Zagazig University Medical Journal
www.zumj.journals.ekb.eg

https://doi.org/10.21608/zumj.2023.201832.2773 Volume 29, Issue 4, Jully 2023

Manuscript ID ZUMJ-2303-2773
DOI 10.21608/zumj.2023.201832.2773

ORIGINAL ARTICLE

Assessment of hepatic fibrosis in hemodialysis children and adolescents by fibroscan and hyaluronic acid

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Submit Date 2023-03-25 12:24:53
Accept Date 2023-03-27

ABSTRACT

Background: Patients undergoing hemodialysis (HD) are more likely than the general population to contract the hepatitis C virus (HCV). Due to the possibility of developing cardiovascular disease and liver fibrosis, HCV hemodialysis patients' survival rates are lower than those without HCV. Evaluation of hepatic fibrosis by biochemical indicators such as serum hyaluronic acid and the evaluation of liver stiffness fibroscan can be used to evaluate the severity of fibrosis. Aim: To evaluate the role of fibro scan and hyaluronic acid (HA) for the detection of hepatic fibrosis in HD individuals who have HCV. **Patients and methods:** This cross-sectional study on HD children receiving regular hemodialysis was conducted in the Pediatric Nephrology Unit, Pediatrics Intensive Care Unit of Children Hospital, and Clinical Pathology Lab, Faculty of Medicine, Zagazig University. 54 patients were split into: Group 1: Hepatitis C individuals with HD make-up and Group 2: HD patients without hepatitis C. Serum hyaluronic acid and fibroscan were done. **Results:** Regarding serum hyaluronic acid, there is no statistically significant difference between the HD patient groups that were HCV positive and those that were HCV negative. There is a statistically significant correlation between serum hyaluronic acid and the degree of liver fibrosis, when performing a PAIRWISE comparison, F2 and F0 show a considerable difference**. Conclusion:** Fibroscan is a good noninvasive assessment of liver fibrosis in HD patients with HCV. Despite the study's small sa mple size, serum hyaluronic acid and the degree of liver fibrosis determined by fibroscan are significantly correlated

Keywords: Hyaluronic Acid, fibroscan, hemodialysis, HCV.

INTRODUCTION

Patients with end-stage renal disease (ESRD) receiving hemodialysis had a higher prevalence of chronic viral C hepatitis and liver cirrhosis than the general population. In hemodialysis patients, problems from liver puncture biopsy, the gold standard for determining liver fibrosis, are more likely to occur [1].

Several scoring and imaging modalities have been used as non-invasive diagnostic methods. All can be repeated virtually as many times as necessary and are better tolerated, safer, and more acceptable to the patient. most are significantly less costly than a liver biopsy [2].

Biochemical markers such as serum hyaluronic acid (HA), the aspartate aminotransferase-to-platelet ratio index (APRI), the ASAT/ALAT ratio, fibrosis 4 score (FIB4), and the evaluation of liver stiffness with transient elastography (FibroScan) can all be used to estimate the degree of fibrosis [3].

Although less commonly utilized in ESRD patients receiving hemodialysis, serum hyaluronic acid is an excellent non-invasive marker for liver fibrosis in chronic B and C viral hepatitis in the general population [4].

In hemodialysis patients with hepatitis B and C, the level of hyaluronic acid is a marker for the distinguishing of liver fibrosis stages 1, 2, and 3, but its ability to distinguish between chronic hepatitis and liver cirrhosis has not been proven [5].

Hence, we sought to investigate the relationship between hyaluronic acid levels and liver fibrosis in hemodialysis-dependent children.

Therefore, our goal was to measure the level of hyaluronic acid in the blood of HD patients and to correlate that level with the degree of hepatic

fibrosis detected by fibroscan in hemodialysis-positive children.

Patients and methods

This cross-sectional study was conducted from March 2022 to December 2022 at the Pediatric Nephrology Unit, Pediatrics Intensive Care Unit of Children Hospital, and Clinical Pathology Lab, Faculty of Medicine, Zagazig University. The Zagazig University Institutional Review Board gave their approval for the project. All parents and the oldest children provided their written informed consent. In this study, 54 participants were categorised into groups.

