The Importance of Molecular and Clinical Laboratory Tests in Diagnosis and Treatment of Coronavirus Disease

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Abstract: 900 abusers were tested for the presence of drug abuse and coronavirus disease. In the early stage, the throat and noise samples of these patients were examined by polymerase chain reaction (PCR). The mean age of the study group is 42 ± 23. Hematological and serological examinations were performed on 131 patients. All data were analyzed by t-test and one-way analysis of variance (ANOVA). Therefore, $P < 0.05$ is considered as the significance of the test results. The results showed that 131 patients in the study group had positive results of PCR tests and nearby they had Covid-19. Approximately 90% of patients with coronavirus disease showed positive serological tests and lymphopenic condition. All of urine or blood samples in the 131 patients were positive for the presence of abuse drugs. C-reactive protein (CRP) is one of important serologic test that detected on these patients. This study showed the importance of molecular genetics test such as PCR and also hematology and serology tests in distinguish of coronavirus diseases.

Key words: Abusers, coronavirus disease, clinical laboratory tests, samples, treatment.

1. Introduction

Using laboratory tests and radiological diagnostic methods to understand the symptoms and signs of the disease is effective in the treatment and prevention of the disease. The presence of IgM and IgG immunoglobulins play an important role in the acute and chronic phases of the disease, respectively. Blood cell counts also have an important advantage in confirmation of some diseases. Therefore, it is suggested that some molecular tests should be carried out in the early stage of the disease. Cheap and simple clinical laboratory tests will be very effective in identifying diseases in a short period of time. Molecular PCR test is the first step in diagnosing coronavirus disease [1-5]. When a virus is infected,

cellular immunity is first followed by humoral immunity. Some parameters, such as acute phase proteins, may increase the incidence of disease. CRP is an annular pentameric ring-shaped protein found in plasma, and its circulating concentration will increase due to inflammation. It is an acute-phase protein of hepatic origin and increases after secretion of interleukin-6 by macrophages and cells. Its physiological role is to bind lysophosphatidylcholine expressed on the surface of dead or dying viral infected cells and some types of bacteria in order to activate the complement system via C1q classic pathway. C-reactive protein can be a prognostic marker in Covid-19 patients. In the early stage of Covid-19 patients, CRP levels were significantly increased in coronavirus diseases [6, 7]. In this research, lymphopenia and an increase of acute phase protein such as CRP were clearly seen in patients of Covid-19. Therefore, in this study, molecular PCR

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detection, blood cell count and other serum tests were carried out in the abusers of coronavirus diseases.

2. Methods and Materials

2.1 Study Population

900 drug addicted men participated in the experiment and were divided into two groups, aged 35 ± 15 years old and 42 ± 23 years old. First, the consent form and questionnaire, as well as all forms that meet the needs of the patient. Information such as age, gender, type of materials, medications used for treatment, and history of the forms are recorded. All questionnaires and completed forms were confirmed by the ethics committee of welfare institutions.

2.2 Preparation of Samples

Molecular PCR was performed on throat and nasal swab samples. Nuclei extracted from epithelial cells were detected by molecular PCR. DNA molecules of laryngeal and nasal epithelial nuclei were extracted for PCR detection.

2.3 Samples Analysis

In all study groups, the results of their PCR molecular test were positive and drug abuse was confirmed in urine and blood samples [5, 8]. Blood samples were also collected for hematology and serology tests. In the early stage, 3 ml blood sample was taken from each patient and put into a vial containing ethylene-diamine-tetra-acetic acid (EDTA) anticoagulants. After mixing, blood smear was provided and evaluated under the microscope. Then the rest of each person's blood samples were collected in other test tubes. From peripheral blood samples containing anticoagulants smears were prepared then smears were fixed with 96 $^\circ$ethanol alcohol. Then the fixed slides were stained with Geimsa paint for one hour at laboratory room temperature. After preparing all the slides, the differentiation of blood cells were evaluated with a lens of 100 of light microscope. And the percentage of leukocytes for each slide was recorded. CRP test was performed on the blood serum prepared of each test tube then positive and negative results were recorded for each patient [5, 8-16].

