Effect of SARS-COV-2 infection on D-Dimer among Thumbay Hospital Patients with and without Comorbidities

Authors: Ibtisam Obaid Almatrooshi[1], and Nelofar Sami Khan[2]*
[1]MSc Medical Laboratory Sciences, Gulf Medical University, Ajman, UAE,
*[2]Prof. of Biochemistry, Dept. of Biomedical Sciences, Gulf Medical University, Ajman, UAE, *Presenting author*

INTRODUCTION

COVID-19 is a pandemic infectious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-19).
COVID-19-related morbidity and mortality are high in the elderly with pre-existing comorbidities such as hypertension, diabetes mellitus (DM), chronic kidney disease (CKD), and a history of cardiac diseases.

AIM

Abnormal coagulation function has been demonstrated to be involved in the disease progression of SARS-COV-2. This study aimed to evaluate the level of D-Dimer in hospitalized SARS-COV-2 infected patients and to determine the influence of age, gender, BMI, and comorbidities on D-dimer value correlating with disease severity.

MATERIALS AND METHODS

Data Collection

Medical records from the Hospital Management System of SARS-CoV-2 patients from Thumbay Hospital, Ajman, were scanned.
The reference range of D-dimer was up to 232 ng/mL, according to Thumbay lab. The severity of SARS-CoV-2 was defined according to NIH clinical management, considered severe illness if a patient has SpO2 <94% and a respiratory rate of >30 breaths/min.

Statistical Analysis

Continuous variables expressed as mean and standard deviation, and categorical variables as counts and percentages.
A Chi-Square test was done to compare parameters between different demographic categories.
An Independent sample t-test was used for the comparison of the mean levels of D-Dimer among COVID-19 patients between two categories, and one-way ANOVA was used to find the difference in the mean between more than two categories.

RESULTS

The majority of the SARS-COV-2 hospitalized patients were males above 40 years of age, overweight or obese, with approximately 50% of patients having no comorbidity, 30% having one, and 20% having two or more comorbidities. Among the one comorbidity group, 77% were above 40; in the two comorbidity groups, almost all were above 40 years of age, with equal distribution among genders, and more were obese. Among the total, 76% have a moderate condition, and 24% have severe, with a similar trend followed irrespective of age, gender, or BMI.

Elevated D-dimer was seen in 70% of the total, with more in the higher age group, with no significant difference due to gender or BMI. Also, the D-dimer levels were equally elevated in the control group (68%) and one comorbidity group (68%). However, the D-dimer was higher in the two or more comorbidity groups (78.3%).

Comorbidities	Total N=107 n (%)	Age in years			Gender			Body Mass Index				Condition		
		≤ 40 N=31 n (%)	> 40 N=76 n (%)	P Value	Male N=74 n (%)	Female N=33 n (%)	P Value	Normal N=13 n (%)	Overweight N=52 n (%)	Obese N=40 n (%)	P Value	Moderate N= 81 n (%)	Severe N=24 n (%)	P Value
Control (No comorbidity)	53 (49.5)	23 (74.2)	30 (39.5)	0.002	38 (51.4)	15 (45.5)	0.837	3 (23.1)	33 (63.5)	16 (40.0)	-	43 (81.1)	10 (18.9)	0.600
1 Comorbidity	31 (29.0)	7 (22.6)	24 (31.6)		21 (28.4)	10 (30.3)		6 (46.2)	10 (19.2)	15 (37.5)		23 (74.2)	8 (25.8)	
≥2 Comorbidities	23 (21.5)	1 (3.2)	22 (28.9)		15 (20.3)	8 (24.2)		4 (30.8)	9 (17.3)	9 (22.5)		15 (71.4)	6 (28.6)	

Table I: Distribution of comorbidities among patients with respect to age, gender, and BMI

Demographic Characteristics		No. of Patients N*	Condition			Mean D-Dimer (ng/mL)						D-Dimer (ng/mL)		
			Moderate n (%)	Severe n (%)	P-Value	Moderate Mean (SD)	P-Value	Severe Mean (SD)	P-Value	Total	P-Value	≤ 232 n (%)	>232 n (%)	P-Value
Total		105	81 (77.1)	24 (22.9)	**0.001**	378 (366)	-	536 (551)	-	422 (426)	-	32 (30)	75 (70)	**0.001**
Age	≤ 40	31	26 (83.9)	5 (16.1)	0.232	265 (134)	**0.05**	315 (140)	0.404	271 (133)	**0.05**	14 (45.2)	17 (54.8)	**0.028**
	> 40	74	54 (73.0)	20 (27.0)		435 (429)		581 (594)		484 (486)		18 (23.7)	58 (76.3)	
Gender	Female	33	26 (78.8)	7 (21.2)	0.672	343 (218)	0.447	424 (159)	0.295	358 (208)	0.324	10 (30.3)	23 (69.7)	0.952
	Male	72	54 (75.0)	18 (25.0)		396 (422)		574 (631)		451 (492)		22 (29.7)	52 (70.3)	
Body Mass Index	Normal	13	11 (84.6)	2 (15.4)	0.605	367 (175)	0.862	407 (192)	0.818	373 (169)	0.824	3 (23.1)	10 (76.9)	0.802
	Over weight	50	36 (72.0)	14 (28.0)		333 (184)		598 (712)		424 (433)		15 (28.8)	37 (71.2)	
	Obese	40	31 (77.5)	9 (22.5)		366 (357)		462 (184)		385 (330)		13 (32.5)	27 (67.5)	

Table II: Prevalence of disease severity and D-Dimer among various demographic subgroups of patients
A P-Value less than 0.05 is considered to be significant

Patient Condition Category	Number of Patients	D-Dimer (ng/mL)		D-Dimer (ng/mL)		
		Mean (SD)	P-Value	≤ 232 N (%)	>232 N (%)	P-Value
Total Patients	Control (N=53)	366 (228)	0.330	17 (32.1)	36 (67.9)	0.627
	1 Comorbidity (N=31)	445 (567)		10 (32.3)	21 (67.7)	
	≥2 Comorbidities (N=23)	521 (543)		5 (21.7)	18 (78.3)	
Moderate Condition Patient	Control (N= 43)	354 (228)	0.583	14 (32.6)	29 (67.4)	0.533
	1 Comorbidity (N=23)	366 (379)		8 (34.8)	15 (65.2)	
	≥2 Comorbidities (N=15)	467 (612)		4 (26.7)	11 (73.3)	
Severe Condition Patient	Control (N=10)	422 (235)	0.652	3 (30.0)	7 (70.0)	-
	1 Comorbidity (N= 8)	672 (921)		2 (25.0)	6 (75.0)	
	≥2 Comorbidities (N= 6)	548 (240)		1 (16.7)	5 (83.3)	

Table III: Comparison of D-Dimer value between the comorbid groups to the control concerning patient condition as moderate or severe

CONCLUSION

Increased D-dimer levels seen in SARS-COV-2-infected hospitalized patients, irrespective of the presence or absence of comorbidity, with age as the main determinant influencing D-dimer elevation, though the trend of higher prevalence of elevated D-dimer value in the multiple comorbid groups was observed.
This study supports that SAR-COV-2 is a coagulopathic condition with D-dimer representing a direct link between SAR-COV-2 infection and disease progression. The information on elevated D-dimer may also be considered to guide clinical treatment.

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