Group 1 (HCV Negative): This group comprised 35 HD children. They were 19 (54.3%) male and 16 (45.7%) female. The duration of dialysis ranged from 18 to 60 months.

Group 2 (HCV Positive): This group comprised 19 HD children. They were 10 (52.6%) male and 9 (47.4%). The duration of dialysis ranged from 72 to 120 months.

Patients with ages from 1 year to 18 years old, both sexes, children with chronic kidney disease and regular hemodialysis were included.

Patients with ages below 1 year and above 18 years old, those who have received treatment for hepatitis C, those with hepatitis B, autoimmune hepatitis, a history of regular use of hepatotoxic medications, various chronic liver disorders known to raise hyaluronic acid levels in the blood, such as rheumatoid arthritis and amyloidosis, and children with hepatorenal syndrome were excluded from the study.

Every patient had their personal history reviewed including name, age, sex, family history, a special history of the kidney disease (cause of the kidney disease, onset, course, and duration of the renal disease, history of oedema, hypertension, and urine output), a history of the settings for dialysis (starting with dialysis, frequency, length of each session, size of filter), a history of the number and frequency of blood transfusion, weight, height, and body mass index, as well as laboratory tests including (complete blood count, liver function, kidney function, serum electrolyte, serum Calcium, Phosphorus, PTH, iron, ferritin, hepatitis C virus antibodies, hepatitis C virus RNA, serum hyaluronic acid), abdominal ultrasound, fibroscan (transient elastography) to correlate the degree of liver fibrosis with the effects of hyaluronic acid in hepatitis C positive patients.

Ethics Considerations:

The Institutional Review Board of the Faculty of Medicine of Zagazig University gave its ethical approval to this investigation. All participants gave their consent in writing after being fully informed. The Declaration of Helsinki, the International Medical Association's guideline of ethics for studies involving humans, was followed in the conduct of this study.

Statistical analysis:

The frequency of the categorical variables was determined by descriptive analyses, and the continuous variables were expressed as mean standard deviation, median, and interquartile range (IQR). As acceptable comparisons of groups, continuous variables were compared using the student-t test or Kruskal-Wallis. We compared categorical variables using the Chi-square or Fishers exact test. Using the KW Kruskal test, the connections between the fibro scan and HA were determined. For HA levels, a logarithmic transformation was applied. By calculating the area under the receiver operating characteristic curve, it was determined if serum hyaluronic acid was accurate in distinguishing F1-2 HD with positive hepatitis C from those with F0 and in separating HD with positive hepatitis C from HD with negative hepatitis (AUROC). On the basis of this curve, the ideal cutoff point was identified. Statistical significance was defined as a p-value 0.05. SPSS software version 12.0 was used to conduct the statistical analysis (SPSS Inc., Chicago, IL).

RESULTS

The age difference between the examined groups, which is larger in individuals with positive HCV, is statistically very significant. Gender, weight, height, body mass index, or dry weight differences between the tested groups are statistically insignificant. Regarding the frequency of blood transfusions, there is a statistically significant difference between the examined groups (17% of HCV-negative individuals had rarely blood transfusions). Recoded data shows that people with HCV are more likely to receive blood transfusions. Regarding the length of dialysis, there is a statistically significant difference between the analysed groups (significantly higher in HCV-positive) (Table 1).

In terms of ALT and AST, there is a statistically significant difference between the study groups, with AST being much greater in those with positive HCV. Serum albumin and total protein levels are both noticeably low in HCV-infected individuals. Regarding other laboratory parameters, there is no statistically significant difference between the studied groups (table 2).

The frequency of hepatomegaly and splenomegaly in the analysed groups differs statistically significantly from one another (significantly higher in HD with HCV positive). Regarding

kidney ultrasonography, there is no statistically significant difference between the tested groups (Table 3).

Regarding serum hyaluronic acid, there is no statistically significant difference between the tested groups of HD patients (Table 4).

