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Association between the Torquetenovirus (TTV) DNA Load and the Severity of Covid-19 Patients

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ABSTRACT

Objective: The research aimed at studying the differences in the perception of anxious and depressed university students. It was hypothesized that depressed students will have more dysfunctional attitudes as compared to anxious students. It was further assumed that students with depression will comparatively have more negative perception of themselves and others associated with them. Material and Methods: The sample comprised of 100 participants, selected from various departments of University of Karachi. They were provided with the Intensive Care Psychological Assessment Tool (IPAT) Anxiety, IPAT Depression scales and (Form B) Dysfunctional Aptitude scale (DAS) as well as a set of personality traits. An adjective checklist of 88 traits was adapted from Neuroticism, Extraversion and Openness Personality Inventory revised (NEO-PI-R). The pattern of responses was illustrated through the use of percentages while the results were analyzed using Chi-square and t-test.

Results: The results suggest that no significant difference exists between the perception of self and others among students with depression and anxiety. Furthermore, no significant differences were observed among both groups in DAS scores.

Key words: TTV, Covid-19, Coinfection, Viral load, PCR

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INTRODUCTION

The epidemic induced by SARS-CoV-2 has now resulted in millions of cases of COVID-19 all over the world. According to the findings of epidemiological studies, persons of any age can be affected by serious sickness [1]. On account of these factors, there is a requirement for dependable risk stratification markers for the severity of the disease and the outcome. It has been demonstrated that severe sickness is characterized by the presence of SARS-CoV-2 RNAemia [2,3]. On the other hand, the severity of COVID-19 has been related, not to the harm caused by the virus, but rather to an overactive immune response that may have led to a cytokine storm [4]. As a result, a dependable marker of immunity may be an appropriate option for predicting the severity of COVID-19. The Torque Teno Virus is a virus that is extremely prevalent in populations. It is speculated that fifty percent of the world's population, one hundred percent of the population in certain nations, and ten percent of the people who give blood in the United States and England have TTV. TTV does not cause hepatitis by itself; nonetheless, it has been discovered that 46% of patients with fulminant hepatitis and 47% of patients with chronic liver disease of unclear etiology had TTV [5,6]. The Torque Teno Virus is a member of the group of viruses that are spread by blood transfusions. In addition, people can catch TTV through the parenteral route, through sexual contact, from their mothers to their children, and through a variety of other channels. On the other hand, the TT virus has been isolated from samples of saliva, secretions from the throat, semen, tears, breast milk, and scalp [4,5]. Torquetenovirus (TTV), which has not been consistently linked to any human disease, establishes a chronic-persistent infection presumably in multiple body sites, representing a major component of the human virome [7]. TTV DNAemia is commonly documented in healthy infected individuals and remains relatively stable in magnitude over years; in contrast, the level of TTV DNAemia fluctuates widely in transplant recipients with a clear linkage to the net state of immunosuppression; in fact, peripheral blood TTV DNA load consistently correlates directly with the intensity of host immunosuppression, and as such it may predict the occurrence of allograft rejection (low viral

loads) or infectious events (high viral loads), notably in the solid organ transplantation setting-SOT [8-10]. The aim of this study is to evaluate the coinfection between TTV and Covid-19 among vulnerable patients.

MATERIALS AND METHODS

The study will comprise 50 persons infected with Covid-19 at Al-Shifaa Epidemiological Hospital in Kirkuk, both sexes Depending on hospital internal medicine specialists and CT-scan results, Covid-19 patients. The study included 30 healthy controls with the same age range and box sexes. Covid-19 diagnosis was made based on WHO criteria and/or confirmed by RT-PCR of nasopharyngeal specimens and based upon the instructions for the companies that manufacture laboratory materials for diagnosing the Covid-19 virus by means of the PCR device by the laboratory staff working in the Public Health Laboratory in the city of Kirkuk, where the infection was confirmed by them through the protocols followed by the Ministry of Health and all information's about patients were taken officially by cadres Kirkuk Health Department, where this information were saved for later contact with patients. Same sample also done for detection of TTV by real-time PCR as manufactured instruction.

