Clinical Characteristics of 208 Patients with COVID-19 in a Surrounding City of Wuhan, China

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Research article

Keywords: COVID-19,Clinical characteristics,Non-severe

Posted Date: May 11th, 2020

DOI: https://doi.org/10.21203/rs.3.rs-23842/v1

Abstract

Background: Since December 2019, a severe novel coronavirus (SARS-CoV-2) infection (Coronavirus Disease 2019,COVID-19) has occurred in Wuhan, China, and has rapidly spread to the country and around the world. This study intends to investigate the epidemiological and clinical characteristics of patients with COVID-19 in a surrounding city of Wuhan.

Methods: A retrospective study was conducted on 208 cases of COVID -19 patients from February 11, 2020 to February 29, 2020 in Xiaogan dongnan Hospital, collected basic information, history of exposure, medical history, clinical symptoms, laboratory indicators and pulmonary imaging Data, and analyzed the epidemiological and clinical characteristics of all patients. According to the clinical classification criteria, 208 patients were divided into light group and ordinary group, and the epidemiological and clinical characteristics of the two groups were compared.

Results: Among 208 patients in this study, with a median age of 50.5 years (IQR,36-64.7,range,10-91 years), among which 107 (51.4%) were males and 101 (48.6%) were females. 51 (24.5%) had a clear exposure to COVID-19 infection within 2 weeks before admission, and 40 (19.2%) had a history of residence or exposure in Wuhan within 2 weeks before admission. Among all the patients, there were 16 (7.7%) with pulmonary diseases, 41 (19.7%) with hypertension, 11 (5.3%) with coronary heart disease, 13 (6.3%) with diabetes, 12(5.8%) with a history of alcohol consumption, and 12(5.8%) with a history of smoking. Among all clinical symptoms, 146 cases (70.2%) of fever, the highest temperature range was 37.3℃-41℃ before admission, 115 (55.3%) cases of cough, and 57 (27.4%) cases of chest tightness, 47 (22.6%) cases of fatigue, 28 (13.5%) cases of inappetence, 9 (4.3%) cases of diarrhea, 7 (3.4%) cases of nasal congestion or runny nose , and 5 (2.4%) cases of pharyngalgia. Analysis of the laboratory results of 208 patients showed that 42 (20.2%) cases had decreased white blood cell count, and 61 (29.3%) cases had decreased lymphocyte count. There were 154 (74%) cases with elevated CRP, 50 (24%) cases with elevated fasting blood glucose, and 23 (11.1%) cases with elevated LDH (>245U/L). The comparison of clinical characteristics between the light group and the common group showed that the median age of the light group was 44.8 years (IQR 30-58), the median age of the common group was 53.1 years (IQR 38.8-67) (P<0.01). The symptoms of fever [53(80.3%) vs 93(65.5%),P<0.05], fatigue [53(80.3%) vs 93(65.5%),P<0.05] and inappetence [4(6.1%) vs 24(16.9%),P<0.05] in the light group were less than those in the common group. The white blood cell count (5.48 vs 6.37, P<0.05), lymphocyte count (1.40 vs 1.61, P<0.05) and HDL-C (1.5 vs 1.3, P<0.05) of the common group were lower than that of the light group, while CRP (26.5 vs 22.1, P<0.01), AST (22.9 vs 18.5, P<0.05), fasting blood glucose (5.8 vs 5.6, P<0.05), LDH (196.8 vs 157.9, P<0.001) of the common group were higher than that of the light group.

Conclusion: COVID-19 infection is mainly in middle-aged and elderly patients, patients with other diseases are more susceptible to infection. The main symptoms of COVID-19 infection were fever, cough, chest tightness, fatigue, and inappetence. Decreased lymphocyte count, increased CRP concentration, increased LDH concentration and decreased HDL-C concentration were the laboratory features of COVID-19 infection, and were important indicators to assess the severity of COVID-19 disease.