The optimum area under curve threshold for hepatic fibrosis of HD with positive hepatitis C is 154.65 ng/ml for serum hyaluronic acid. 0.541, sensitivity 57.9%, specificity 45.7%, positive predictive value 36.4%, negative predictive value 66.7% and overall accuracy 50% (Table 5).

There is a significant positive correlation between fibro scan score with both of dialysis duration and frequency of blood transfusion. The relationship between the fibro scan score and any one of age, weight, height, dry weight, body mass index, frequency, or session length is statistically non-significant. The serum fibroscan score and total protein have a strong negative connection that is statistically significant. The correlation between the fibroscan score and any other laboratory data is statistically insignificant (Table 6).

There is a statistically significant correlation between serum hyaluronic acid and the degree of liver fibrosis. The PAIRWISE comparison reveals a considerable difference between F2 and F0 (Table 7).

The best cutoff of serum hyaluronic acid in diagnosis of F1-2 in HD with positive hepatitis C is ≥140.5 ng/ml with the area under curve 0.808, sensitivity 84.6%, specificity 66.7%, positive predictive value 84.6%, negative predictive value 66.7% and overall accuracy 78.9% (Table 8).

Table 1: Comparison between the studied groups of HD regarding demographic and anthropometric data.

Variables	**HCV Negative**	**HCV positive**	χ^2	**P**
	N=35 (%)	**N=19 (%)**		
Gender Female Male	 16 (45.7%) 19 (54.3%)	 9 (47.4%) 10 (52.6%)	0.014	0.907
	Mean ± SD	**Mean ± SD**	**t**	**P**
Age (year)	9.68 ± 3.6	14.0 ± 3.37	-4.675	<0.001**
	Median(IQR)	**Median(IQR)**	**Z**	**P**
Weight (kg)	26.5(20.75–39.75)	46(37 – 49)	-1.544	0.133
Height (cm)	130(118.75 – 150)	140(130 – 150)	-1.659	0.097
Dry weight (kg)	25.5(20 – 36.13)	43(35 – 46)	-1.844	0.066
BMI (kg/m^2)	16.3(13.23 – 20)	20.8(15 – 23)	-1.251	0.211
History of blood transfusion from recorded data Three/month Twice Monthly Every 2 months 3 – 4 months 4 months 5 months Infrequent	 0 (0%) 0 (0%) 6 (5 (%) 4 (%) 3 (%) 17 (%)	 6 (%) 6 (%) 6 (%) 1 (%) 0 (0%) 0 (0%) **0**	**31.88**	<0.001**
	Median (IQR)	**Median (IQR)**	**Z**	**P**
Dialysis duration (months)	36(18 – 60)	96(72 – 120)	-5.184	<0.001**

χ^2 Chi square test Z Mann Whitney test t independent sample t test *p<0.05 is statistically significant **p≤0.001 is statistically highly significant

Table 2: Comparison between the studied groups of HD regarding laboratory parameters.

Variables	**HCV Negative (n=35)** **Mean ± SD**	**HCV positive (n=19)** **Mean ± SD**	**t**	**P**
Hemoglobin(g/dl)	9.09 ± 1.22	7.72 ± 3.32	1.774	0.092
Total protein(g/dl)	6.8 ± 0.55	6.34 ± 0.98	**-2.626**	**0.011***
Albumin (g/dl)	4.26 ± 0.27	3.72 ± 0.7	**-5.709**	**<0.001****