3. Results

The results of welfare organization in Tabriz clinics generally showed that urine and blood samples were positive in all the study population. This study showed that most drug abusers with coronavirus disease have positive PCR and serum CRP test results [5-8]. The following table shows some results of drug abusers with Covid-19 disease. Table 1 shows demographic characteristics of men abusers involved in the study. There is no statistical significance between people of different age groups and all people taking morphine and amphetamine. From the perspective of drug abuse and addiction history, the results of significant lymphocytopenia on peripheral blood smears in patients with coronavirus are shown in Table 2. Table 3 shows the CRP test results of blood samples of different ages during treatment. Table 4 records the percentage of lymphopenia and CRP test results in blood samples taken early in the treatment. Table 5 shows a comparison of the results of the hematology test (lymphopenia) and the serology test (CRP) of blood samples taken early in the treatment from the abuser [15-19].

Table 1 Demographic characteristics of Men abusers involved in the study.

Parameters	Men abusers (n = 450)	Men abusers (n = 450)	Statistical analysis
Age (years) (mean $\pm$SD)	42 ± 23	35 ± 15	P = 0.12
Years of Methamphetamine consumption (mean $\pm$SD)	6.4 ± 3.6	13.2 ± 3.8	P = 0.14
Years of Morphine consumption (mean $\pm$SD)	14.3 ± 5.7	5.5 ± 4.5	P = 0.13

t-test, P < 0.05, significant for between age groups and kinds of consumption.

Table 2   Hematology tests (Lymphopenia) results of blood samples during early stage of treatment comparisons of with history and kinds of abuse drug consumption.

No	Age	History of consumption (Years)	Kinds of consumption	Lymphopenia (Mild, Modrate, Sever)
1	55	20	Morphine	Sever
2	49	18	Morphine	Sever
3	47	19	Morphine	Moderate
4	40	20	Morphine	Moderate
5	34	13	Morphine	Moderate
6	22	4	Methamphetamine	Mild
7	23	5	Methamphetamine	Mild
8	19	2	Methamphetamine	Mild
9	20	2	Methamphetamine	Mild
10	23	5	Methamphetamine	Mild
11	30	9	Methamphetamine	Mild
12	33	11	Methamphetamine	Mild
13	48	20	Morphine	Moderate
14	50	20	Morphine	Moderate
15	49	20	Morphine	Moderate
16	48	18	Morphine	Moderate
17	47	20	Morphine	Sever
18	50	21	Morphine	Sever
19	51	21	Morphine	Sever
20	40	19	Morphine	Sever
21	36	15	Morphine	Moderate
22	38	17	Morphine	Moderate
23	33	14	Morphine	Moderate
24	41	21	Morphine	Moderate
25	30	11	Morphine	Moderate
26	22	2	Methamphetamine	Mild
27	27	9	Methamphetamine	Mild
28	26	8	Methamphetamine	Mild
29	20	2	Methamphetamine	Sever
30	23	4	Methamphetamine	Mild
31	55	21	Morphine	Mild
32	65	25	Morphine	Sever
33	60	28	Morphine	Sever
34	58	29	Morphine	Sever
35	59	33	Morphine	Sever

Blood smear differentiate evaluation of patients, lymphopenia (mild, moderate, sever), with history and kinds of abuse drug consumption, N =35.

Table 3   CRP positive tests results in duration of treatment with different ages and consumption kinds in Blood samples.

No	Morphine (Men Age)	Amphetamine (Men Age)	Consumption history (Years)	CRP test Results (+, ++, +++)
1	22	44	5	+
2	28	31	8	+
3	35	58	15	+++
4	31	44	20	+
5	65	57	35	++
6	47	55	25	+
7	26	40	9	+

Table 3 to be continued

8	33	46	14	+++
9	29	49	10	+
10	35	39	12	++
11	45	41	20	+
12	46	39	18	+++
13	60	50	30	++
14	40	41	18	+
15	23	31	5	++
16	22	34	4	++
17	33	39	14	+
18	49	50	4	+
19	28	57	5	++
20	20	23	2	+
21	37	36	15	+++
22	62	53	33	+++
23	59	46	25	+
24	19	22	2	++
25	21	25	3	+++

CRP test: positive results (+, ++, +++), N = 25, Slide test, Blood samples, between two ages groups.

