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ORIGINAL ARTICLE

Prognostic Accuracy of VITRO Score in Predicting the Mortality in patient with Decompensated Liver Cirrhosis

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ABSTRACT

Background: Cirrhosis of the liver is a widespread chronic illness that kills more people from non-malignant diseases than any other condition. In the case of cirrhosis, the liver has sustained long-term damage and is unable to operate normally. The VITRO score is a noninvasive instrument that can forecast whether cirrhotic patients would experience problems.

Objective: To determine the prognostic accuracy of VITRO score in predicting the mortality in patient with decompensated liver cirrhosis

Material & Methods: Study Design: Descriptive Study

Setting: Liver Clinic, Services Hospital, Lahore

Duration: 06 months January 2022 to June 2022. One Hundred Ninety cirrhotic patients were recruited after meeting the inclusion criteria. Both informed consent and demographic data were collected. Blood samples were drawn and were sent to a certain facility in order to test for VWF-Ag and thrombocyte count. The VITRO-score was estimated by dividing the VWF-Ag to thrombocyte count. Patient followed for 3 months after which it was determined whether patients survived or died of cirrhosis complications.

Results: The mean age of the patients was 51.42±9.98 years, 103(54.50%) were male. The mean VITRO score of the patients was 6.15±6.08. The VITRO scores the prediction of mortality was noted in 148(77.9%) patients. The sensitivity was 96.08%, specificity was 28.78%, and diagnostic accuracy of VITRO score was 46.84% for assessment of mortality taking mortality occurred within 3 months as gold standard.

Practical implication: The prognosis of patients could be improved by using accurate prognostic scoring systems to assist clinicians in earlier diagnosis and therapy selection.

Conclusion: According to this study the prognostic accuracy of VITRO score in predicting the mortality is approximately 50% in patient with decompensated liver cirrhosis, however the sensitivity of it is very high

Keywords: Prognostic Accuracy, VITRO score, Mortality, Cirrhosis, decompensated liver disease

INTRODUCTION

Cirrhosis is a clinical and pathological outcome of several liver illnesses and is defined by architectural distortion of liver, fibrosis, and development of regenerating nodules. It may also have wide range of clinical manifestation and problems. According to autopsy studies, cirrhosis affects somewhere between 4.5% and 9.5% of population all around the globe. As a result, it has been predicted that more than fifty million people worldwide will suffer from chronic liver disease.[1] In 2017, there were more than 1.32 million cirrhosis-related fatalities in women and 883000 in men worldwide, compared to less than 899 000 deaths in 1990.[2] Cirrhosis mortality rates vary significantly by region, and this variance in the burden of liver disease serves as an example of the relationship between population risks for liver disease and mortality. Alcohol, NASH, and viral hepatitis are the most frequent causes of hepatitis in the world.[1]

In USA cirrhosis liver is the 12th leading disease cause of death.[3] Cirrhosis of the liver is more common in developing nations like Pakistan than in wealthy nations. Approximately, 5 and 10 million people are affected with hepatitis Band C respectively, both are the leading causes of cirrhosis in Pakistan.[3]

The majority of the complications associated with cirrhosis that result in death or the need for liver transplantation are caused by portal hypertension, which is defined as the rise in the pressure gradient between the portal and hepatic veins. This is a major effect of chronic liver disease progression. The raised hepatic vascular resistance, which leads to the portal hypertension in liver cirrhosis patients is temporary and reversible that occurs due to structural damage brought on by liver fibrosis, nodular regeneration, vascular remodeling, and parenchymal collapse after venous obstruction.[4]

The endothelial dysfunction, is regarded as a significant element of the elevated hepatic vascular tone in cirrhotic livers and is an early and crucial event in many vascular disorders. Von Willebrand factor (VWF) is a marker for the health of endothelial cells. It is simple to measure endothelial cell activation because VWF, a sizable sticky protein secreted by activated endothelial cells, serves as an indication. [4] Patients with cirrhosis have higher VWF levels, which are correlated with the severity of liver disease.[5]

VWF-Ag has been newly discovered and introduced as an important marker for assessment of severity of fibrosis and liver cirrhosis, also in predicting the varices and variceal bleed, detection of portal hypertension as well as prediction of mortality in liver cirrhosis. Thrombocytopenia is the most common hematological abnormality, which occurs because of splenic platelets requisitioning, suppression of bone-marrow, and diminished activity and level of haematopoietic growth-factor thrombopoietin.[6]

Additionally, thrombocytopenia may be utilised to rule out liver cirrhosis. The von Willebrand factor to platelet ratio (VITRO), which represents the degree of fibrosis and portal hypertension, may be useful in predicting prognosis in cirrhotic patients.[7] The VITRO score exhibited a sensitivity of 67% and a specificity of 71% for predicting mortality six months in patients with decompensated liver cirrhosis in one investigation using the cut-off value of 2.41. There is only one international study on this subject, and none at the national level.[8]

The rationale of this study is to evaluate the predictive accuracy of VITRO score in our population. If its validation is proven in our population it might help in determining the risk of mortality non-invasively in patients with compensated and decompensated cirrhosis and risk base stratification so that treatment options could be prioritized.

