ASSESSMENT OF THE VALUE OF MEAN PLATELET VOLUME, DES GAMMA CARBOXY PROTHROMBIN AND ALPHA FETO PROTEIN IN EARLY DETECTION OF HCC

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ABSTRACT:

Background: *Hepatocellular carcinoma (HCC) is the commonest primary hepatic neoplasm. The gold standard HCC biomarker is alfa-feto protein (AFP), also mean platelet volume (MPV) is increased in many inflammatory disorders and numerous neoplasms. Des-gamma-carboxyprothrombin (DCP), a protein formed during the synthesis of prothrombin with disturbance in carboxylation with vitamin K defect.*

Aim of the Work: *To determine the value of mean platelet volume, Des gamma Carboxy prothrombin (DCP) and (AFP) in early detection of Hepatocelluler carcinoma.*

Patients and Methods: *105 patients were enrolled in this study, they were divided into 3 equal groups* ***Group A:*** *Hepatocelluler carcinoma patients (HCC)* ***Group B:*** *Liver cirrhosis patients* ***Group C:*** *Healthy Control group each is 35 patients****.*** *MPV, AFP, DCP were evaluated in all groups*

Results: *Our results showed that: AFP, MPV and DCP were highest in HCC group, followed by CLD group and lowest in control group. The differences between all groups were significant in MPV and DCP, with no significant difference between CLD and HCC in AFP.*

Conclusion: *Measurement of MPV is non-invasive, cheap and quick, and may therefore serve as a good predictor of HCC in patients with CLD. Low sensitivity and specificity, on the other hand, suggests that this may be an adjunctive parameter to some other markers like AFP.*

Keywords: *Mean Platelet Volume, Des Gamma Carboxy Prothrombin, Alpha Feto Protein, HCC*

INTRODUCTION:

HCC is the commonest Primary hepatic cancer, among the commonest cancers worldwide, HCC is the sixth one and also the fourth cause of cancer death, with about 841,000 cases and 782,000 deaths in 2018[1]**.** HCC being usually develops upon liver cirrhosis, so the progression of cancer occurs without clear manifestation and thus the HCC is mostly asymptomatic[2]**.**

Rising hepatitis C virus and hepatitis B virus infection rates are associated with increase HCC incidence rate[3]**.** The HCC high risk factors for occurrence and also progression are Aflatoxin exposure, heavy alcoholics, nonalcoholic fatty liver disease, and smokers[3]**.** While in last decade there were rising the survival rates of patients with most neoplasms, still HCC have poor prognosis with 5 year survival less than 5%,

because of the late diagnosis at advanced stages of disease[4].

The mean platelet volume (MPV) is a unique platelet dimension measurement, calculated based on volume distribution at ordinary blood morphology test. MPV normally range from 7.5 to 12.0 fl, whereas the only 0.2-5.0% of all blood platelets are large platelets[5]. Physiologically, there is inverse proportional correlation between MPV and the platelet count[6]. Different stages of liver diseases are usually associated with platelets disorders. Cirrhotic patients usually have low platelets count whereas HCC patients have normal or high platelets count[7,8,9&10]. High MPV values were noted in multiple inflammatory disorders as liver cirrhosis and malignancies, also in nonalcoholic fatty liver disease patients, cholestasis of pregnancy, pre-eclampsia, acute coronary infarction, acute ischemic brain stroke, renal artery stenosis, rheumatoid arthritis[11,12,13,14,15,16,17&18]. In primary biliary cirrhosis (PBC) patients, MPV was elevated and related to histological grade severity[19]. Des-gamma-carboxyprothrombin (DCP), a protein formed during the synthesis of prothrombin with disturbance in carboxylation with vitamin K defect [20].

AIM OF THE WORK:

To determine the value of mean platelet volume, Des gamma Carboxy prothrombin and Alfa-feto protein in early detection of Hepatocelluler carcinoma.

