Original Article

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The First Wave of COVID-19 Pandemic: Sociodemographic Characteristics of Patients in A Tertiary Level Hospital of Bangladesh

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Abstract

Background: The COVID-19 has led to more than 120 million confirmed cases, with over 2.6 million deaths globally, as of March 2021. As the outbreak continues, several research activities regarding the first wave have been conducted to better understand the incidence and prevention methods. This record will play an important role to take more precautions for overcoming the second wave.

Materials and methods: In this retrospective cohort study, we collected the age, sex, and the locality of the suspected and SARS-CoV-2 positive patients and tried to make a bridge among them. We conducted rRT-PCR in the Molecular Biology Laboratory of Chittagong Medical College, Chattogram in between May and August 2020. After that, we used a decision tree and time series evaluation to analyze the data.

Results: The highest (50.35%) positive cases were detected in the 3rd and 4th week of May. Men were significantly infected (66.2%) more than women. The 31-40 year age group was mainly affected (24.4%), and 88% of the cases belonged to urban areas.

Conclusions: The distribution of cases varied with time, and it will guide the physicians to give better support to humanity.

Key words: COVID-19; First wave; Sociodemographic characteristics.

Introduction

Wuhan of China faced a novel virus outbreak in December 2019. Researchers revealed its origin from a Seafood Market.[1] They identified a new beta-coronavirus which was known as 2019 novel coronavirus (2019- nCOV) earlier.[2] There were six Human Corona Viruses (HCoV) previously.[3] But this 7th coronavirus has posed the largest genome of a RNA virus and categorised as Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2) in January 2020.[4] The World Health Organization (WHO) has assigned the disease as Corona Virus Disease 2019 (COVID-19) caused by this virus.

Presently all coronaviruses cause respiratory tract diseases, but only SARS-CoV, MERS-CoV and SARS-CoV-2 can be fatal. They can involve our lungs, gastrointestinal tract, heart, and nervous system.[5] COVID-19 has been declared a global pandemic by the World Health Organization (WHO) on March 12, 2020, due to an increase in cases around the world.[6]

It is assumed that the pangolin caused the transmission to humans, and then human to human transmission occurred.[7] There is also the most chance of asymptomatic transmission.[8] The case fatality is still in progress, which acts for health and economic emergency throughout the world.[9]

The diagnosis of this viral disease depends on two main sections, clinical and para-clinical. Fever, cough, dyspnea, body ache, anosmia and gastrointestinal symptoms are the common clinical presentations. On the other hand, real-time Reverse Transcriptase-PCR (rRT-PCR) chest x-ray, High Resolution Computed Tomography (HRCT) of the chest and other supportive investigations are para-clinical diagnostic procedures.[10] The rRT-PCR method acts as the "Gold standard" method for detecting this highly sensitive and specific virus. As a result, due to its advantages as a precise and easy qualitative assay for detecting SARS-CoV-2, it is of great interest today.[11-13] Bangladesh got her first case on March 8, 2020.[14] From then, patients

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and fatality rate both were increasing. About eight lac patients are diagnosed here to date, from them, more than 10000 has died.[15]

Our study's main aim was to assess the sociodemographic profile of COVID-19 patients in our region during the first wave of the disease. Early investments in characterising the SARS-CoV-2, proper tracing of patients, and giving scheduled follow-up and post-COVID-19 rehabilitation will pay off handsomely in improving the epidemic response.

Materials and methods

A retrospective cohort study was carried on from 12 May 2020 to 17 August 2020 in the Microbiology laboratory of Chittagong Medical College, Chattogram, with a total of 19197 patients who were COVID-19 suspected.

We began our work after receiving ethical approval (Memo no.: CMC/PG/2020/102) from the Ethical Review Committee of Chittagong Medical College, Chattogram.Nasopharyngeal and Oropharyngeal combined sample were collected from the suspected patients. rRT-PCR protocols were followed from the WHO website.[16] We used the QuantStudio-5 machine to perform the rRT-PCR using a Sansure Biotech Inc. kit from China.This automated device was used for 40 cycles before the viral cDNA was detected, which was normally done by a fluorescent signal from various channels, including FAM, ROX and CY5.