Introduction

Since late December 2019, a series of acute respiratory diseases and unexplained pneumonia cases have occurred in wuhan, hubei province, China, which have been confirmed as a novel coronavirus (SARS-CoV-2) infected and known as Coronavirus Disease 2019 (COVID-19) by World Health Organization (WHO)[1–2]. The novel coronavirus has not been previously identified in humans. The COVID-19 was declared a Public Health Emergency of International Concern (PHEIC) by the world health organization on January 30, 2020[3–4]. The disease has spread rapidly from Wuhan to all over China and other countries, posing a threat to global public health[5–6]. According to the latest statistics of the National Health Commission of China, as of March 14, 2020, the cumulative number of confirmed COVID-19 cases nationwide reached 81054 and the number of deaths was 3204[7].These figures are updated daily.

With the spread of the novel coronavirus, more and more correlation studies have been performed. Based on the preliminary information of this novel virus, it is considered that SARS-CoV-2 is the third zoonotic coronavirus of the century[8]. Through the detection of the full-length SARS-CoV-2 genome, it was found that the new virus shares 87.99% homology with bat SARS-like coronavirus[9]. At present, the new coronavirus is believed to have spread from animals, but it is not entirely clear origin and possible intermediate animal vectors of SARS-CoV-2. There is clinical evidence that sars-cov-2 can be transmitted from person to person, and the main source of infection is COVID 19 infection[6,10–11]. Epidemiological studies show that the incubation period for COVID-19 infection is on average 1–14 days or longer[12]. The main clinical manifestations of COVID-19 are fever, dry cough, and fatigue, and some patients have symptoms such as myalgia and diarrhea, or even no symptoms[13–14]. Severe patients may have dyspnea, shock, and multiple organ dysfunction,leading to death[15]. Complete blocking of the spread of novel coronavirus and active treatment are the major means to control the infection of novel coronavirus.

At present, there is no effective treatment or vaccine for COVID-19. The epidemiology, clinical characteristics and treatment of COVID-19 have been reported. Many studies have reported the relationship of clinical characteristics between severe and non-severe cases of COVID-19, but few studies have explored the clinical characteristics of light and common cases. In order to further understand the clinical characteristics of COVID-19 and provide evidence for treatment, this study intends to investigate the clinical characteristics of light and common cases in Xiaogan dongnan Hospital, Hubei. Xiaogan dongnan hospital is mainly responsible for the treatment of local patients with novel coronavirus infection.

Materials And Methods

Data sources

According to World Health Organization interim guidance and Diagnosis and treatment of novel coronavirus pneumonia (trial version fifth) diagnostic criteria[16–17]: included 208 non-severe patients who were diagnosed with COVID-19 from February 11, 2020 to February 29, 2020 in Xiaogan dongnan Hospital. This study received verbal consent from all patients. The study was approved by the Ethics Committee of Hubei Aerospace Hospital (No.2020007).

Data Collection

Detailed records the patient's name, sex, age, exposure history (exposure to infected persons within 2 weeksou, exposure to wuhan within 2 weeks) and medical history (pulmonary disease, coronary heart disease, hypertension, diabetes, smoking, alcohol consumption). All patients received venous blood samples on an empty stomach the next morning after admission (at least 8 hours after eating). Blood routine indexes, liver function [alanine aminotransferase (ALT), aspartic transaminase (AST), total bilirubin, albumin (ALB), alkaline phosphatase (ALP)], blood lipid [total cholesterol (TC), triglycerides (TG), High density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterin (LDL-C)], C-reactive protein (CRP), fasting blood glucose (FBG), creatinine, urea nitrogen, uric acid (UA), Creatine kinase -MB (CK-MB), amylase (AMY) and electrolytes were collected. Collect the pulmonary CT (computed tomography) results of the patients on the second day after admission(evaluated by imaging specialists). According to the standards of World Health Organization interim guidance and Diagnosis and treatment of novel coronavirus pneumonia (trial version fifth), light type has mild clinical symptoms and no pneumonia on imaging, common type has fever and respiratory symptoms, and imaging shows pneumonia. And combined with the patients' epidemiology, symptoms and pulmonary CT results,the patients were divided into the light group and the common group.

Statistical analysis

IBM SPSS 22.0 software (IBM Corporation, Armonk, New York, United States) was used for statistical analysis. The measurement data conforming to a normal distribution are expressed as the means ± standard deviation (SD), and the comparisons between the two groups were performed by independent sample t-test. Non-normally distributed measurement data are expressed as the medians and interquartile ranges (IQR), and comparisons between the two groups were performed by Mann-Whitney U test. The counting data are expressed as frequencies and percentages and the comparisons between groups were performed by x2-test,with $P < 0.05$ indicating statistical significance.