Variables	HCV Negative (n=35) Mean ± SD	HCV positive (n=19) Mean ± SD	t	P
Sodium (mEq/ml)	137.56 ± 6.29	135.32 ± 2.19	1.525	0.131
Potassium (mg/dl)	4.81 ± 1.05	5.3 ± 0.72	-1.908	0.06
Calcium (mg/dl)	8.45 ± 0.77	8.73 ± 0.66	-1.433	0.156
Phosphorus (mg/dl)	5.01 ± 1.01	5.02 ± 1.1	-0.028	0.978
	Median (IQR)	**Median (IQR)**	**Z**	**P**
PTH	**223(106 – 455)**	**359(123 – 667)**	**-0.979**	**0.3**
TLC (10^3/mm^3)	7(6 – 8)	6.8(5.7 – 8)	-0.466	0.641
Platelet (10^3/mm^3)	210(187 – 250)	234(188 – 297)	-0.779	0.437
CRP (mg/L)	1.9(0.6 – 2.9)	2.4(1.58 – 4)	-1.401	0.161
Creatinine (mg/dl)	6.9(5.9 – 8.8)	8.4(5.8 – 9.9)	-0.861	0.389
BUN (mg/dl)	48(42.5 – 56)	48 (42.5 – 56)	-0.571	0.568
Bilirubin (mg/dl)	0.29 (0.2 – 0.3)	0.3 (0.23 – 0.4)	-1.565	0.118
ALT (U/L)	35(24 – 59)	63(43 – 85)	-2.748	**0.005***
AST (U/L)	63(48 – 86)	98(76 – 143)	-3.128	**0.002***
Ferritin (ng/dl)	298(162 – 775)	648.4(154 – 1555)	-1.322	0.186
PT (Second)	12(11.7 – 13)	11.8(11 – 12.8)	-1.436	0.151
PTT (Second)	39.6(37 – 43)	42(38 – 45)	-1.271	0.204
INR	1(1.0 – 1.0)	0.9 (0.9 – 1)	-1.731	0.083

χ^2 Chi square test Z Mann Whitney test t independent sample t test *p<0.05 is statistically significant **p≤0.001 is statistically highly significant

Table 3: Comparison between the studied groups of HD regarding ultrasonographic findings

Variables	HCV Negative	HCV positive	χ^2	P
	N=35 (%)	**N=19 (%)**		
Kidney Hydronephrosis Atrophy	 8 (22.9%) 27 (77.1 %)	 3 (15.8%) 16(84.2%)	**Fisher**	0.728
Hepatomegaly	1 (2.9%)	9 (47.4%)	Fisher	0.001**
Splenomegaly	0 (0%)	4 (21.1%)	Fisher	0.012*

χ^2 Chi square test MC Monte Carlo test *p<0.05 is statistically significant **p≤0.001 is statistically highly significant

Table 4: Comparison between groups of HD patients regarding to presence or absence HCV and Hyaluronic acid.

Variable	HCV Negative (35)	HCV positive (19)	t	p
	Mean ± SD	**Mean ± SD**		
Hyaluronic acid(ng/ml)	143.22± 53.9	153.72 ± 40.9	1.774	0.092

t independent sample t test *p<0.05 is statistically significant **p≤0.001 is statistically highly significant

Table 5: Performance of serum hyaluronic acid in differentiating HD with positive hepatitis C from HD with negative hepatitis C**.**

Cutoff	AUC	Sensitivity	Specificity	PPV	NPV	Accuracy	P
≥154.65ng/ml	0.541	57.9%	45.7%	36.4%	66.7%	50%	0.625

AUC area under curve PPV positive predictive value NPV negative predictive value **p≤0.001 is statistically highly significant

Table 6: Correlation between fibro scan score and the studied parameters in HD group.

Variables	**r**	**P**
Age	-0.044	0.857
Weight	-0.259	0.289
Height	0.014	0.954
Dry weight (kg)	0.022	0.978
BMI (kg/m^2)	0.055	0.824
Dialysis duration	0.202	0.027*
Dialysis frequency	-0.301	0.21
Frequency of blood transfusion	0.434	0.03*
Session duration	0.089	0.717
Variables	r	P
TLC ($10^3/mm^3$)	-0.227	0.351
Hemoglobin (g/dl)	0.095	0.7
Platelet count ($10^3/mm^3$)	0.277	0.251
CRP (mg/L)	0.166	0.496
Creatinine (mg/dl)	-0.003	0.99
BUN (mg/dl)	-0.001	0.996
Total protein (g/dl)	**-0.541**	**0.017***
Serum albumin (g/dl)	-0.215	0.376
Bilirubin (mg/dl)	0.123	0.616
AST	0.223	0.358
ALT	0.297	0.216
Sodium	-0.083	0.735
Calcium	-0.292	0.225
Potassium	-0.083	0.735
Phosphorus	-0.019	0.94
Ferritin	-0.025	0.92
PTH	-0.168	0.493
PT	-0.337	0.158
PTT	0.121	0.62
INR	-0.149	0.554
Serum hyaluronic acid	0.097	0.694

r; Spearman rank correlation efficient *$p<0.05$ is statistically significant

Table 7: Relation between degree of fibrosis by fibro scan and serum hyaluronic acid among HD patients with positive HCV.

