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Intestinal Parasitic Infections in Relation to COVID-19 in Baghdad City

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Abstract

BACKGROUND: COVID-19 is resulted from severe acute respiratory syndrome coronavirus 2, which initiated in China in December 2019. Parasites are efficient immune modulators because their ability to stimulate an immune response in infected persons.

AIM: This study aims to detect if there is a probable relationship between intestinal parasitic infections and COVID-19.

METHODS: Ninety patients consulted at Al-Kindy Teaching Hospital (Al-Shifa center) from October 2020 till April 2021, confirmed infection with COVID-19 by PCR. Stool examination was done for detecting intestinal parasites.

RESULTS: From 90 patients, males were 63 (70%), with median age 32 years, while females were 27 (30%), with age 24–44 years. Asymptomatic patients were 8.1 (9%), patients with moderate symptoms 22.5 (25%) cases, while the rest were 59.4 (66%) cases who required enter to the intensive care unit, with symptoms including cough (80%), dyspnea (74%), fever (56%), headache (43%), chest pain (37%), sore throat (35%), myalgia (32%), diarrhea (27%), and hemoptysis (3%).

CONCLUSION: There is inverse relationship between parasitic infection and COVID-19 infections, and it is significant to understand the action between parasites and microbiome, also its function in COVID-19 pathogenicity.

Introduction

There were more than 177 million cases recorded and 38 million deaths till May 2021 [1]. Serious cases, COVID-19 can be complicated by acute respiratory distress syndrome, cardiac injury, sepsis, kidney infection, and also multiorgan failure [2]. Elder also underlying comorbidities as diabetes, hypertension, and cardiac diseases were documented as factors increase the severity of this virus and death [3].

Parasites are efficient immune modulators because their ability to stimulate an immune response in the persons infected by making a balance between responses of pro-inflammatory and responses of anti-inflammatory [4].

Parasites infect about 2 billion persons over the world [5]. Metazoan parasites such as *Schistosoma*, *Ascaris*, and *Enterobius*, as well as protozoa such as *Giardia*, *Entamoeba*, and *Cryptosporidium* are the main parasites [6]. Chronic parasitic infections, through host's immune response modulation, proved to change other infections related clinical outcomes [7]. Previous parasitic infections could also modulate host immune reaction to infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by harmful or useful effects [8]. Recent researches proved counteractive relationship between occurrences of this viral disease some parasitic infections [9]. The aim of this study was to detect if there is a probable relationship between intestinal parasitic infections and COVID-19.

Materials and Methods

Study design and participants

Ninety patients confirmed diagnoses with COVID-19 were consulted at Al-Kindy Teaching Hospital (Al-Shifa center) from October 2020 till April 2021. All patients in this study were from Baghdad, diagnosed according to the WHO procedure [10].

Data collection

Clinical and laboratory data were collected in questionnaire; COVID-19 patients' data were reviewed.

Sample collection and RNA extraction

Ninety patients examined in this study. Nasal pharyngeal and throat swab were collected in viral transporting media tube (VTM-tube) for RNA extraction. RNA extraction processed according to the manufacture use (Viral Line RNA extraction Kit KFFLX, automated German). KingFisher thermos machine has been programmed and used.

Real-time reverse transcription polymerase chain reaction assay (RT-PCR)

RT-PCR tests of swabs done as described by Wang *et al*. [11]. The RT-PCR kit (RealLine-SARS-CoV-2, BIORON diagnostic German) was used according to the manufacture manual.

The RT-PCR program was as described by manufacture use (RealLine-SARS-CoV-2, BIORON diagnostic), as shown in Table 1. Analytik Jena qTOWER^3 PCR machine has been programed and used. The data analyzed according to the manufacture manual.

Table 1: Program of RT-PCR

No. of step	Temperature (°C)	Time	No. of cycles
1	35	20 min	1
2	95	5 min	1
3	94	10s	50*
	64	15 s*	
4	80	1 s	1
5	10	Hold	

*Measurement for fluorescence

Stool examination

Confirmed infected patients with this viral infection were examined for intestinal parasitic infections, stool samples were taken from patients, and a wet slide was prepared using normal saline, iodine to demonstrate parasites under light microscope.

Ethical considerations

Ethical approval obtained from scientific affairs of Al-Kindy College of Medicine.

Results

According to the signs and symptoms of disease, patients were divided to three categories: Asymptomatic patients were 8.1 (9%), or patients had moderate symptoms 22.5 (25%) cases, while the severe cases were 59.4 (66%) in Table 2. Cough (80%), dyspnea (74%), fever (56%), headache (43%), chest pain (37%), sore throat (35%), myalgia (32%), diarrhea (27%), and hemoptysis (3%) as shown in Table 3.

Table 2: Categories and percentage of infected patients with severe acute respiratory syndrome coronavirus 2

Total patients (90)		
Category	No.	%
Asymptomatic patients	8.1	9
Mild symptoms	22.5	25
Severe disease	59.4	66

Stool examination was done by technicians team specialized in parasitology, showed that there were no parasitic infections in the stool of 89 patients, so there was a negative correlation between intestinal parasitic infections and COVID-19 in patients, results detected only one asymptomatic patient harbored *Giardia* parasite, as shown in Table 4.

Table 3: Significant symptoms and percentage of infected patients

Significant symptoms	%
Cough	80
Dyspnea	74
Fever	56
Headache	43
Chest pain	37
Sore throat	35
Myalgia	32
Diarrhea	27
Hemoptysis	3

Discussion

The previous studies have recorded that infection with helminths decreases the metabolic syndrome and diabetes in man [12], [13], [14].

Table 4: Stool examination of infected patients

Total patients (90)		
Category	Number of patients infected with parasites	%
Asymptomatic patients	1	0.01
Mild symptoms	0	0
Severe disease	0	0

Parasitic infections provide immune tolerance by induction of secretion immunomodulatory cytokines (TGFβ and IL-10), and regulatory CD4+ T cells, and this may be the responsible key for the protection from COVID-19, in addition to that, severity of COVID-19 was recorded to be linked with activated pro-inflammatory condition that suppression by IL-6 contrariness made improvement of clinical severity [15]. Parasites are developed and become sufficient modulators for human immunity, for instance, infection with schistosomiasis makes a balance between immune response type 1 and type 2 regarding cytokines (IL-13, IL-4, IL-5, and IFNγ) was very important to contain ova of some parasites in a small area of inflammation, and *interleukin 10*, that acts as immunoregulator that inhibits these responses to make immunopathology limitation [16].

Clinical outcomes of many researches were very higher worse in patients of COVID-19 with no parasites, and a high ratio of them was entered ICU, while existing helminth infections or protozoal infection

is all related with reducing this probability [17].

Pre-existing parasitic infections provide prevention against pathogenesis related with COVID-19 severity, by perturbation of gut microbiome that results from parasitic infection which can change immune response to the infection of this virus. In animal models, researchers found that helminths protect lung from viral infections of it by acting together with microbiota [18].

Conclusion

There is inverse relationship between parasitic infection and COVID-19 infections, and it is significant to understand the action between parasites and microbiome, also its function in COVID-19 pathogenicity.

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