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Long COVID syndrome-associated clinical characteristic on the Qing Hai Plateau and plateau plants treatment strategies

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Abstract

Long Covid is an emerging public health public problem, the ligering symptoms after Covid-19 infection can last weeks to months. At present, no pharmacologic agent has been know that effectively reduces or abolishes the symptoms of long COVID. The aim of this study was to describe the long term health of patients with confirmed COVID-19 who have discharged from QingHai fourth people's hospital (Qing Hai, China) and investigate clinical characteristic of long Covid syndrome by using questionnaires and case review in 200 discharged adult patients and 156 discharged pediatric patients. In addition to describing therapeutic strategies, this study explores the potential effect of highland plants on the treatment of fatigue associated with long Covid syndrome and is innovative in that it opens up new possibilities for future reserch and clinical practice.

Keywords: Long Covid-19; Plateau; Clinical characteristic; Fatigue; Plateau plants; Treatment strategies.

Introduction

At least 65 million individuals around the world have long COVID, based on a conservative estimated incidence of 10% of infected people and more than 651 million documented COVID-19 cases worldwide [1], by December 8th 2023, more than 772 million individuals were infected with over 6.98 million deaths worldwide.

According to World Health Organization (WHO) [2] COVID-19 still deserves our attention and research. SARS-COV-2 has been evolving quickly in past three years,and multiple variants have gained increased abilities to infect patients or evade the protection by vaccination [3], so long COVID will remain a global challenge to health care system and economy [4,5]. After the acute phase of a SARS-COV-2 infection, a proportion of those infected show persistent somatic sypmtoms over weeks, months and even years, including general tiredness, muscle pain, difficulties when breathing, chest pain [6]. This post COVID-19 condition is termed" long COVID" [7-9]. Many patients experiencing dozens of symptoms across multiple organ systems [10-12]. There are currently no validated effectively treatments. WHO has made a clinical case definition to the public in delineating long COVID," post COVID-19 condition occurs in individuals with a history of probable or confirmed SARS-COV-2 infection, usually 3

months from the onset of COVID-19 with symptoms that last for at least 2 months and cannot be explained by an alternative diagnosis" [13,14]. The national institute for health and Care Excellence (NICE) defined post COVID-19 syndrome as "signs and symptoms that develop during or after an infection consistent with COVID-19, continue for more than 12 weeks and are not explained by an alternative diagnosis". Addtionally, symptoms appearing during a timeframe of four to twelve week post COVID-19 onset are regarded as ongoing symptomatic COVID-19 [15,16].

We designed a follow-up questionnaire for post-COVID-19 syndrome in individuals discharged from the Fourth people,s Hospital of QingHai Province for three months. The study included 100 discharged adults and 86 discharged children October 23, 2022 and January 11, 2023. The aim is to explore differences in post-COVID-19 syndrome among patients of different age groups,providing a more comprehensive understanding of the clinical manifestations of post-COVID-19 syndrome in the Qing Hai region.

Qing Hai is located on an elevated plateau, has an average altitude of more than 3,000 meters and has climate characteristics of low oxygen, dryness and strong ultraviolet rays [17-21], which have a unique impact on the lives and health of residents. Our study compared symptom presentations of long-term COVID-19 recoverers in Qinghai Plateau with those in low-altitude regions to understand high-altitude COVID-19 characteristics [22-24]. Additionally, we explored the therapeutic potential of plateau plants in long COVID-19 treatment.

Method

Study design and patients: For this retrospective study, we enrolled 200 discharged adults and 156 discharged children from the Fourth People of QingHai province from October 23, 2022 and January 11, 2023. The time since discharge from the hospital of all subjects was more than 3 months. The discharge criteria for all survivor also followed the World Health Orgenazation interim guidance. The selected survivors were enrolled onto a telephon follow-up study primarily to observe their clinical sequelae in early recovery from COVID-19 (3 months after discharge).

This study was approved by the ethics commissions of the Fourth People of Qing Hai province. Oral consent was obtained from patients .

Data collection: The demographic, clinical and treatment were obtained from patients' medical records. Survivors were systematically contacted by three experienced clinicians via mobile Phone, and the detailed reported symptoms related to the key points we were assessing were recorded. Median values were compared by Mann-Whiney test.

Statistical analysis: Categorical variables were described as proportions and percentages, and continuous variables were described using median and range (min-max) values. Statistical analyses were done using the Graphpad Prism software, version 8.02. For unadjusted comparisons a two-sided α of less than 0.05 was considered statistically significant.

Results

Demographics and characteristics: The median (IQR) age of the 200 Covid-19 adults survivors was 44.0 years, ranging from 18 to 76 years, 112 patients (56%) were female. The median (IQR) age of the 156 COVID-19 children survivors was 4.0 years, ranging from 1 to 17 years, and 73 patients (47%) were female. Their age distribution, clinical symptoms and treatment time are shown in Table 1. The sex ratio, age distribution between two cohorts showed no significant difference ($P>0.05$).