Results

General baseline and Epidemiological characteristics

A total of 208 patients with COVID-19 were included in this study, which were divided into light group(n = 66,31.7%) and common group (n = 142,68.3%), with a median age of 50.5 years (IQR,36-64.7,range,10–91 years), among which 107 (51.4%) were males and 101 (48.6%) were females. Among the 208 patients, 51 (24.5%) had a clear exposure to COVID-19 infection within 2 weeks before admission, and 40 (19.2%) had a history of residence or exposure in Wuhan within 2 weeks before admission. The remaining patients are not clear whether there is a direct history of exposure. Among all the patients, there were 16 (7.7%) with pulmonary diseases (including chronic obstructive pulmonary disease and tuberculosis), 41 (19.7%) with hypertension, 11 (5.3%) with coronary heart disease, 13 (6.3%) with diabetes, 12(5.8%) with a history of alcohol consumption, and 12(5.8%) with a history of smoking. Almost all the patients in this study had clinical symptoms when they were admitted to the hospital. Among all clinical symptoms, fever was the most common, with 146 cases (70.2%), the highest temperature range was 37.3℃-41℃ before admission, followed by 115 (55.3%) cases of cough, and 57 (27.4%) cases of chest tightness, 47 (22.6%) cases of fatigue, 28 (13.5%) cases of inappetence, 9 (4.3%) cases of diarrhea, 7 (3.4%) cases of nasal congestion or runny nose, and 5 (2.4%) cases of pharyngalgia (Table 1).

Clinical characteristics

Analysis of the laboratory results of 208 patients on the second day after admission showed that 12 (5.8%) cases had increased white blood cell count (> 10.0 × 10^9/L), 42 (20.2%) cases had decreased white blood cell count (< 4.0 × 10^9/L), 14 (6.7%) cases had increased neutrophils count (> 7.0 × 10^9/L), 33 (15.9%) cases had decreased neutrophils count (< 2.0 × 10^9/L), and 61 (29.3%) cases had decreased lymphocyte count (< 1.0 × 10^9/L). There were 154 (74%) cases with elevated CRP (>,4 mg/L), 50 (24%) cases with elevated fasting blood glucose (> 6.1 mmol/L), 80 (38.5%) cases with elevated LDL-C (> 3.1 mmol/L), and 23 (11.1%) cases with elevated LDH (> 245U/L). Elevated concentrations of AST and CK-MB were relatively rare in all patients.

Comparison of light group and common group

In this study, the comparison of clinical characteristics between the light group and the common group showed that the median age of the light group was 44.8 years (IQR 30–58), the median age of the common group was 53.1 years (IQR 38.8–67) ($P < 0.01$). The symptoms of fever [53(80.3%) vs 93(65.5%),$P < 0.05$], fatigue [53(80.3%) vs 93(65.5%),$P < 0.05$] and inappetence [4(6.1%) vs 24(16.9%),$P < 0.05$] in the light group were less than those in the common group. There were no statistical significant differences in gender, history of exposure, comorbidities, medical history, and some symptoms (cough, chest tightness, diarrhea, nasal congestion or runny nose, and sore throat) between the two groups (Table 1). The comparison of laboratory results between the two groups showed that the white blood cell count (5.48 vs 6.37, $P < 0.05$) and lymphocyte count (1.40 vs 1.61, $P < 0.05$) of the common group were lower than that of the light group, while CRP (26.5 vs 22.1, $P < 0.01$), AST (22.9 vs 18.5, $P < 0.05$), fasting blood glucose (5.8 vs 5.6, $P < 0.05$), LDH (196.8 vs 157.9, $P < 0.001$) of the common group were higher than that of the light group. Interestingly, ALB (44.2 vs 41.8, $P < 0.05$), HDL-C (1.5 vs 1.3, $P < 0.05$), creatinine (75.7 vs 70.9, $P < 0.05$), and serum calcium concentrations (2.4 vs 2.3, $P < 0.05$) were higher in the light group than in the common group (Table 2).