PATIENTS AND METHODS:

This case cross sectional comparative study had been carried out after the approval of the Ethics Committees of the faculty of medicine Ain Shams university on 105 subjects, age range 25-68 year selected from: Patients attending Hepatology and virology outpatient clinic at ElDemerdash hospital, Also Liver transplantation center at Ain Shams specialized hospital in Cairo after informed consent were taken from the patients. Subjects were divided as follow: Group I: Includes 35 HCC patients, Group II: Includes 35 matched cirrhotic patients without HCC, Group III: Includes 35 apparently healthy subjects.

Exclusion criteria: Patient with already elevated Mean platelet volume: Patients with ascitic fluid infection, alcohol abusers, non-Alcoholic fatty liver disease, primary biliary cirrhosis, acute myocardial Ischemia, atherosclerosis, cerebrovascular events, inflammatory bowel disease and patients with rheumatoid arthritis, pregnant and lactating females, end stage renal disease, hepatic malignancy rather than HCC, patients with malignancy elsewhere.

Methods: Pre enrollment assessment and work up: All patients were subjected to the following: **Full history taking** including history of chronic liver disease, symptoms of hepatic decompensation such as lower limb edema, ascites, hepatic encephalopathy, hematemesis or melena as well as history of extra hepatic manifestations and other system affection. **Full clinical examination:** general and local, for the stigmata of chronic liver disease and **intial laboratory assessment** including: Liver profile: Alanine transaminase (ALT), Aspartate transaminase (AST), serum albumin level, serum total bilirubin level, international normalized ratio (INR) and serum (AFP), Complete blood count particularly platelets count (PC) and (MPV), pregnancy test for females in child bearing period, viral markers (HCV Ab, HBsAg, HIV Ab), des gamma carboxyprothrombin. **Radiological assessment**: Abdominal Ultrasound: emphasis on liver size, liver echogenicity (bright or coarse echo pattern), splenic bi-polar diameter, portal vein diameter and triphasic CT: confirm the diagnosis of HCC and performed on healthy individuals (controls) for being donors for LDLT

Specimen collection: Peripheral venous blood samples: Allow serum to clot for 10-20 minutes at room temperature. Centrifuge at 2000-3000 RPM for 20 minutes. Collect plasma using EDTA or heparin as an anticoagulant. Centrifuge samples for 15 minutes at 2000-3000 RPM at 2 - 8°C within 30 minutes of collection. **MPV:** Samples for full blood count analysis were collected into ethylenediaminetetraacetic acid (EDTA) anticoagulated tubes. Measurements were performed on Sysmex XN- 1000 device using the flow cytometric technique. **AFP (Alpha-Fetoprotein):** Sandwich principle was employed to determine the AFP concentration via the **Roche COBAS** that tilize **Chemiluminescent** technique according to manufacturers' instructions. **Des-Gamma-Carboxyprothrombin**: DCP was measured using commercially available ELISA kit (Asserachrom PIVKA II kit, Stago, France), according to the manufactures' instructions.

The collected data were coded, tabulated, and statistically analyzed using IBM SPSS statistics (Statistical Package for Social Sciences) software version 22.0, IBM Corp, Chicago, USA, 2013. Quantitative normally distributed data described as mean±SD (**standard deviation)** after testing for normality using Shapiro-Wilk test then compared using **ANOVA test** with post hoc Bonferroni test for pairwise comparisons if normally distributed. Qualitative data described as number and percentage and compared using **Chi square test and Fisher's Exact test** for variables with small expected numbers. **ROC curve** was used to evaluate the performance of different tests differentiate between HCC and CLD groups. The level of significance was taken at P value < 0.050 was significant, otherwise was non-significant.

RESULTS:

Table (1) highlights that Hb, TLC, platelets and albumin were significantly higher in control group than HCC and CLD groups with no significant difference between HCC and CLD groups. Thrombocytopenia has been observed in up to 67. % in our study among both HCC and CLD groups. Creatinine, ALT, AST, PT, bilirubin and INR were significantly lower in control group than HCC and CLD groups with no significant difference between HCC and CLD groups. Most of the patients in both the HCC and CLD groups were referred to have HCV infection while only 11% of the HCC group and 3 of the CLD had positive HBVsAb positive.

