statistically signficant

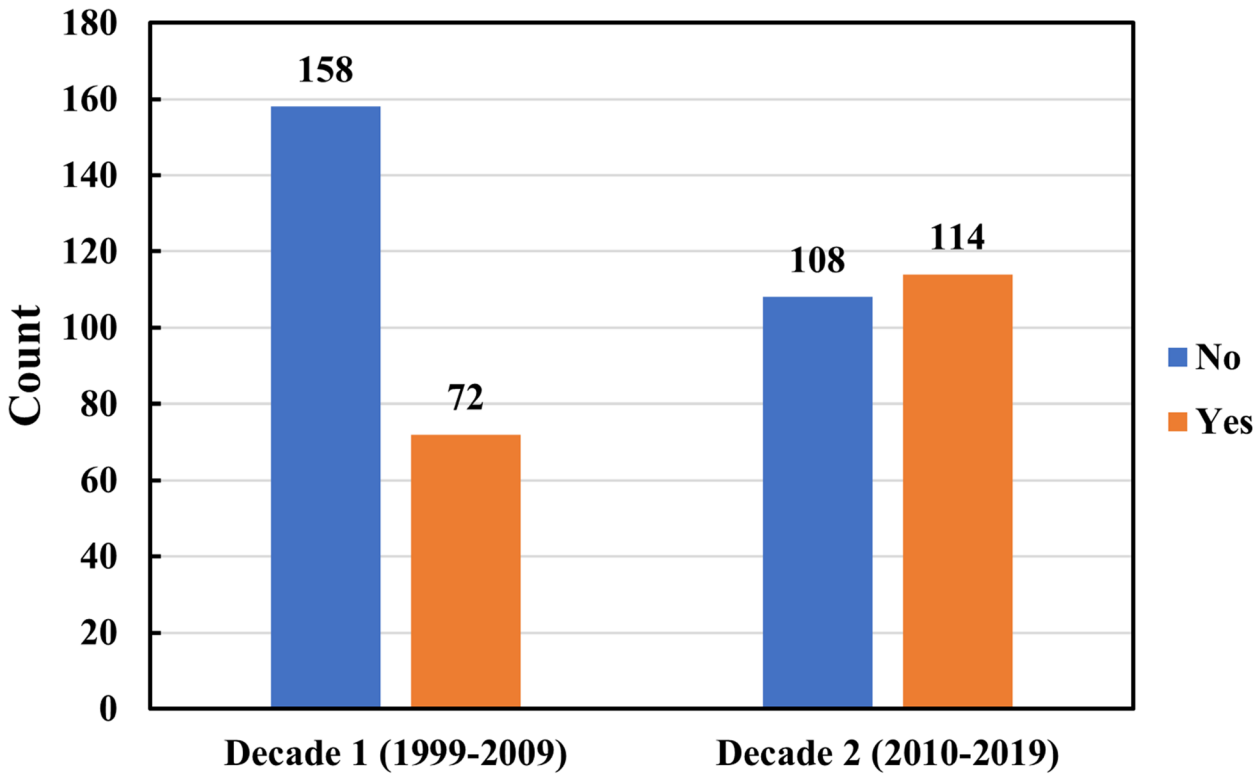

Fig. 12 Comparison between the 1st and 2nd decade regarding vascular invasion Fig. 12. This chart showed that, vascular invasion is statistically significantly higher in 2nd decades

etiology (83.1%) had less than 3 nodules. It was also reported that the number of focal lesions was less than 3 in 52 cases (69.3%) from 2000–2011 and 169 cases (84.5%) from 2012–2019.

The median size of the largest tumor diameter observed by the US in the studied HCC cases was about 5 cm (IOR 3–7), while the estimated median by CT was about 5.35 cm (IOR 4–8). It is known that CT is more sensitive than the US in determining tumor size and other characteristics. This finding agrees with Wu et al. [20]. They reported that 5.97 cm was the median tumor diameter.

Portal vein thrombosis (PVT) was prevalent in about one-third of our patients (35.6%). Al-haimi et al. [17] study reported that 18 cases (18.9%) at the time of HCC diagnosis had PVT. Both studies showed a significant percentage of the patients had PVT but still less than 50%. The difference in results could be explained by different locations and our greater sample size.

The common locations for extrahepatic metastasis from primary HCC include lungs, bones, lymph nodes, bowels, brains, and adrenal glands. In the present study, LN metastasis was found in about (40%) of cases, while distant metastasis was found in (54%) of cases. The latter was mainly pulmonary metastasis. Deo et al. [21] study showed 8 cases (22.2%) with regional lymph node metastasis. Ganeshan et al. [22] study showed that the lung was the commonest site of metastasis (48%), and this agreed with our findings.

Regarding Milan criteria, only about 30% of patients in the present study were within Milan criteria, i.e., suitable for hepatic transplantation. The present study has shown that the number of HCC patients within Milan criteria was higher in the 1st decade than the 2nd decade (84 vs 66) with no significant difference. This result disagreed with the results reported by Santi et al. [23]. They found that the percentage of both "very early" and "non-advanced" (meeting the Milan criteria) HCCs significantly increased across G1 (1987–1996) and G2 (1997–2001). However, advanced HCCs decreased. 339 cases (45.1%) from 1987 to 1996, 415 cases (50.7%) from 1997 to 2001, and 633 cases (50.4%) from 2002 to 2008 were within Milan criteria [23].