The WizPrepTM Viral DNA/RNA Mini Kit (V2) isolates viral DNA and/or RNA from blood, serum, plasma, bodily fluid, or virus-infected cell culture supernatant. The WizPrepTM Viral DNA/RNA Mini Kit (V2) uses silica-membrane technology to remove tedious procedures. The kit can purify viral nucleic acid from virus-infected samples in less than 15 minutes. PCR or RT-PCR can use purified virus DNA or RNA.

RESULTS

The study demonstrated that the maximum rate of TTV infection (TTV DNA by PCR) was found in Covid-19 patients (36%) and no infection was detected among healthy individuals. The result was significant (P: 0.001) (Table 1 and Figure 1). The study revealed that the highest rate of TTV infection was recorded in elderly patients of Covid-19 infection (Table 2). The current study revealed that the highest mean level of ALT and AST were recorded in thalassemia and HD patients with TTV infection comparing with patients without TTV infection and blood donors group (Table 3).

HPV DNA load was determined by real-time PCR using HPV-specific GP5+/6+ primers in the 12 RPL women HPV-positive cases. Quantitative results indicated that the mean HPV DNA load detected by RT-PCR in deep

Table 1: Detection of TTV in studied groups by PCR.

TTV DNA (PCR)	Covid-19 patients		Control group		P. value
	No.	%	No.	%	
Positive	18	36	0	0	0.001
Negative	32	46	30	100	
Total	50	100	30	100	

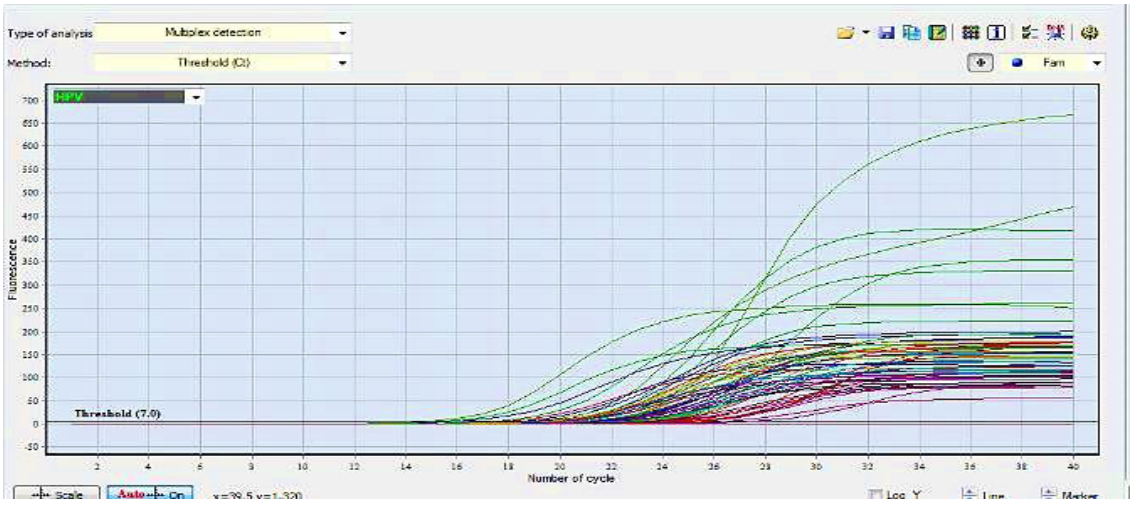

Figure 1: Dependence of FAM/HEX /CY5.5 channel fluorescence on cycle number.

Table 2: Distribution of TTV infection as diagnosed by PCR according to age.