Table (1): Laboratory findings among the studied groups

Variables		HCC (N=35)	CLD (N=35)	Control (N=35)	p-value
Hb (gm/dL)	Mean±SD	10.6±1.7a	10.6±1.9a	13.9±0.6b	^<0.001*
	Range	7.8–13.6	7.2–14.4	12.2–14.8	
TLC ($x10^3$/mL)	Mean±SD	7.2±2.6	6.3±2.6	7.4±2.4	^0.201
	Range	2.8–10.9	1.9–9.8	2.9–11.2	
PLT ($x10^3$/mL)	Mean±SD	158.3±87.6a	136.3±81.3a	279.5±32.1b	^<0.001*
	Range	51.0–479.0	24.0–359.0	236.0–333.0	
Creat-inine (mg/dL)	Mean±SD	1.2±0.5a	1.3±0.4a	0.6±0.2b	^<0.001*
	Range	0.4–2.2	0.4–2.0	0.2–1.0	
Albumin (g/dL)	Mean±SD	2.7±0.5a	2.8±0.7a	4.2±0.3b	^<0.001*
	Range	1.7–4.0	1.6–4.3	3.8–5.2	
ALT (IU/L)	Mean±SD	60.8±36.5a	70.5±83.6a	19.8±7.0b	^<0.001*
	Range	19.0–159.0	19.0–387.0	10.0–30.0	
AST (IU/L)	Mean±SD	100.8±76.4a	80.1±48.5a	19.6±6.4b	^0.001*
	Range	24.0–394.0	13.0–228.0	10.0–34.0	
Bilirubin (mg/dL)	Mean±SD	2.2±1.3a	1.9±1.3a	0.2±0.1b	^<0.001*
	Range	0.6–5.8	0.4–7.0	0.1–0.4	
PT (sec.)	Mean±SD	16.6±4.3a	17.1±5.0a	11.4±1.5b	^<0.001*
	Range	8.0–29.0	11.0–35.0	9.0–15.0	
INR	Mean±SD	1.5±0.3a	1.4±0.3a	1.0±0.2b	^<0.001*
	Range	0.9–1.9	0.9–2.0	0.6–1.4	
HCV Ab		31 (88.6%)	34 (97.1%)		§0.356
HBV Ab		4 (11.1%)	1 (2.9%)		§0.356

^ANOVA. §Fisher's Exact test. *Significant, HG: Homogenous groups (have the same letter by post hoc Bonferroni test).

Table (2) concluded that the AFP, MPV and DCP were highest in HCC group, followed by CLD group and lowest in control group. The differences between all groups were significant in MPV and DCP, with no significant difference between CLD and HCC in AFP.

Table (2): Tumor markers among the studied groups

Variables		HCC (N=35)	CLD (N=35)	Control (N=35)	p-value
AFP (IU/mL)	Mean±SD	971.7±2057.9a	70.9±232.5b	3.2±1.5b	^0.001*
	Range	4.0–7258.0	2.0–1001.0	1.0–5.0	
MPV (fl)	Mean±SD	10.8±1.1a	9.6±0.8b	8.2±0.9c	^<0.001*
	Range	8.9–13.1a	7.6–11.0	6.5–10.6	
DCP (mAU/mL)	Mean±SD	99.3±18.8a	52.6±60.8b	20.4±8.5c	^<0.001*
	Range	61.8–140.0	8.7–201.9	7.3–46.1	

^ANOVA. *Significant, HG: Homogenous groups (have the same letter by post hoc Bonferroni test).

The following table (3) and diagram (1) display that: DCP had highest significant diagnostic performance in differentiating HCC from CLD groups with highest AUC and lowest SE.

Table (3): Diagnostic performance of tumor markers in differentiating HCC from CLD groups

Marker	AUC	SE	P	95% CI	Cutpoint
AFP	0.719	0.061	0.002*	0.599−0.839	≥40.0
MPV	0.801	0.063	<0.001*	0.678−0.924	≥10.2
DCP	0.842	0.047	<0.001*	0.750−0.935	≥69.3