Table 4   Percentage of Lymphopenia and CRP positive tests results of Blood samples during early stage of treatment.

Parameters	Men abusers (n = 66)	Men abusers (n = 65)	Statistical analysis
Age (years) (mean ±SD)	42 ±23	35 ±15	P = 0.12
Hematology tests (Lymphopenia)	90%	85%	P = 0.21
Serology tests (CRP) results	80%	85%	P = 0.19

t-test, $P < 0.05$ significant for between age groups and hematology tests (lymphopenia) and serology tests (CRP) results of Blood samples.

Table 5   Hematology tests (lymphopenia) and serology tests (CRP) results of blood samples during early stage of treatment.

No	Age	Hematology tests (Mild, Moderate, Sever)	Serology tests (CRP Test)
1	55	Sever	+++
2	49	Sever	+++
3	47	Moderate	++
4	40	Moderate	++
5	34	Moderate	++
6	22	Mild	+
7	23	Mild	+
8	19	Mild	+
9	20	Mild	+
10	23	Mild	+
11	30	Mild	+
12	33	Mild	+
13	48	Moderate	++
14	50	Moderate	++
15	49	Moderate	++
16	48	Moderate	++
17	47	Sever	+++
18	50	Sever	+++
19	51	Sever	+++

Table 5 to be continued

20	40	Sever	+++
21	36	Moderate	++
22	38	Moderate	++
23	33	Moderate	++
24	41	Moderate	++
25	30	Moderate	++
26	22	Mild	+
27	27	Mild	+
28	26	Mild	+
29	20	Sever	+++
30	23	Mild	+
31	55	Mild	+
32	65	Sever	+++
33	60	Sever	+++
34	58	Sever	+++
35	59	Sever	+++

Blood smear differentiate evaluation of patients, lymphopenia (mild, moderate, sever), and serology tests (CRP) positive results (+, ++, +++), N = 35.

4. Discussion

The results of this study showed that all the study groups with coronavirus disease had a body temperature higher than 37.5 ℃ at the time of admission, and PCR molecular tests were all positive. Patients may need this test if they have symptoms of serious viral or bacterial infections. Symptoms include fever, chills, shortness of breath, rapid heart rate, nausea and so on. In coronary cell disease, some blood cells are also significantly reduced. The data in Table 5 shows that long-term of drug abuse consumption. In elderly abusers with coronavirus disease, the proportion of anemia and lymphopenia increased [6, 7]. The results of this study also showed that urine or blood samples of drug addicts in all study groups were positive at the time of admission. Therefore, the results of peripheral blood smear hematology tests showed a significant reduction in blood lymphocytes of coronavirus disease patients [14, 16]. In addition, the evaluation of serological tests confirmed a high level of acute phase CRP protein in blood serum of all abusers coronavirus with diseases [5, 8]. In viral infections, cellular immunity is first followed by humoral immunity. However, during the acute phase of the disease, a significant increase in acute phase proteins such as fever and CRP can be observed. CRP is a protein produced in the liver, and it is sent into the blood stream to deal with inflammation. Inflammation is a way for the body to protect tissues when it is injured or infected. It can cause pain, redness and swelling in the injured or affected area. Some autoimmune diseases and chronic diseases can also cause inflammation. Patients with weakness and immunodeficiency must be treated for anemia and leucopenia, and the serum of the treated patients will be effective for new patients [14, 16].

5. Conclusions

These studies demonstrate the importance of molecular and clinical laboratory tests in the diagnosis and treatment of coronavirus disease. Hypoxia can cause disease and cause damage to other tissues. Therefore, in coronavirus disease, hypoxia should be treated with oxygen therapy. In this case, the covid-19 disease caused by anemia and lymphopenia should be recovered. Therefore, appropriate treatments such as injections of vitamins B-complex, B12 and neurobion will help reduce the blood cell supply for coronavirus disease. Blood transfusions can also be used in

emergencies. It is recommended to use vitamins, vitamin E, zinc sulfate and nutrients containing ideal proteins (such as birds and minerals) to enhance the patient's resistance and immune boost. Vitamin C plays an important role in compensating for dehydration. The public is advised to use effective vaccines [1-4, 14, 16, 20-25].

Acknowledgement

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