MATERIAL AND METHODS

Descriptive study was done in Liver Clinic, Services Hospital, Lahore from January 2022 to June 2022. Taking the estimated sensitivity and Specificity of VITRO Score as 67%[14], and 71%[14]

respectively and estimated prevalence of as 52%[14], Minimum required sample size comes to be 190 with precision of 10% and confidence level of 95%. Patients, aged 18-70 years both genders, diagnosed with decompensated cirrhosis, which was defined as Presence of at least one of following:

1. Ascites on abdominal ultrasound (>100 ml on USG)
2. Variceal hemorrhage confirmed on endoscopy
3. Porto-systemic encephalopathy using West-Haven criteria Grade 1 or higher

All patients with compensated liver disease, malignancy, hepatocellular carcinoma, ischemic Heart disease, congestive cardiac failure, diabetes (HbAIc > 6.5), chronic kidney disease (eGFR < 60ml/min) and cerebral vascular accident.

Informed consent was taken of the 190 Patients, fulfilling the inclusion criteria. Blood samples, for VWF-Ag and thrombocyte count, was taken and sent to specific laboratory. VITRO score was calculated by dividing the value of VWF-Ag by thrombocyte count. Patient's biodata and prediction of VITRO Score was documented on Data Collection Sheet and patient followed for 3 months after which it was determined whether patients survived or died of cirrhosis complications. Outcomes were documented on same Data Collection Sheet. Primary end-point of study was death or completion of follow up time.

Analysis was done in "Statistical Package of Social Science", version 20 (SPSS). For quantitative factors like age and weight, mean and standard deviation were determined, while frequency and percentage were used to determine qualitative variables like gender, mortality, and anticipated mortality based on VITRO Score. The "sensitivity, specificity, accuracy, positive predictive value, and negative predictive values" were calculated.

RESULTS

The mean age of the patients was 51.42±9.98 years. Out of 190 patients, 103(54.50%) were male and 86(45.50%) were females (Figure 1). The mean duration of cirrhosis was 3.55±2.49 years. The mean VWF of patients was 716.89±532.46 ng/l. The mean platelets count of the patients was 138.84±54.92. In this study the mean VITRO score of the patients was 6.15±6.08. According to the VITRO score the prediction of mortality was noted in 148(77.9%) patients. In our study the mortality occurred within 3 months in 51(26.84%) patients. Table 1

The "sensitivity, specificity, PPV, NPV and diagnostic accuracy" of VITRO score for assessment of mortality was 96.08%, 28.78%, 33.11%, 95.24% & 46.84% respectively taking mortality occurred within 3 month as gold standard. In patients aged ≤ 50 years, showed 100%, 25.64% & 38.95% respectively. In patients aged > 50 years, showed 94.12%, 32.79% & 54.74% respectively. Male patients showed 100%, 32.88% & 52.43% respectively. Female patients showed 90.48%, 24.62% & 40.7% respectively. In patients having cirrhosis ≤ 5 years, showed 97.30%, 29.82% and 46.36% respectively. In patients having cirrhosis >5 years, showed 92.86%, 24% and 48.72% respectively taking actual mortality within 3 months as gold standard. Table 2

Table # 1: Demographics of patients

	Frequency (%), mean ± SD
N	190
Age (years)	51.42 ± 9.98
gender	
Male	104 (54.7%)
Female	86 (45.3%)
Duration of cirrhosis	3.55 ± 2.49
VWF result (ng/l)	716.89 ± 532.46
Platelets count	138.84 ± 54.92
VITRO Score	6.15 ± 6.08
Mortality by VITRO score	
Yes	148 (77.9%)
No	42 (22.1%)
Mortality occurred within 3 months	
Yes	51 (26.8%)
No	139 (73.2%)

