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Experiencing Malaria Earlier Aggravates the COVID-19 Symptoms

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ABSTRACT

Introduction: In the present study, the effects of the frequency of experienced malaria and flu/cold on the symptom severity in patients with COVID-19 were investigated.

Materials and Method: Subjects were those who experienced COVID-19 and recovered. Eighty-one subjects were included in the study. All of them were voluntarily to participate in this study (51 men and 30 women). Out of 81 cases, 48 were expat and 33 were Nigerian. Data was collected by using an online survey. The survey was shared by using social media.

Results: The number of symptoms and overall symptom severity were higher in people with 2 or more malaria than in people with 1 or zero malaria in the last year. However, there is no difference between people with 2 or more flu and people with 1 or zero flu.

Conclusion: These results show that to have malaria disease before aggravates COVID-19 symptoms. Therefore, it can be stated that malaria is additional risk factor for COVID-19. Precautions to decrease malaria infections in Nigeria can be beneficial to decrease COVID-19 cases and deaths of COVID-19.

Key words: Malaria, Flu, Cold, COVID-19

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INTRODUCTION

The very 1st case of COVID-19 infected in Nigeria was recorded on March 10, 2020. With a constant increment in numbers, all tertiary educational institutions were closed with an order of the Ministry of Education by March 20, 2020, and the government announced the initial lockdown of big cities on March 30, 2020 [1].

Psychological stress due to COVID-19 pandemic can result in fear and worry among people about their health and financial conditions. It can also cause changes in eating patterns, sleeping problems, concentration difficulties, and exacerbation of chronic health problems, mental health conditions, usage of tobacco, alcohol, and other substances [2]. The current pandemic-related coping strategies may harm mental health, such as decreased well-being and increased depression and anxiety symptoms [1,3], insomnia, and anger [4-6]. Also, inactivity due to COVID-19 disease can have a negative effect on physical and mental health and coping with stress and anxiety during isolation time [7,8]. Besides, there were some negative lifestyle changes due to the COVID-19 pandemic [9]. Furthermore, the fairly big changes in food consumption preferences were reported [10]. Also, in another study, there was a significant decrease in family incomes and a significant increase in family expenditures during the pandemic outbreak [11]. Also, Nigerian women entrepreneurs experienced the negative effect of COVID-19 outbreak on their businesses [12] and there was a negative effect of COVID-19 on the performance (growth) of small businesses in Nigeria [13].

A wide range of symptoms are found in COVID-19 patients, ranging from mild/moderate to severe, rapidly progressive, and fulminant disease. Symptoms of COVID-19 are non-specific and disease presentation can range from asymptomatic to severe pneumonia. Incidence of asymptomatic cases ranges from 1.6% to 51.7% and these people do not present typical clinical symptoms or signs and do not present apparent abnormalities in lung computed tomography [14-19]. The most common symptoms of COVID-19 are fever,

Table 1: The effect of malaria frequency on symptoms of COVID-19.

	People with 1 or less malaria a year	People with 2 or more malaria a year	T	p
Number of Symptoms	6.721 ± 4.142	8.948 ± 4.532	2.31	0.024
Overall Symptom severity	13.069 ± 9.051	18.289 ± 10.845	2.36	0.021

Table 2: The effect of flu/cold frequency on symptoms of COVID-19.

	People with 1 or less flu/cold a year	People with 2 or more flu/cold a year	T	p
Number of Symptoms	7.421 ± 5.501	7.871 ± 4.115	0.384	0.702
Overall Symptom severity	14.053 ± 11.928	15.968 ± 9.69	0.713	0.478

cough, myalgia, or fatigue and atypical symptoms include sputum, headache, haemoptysis, vomiting, and Diarrhea [20,21]. Some patients may present with sore throat, rhinorrhea, headache, and confusion a few days before the onset of fever, indicating that fever is a critical symptom, but not the initial manifestation of infection [21]. Furthermore, some patients experience loss of smell (hyposmia) or taste (hypogeusia), which are now being considered early warning signs and indications for self-isolation [22,23].

In a recent study performed in Nigeria, the most severe symptoms of COVID-19 patients were generalized body pain, loss of smell, fatigue, headache were. The duration of generalized body pain, loss of smell and fatigue were higher than 1-3 days [24].

Malaria is transmitted all over Nigeria; 76 % of the population live in high transmission areas while 24 % of the population live in low transmission areas. The effects of having malaria before on the severities and durations of COVID-19 symptoms are unknown. Malaria is likely to influence the severities and durations of COVID-19 by affecting the immune system positively or negatively [25,26].

In the present study, two aims were targeted, (1) determination of the effects of the frequency of the experienced malaria on COVID-19 symptoms, (2) determination of the effects of the frequency of experienced flu/cold on COVID-19 symptoms.

MATERIALS AND METHOD

Participants

Subjects were those who experienced COVID-19 and recovered. All subjects were living in Abuja Nigeria for at least the last one year. Eighty-one subjects were included in the study. All of them accepted to participate in this study (51 men, average age=35.123 years, standard deviation, SD=3.861; 30 women, average age=34.428, SD=4.952). Out of 81 cases, 48 were expat and 33 were Nigerian. Data was collected by using an online survey. The survey was shared by using social media (whatsup groups).