ng/ml	F0	F1	F2	KW	P
	Mean ± SD	Mean ± SD	Mean ± SD		
Hyaluronic acid	127.3 (98.55 –161.48)	171.05 (147 – 181.53)	185 (118.35 – 202.75)	6.442	0.04*
LSD	P_1 0.103	P_2 0.265	P_3 0.012*		

KW Kruskal Wallis test *p<0.05 is statistically significant p1 difference between F0 and F1 p2 difference between F1 and F2 p3 difference between F2 and F0

Table 8: Performance of serum hyaluronic acid in differentiating F1-2 HD with positive hepatitis C from those with F0.

Cutoff	AUC	Sensitivity	Specificity	PPV	NPV	Accuracy	P
≥140.5ng/ml	0.808	84.6%	66.7%	84.6%	66.7%	78.9%	0.035*

AUC area under curve PPV positive predictive value NPV negative predictive value **p≤0.001 is statistically highly significant.

DISCUSSION

This cross-sectional study was carried out on HD patients. Among 54 children and adolescents on HD were divided into two groups according to the presence of HCV by PCR either HCV 35.2% positive and 64.8% negative. Khan et al. [6] published that because hemodialysis (HD) patients have underlying cellular immunity issues that make them more susceptible to infection, their prevalence of HCV infection is typically substantially higher than that of the general population.

Before the presidential initiative to eradicate the C virus, Egypt had the highest HCV prevalence in the world; in 2008, the Egyptian Demographic Health Survey (EDHS), which was conducted on a sizable nationally representative sample, estimated that the prevalence of HCV antibodies and HCV-RNA, among the 15 to 59 year age group, was respectively 14.7 and 9.8% [7].

Martins et al. [8] and Gomes et al. [9] correlated the prevalence of the antibody in groups of blood donors with the risk of HCV infection in dialysis patients, which may help explain the nosocomial spread of the disease in these facilities.

Carneiro et al. [10] and Baid-Agrawal et al. [11] showed that many blood transfusions and the length of time the patient has been on hemodialysis are two factors that have been linked to the high incidence and prevalence rates of acquired HCV.

In terms of age, the current study found a highly significant difference between the studied group's age which is higher in children and adolescents with positive HCV. In agreement with the report of CDC [12] the length of time a patient had been undergoing hemodialysis treatments was statistically significant for HCV-positive patients, indicating that the longer the hemodialysis permanence time, the greater the risk of contracting HCV.

Our study found no significant relationship between HCV and patient gender in either group 9(47.4%) in females and 10(52.6) % in males in HCV positive group but in HCV negative group 16(45.7%) in females and 19(54.3%) in males. This agrees with Fahmi et al. [13] while Ataei et al. [14] did not agree with our findings because their paediatric study in Iran found a higher prevalence of females than males.

Weight, height, and body mass index differ statistically insignificantly between the studied groups or dry weight as both groups on regular HD. Foster et al. [15] and Rodig et al. [16] explained our findings as age at CKD onset, residual renal function, metabolic derangements, renal osteodystrophy, and abnormalities of the growth hormone-insulin-like growth factor-1 axis.

Mode of dialysis, duration of hemodialysis, and number of blood transfusions are all risk factors for HCV infection in dialysis patients. In addition, hemodialysis patients are subjected to prolonged vascular access, contaminated equipment, and medical staff handling. Furthermore, HD patients required frequent hospitalization and surgery which increases opportunities for getting nosocomial infection exposure Khan et al. [6].