Open Reading Frame (ORF) 1ab and the nucleocapsid (N) gene were set for double-target sequence genes to detect SARS-CoV-2. The internal control gene was detected by the CY5 signal. The entire reaction is carried out in a single tube containing all of the required chemicals. Positive control represented the presence of PCR inhibitors in samples. As a negative control, normal saline was used.

Among the socio-demographic conditions, age, sex and locality were obtained through an over-phone interview with the patients or their legal guardians. Direct contact with sample collectors from the respective booths verified any missing or ambiguous data. Our research involved people of all ages, with those who were not interested being excluded.

We have used the decision tree analysis to identify the phenomena of the different groups to discover the relationship among the variables. A weekly time series analysis is also plotted to see the number of infected people and the percentage.

Results

Bonferroni adjustment was applied to find the significance level among the mentioned variables.

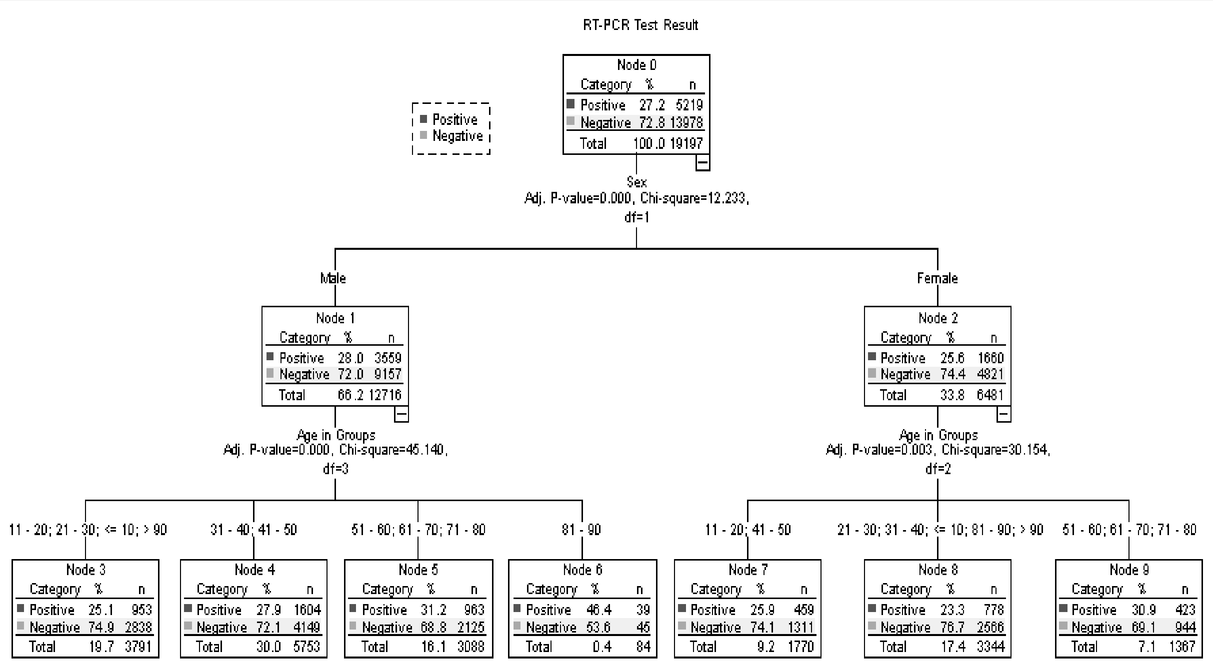

Fig 1: Decision Tree showing rRT-PCR results along with sex and age distribution

Table I : Decision Tree table along with significance level

Node	Positive Percent	Negative Percent	n	Total Percent	p value	Primary Independent Variable		
						Chi-Square	df	Split Values
0	27.2%	72.8%	19197	100.0%	-	-	-	-
1	28.0%	72.0%	12716	66.2%	.000	12.233	1	Male
2	25.6%	74.4%	6481	33.8%	.000	12.233	1	Female
3	25.1%	74.9%	3791	19.7%	.000	45.140	3	11 - 20, 21 - 30, ≤10, > 90
4	27.9%	72.1%	5753	30.0%	.000	45.140	3	31 - 40, 41 - 50