Table 1
Clinical characteristics of 208 patients with COVID-19

	N0.(%)			
Variables	Total (N = 208)	Light (N = 66)	Common (N = 142)	P value
Age(years)	50.5(36–64.7)	44.8(30–58.)	53.1(38.8–67)	0.002
Sex				
Male	107(51.4)	34(51.5)	73(51.4)	0.989
Female	101(48.6)	32(48.5)	69(48.6)	
Exposure history				
Exposure to infected persons within 2 weeks	51(24.5)	15(22.7)	36(25.4)	0.682
Exposure to wuhan within 2 weeks	40(19.2)	15(22.7)	25(17.6)	0.383
Comorbidities				
Pulmonary disease	16(7.7)	3(4.5)	13(9.2)	0.246
Hypertension	41(19.7)	10(15.2)	31(21.8)	0.260
Coronary heart disease	11(5.3)	2(3.0)	9(6.3)	0.321
Diabetes	13(6.3)	3(4.5)	10(7.0)	0.489
Smoking	12(5.8)	2(3.0)	10(7.0)	0.248
Drinking	9(4.3)	1(1.5)	8(5.6)	0.174
Signs and symptoms				
Fever	146(70.2)	53(80.3)	93(65.5)	0.030
Cough	115(55.3)	36(54.5)	79(55.6)	0.883
Chest tightness	57(27.4)	14(21.2)	43(30.3)	0.172
Fatigue	47(22.6)	8(12.1)	39(27.5)	0.014
Inappetence	28(13.5)	4(6.1)	24(16.9)	0.033
Diarrhea	9(4.3)	2(3.0)	7(4.9)	0.531
A stuffy or runny nose	7(3.4)	3(4.5)	4(2.8)	0.520
Pharyngalgia	5(2.4)	1(1.5)	4(2.8)	0.568

Note: all data are expressed as median (interquartile range,IQR) and N0.(%). The P value represents the comparison between light cases and common cases.

Table 2
Laboratory findings of 208 patients with COVID-19

Variables	Normal value	Total (N = 208)	Light (N = 66)	Common (N = 142)	P value
WBC (× 10^9 /L)	4.00–10.00	5.76(4.05–6.69)	6.37(4.57–7.27)	5.48(3.92–6.48)	0.034
RBC (× 10^{12} /L)	4.00–5.50	4.24 ± 0.62	4.32 ± 0.66	4.2 ± 0.6	0.189
HB(g/L)	120–160	131(118.3–146)	133.8(119–150)	129.7(118–144)	0.129
PLT(× 10^9 /L)	100–300	190(132–231)	192(144–234)	189(124–231)	0.614
Neutrophil (× 10^9 /L)	2.00–7.00	3.76(3.12–4.39)	4.21(2.66–4.4)	3.56(2.31–4.38)	0.061
Lymphocyte (× 10^9 /L)	0.80–4.00	1.47(1.05–1.88)	1.61(1.13–2.02)	1.40(1.04–1.73)	0.028
Monocyte (× 10^9 /L)	0.12–1.20	0.41(0.29–0.47)	0.44(0.31–0.46)	0.39(0.28–0.47)	0.283
Eosinophils (× 10^9 /L)	0.02–0.50	0.09(0.02–0.12)	0.89(0.03–0.13)	0.09(0.02–0.12)	0.227
Basophils (× 10^9 /L)	0.00–0.10	0.01(0–0.02)	0.01(0.01–0.02)	0.01(0–0.02)	0.014
HCT (%)	40.0–54.0	39.2 ± 5.9	40 ± 5.4	38.8 ± 6.1	0.166
CRP(mg/L)	0.0–0.4	25.1(0.4–35.9)	22.1(0.2–19.2)	26.5(0.7–39.6)	0.005
Total bilirubin (μmol/L)	5.1–19.0	13.4(8.7–16.2)	13.9(9.2–18)	13.1(8.6–15.7)	0.218
ALT (U/L)	0.0–40.0	25.3(14.7–28.8)	23.1(13.3–25.3)	26.4(14.9–30.1)	0.260
AST (U/L)	0.0–40.0	21.6(13.8–23.3)	18.5(13.1–21.9)	22.9(14.2–25)	0.012
ALP (U/L)	40.0–150.0	72.7(56.3–83.6)	70.9(55.3–81.1)	73.5(56.5–84.5)	0.361
ALB (g/L)	37.0–53.0	42.6(40.4–45.3)	44.2(41.6–46.8)	41.8(39.4–44.7)	0.000
FBG (mmol/L)	3.89–6.11	5.8(4.9–6.1)	5.6(4.9–5.7)	5.8(5–6.2)	0.043
TC (mmol/L)	3.10–6.10	4.43 ± 0.99	4.5 ± 1.05	4.4 ± 0.97	0.474
TG (mmol/L)	0.40–1.81	1.1(0.66–1.34)	1(0.5–1.2)	1.1(0.7–1.4)	0.073
HDL-C (mmol/L)	1.07–1.89	1.4(1.1–1.5)	1.5(1.2–1.6)	1.3(1.1–1.4)	0.000