The current study found a statistically significant difference in the frequency of blood transfusions between the studied groups (17% of HCV-negative had infrequent blood transfusions). The frequency of blood transfusion from documented

data of patients' sheets along all periods of dialysis was more HCV positive. In agreement with Fahmi et al. [13] & Somi et al. [17] they reported that blood transfusion was discovered to have a risk percentage in HD for HCV infection; increasing the risk of HCV infection with more frequent blood transfusion.

In this study, the median length of hemodialysis for HCV-positive patients was 96 months (8 years) with an IQR of 72-120, while the median length of hemodialysis for HCV-negative patients was 36 months (3 years) with an IQR of 72-120. (18-60). Another study conducted by Mitchell et al. [18] found that the prevalence of hemodialysis duration in HCV patients was 13.3% with a duration of less than one year and 69.9% with a duration of more than ten years. This demonstrated the link between hemodialysis duration and HCV risk. The HCV virus is unable to pass through the membrane dialyzer pores. Reusing dialyzers, poor infection control, internal hemodialysis monitor contamination, environmental aerosols, contaminated droplets, or transfusions of contaminated blood products are all potential sources of nosocomial transmission [19, 20, 21].

The danger of HCV infections in patients on HD in the paediatric age group is highlighted by the current investigation. Our investigation revealed a highly significant difference in the length of dialysis between the analysed groups (significantly higher in HCV-positive). According to findings, the probability of HCV infection rose as the length of hemodialysis sessions increased. They also observed that seroconversion from HCV Ab negative to positive has been documented in virtually all cases of HCV-positive patients who contracted the virus after HD. This outcome was consistent with Fahmi et al. [13] other study in Egypt Kandil et al. [22].

Using recombinant erythropoietin, decreasing the number of blood transfusions given to HD patients, and improving the lab are the main factors in the decrease in HCV prevalence in our HD patients and unit. Isolation of HCV patients using screening methods for anti-HCV antibodies in blood donors, strict application of infection control guidelines

In this study, serum hyaluronic acid levels showed a non-significant difference between the HD group with positive HCV and HD group with negative HCV. Our results can be explained on the basis both groups either positive or negative HCV were hemodialyzed patients and their values were nearly on the same range. In disagreement with our study, de Ávila et al. [23] documented that a reliable noninvasive indicator of severe fibrosis in hemodialysis-dependent patients with hepatitis C was the HA level. Additionally, they stated that individuals with ESRD should be given priority over those with hepatitis C and no co-morbid conditions in order to lessen the incidence and severity of liver biopsy problems in HD patients.

In this study, the best cutoff of serum hyaluronic acid in the diagnosis of hepatic fibrosis in CKD with positive hepatitis C is ≥154.65 ng/ml with the area under curve 0.541, sensitivity 57.9%, specificity 45.7%, positive predictive value 36.4%, negative predictive value 66.7% and overall accuracy 50%. Our results disagree with de Ávila et al. [23] documented that ESRF with HCV positive had a greater sensitivity of HA in diagnosing severe hepatic fibrosis than HCV with normal kidney function. Hepatitis C infection caused plasma HA levels to rise even further, supporting the test's ability to detect patients with severe liver fibrosis. Our results referred to both groups were HD patients and differences were inapparent. Several kinds of literature can be explained the additional elements that cause HA levels in ESRD patients to rise. ESRD patients have already been reported to have high plasma levels of HA. The "inflammatory state" brought on by hemodialysis itself has been blamed for the rise in plasmatic HA in ESRD.

A Fibro scan was used to calculate an LSM score and determine the degree of liver fibrosis. Significantly, there was a favourable link between fibro scan score and dialysis duration and frequency of blood transfusion. Fahmi et al. [13] & Somi et al. [17] backed up our findings. Apparently, blood transfusions and long periods of dialysis were found to increase the risk percentage for HCV infection in HD patients.

Fu et al. [24] found that the LSM of Fibro scan has a sensitivity of 85% with a specificity of 79% for diagnosing mild hepatic stiffness (F2) and a sensitivity of 87% with a specificity of 84% for detecting severe liver stiffness (F3). The pooled sensitivity was 88%, while the specificity was 91% for severe liver stiffness (F4). The LSM score and stiffness grades also had a strong positive correlation.