5	31.2%	68.8%	3088	16.1%	.000	45.140	3	51 - 60, 61 - 70, 71 - 80
6	46.4%	53.6%	84	0.4%	.000	45.140	3	81 - 90
7	25.9%	74.1%	1770	9.2%	.003	30.154	2	11 - 20, 41 - 50
8	23.3%	76.7%	3344	17.4%	.003	30.154	2	21 - 30, 31 - 40, ≤10, 81 - 90, > 90
9	30.9%	69.1%	1367	7.1%	.003	30.154	2	51 - 60, 61 - 70, 71 - 80

To evaluate the decision tree (Fig 1) and Table I, the rRT-PCR test result was used as an independent variable. On the contrary, sex and age group were used as dependent variables. Chi-square Automatic Interaction Detector (CHAID) tool was accustomed to discover the relationship among the explanatory variables.

A total of 27.2% patient was found positive by rRT-PCR test. This is shown in the above decision tree in the red dot on Node 0. There is a significant difference between male and female patients with the chi-square value 12.233 at a 0% level of significance.

28.0% male in Node 1 and 25.6% female in Node 2 was COVID-19 positive. Besides, the male whose age group lies between 51-80 years was 31.2%, as well as 81-90 years old patients were 46.4% predicted as a positive which was shown in the Node 5, 6 respectively than other age groups. The result was highly significant with an adjusted p-value of 0.000 with the chi-square value of 45.140.

Similarly, the females who were in the 51-80 years age group were 30.9% predicted as a positive shown in the Node 9 rather than other age groups, which were highly significant with an adjusted p-value of 0.003 with the chi-square value 30.154.

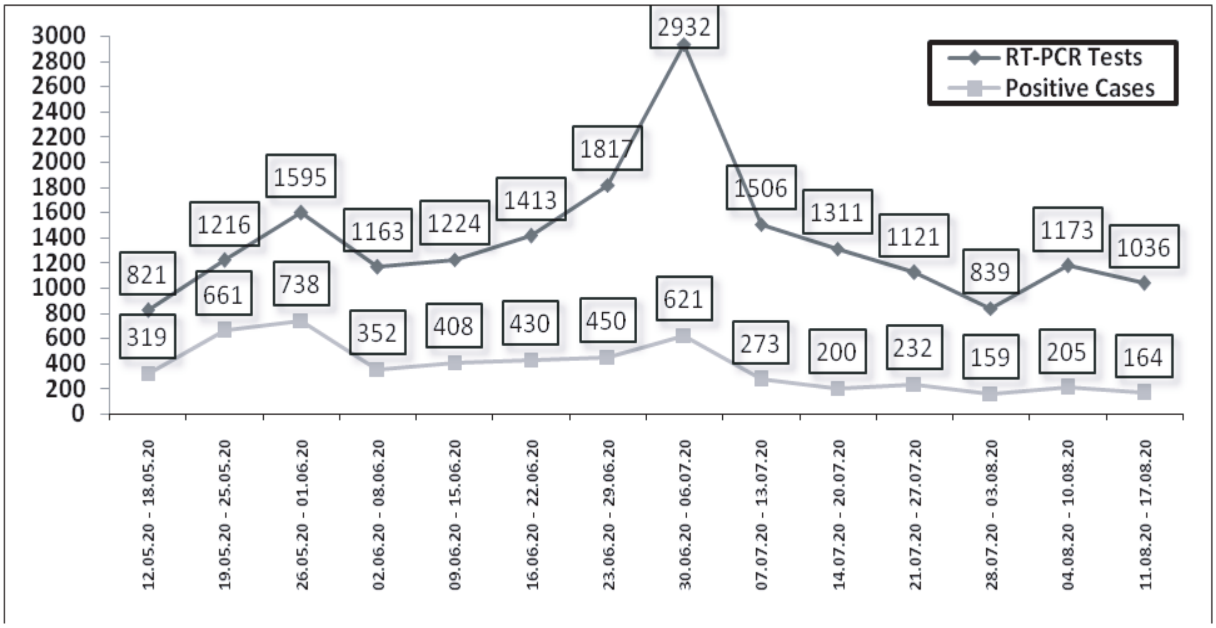

Fig 2 : RT-PCR test number and COVID-19 positive cases (12 May to 17 August 2020) among the suspected patients (n = 19167)