The experimental protocol was by following international ethical standards. The study was performed per under the Helsinki Declaration (1975, revised in 1996-2013) [27]. The aims and objectives of the study were explicitly explained to the participants before the commencement of the study.

The survey consisted of 4 different parts.

Part 1. Demographic information. In this part the demographic information (gender, age) was asked.

Part 2. Flu and malaria condition: In the questionnaire, the numbers of flu and malaria experienced in the last 1 year were asked. Patients with COVID-19 were divided into two groups: Group 1 was the patients with COVID-19 experienced flu or malaria 0 or 1 in the last 1 year; group 2 was the patients with COVID-19 experienced flu or malaria 2 or more in the last 1 year.

Part 3. The number of symptoms. In total, 18 COVID-19 symptoms (fever, cough, general body pain, loss of smell, loss of taste, fatigue, eye pain, headache, runny nose, breathing difficulty, sore throat, abdominal pain, shivering, Diarrhea, catarrh, joint pain, weight loss, another symptom) were taken into consideration. In the questionnaire, each COVID-19 symptom had 2 answer options: if symptom was absent (0 point or NO) if symptom was present (1 point or YES). The number of symptoms was calculated by counting 1s (number of YES).

Part 4. COVID-19 symptom severity. Above mentioned 18 symptoms were taken into consideration. In the questionnaire, each COVID-19 symptom had 4 answer options: if person had not this symptom (0 point), if symptom was mild (1 point), if it was moderate (2 points) and if it was severe (3 points). Overall symptom severity was calculated by summing all symptom severities.

Statistical analyses

Measured values are given as a mean ± standard deviation (SD). Statistical analysis was performed using the software SPSS for Windows, version 26. The student's t test was used.

RESULTS

The number of symptoms (t=2.31, p=0.024) and overall symptom severity (t=2.36, p=0.021) were statistically significantly higher in people with 2 or more malaria than in people with 1 or zero malaria in the last year (Table 1). However, there is no statistically significant difference between people with 2 or more flu/cold and people with 1 or zero flu/cold (Table 2).

DISCUSSION

As of today (03/27/2021), Nigerian COVID-19 statistics

are following: Total number of cases=162.388, Total number of deaths=2.039, Total number of recovered patients=149.986, The number of active cases=10.363, The number of serious/critical cases=10, Total number of cases per 1 million population=774, The total number of deaths per 1 million population=10 [28]. These statistics show that COVID-19 cases and deaths in Nigeria are quite low compared to other world countries.

In the present study, the number of symptoms and overall symptom severity were higher in people with 2 or more malaria than in people with 1 or zero malaria in the last year. However, there is no difference between people with 2 or more flu and people with 1 or zero flu. That is to say, to experience malaria before aggravates COVID-19 symptoms. This issue is very important for Nigeria because it is a malaria country.

Hematologic studies have shown that bone marrow suppression and ineffective erythropoiesis contribute importantly to the severe anemia of malaria infection. The host mechanisms responsible for suppression of erythropoiesis may involve an excessive or sustained innate immune response or a pathologic skewing of the T-cell differentiation response with the attendant production of certain proinflammatory cytokines. Experimental data also indicate that severe malarial anemia is associated with the immunologic expression of a circulating inhibitor of erythropoiesis that functionally antagonizes the action of erythropoietin [26]. Above mentioned immunologic changes such as in people with malaria experienced before may be responsible for higher symptom severities in patients with COVID-19. For example, decreased circulating macrophage migration inhibitory factor (MIF) protein and blood mononuclear cell MIF transcripts in children with Plasmodium falciparum malaria were reported [29].

Also, inflammatory cytokines can play an important role in human immune responses to malarial disease. In a previous study, elevated levels of interleukin-6, tumor necrosis factor alpha, IL-10 and IL-12 in serum were found in severe malaria cases. Conversely, lower levels of IL-6 and IL-10 were noted in children with severe anemia compared to severe malaria cases with hemoglobin at >5 g/dl. Hyperparasitemia was associated with significantly lower levels of IL-6. These results illustrate the complex relationships between inflammatory cytokines and disease in P. falciparum malaria [30]. Interleukin (IL)-12 and transforming growth factor (TGF)-beta1 regulate the balance between pro- and anti-inflammatory cytokines in animal models of malaria [31]. Since the cytokine balance may be an important determinant of whether a protective or a pathogenic immune response develops, plasma cytokine ratios were examined in Gabonese children with various degrees of malarial severity. IL-12 and TGF-beta1 were lower, whereas tumor necrosis factor (TNF)-alpha and IL-10 were higher in children with severe malaria. The ratios of TGF-beta1/IL-12 and IL-10/IL-12 were higher in the severe, compared with the mild, malaria group. In contrast, ratios of TGF-beta1/TNF-alpha and IL-10/TNF-alpha were significantly lower in the severe malaria group. These results suggest that the inflammatory cascade in severe malaria is characterized by suppression of the protective effects of TGF-beta1 and IL-12, and that overproduction of TNF-alpha may promote deleterious effects, such as severe anemia.

CONCLUSION

These results show that to have malaria disease before aggravates COVID-19 symptoms. Therefore, it can be stated that malaria is additional risk factor for COVID-19. Precautions to decrease malaria infections in Nigeria can be beneficial to decrease COVID-19 cases and deaths of COVID-19.

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