AUC: Area under curve, SE: Standar error, CI: Confidence interval, *Significant

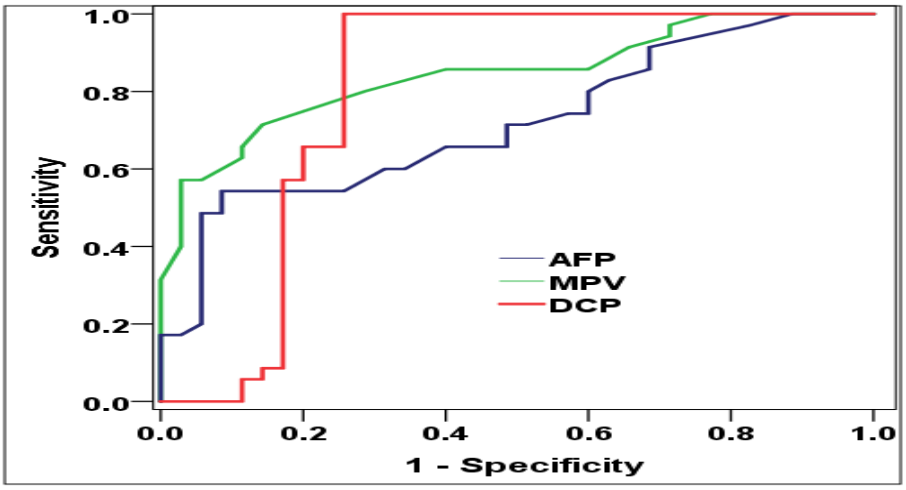

Diagram (1): ROC curve for tumor markers in differentiating HCC from CLD groups

The next table (4) and diagram (2) display that: DCP≥ 69.3 had highest sensitivity and NPV of 97.1% and 96.3% respectively. AFP≥ 40.0 had highest specificity and PPV of 91.4% and 86.4% respectively. Youden's index was highest in DCP ≥69.3, followed by MPV ≥10.2 and lowest in AFP ≥40.0.

Table (4): Diagnostic characteristics of tumor markers cutpoints in differentiating HCC from CLD

Sensitivity	AFP ≥40.0		MPV ≥10.2		DCP ≥ 69.3	
	Value	95% CI	Value	95% CI	Value	95% CI
Sensitivity	54.3%	36.6%–71.2%	71.4%	53.7%–85.4%	97.1%	85.1%–99.9%
Specificity	91.4%	76.9%–98.2%	85.7%	69.7%–95.2%	74.3%	56.7%–87.5%
DA	72.9%	60.9%–82.8%	78.6%	67.1%–87.5%	85.7%	75.3%–92.9%
YI	45.7%	26.8%–64.6%	57.1%	38.2%–76.1%	71.4%	55.9%–86.9%
PPV	86.4%	65.1%–97.1%	83.3%	65.3%–94.4%	79.1%	64.0%–90.0%
NPV	66.7%	51.6%–79.6%	75.0%	58.8%–87.3%	96.3%	81.0%–99.9%
LR+	6.33	2.06–19.49	5.00	2.16–11.56	3.78	2.15–6.65
LR-	0.50	0.34–0.73	0.33	0.19–0.57	0.04	0.01–0.27
LR	12.67	3.26–49.23	15.00	4.53–49.68	98.22	11.69–825.00
Kappa	0.457	0.264–0.651	0.571	0.381–0.762	0.714	0.555–0.874