In Fig 2, the distribution of RT-PCR positive cases for SARS-CoV-2 is shown according to weeks from mid-May to mid-August of this year. Between the third and fourth weeks of May, 1399 positive cases (50.35% of 2811 samples) were detected, followed by 31.3% cases between the fifth and seventh weeks of our study period. The percentage of positive cases were subsequently decreased, and the lowest one was found (15.2%) in the 3rd week of July. In between the 2nd and the 3rd week of August, the number of positive cases was 164 (15.8%) among 1036 test samples. This figure is also indicating the peak of 2932 RT-PCR tests in the 1st week of July and the highest positive cases (738) in the last week of June.

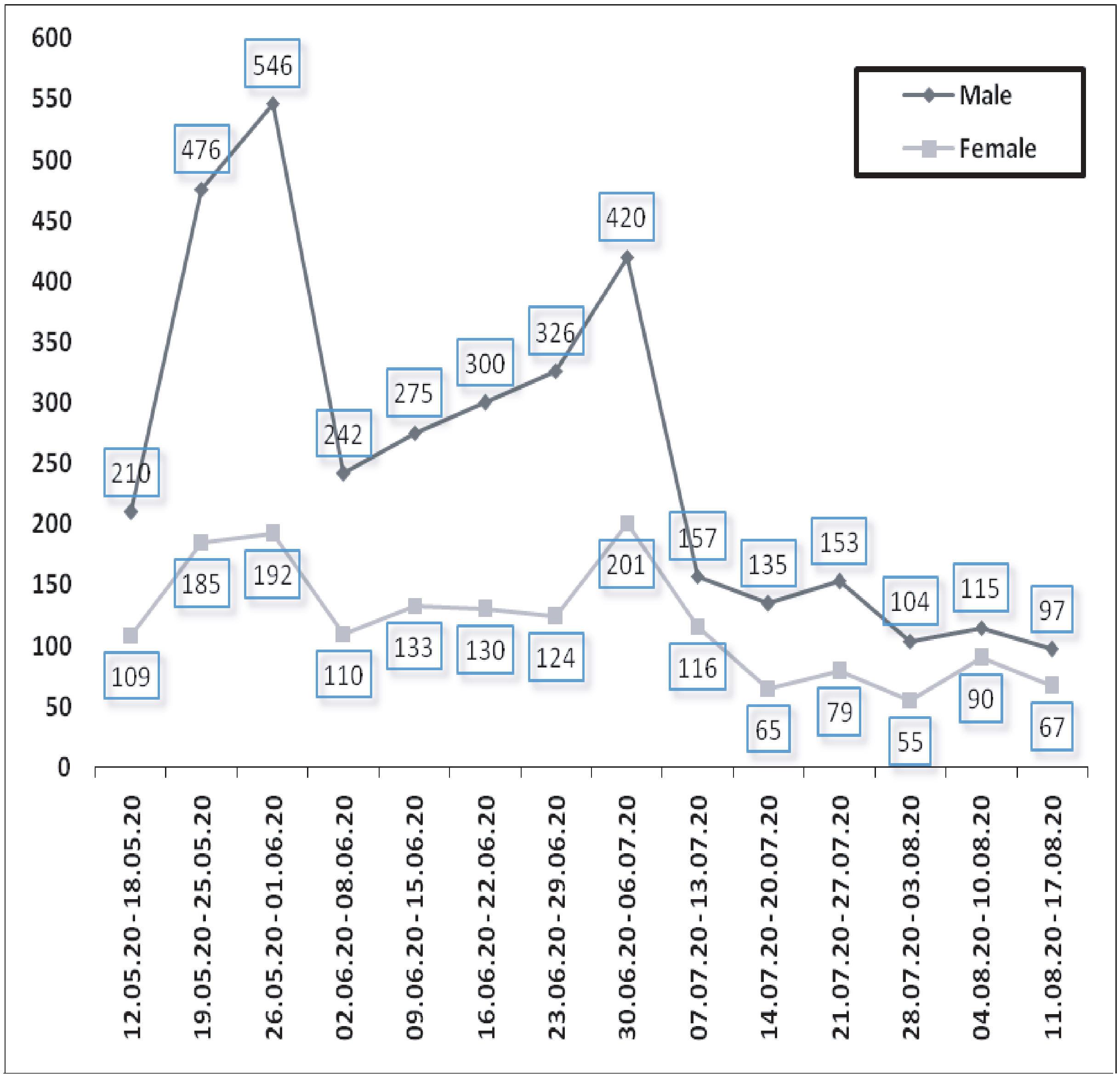

Fig 3 : Week-wise distribution of RT-PCR test positive patients according to gender (12 May to 17 August 2020) (n = 5212)