Age groups (years)	Covid-19 patients	
	No. of +ve	%
15-24	7	21.21
25-34	3	9.09
35-44	5	15.15
45-54	5	15.15
55-64	7	21.21
65-75	9	27.27
Total	33	100

Table 3: Level of ALT and AST in Covid-19 patients and the control group.

Mean Level of	Covid-19 patients		Blood donors (n:50)
	TTV +ve (n:33)	TTV –ve (n:167)	
ALT* (IU/ml)	144.6	83.7	15.52
AST** (IU/ml)	39.7	14.8	13.67
* ALT: Alanine aminotransferase.			
** AST: Aspartate aminotransferase.			

Table 4: Relation of TTV DNA load with number of miscarriage.

No. of +ve PCR cases	12
Mean	11.56
SD	3.34
Minimum	8.32
Median	11.54
Maximum	18.78

Table 5: Relation of TTV DNA Load with number of miscarriage.

Covid-19 patients	No.	TTV DNA load (copy/cell)		P. value
		Mean	SD	
Mild	10	8.45	0.33	0.0001
Moderate	11	10.347	0.86	
Severe	15	14.66	1.68	

vaginal swab from the RPL group was 10.95 copy/cell (range 7.665–15.75 copy/cell) (Table 4). The study demonstrated that the high mean of TTV DNA load (14.66 copy/cell) was recorded among severe covid-19 infection and the lowest mean (8.45 copy/cell) was in Mild covid-19 infection (Table 5).

DISCUSSION

Positivity for SARS-CoV-2 RNAemia can range from 0% to 41%, with significantly higher rates (up to 100%) having been recorded in severely or critically ill patients [10-12]. In the patients that were part of our cohort, SARS-CoV-2 RNAemia was found in 40.7 percent of them. This percentage decreased with time, going from 43.4 percent in the first week after symptom onset to 14.6 percent in the third week after symptom onset. Additionally, this percentage was significantly higher in severe cases compared to mild-to-moderate patients at all-time points after the onset of symptoms. Research conducted on healthy individuals as well as recipients of transplants has shown that low levels of TTV correspond with strong immunological responses, whereas high levels correlate with age and represent inadequate immune responses [13,14]. Since the severity of COVID-19 and the mortality rates associated with it have been linked to a robust immune response and inflammation, we decided to study whether or not plasma levels of TTV could predict the prognosis of COVID-19 patients. We discovered that severe cases were more common in patients with low TTV DNA load as early as the first week after the onset of symptoms, using a criterion of 700 copies/ml of TTV DNA load. This was the case even though we used this criteria [15,16]. This suggests that in circumstances affecting or triggered by changes in immunity, TTV DNA load quickly adjusts and can be a helpful marker of severe COVID-19. This is true regardless of age. In addition, SARS-CoV-2 sero conversion occurred earlier in patients who had a low TTV DNA load, which is indicative of better immunity. This finding implies that there is a correlation between the magnitude of global immunity and of specific anti-SARS-CoV-2 humoral immunity [17]. The present results were in agreement with several studies done earlier reported indicated that the frequency of TTV infection can vary with the genomic region tested, as well as with the geographic location studied, and group of different type of patients including hemodialysis patients showed a TTV positivity rate of 17% [18]. Another study reported that the frequency of TTV infection increased from 36% in HD patient [19]. These results suggest that TTV-DNA is transmitted to the recipients by blood and blood products. So, blood transfusion is one of the most ways for TTV transmission Because of a very high genetic variety, different studies are affected by the viral, amplified region and sensitivity of its primers [20]. In consistence with current results. In this exploratory and proof-of-principle study, we tested the hypothesis that monitoring for TTV DNA in plasma could serve the purpose of identifying critically ill COVID-19 patients who were at the highest risk of developing infectious events leading to poor prognosis, such as bloodstream infections and VAP, and overall mortality [21,22].

CONCLUSION

The results suggest that no significant difference exists between the perception of self and others among students with depression and anxiety. Furthermore, no significant differences were observed among both groups in DAS scores.

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