CI: Confidence interval

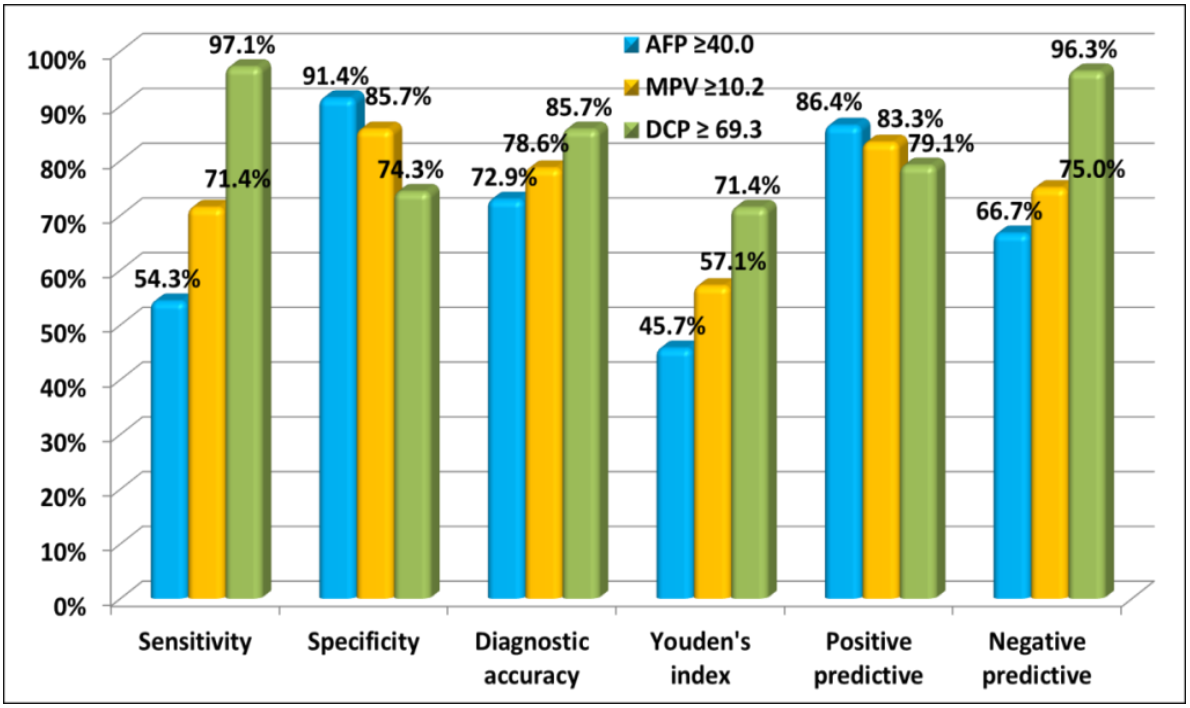

Diagram (2): Diagnostic characteristics of tumor markers cutpoints in differentiating HCC from CLD

Table (5) concluded that Testing AFP≥ 40.0 if positive considered positive. If negative, retested for DCP≥ 69.3 if positive considered positive, otherwise is negative. This although deceased specificity and PPV, it raised sensitivity and NPV to 100.0%, and the Youden's index was not changed.

Table (5): Diagnostic characteristics of AFP and DCP cutpoints in differentiating HCC from CLD

Characters	Value	95% CI
Sensitivity	100.0%	90.0%–100.0%
Specificity	71.4%	53.7%–85.4%
Diagnostic accuracy (DA)	85.7%	75.3%–92.9%
Youden's index	71.4%	56.5%–86.4%
Positive Predictive value (PPV)	77.8%	62.9%–88.8%
Negative Predictive value (NPV)	100.0%	86.3%–100.0%
Positive likelihood ratio (LR+)	3.50	2.07–5.91
Negative likelihood ratio (LR-)	0.00	0.00–0.00
LR	>100.0	>100.0–>100.0
Kappa	0.714	0.557–0.871

CI: Confidence interval

The next diagram (3) highlights that by combining both AFP and DCP raised sensitivity and NPV to 100.0% (CI 90.0%–100.0% and 86.3%–100.0% respectively), this although deceased specificity and PPV but the benefit of increasing the sensitivity is not to miss cases with HCC while the decreased specificity and PPV can be compensated by further imaging studies to eliminate the false positive cases as (table 5).