There is a highly statistically Very negative correlation between total protein and serum fibro scan score. But, Fu et al. [24] documented other liver and biliary-related markers, such as AST ($P = .034$), g-GT($P < .001$), total bilirubin ($P = .046$), ALK-P($P < .001$), albumin ($P = .002$) were statistically related to fibro scan in CKD.

The relationship between the fibro scan score and any one of age, weight, height, dry weight, body mass index, frequency, or session length is statistically non-significant. The correlation between the fibro scan score and any other laboratory measures is statistically insignificant.

This study is a pioneering study demonstrating the relation of the combination of Fibro scan and HA in positive HCV children and adolescents of HD to detect liver fibrosis in a single center for children with HD. There was a statistically significant relation between the degree of liver fibrosis and serum hyaluronic acid. When comparing like with like, there is a big gap between F2 and F0. Our result supported a combination of fibro scan with HA. The best cutoff of serum HA in the diagnosis of F1-2 in CKD with positive hepatitis C is ≥140.5 ng/ml with the area under curve 0.808, sensitivity 84.6%, specificity 66.7%, positive predictive value 84.6%, negative predictive value 66.7% and overall accuracy 78.9%.

CONCLUSION

Fibro scan is an excellent noninvasive method of assessing liver fibrosis in chronic hemodialysis patients with viral hepatitis C. Despite the study's small sample size, serum hyaluronic acid and the degree of liver fibrosis determined by fibroscan are significantly correlated.