Regarding BCLC staging, BCLC C and D showed a higher percentage of patients in the second decade (51,2%, and 34.4% respectively) compared to the first decade (30.7%, and 18.6% respectively). Garuti et al. [24] studied HCC cases and their study included three groups (1st group (2004–2008), 2nd group (2009–2013), and 3rd group (2014–2018)). BCLC C was in the three groups respectively (294 (28.2%), 697 (31.4%), and 607 (25.2%)). BCLC D showed the following results in the three groups respectively (114 (10.9%), 164 (7.4), 153 (6,4%)).

Conclusion

The mean score of the Child–Pugh score was 7.5 (from 6–11) and of MELD score was 18.8 (from 6–29). HCC mass was located in the Right lobe of the liver in (63.8%). A single focal hepatic lesion was detected in about 60% of patients. The 1st decade showed a significantly higher frequency of patients with marked enlarged spleen and splenectomy. On the other hand, the second decade showed a significantly higher frequency of patients who reside in rural areas. Significantly higher frequency of DM, advanced hepatic encephalopathy grade III/ IV, and unfortunately more aggressive tumor with PVT, vascular invasion, LN metastasis, and distant metastasis.

Abbreviations

HCC	Hepatocellular carcinoma
PVT	Portal vein thrombosis
AFP	Alpha-fetoprotein
LN	Lymph nodes
CTP	Child Turcotte Pugh score
MELD	Model for end-stage liver disease

Acknowledgements

None.

Authors' contributions

AA and DE made practical work (collection of data and patients follow-up). EH, SE, and DE made statistical analysis and interpretation of results and paper revision. EH and RA made the main research idea, initial paper structure and paper revision. DE made the initial paper structure, and paper revision. All authors have read and approved the manuscript.

Funding

None.

Availability of data and materials

The data used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study protocol was approved by the Ethics Review Board of Faculty of Medicine, Mansoura University, and informed written consent was obtained from all participants according to the Declaration of Helsinki.
The ethical committee's reference number is MS.17.08.117.
The date of ethical committee approval: 17–9-2017.

Consent for publication

A written consent was obtained from the patients to participate in the study and to share and publish its findings.

Competing interests

The authors declare that they have no competing interests.

Author details

[1]Department of Internal Medicine, Faculty of Medicine, Mansoura University, Mansoura 35511, Egypt. [2]Department of Clinical Oncology and Nuclear Medicine, Faculty of Medicine,, Mansoura University, Mansoura 35511, Egypt.

Received: 30 December 2022 Accepted: 19 February 2023
Published online: 13 March 2023