Fig 3 represents that males were more affected in the 3rd week of May, which was 546 in number. The majority of female patients (201), on the other hand, were detected in the first week of July. In between the 2nd and the 3rd week of August, males were less detected (97) and in the case of females, it was 55 in between the last week of July and the first week of August.

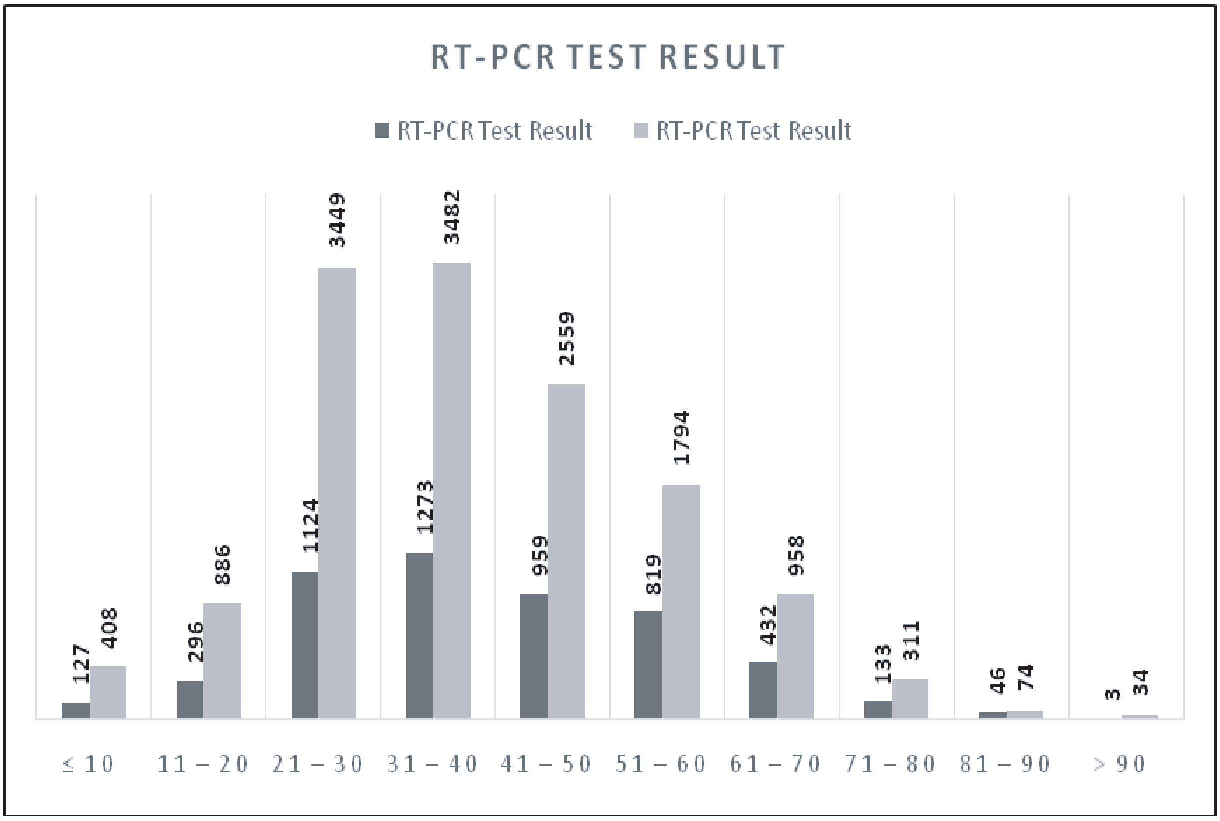

Fig 4 : The bar chart also shows that the 31-40 years group is most affected (1273). The least affected group is > 90 years group and that was only 3 in number

Fig 4 represents the highest number of COVID-19 positive cases (2356) were from the age group of 21-50 years. That means young, young adults, and middle-aged were more affected. Only 614 patients were found from old age groups between 61 and 110 years.