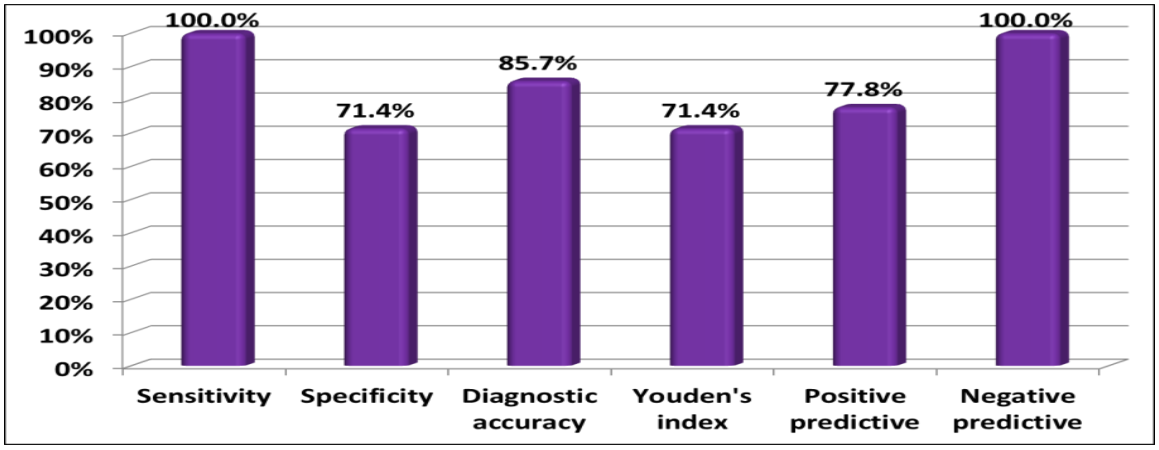

Diagram (3): Diagnostic characteristics of AFP and DCP cutpoints in differentiating HCC from CLD

Last of all in the our results we tried to combine the MPV with either AFP or DCP but it it failed to show any statistical significance in either improving the diagnostic performance or improving the sensitivity and specificity of any of these markers alone.

DISCUSSION:

HCC is the commonest Primary hepatic cancer, among the commonest cancers worldwide, HCC is the sixth one and also the fourth cause of cancer death[1]**.** HCC being usually develops upon liver cirrhosis, so the progression of cancer occurs without clear manifestations and thus the HCC is mostly asymptomatic[2]**.** Rising hepatitis C virus and hepatitis B virus infection rates are associated with increasing HCC incidence rate[3]**.** The HCC high risk factors for occurrence and also progression are Aflatoxin exposure, heavy alcoholics, nonalcoholic fatty liver disease, and smokers[3]**.**

HCC prognosis is usually poor because of the late diagnosis which detected at advanced stages. Early diagnosis of HCC could be done among high risk people by tumor biomarkers and radiology methods **[21].** Early diagnosis offers better prognosis which could be done by AFP testing and ultrasonography. AFP test have false positive and false negative results, so early HCC detection become easy with combination of imaging studies and markers testing **[21].** The most effective way is doing regular ultrasonography and AFP at 6 months interval as screening program for risky persons **[21].**

This study had been carried out on 105 subjects, age range 39-68 years divided as the following group I includes 35 HCC patients diagnosed by imaging and alpha-fetoprotein, group II includes 35 matched patients with liver fibrosis and cirrhosis only without HCC, classified according to child score into child A, child B, child C. and group III includes 35 apparently healthy subjects, age and sex matched, having no acute or chronic illness and taking no medications were taken as control group.

In the present study 88.5% of the patients in the HCC group were referred to have HCV infection. Similar results were found elsewhere; as 70%, 84%, and 75.8%. Lower rates were found in some other areas in Egypt, where HCV prevalence among HCC patients was found to be 30%**[20]**. This discrepancy in prevalence rates might be due to cultural and hygienic difference in individuals contributing in the surveillances **.** There was an increased risk of HCC accompanying HCV infection. In the present

study, most of HCC patients were seropositive to HCV. This could be explained on the basis that chronic hepatitis always progresses to cirrhosis, ultimately developing HCC**[20].**

Thrombocytopenia is a common complication in patients with chronic liver disease that has been observed in up to 76% of patients according to **Kurt et al.**[2] with close result of 67.14% in our study.

In our study AFP, MPV and DCP were highest in HCC group, followed by CLD group and lowest in control group. The differences between all groups were significant in MPV and DCP, with no significant difference between CLD and HCC in AFP this agrees with **Yuen et al.**[22] showed that AFP levels do not correlate with tumor size, histological grades, intrahepatic metastases and portal vein thrombosis. The elevated AFP values among chronic HCV patients still a promoter for looking for alternative markers do discriminate HCC from chronic HCV interference[20]**.**

Some studies reported that the unsatisfactory performance of AFP in the diagnosis of HCC, was due to the high false positive and false negative results[20&23] On the other hand, our results showed specificity of DCP lower than that of AFP (74.3% versus 91.4%), comparable to elsewhere statement **Durazo et al.**[24] however other studies as **Lok et al**.[25] showed that DCP has higher sensitivity and specificity as well.