References

1. McGlynn KA, Petrick JL, El-Serag HB. Epidemiology of Hepatocellular Carcinoma. Hepatology. 2021;73 Suppl 1(Suppl 1):4–13. Available from: https://onlinelibrary.wiley.com/doi/10.1002/hep.31288
2. Zhang C hao, Cheng Y, Zhang S, Fan J, Gao Q. Changing epidemiology of hepatocellular carcinoma in Asia. Liver Int. 2022 Aug 3;42(9):2029–41. Available from: https://onlinelibrary.wiley.com/doi/10.1111/liv.15251
3. Samant H, Amiri HS, Zibari GB. Addressing the worldwide hepatocellular carcinoma: epidemiology, prevention and management. J Gastrointest Oncol. 2021;12(S2):S361–73. Available from: https://jgo.amegroups.com/article/view/36868/html
4. Okeke E, Davwar PM, Roberts L, Sartorius K, Spearman W, Malu A, et al. Epidemiology of Liver Cancer in Africa: Current and Future Trends. In: Seminars in Liver Disease. Thieme Medical Publishers 2020;40(2):111–23. Available from: https://pubmed.ncbi.nlm.nih.gov/31726474/
5. Al-Othman S, Al-Madouj A, Al-Zahrani A. Incidence and Trends of Liver Cancer in the Gulf Cooperation Council States, 1998–2012. Gulf J Oncolog. 2021;1(36):53–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/35017136
6. Zhang H, Spencer K, Burley SK, Zheng XFS. Toward improving androgen receptor-targeted therapies in male-dominant hepatocellular carcinoma. Drug Discov Today. 2021 Jun;26(6):1539–46. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1359644621000672
7. Rashed WM, Kandeil MAM, Mahmoud MO, Ezzat S. Hepatocellular Carcinoma (HCC) in Egypt: A comprehensive overview. J Egypt Natl Canc Inst. 2020 Dec 16;32(1):5. Available from: https://jenci.springeropen.com/articles/10.1186/s43046-020-0016-x
8. Chong N, Schoenberger H, Yekkaluri S, Fetzer DT, Rich NE, Yokoo T, et al. Association between ultrasound quality and test performance for <scp>HCC</scp> surveillance in patients with cirrhosis: a retrospective cohort study. Aliment Pharmacol Ther. 2022 Mar 15;55(6):683–90. Available from: https://onlinelibrary.wiley.com/doi/10.1111/apt.16779
9. Lim S, Taskinen M-R, Borén J. Crosstalk between nonalcoholic fatty liver disease and cardiometabolic syndrome. Obes Rev. 2019 Apr;20(4):599–611. Available from: https://onlinelibrary.wiley.com/doi/10.1111/obr.12820
10. Abd-Elsalam S, Elwan N, Soliman H, Ziada D, Elkhalawany W, Salama M, et al. Epidemiology of liver cancer in Nile delta over a decade: A single-center study. South Asian J Cancer. 2018;07(01):24–6. Available from: http://www.thieme-connect.de/DOI/DOI?10.4103/sajc.sajc_82_17
11. Pugh RNH, Murray-Lyon IM, Dawson JL, Pietroni MC, Williams R. Transection of the oesophagus for bleeding oesophageal varices. Br J Surg. 2005;60(8):646–9. Available from: https://academic.oup.com/bjs/article/60/8/646/6188292
12. Acharya G, Kaushik RM, Gupta R, Kaushik R. Child-Turcotte-Pugh Score, MELD Score and MELD-Na Score as Predictors of Short-Term Mortality among Patients with End-Stage Liver Disease in Northern India. Inflamm Intest Dis. 2020;5(1):1–10. Available from: https://www.karger.com/Article/FullText/503921
13. Tsilimigras DI, Mehta R, Paredes AZ, Moris D, Sahara K, Bagante F, et al. Overall Tumor Burden Dictates Outcomes for Patients Undergoing Resection of Multinodular Hepatocellular Carcinoma Beyond the Milan Criteria. Ann Surg. 2020 Oct;272(4):574–81. Available from: https://journals.lww.com/10.1097/SLA.0000000000004346
14. Sayiner M, Golabi P, Younossi ZM (2019) Disease Burden of Hepatocellular Carcinoma: A Global Perspective. Dig Dis Sci 64(4):910–917
15. Elhendawy M, Abo-Ali L, Abd-Elsalam S, Hagras MM, Kabbash I, Mansour L, et al. HCV and HEV: two players in an Egyptian village, a study of prevalence, incidence, and co-infection. Environ Sci Pollut Res. 2020 Sep 12;27(27):33659–67. Available from: https://link.springer.com/10.1007/s11356-020-09591-6
16. Fathy Barakat EM, AbdAlaziz KM, Mahmoud El Tabbakh MM, Alden Ali MK. Characteristics of Hepatitis B virus induced Hepatocellular Carcinoma in Egyptian patients. QJM An Int J Med. 2021;114(Supplement_1). Available from: https://academic.oup.com/qjmed/article/114/Supplement_1/hcab107.006/6379183
17. Al-Haimi M, Hamid GA, Ahmed AS (2018) Hepatocellular carcinoma in Yemen: Epidemiology and clinical presentation. World J Pharm Med Res 4:248–253
18. Tang A, Hallouch O, Chernyak V, Kamaya A, Sirlin CB (2018) Epidemiology of hepatocellular carcinoma: target population for surveillance and diagnosis. Abdom Radiol 43(1):13–25
19. Markakis GE, Koulouris A, Tampaki M, Cholongitas E, Deutsch M, Papatheodoridis G V., et al. The changing epidemiology of hepatocellular carcinoma in Greece. Ann Gastroenterol. 2022;35(1):88–94. Available from: http://www.annalsgastro.gr/files/journals/1/earlyview/2021/ev-12-2021-03-AG_6222-0680.pdf
20. Wu G, Wu J, Wang B, Zhu X, Shi X, Ding Y (2018) Importance of tumor size at diagnosis as a prognostic factor for hepatocellular carcinoma survival: A population-based study. Cancer Manag Res 10:4401–4410
21. Deo RK, Chitalkar P, Malla S, KC I, Karki B, Thapa R. Epidemiology, Clinico-radiological Profile and Management of Hepatocellular Carcinoma in a Tertiary Care Center in Nepal. Med J Shree Birendra Hosp. 2021 Feb 2;20(1):6–11. Available from: https://www.nepjol.info/index.php/MJSBH/article/view/32256
22. Ganeshan D, Szklaruk J, Kaseb A, Kattan A, Elsayes KM. Fibrolamellar hepatocellular carcinoma: multiphasic CT features of the primary tumor on pre-therapy CT and pattern of distant metastases. Abdom Radiol. 2018 Dec 13;43(12):3340–8. Available from: http://link.springer.com/10.1007/s00261-018-1657-2
23. Santi V, Buccione D, Di Micoli A, Fatti G, Frigerio M, Farinati F et al (2012) The changing scenario of hepatocellular carcinoma over the last two decades in Italy. J Hepatol 56(2):397–405
24. Garuti F, Neri A, Avanzato F, Gramenzi A, Rampoldi D, Rucci P, Farinati F, Giannini EG, Piscaglia F, Rapaccini GL, Di Marco M (2021) The changing scenario of hepatocellular carcinoma in Italy: An update. Liver Int 41(3):585–597

Publisher's Note