Variables	Normal value	Total (N = 208)	Light (N = 66)	Common (N = 142)	P value
LDL-C (mmol/L)	0.00–3.10	2.9 ± 0.9	2.9 ± 0.9	2.8 ± 0.9	0.796
Scr (μmol/L)	60.0–115.0	72.4(57.3–80.6)	75.7(60.3–85.1)	70.9(56.6–77.4)	0.048
BUN (mmol/L)	2.82–8.20	4.4(2.9–4.7)	4.3(3.2–4.7)	4.5(2.9–4.8)	0.120
UA (μmol/L)	140.0–420.0	289.5(229.5–328.8)	294(230.8–349.3)	287.4(228.1–327)	0.419
LDH (U/L)	109.0–245.0	184.5(143.2–203.1)	157.9(134.1–176.8)	196.8(151.1–218.8)	0.000
CK-MB (U/L)	0.0–25.0	9.7(6.5–10.6)	8.7(6.3–10.1)	10.2(6.9–11)	0.110
AMY (U/L)	0.0–115.0	59.5(42.9–68.5)	56.3(43.1–67.4)	60.9(42.9–69.7)	0.772
K^+ (mmol/L)	3.5–5.5	4.3(4–4.6)	6.4(4.1–4.6)	4.3(4–4.6)	0.502
Na^+ (mmol/L)	135.0–145.0	139.4(138.1–141)	139.6(138.7–141)	139.2(138–141)	0.617
Cl^- (mmol/L)	98.0–106.0	101.8(101.4–103)	102.2(101.5–103)	101.7(101.2–103)	0.168
Ca^{2+} (mmol/L)	2.1–2.9	2.4(2.3–2.4)	2.4(2.3–2.5)	2.3(2.3–2.4)	0.001

Note: all data are expressed as median (interquartile range,IQR) and mean ± standard deviation. The P value represents the comparison between mild cases and common cases. Abbreviations: WBC,white blood cell;HB,hemoglobin;PLT,platelet;HCT,hematokrit;ALB,albumin;TG,triglycerides;RBC,red blood cell; LDL-C,low density lipoprotein cholesterin;CRP,C-reactive protein;HDL-C,High density lipoprotein cholesterol;FBG,fasting blood glucose;TC,total cholesterol.BUN,blood urea nitrogen;Scr,Serum creatinine;UA,Uric acid;LDH,Lactate dehydrogenase;K,kalium;Na,natrium;Cl,chlorinum;Ca,calcium;ALP,alkaline phosphatase;CK-MB,Creatine kinase -MB;AST,aspartic transaminase; ALT,alanine aminotransferase;AMY,amylase;

Discussion

This study included 208 patients diagnosed with COVID-19 in Xiaogan City, a city around Wuhan, and explored the clinical features of light and common types after clinical classification. The comparison of the median age between the two groups showed that the median age of the light group was lower than that of the common group, suggesting that age was related to clinical symptoms and conditions in COVID-19 patients, while the clinical symptoms were more obvious and the disease was more serious in the elderly patients. Of the 208 patients in this study, 51 patients were directly exposed to COVID-19 infection, and 40 had a history of Wuhan residence or Wuhan exposure within 2 weeks before admission. This suggests that the novel coronavirus is contagious and can be transmitted from person to person. Recent studies have shown that the estimated R0 (an indicator of virus transmissibility) of SARS-CoV-2 is about 3.28, which is higher than the WHO estimated at 1.95,and higher than the average of SARS-CoV of 3.0[18–20]. Some studies have shown that men are more

susceptible to COVID 19[21], but the results of this study suggest that there is no significant difference between men and women infected with novel coronavirus. The number of complications before admission in the normal group was higher than in the mild group, suggesting that the more basic diseases the patients had, the more severe the symptoms and conditions of covid-19 patients were, which may be related to the decreased immunity of the patients. Among the 208 cases in this study, the main clinical symptoms were fever 146(70.2%), cough 115(55.3%), chest tightness 57(27.4%), fatigue 47(22.6%) and inappetence 28(13.5%), similar to other studies[12, 15]. A few patients have diarrhea, nasal congestion or runny nose, pharyngalgia and other symptoms. Two patients were asymptomatic at admission because they had a clear history of exposure to the infected.