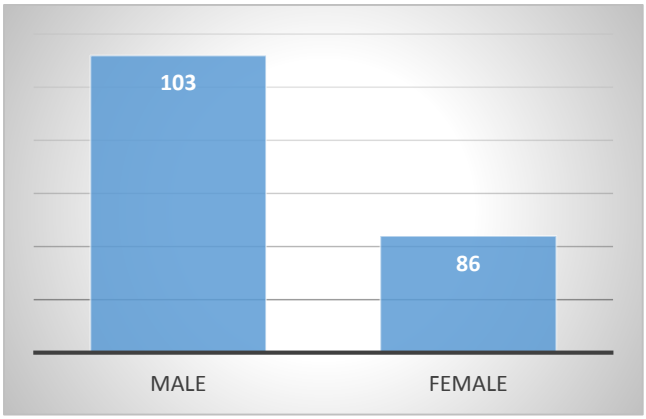

Figure 1: Frequency distribution of Gender

Table # 2: Validity of VITRO score for assessment of mortality

VITRO score		Sensitivity	Specificity	PPV	NPV	Diagnostic Accuracy
Overall		96.08%	28.78%	33.11%	95.24%	95.24%
Age (years)	≤ 50	100%	25.64%	22.67%	100%	38.95%
	>50	94.12%	32.79%	43.84%	90.91%	54.74%
Gender	Male	100%	32.88%	37.97%	100%	52.43%
	Female	90.48%	24.62%	27.94%	88.89%	40.7%
duration of cirrhosis	≤ 50	97.30%	29.82%	31.03%	97.14%	46.36%
	>50	92.86%	24%	40.63%	85.71%	48.72%

DISCUSSION

Making decisions in clinical practise requires early detection of the severity of infections in cirrhotic individuals. In Europe, liver cirrhosis causes 1.8% of all fatalities. Major problems and death in cirrhotic patients are caused by CSPH. By confirming whether vWF-Ag levels are higher than thrombocyte counts, the introduction of vWF-Ag and VITRO score makes it easier to detect liver disease. Individualized patient care may be made possible by incorporating the VITRO score into clinical practise. [7, 9-12]

According to our findings, the diagnostic accuracy of VITRO - score in predicting the mortality in patients with decompensated liver cirrhosis is not much high however it is very sensitive tool. In this study, we observed the "sensitivity, specificity, PPV, NPV and diagnostic accuracy" of VITRO score for assessment of mortality was 96.08%, 28.78%, 33.11%, 95.24% & 46.84% respectively taking mortality occurred within 3 month as gold standard.

The most common and early hematologic abnormality in cirrhotic people is thrombocytopenia, which is brought on by the "splenic platelet sequestration, bone marrow suppression, and decreased levels or activity of the hematopoietic growth factor thrombopoietin." Additionally, thrombocytopenia may be utilised to rule out liver cirrhosis.[13, 14] The VITRO-score was studied by Rémy Schwarzer et al. to determine how well it predicted mortality and hepatic decompensation in cirrhosis. According to the author's findings, VITRO is a useful predictive tool for calculating the mortality and decompensation risks in cirrhotic patients, even in the context of eradication of hepatitis-C. [7]

After hepatitis C eradication, cirrhotic patients with VITRO score > 2.1 continued to have a significantly higher risk of decompensation (p = 0.033). Hepatocellular carcinoma was diagnosed in three patients with VITRO-score 2.5, but not in any patients with a VITRO-score >2.5. This may be clarified by findings that VITRO-score and hepatic venous pressure correlate, and that a blood pressure of 10 mmHg HVPG is linked to a six-fold increased risk of hepatocellular cancer.[15, 16]

According to a different study, the VITRO score represents a standalone risk factor for liver-related deaths. It has been demonstrated that the VITRO score is a reliable indicator of portal hypertension, which is associated with mortality in cirrhotic individuals.[12, 16] One study came to the conclusion that the VITRO score is a quick and simple method to confirm the CSPH, autonomously of CPS in a clinical setting and may enhance patient treatment of liver cirrhosis.[16]

The VITRO score and CSPH had a strong connection (P<0.0001). Additionally, it was associated with esophageal varices, ascites, bleeding, and decompensation (P-value <0.05), which are all clinical symptoms of portal hypertension. La Mura et al., & Ferlitsch et al., previously shown comparable outcomes by substituting the VWF-Ag score for VITRO-score.[17, 18]

As we have used the ratio of Von Willebrand factor-Ag to thrombocyte count when it is > 2.41 it predicts the mortality, may be if the cut off changed from >2.41 to some other value we may get higher accuracy for prediction of mortality. As very limited literature available on this topic so it is suggested that studies should be done in future with more evident methodology and greater sample size to evaluate the findings of our study.

CONCLUSION

According to this study the prognostic accuracy of VITRO score in predicting the mortality is approximately 50% in patient with decompensated liver cirrhosis, however the sensitivity of it is very high.

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