Conflict of interest: None

Financial Disclosures: None

REFERENCES

1. **Orăşan OH, Orăşan RA, Patiu LM, Dumitrascu DL.** Hyaluronic acid in end-stage renal disease treated by hemodialysis. Renal failure. 2015;37(9):1531-2.
2. **Lurie Y, Webb M, Cytter-Kuint R, Shteingart S, Lederkremer G, Wise G.** Non-invasive diagnosis of liver fibrosis and cirrhosis. World J Gastroenterol**.** 2015; 21(41): 11567–83.
3. **Orăşan OH, Sava M, Iancu M, Cozma A, Saplonţai-Pop A, Sarlea Ţărmure S et al.** Serum hyaluronic acid in chronic viral hepatitis B and C: a biomarker for assessing liver fibrosis in chronic hemodialysis patients. Int Urol Nephrol. 2015a;47(7):1209-17. 14(4):335-341
4. **Avila RE, Carmo RA, Farah Kde P, Teixeira AL, Coimbra LV, Antunes CM et al.** Hyaluronic acid in the evaluation of liver fibrosis in patients with hepatitis C on haemo- dialysis. Braz J Infect Dis. 2010;14(4):335-41.
5. **Orăşan OH, Sava M, Iancu M, Cozma A, Saplonţai-Pop A, Sarlea Ţărmure S et al.** Serum hyaluronic acid in chronic viral hepatitis B and C: A biomarker for assessing liver fibrosis in chronic hemodialysis patients. Int Urol Nephrol. 2015b; 47(7):1209–17.
6. **Khan S, Attaullah S, Ali I, Ayaz S, Naseemullah KSN, Siraj S, et al.** Rising burden of hepatitis C virus in hemodialysis patients. J Virol. **2011;** 8:438.
7. **El-Zanaty F, Way A.** Egypt health issue survey 2015. *Egypt Ministry of Health and Population, Cairo. 2015.*
8. **Martins RM, Teles SA, Freitas NR, Motta-Castro AR, Souto FJ, Mussi A et al.** Distribution of hepatitis C virus genotypes among blood donors from mid-west region of Brazil. Rev Inst Med Trop Sao Paulo. 2006;48(1):53–5.
9. **Gomes M, Gigante LP, Gomes J Boschetti J, Carvalho G.** Anti-HCV seropositivity in dialysis patients. Rev Saude Publica. 2006; 40(5):931–4.
10. **Carneiro MA, Martins RM, Teles SA, Silva SA, Lopes CL, Cardoso DD et al.** Hepatitis C prevalence and risk factors in hemodialysis patients in Central Brazil: a survey by polymerase chain reaction and serological methods. *Mem Inst Oswaldo Cruz.* 2001;96(6):765–9.
11. **Baid-Agrawal S, Pascual M, Moradpour D Frei U, Tolkoff-Rubin N.** Hepatitis C virus infection in haemodialysis and kidney transplant patients. *Rev Med Virol.* 2008;18(2):97–115.
12. **CDC.** Progress toward prevention and control of hepatitis C virus infection--Egypt, 2001-2012. *MMWR Morb Mortal Wkly Rep.* 2012; 61(29):545–9.
13. **Fahmi N, Faruoq Z, Hassan WF, Ahmed A.** Prevalence of Viral Hepatitis (B and C) in Pediatric Hemodialysis Centers in Baghdad. *The Iraqi Postgraduate Med J.* 2018; 17(4): 366-71.
14. **Ataei N, Hosseini M, Yousefifard M, Oraii A, Ataei F, Abbasi A, Bazargani B.** Seroprevalence of hepatitis B and C virus infection in children with chronic kidney diseases; a historical cohort study. *Int J Pediatr.* 2018; *6*(1): 6911-17.
15. **Foster BJ, Kalkwarf HJ, Shults J, Zemel BS, Wetzsteon RJ, Thayu M *et al.*** Association of chronic kidney disease with muscle deficits in children. *J Am Soc Nephrol.* 2011; 2 (2): 377–86.
16. **Rodig NM, McDermott KC, Schneider MF, Hotchkiss HM, Yadin O, Seikaly MG et al.** Growth in Children with Chronic Kidney Disease: A Report From the Chronic Kidney Disease in Children Study. *Pediatr Nephrol.* 2014; 29(10): 1987–95.
17. **Somi MH, Etemadi J, Ghojazadeh M, Farhang S, Faramarzi M, Foroutan S et al.** Risk Factors of HCV Seroconversion in Hemodialysis Patients in Tabriz, *IranHepat Mon.* 2014; 14:e17417.
18. **Mitchell O, Feldman DM, Diakow M, Sigal SH.** The pathophysiology of thrombocytopenia in chronic liver disease. *Hepat Med.* 2016; 8: 39-50.
19. **WHO (2009):** Hepatitis C. In: WHO, editor. 2009.
20. **Mohamed A, Sqalli T, Tazi N, El Youbi R, Chaouch S, Aqodad N et al.** Non-invasive assessment of liver fibrosis in chronic hemodialysis patients with viral hepatitis C. *Pan Afr Med J.* **2015**; 22:273.
21. **Speranta I, Cerban R, Pietrareanu C, Ester C, Iacob R, Gheorghe C et al.** 100% Sustained Virological Response and Fibrosis Improvement in Real-Life Use of Direct Acting Antivirals in Genotype-1b Recurrent Hepatitis C following Liver Transplantation. *J Gastrointestin Liver Dis*. **2018**; 27:139-44.

22. **Kandil M E, Rasheed MA, Nevine E, Saad N.** Hepatitis C and B Viruses Among Some High Risk Groups of Egyptian Children. J Med Sci.15th November 2007; 7: 1259-67.
23. **de Ávila RE, Carmo RA, Farah KP, Teixeira AL, Coimbra LV, de Figueiredo Antunes, CM et al.** Hyaluronic acid in the evaluation of liver fibrosis in patients with hepatitis C on haemodialysis. *Braz J Infect Dis.* 2010; 14 (4): 335-41.
24. **Fu J, Wu B, Wu H, Lin F, Deng W.** Accuracy of real-time shear wave elastography in staging hepatic fibrosis: a meta-analysis. *BMC MedImaging*. 2020; 20:16.

To Cite:
Neemat-Allah, M., Elsaadany, H., Ahmed Ibrahem, A., Hegab, S., Mohamed Abdelaziz, S., Mohammed Elsharkawy, M. Assessment of hepatic fibrosis in hemodialysis children and adolescents by fibroscan and hyaluronic acid. *Zagazig University Medical Journal*, 2023; (1115-1123): -. doi: 10.21608/zumj.2023.201832.2773