According to the laboratory results on the second day after admission, 42 (20.2%) patients had decreased white blood cell counts, 61 (29.3%) patients had decreased lymphocyte counts, and 154 (74%) patients had elevated CRP, fasting blood glucose increased in 50 (24%) patients, LDL-C increased in 80 (38.5%) patients, and LDH increased in 23 (11.1%) patients. This study suggested that the laboratory characteristics of COVID-19 patients were mainly the decrease of white blood cells and lymphocytes and the significant increase of CRP. Among them, the reduction of white blood cells and lymphocytes in the general group was more obvious than in the light group, and the increase of CRP and LDH was more significant. It is suggested that the decrease of white blood cells and lymphocytes, and the increase of CRP and LDH may be related to the severity of the disease in patients with COVID-19. Lymphocytopenia is also a prominent feature of patients with severe SARS-CoV and MERS infections, which is caused by lymphocyte necrosis or apoptosis caused by invasive virus particles[22]. A recent study showed that the total number of T cells, CD4 + and CD8 + T cells decreased significantly in elderly and severe patients with COVID-19[23]. Angiotensin-converting enzyme 2 (ACE2) is an important receptor for SARS-CoV-2 and is widely distributed in the lung, heart, kidney and intestine etc[24–25]. LDH is an enzyme that is released when tissue is damaged and is considered a common marker of tissue damage. In patients with severe pulmonary interstitial disease, the increase in LDH is significant and is one of the important prognostic factors for lung injury. In this study, 23 patients (11.1%) had increased LDH, and the concentration of LDH in the common group (196.8 vs 157.9, $P < 0.001$) was significantly higher than that in the light group, indicating that increased LDH level could indicate an increased degree of tissue damage in COVID-19 patients[26]. Interestingly, HDL-C concentrations (1.3 vs 1.5, $P < 0.05$) were lower in the common group than in the light group. HDL is an anti-inflammatory lipoprotein that negatively regulates the activation of T cells in macrophages and dendrites and the expression of inflammatory mediators. However, during systemic inflammation, HDL can be oxidized into a dysfunctional oxidized HDL(ox-HDL)[27]. The dramatic increase in proinflammatory cytokines in the serum of patients with COVID-19 infection indicates that systemic inflammation is active. This study suggests that HDL-C is involved in the regulation of immune cells during COVID-19 infection. The inflammation in the common group is more severe than that in the light group, resulting in a decrease in HDL-C concentrationp[28]. During the whole course of COVID-19 patients, close detection of the lymphocyte count and CRP concentration of the patients can assess the severity and development trend of the patients' disease, which can help clinicians timely adjust the treatment options.

This study has several limitations, Firstly, this study is a retrospective study, and secondly, this study is only a single-center study. Third, because there was no significant difference in treatment between light and common patients, the treatment of the two groups was not discussed.

Conclusions

This study investigated the clinical characteristics of 208 patients with COVID-19 infection and compared the clinical characteristics of light cases and common cases. COVID-19 infection is mainly in middle-aged and elderly patients, patients with other diseases are more susceptible to infection. 91 patients had a history of exposure to COVID-19 infection or a history of residence or exposure in wuhan. The main symptoms of COVID-19 infection were fever, cough, chest tightness, fatigue, and inappetence. Decreased lymphocyte count, increased CRP concentration, increased LDH concentration and decreased HDL-C concentration were the laboratory features of COVID-19 infection, and were important indicators to assess the severity of COVID-19 disease.

Declarations

Ethics approval and consent to participate

Hubei Aerospace Hospital reviewed and approved the study. The study was conducted in accordance with 1964 Helsinki Declaration.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

None.

Acknowledgements

None.

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