In the present study, DCP values of HCC group showed a highly significant increase upon comparison with the non-malignant groups (II, and III). The sensitivity of DCP was higher than AFP in detecting HCC patients (97.1% versus 54.3%), a result quite similar to previous report as[20,26,27&28]**.** Also**, Yuen and Lai** [22] concluded that DCP is an excellent marker for monitoring the treatment efficacy, indication of complete clearance of HCC after curative treatment, and recurrence of HCC in the future. The serum half-life of DCP is around 40-70 hours, much shorter than that of AFP 5-7 days. Unlike AFP, DCP is found to correlate with the stage of the HCC as well as survival**[22].** Again, many reports stated that DCP is more specific for HCC than AFP and is less often elevated in cirrhotic patients without HCC. Thus, the combination of DCP with AFP might be even more sensitive and specific as both are independent to each other and have different pathways[20&26]**.**

Also, Our results also show that by combining both AFP and DCP raised sensitivity and NPV to 100.0% (CI 90.0%–100.0% and 86.3%–100.0% respectively), this although deceased specificity and PPV but the benefit of increasing the sensitivity is not to miss cases with HCC while the decreased specificity and PPV can be compensated by further imaging studies to eliminate the false positive cases, those results agreed with the results of the meta analysis and validation study done by **Chen et al.**[29] including 27 studies from 20 articles which demonstrated that the diagnostic performance of a combination of DCP + AFP is prominent to that of DCP or AFP alone in the detection of HCC.

Our study showed that the patients with chronic liver disease (CLD) have a significantly elevated MPV compared to control subjects. MPV was also higher among patients with hepatocellular carcinoma compared to patients with CLD at a cutoff point of ≥10.2 MPV had a sensitivity and specificity of 71.4% (CI 53.7%–85.4%0, and 85.7% (CI 69.7%–95.2%) respectively which is more sensitive but less specific than AFP (sensitivity= 54.3%, specificity= 91.4%) and less sensitive but more specific than DCP (sensitivity= 97.1%, specificity= 74.3%). These findings suggest that MPV may be a potential marker of hepatocellular carcinoma in patients with CLD with a moderate

sensitivity and specificity and this was similar to results found by **Kurt et al.**[2] however other studies as **Purnak et al.**[14]**; Metwaly et al.**[30] and **Omar et al.**[31] found that HCC group and cirrhotic group had higher levels of MPV compared to control group with highly statistically significant difference but there was no statistically significant difference between HCC group and cirrhotic group suggesting that MPV would be a marker for fibrosis rather than malignancy.

According to our results combining MPV with either AFP or DCP failed to show statistically significant value in improving their sensitivity or specificity and this disagrees with the results of **Kurt, et al.**[2] and **Metwaly et al.**[30]**.** MPV has been investigated in various clinical fields including chronic liver diseases. In the literature, there are only a few studies examining the relationship between MPV and HCC[30]**.**

Our results also showed that regarding the diagnostic performance of the three tested tumor markers (AFP, MPV and DCP) in differentiating HCC from CLD groups that AFP had area under curve (AUC) of 0.719, Standard error (SE) of 0.061, Confidence interval (CI) of 0.599-0.839 and P value of 0.002 at a cut point of ≥40.0, MPV had area under curve (AUC) of 0.801, Standard error (SE) of 0.063, Confidence interval (CI) of 0.678−0.924 and P value of <0.001 at a cut point of ≥10.2, while DCP had area under curve (AUC) of 0.842, Standard error (SE) of 0.047, Confidence interval (CI) of 0.750−0.935 and P value of <0.001 at a cut point of ≥69.3 proving that **DCP had the highest significant diagnostic performance in differentiating HCC from CLD groups** also DCP≥ 69.3 had highest sensitivity(of 97.1%) and NPV(of 96.3%). AFP≥ 40.0 had highest specificity (of 91.4%) and PPV (of 86.4%). Youden's index was highest in DCP ≥69.3, followed by MPV ≥10.2 and lowest in AFP ≥40.0. MPV had moderate sensitivity and specificity in between AFP and DCP with values of 71.4% and 85.7% respectively with also moderate PPV of 83.3 and NPV of 75%.**Comparison to other studies was not applicable as no previous studies have ever combined those 3 markers together but when it comes to comparing AFP to DCP**