Besides, from 5219 COVID-19 patients, 88% were from town areas of Chattogram district, and others are from upazilla levels in our study.

Discussion

The COVID-19 disease was first detected in Wuhan on December 31, 2019 [17]. It began spreading in various countries around the world, with only three cases being diagnosed in Bangladesh by the Institute of Epidemiology, Disease Control, and Research (IEDCR) on March 8, 2020, using rRT-PCR testing. From then, the number of positive patients was increasing in our country.

We began RT-PCR testing in our laboratory on May 9, 2020, and SARS-CoV-2 was detected within the first week. Among 5212 positive cases, there were 3556 male patients in our study. At the same time, females were 1656 in number. As a result, we observed (The time series plot of Fig 3) a male predominance (68.2%) which is consistent with Bangladesh's COVID-19 status (Male 73%).[18] This situation arose as a result of Bangladesh's social background, in which a man is often the sole breadwinner in his family and requires greater mobility than a woman. Female patients are underreported even after SARS-CoV-2 infection due to the social disgrace, according to an analysis of COVID-19 cases in Bangladesh. It's difficult to concentrate on something that might be a cause of fast disease dissemination.[19] Nevertheless, research from other countries has found that male sufferers with COVID-19 infection are more common than females.[20-23] Numerous factors, such as genetic factors and hormonal mediators, are said to contribute to sex-based heterogeneity in immune responses, and MERS-CoV and SARS-CoV both had a distinguishable sex distribution pattern.[22,23]

According to the IEDCR, 42 % of Bangladeshi COVID-19 patients were aged 21 to 50 years old, which is equivalent to our findings.[24] The majority of our cases comprised males between the ages of 51 and 90 and females between 51 and 80. India resembles the same kind of age distribution pattern as ours. In contrast, the USA, China, and Spain have different experiences.[25]

However, in the first phase of COVID-19, the detection rate of positive patients was gradually increased and eventually decreased as well. The young-working generation was vulnerable. In the last stage of this wave, the number of positive patients was around 100 per day in our country, which resembled the global data too.Delaying case detection could make the condition worse as well.[26] So, the policymakers should be more heedful regarding this.

Limitation

There are a few flaws in our research. This study's retrospective nature will reduce its effectiveness. This was a single-center study with a short duration.

Conclusion

The COVID-19 pandemic is rapidly spreading. Case rates and Case Fatality Rates (CFR) are changing continuously. People who are working outside from home and old who are suffering from so many chronic diseases should be more cautious. Diagnostic test numbers should be increased more to track the correct number of patients and tackle the second wave. As a whole, identifying the socio-demographic profiles are vital for overcoming this pandemic.

Recommendations

To achieve the accuracy, a prospective longitudinal study should be recommended in the future. On a national level, a detailed investigation of older patients with COVID-19 is urgently required, which would provide more accurate data. Finally, data on the outcomes of ageing COVID-19 patients could be studied further since elderly patients were already receiving care in the hospital.

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Contribution of Authors

SD: Design, conception, critical revision & final approval.

MEH: Conception, critical revision & final approval.

SR: Data analysis, manuscript drafting, critical revision & final approval.

AK: Data acquisition, critical revision & final approval.

MAR: Conception, critical revision & final approval.

SP: Data analysis, critical revision & final approval.

SS: Data acquisition, manuscript drafting & final approval.

PD: Data acquisition, data analysis, manuscript drafting & final approval.

AS: Data acquisition, critical revision, manuscript drafting & final approval.

MJR: Data acquisition, interpretation of data, manuscript drafting & final approval.

Disclosure

The authors declare no conflict of interest.

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