There are a few limitations in the current study. The cross-sectional nature of this study with the convenient sampling method provides only a snapshot of the population; it may provide different results if another time frame or another study setting had been chosen and prevalence-incidence bias is expected in this study. MPV may be affected in smoking, hypertension, diabetes, hyperlipidemia, ischemic diseases, thromboembolism, rheumatologic disorders, and inflammatory bowel diseases [30, 32]. Although, patients with most of the aforementioned factors were not included in our study. The possibility that the presence of subclinical aspects that may affect our results cannot be ignored.

Conclusion:

Measurement of MPV is non-invasive, cheap and quick, and may therefore serve as a predictor of HCC in patients with CLD. Low sensitivity and specificity, on the other hand, suggests that this may be an adjunctive parameter to some other markers like AFP. Further studies with larger samples are needed to determine the association of MPV with HCC.

For a single test DCP, it had highest significant diagnostic performance in differentiating HCC from CLD groups. In detection of HCC testing AFP≥ 40.0 if positive considered positive. If negative, retest for DCP≥ 69.3 if positive considered positive, otherwise is negative. This although decreased specificity and Positive predictive value, it raised sensitivity and Negative Predictive Value to 100.0% when

combining both AFP and DCP. The benefit of increasing the sensitivity is not to miss cases with HCC while the decreased specificity and PPV can be compensated by further imaging studies to eliminate the false positive cases.

Conflict of interest:

The authors report no conflicts of interest.

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تقييم قيمة متوسط الصفائح الدموية، ديس جاما كربوكسى بروثرومبين، والفا فيتوبروتين فى الكشف المبكر عن سرطان الكبد

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قسم الكبد, الجهاز الهضمى و الباطنة العامة . كلية الطب جامعة عين شمس.

الخلفية العلمية : يعتبرسرطان الخلايا الكبدية (HCC) هو الأكثر أنواع الأورام شيوعاً .الفيتوبروتين يعتبر مقياس حيوى فعال لها. وايضا ,حجم الصفائح الدموية يزداد مع العديد من الألتهابات والأورام. ديس جاما كربوكسى بروثرومبين تنتج أثناء تخليق بروثرومبين نتجية أضطرابات فعملية الكربوكسلاشن.

الهدف من الدراسة : تحديد قيمة متوسط حجم الصفائح، ديس جاما كربوكسى بروثرومبين و الفا فيتو بروتين، فى الكشف المبكر عن سرطان الكبد.

المرضى / الطرق : تم تسجيل عدد(105) شخص لهذه الدراسة **كالإتى:** [(35)مريض (سرطان كبد) – (35) مريض(تليف كبد) – (35) شخص صحيح].تم قياس متوسط حجم الصفائح الدموية، ديس جاما كربوكسى بروثرومبين ، الفافينوبروتين فى جميع المجموعات

نتائج الدراسة : اظهرت الدراسة ان كل من متوسط حجم الصفائح، ديس جاما كربوكسى بروثرومبين و الفا فيتو بروتين كانت الاعلى فى مجموعة سرطان الكبد تليها مجموعة تليف الكبد والادنى فى مجموعة الاصحاء وكانت الفروق كبيرة بين جميع المجموعات فى متوسط حجم الصفائح، ديس جاما كربوكسى بروثرومبين وعدم وجود فرق بين المجموعة الاولى والثانية فى الالفافيتوبروتين.

الأستنتاج :يعتبر متوسط حجم الصفائح مستوى غير ضار وهو مؤشر جيد على سرطان الكبد فى مرضى تليف الكبد وبالرغم من أنخفاض (الحساسية، التخصص) للمؤشر ألا أنه قد يكون عامل مساعد لبعض العلامات الأخرى مثل الفافينوبروتين .