Characteristics of clinical sequelae: On the basis of follow-up results, compared to the COVID-19 children survivors, cough, fatigue, myalgia, loss of olfactory and gustatory function, throat pain, chest pain, dyspnea, depression, memory loss, anxiety, dizziness, cardiovascular-related symptoms were significantly higher in COVID-19 adults survivors (all $P<0.05$).

Treatment

All adults patients and children patients received antiviral Treatment. Within the adults COVID-19 patients cohort, 32% underwent Oxygen therapy, while 1% received antibiotic treatment. Conversly, among pediatric patients, 5.1% underwent oxygen therapy, whith 0.6% receiving antibiotic treatment.

At three months post-discharge, 18(9%) adults COVID-19 survivors with fatigue symptoms received treatment with high-altitude plants such as Rhodiola and Sea Buckthorn. Preliminary observations indicate some improvement in fatigue associated with long Covid syndrome. However, further resesrch is needed to fully assess the potential role of these plateau plants in treatment.

Discussion

In Qing Hai province, Adults survivors of COVID-19 are significantly more likely to develop clinical sequelae 3 months after discharge from the hospital than children survivors. Fatigue symptoms, in particular, are notably pronounced. This conclusion aligns with the findings of many research studies [25,26].

Of the adults COVID-19 survivors experiencing fatigue symptoms, we found that the median age was 56 years, higher than that of who did not experience fatigue symptoms ($P<0.05$) this finding suggests that age plays a crucial role in fatigue symptoms among long COVID-19.

A study found that among adlt COVID-19 survivors discharged from RenMin Hospital of WuHan University three months, 28.3% experienced fatigue symptoms [27]. The incidence is significantly higher than that of fatigue symptom in Qing Hai province ($P<0.05$). It indicates that at high-altitude, the proportion of fatigue syndrome is lower compared to low altitude.

To our knowledge, our study is the first to report the application of plateau plants such as Rhodiola and sea buckthorn in the treatment strategy for fatigue syndrome related to COVID-19.

The use of plateau plants in treating fatigue syndrome related to COVID-19 in plateau may be a promising therapeutic approach. Plateau plants often possess adaptations to high-altitude, and their bioactive components may positively impact alleviating fatigue symptoms [28,29].

Table 1: Demographic and clinical features in 200 COVID-19 adult survivors and 156 COVID-19 child survivors 3 months after discharge from hospital.

Characteristic	COVID-19 adult survivors(n=200)	COVID-19 child survivors(n=156)	P
Age,median(range)	44(22-76)	4(1-17)	
Sex			
Male	88(44%)	83(53%)	0.085
Female	112(56%)	73(47%)	0.085
Clinical feature in hospital			
Cough	12 (6%)	8(5.1%)	0.723
Fever	0	0	2
fatigue	30 (15%)	5 (3.2%)	0.001
Myalgia	6 (3%)	0	0.029
Loss of olfactory and gustatory function	12 (6%)	5 (3.2%)	0.22
Throat pain	8 (4%)	2(1.2%)	0.124
Chest pain	20 (10%)	0	0.001
Headache	0	0	2
Dyspnea	2(1.0%)	0	0.21
Depression	8 (4%)	2(1.2%)	0.045
Memory loss	6 (3%)	0	0.029
Anxiety	5 (2.5%)	0	0.047
Dizziness	8 (4%)	0	0.045
Cardiovascular-related symptoms	8 (4%)	2(1.2%)	0.045

Table 2: Treatment in 200 adult paitients and 156 child patients with COVID-19.

Treatment	COVID-19 adults patients	COVID-19 children patients
Oxygen therapy		
High-flow nasal cannual or mechanical ventilation	64(32%)	8(5.1%)
Antiviral treatment		
Oseltamivir	80(40%)	30(19.2%)
Ribavirin	60(30%)	20(12.8%)
Azvudine	26(13%)	0
Traditional Chinese medicine	200(100%)	156(100%)
Antibacterial treatment		
Cefotaxime	0	1(0.6%)
Azithromycin	2(1%)	0
Adjuvant therapy		
Vitamin C	120(60%)	80(51.2%)

Firstly, some plateau plants such as Rhodiola, saffron, and sea buckthorn are found to contain abundant alkaloids, flavonoids, and other compounds, which have antioxidative, anti-inflammatory, and immune-regulating effects [30,31]. By consuming extracts of these plants, it is hoped to alleviate oxidative stress to some extent, reduce inflammation levels, and enhance immune system activity.

Secondly, some plateau plants have traditionally been used to improve the body's tolerance to hypoxia [32-36]. These plants may help improve oxygen supply to patients, alleviate symptoms such as difficulty breathing, and thus have a positive impact on fatigue.

Additionally, plateau plants are widely used in traditional medicine to regulate the body and improve physical condition. Some of their active ingredients may have benefits in enhancing patients' physical strength, adjusting the biological clock, and other aspects.

Conclusion

In conclusion, this suggests that plateau plants may be a promising area for further research. In future research and clinical applications, we will further explore the therapeutic potential of plateau plants, comprehensively evaluate their effectiveness and safety in treating fatigue syndrome related to COVID-19 in plateau, and look forward to broader applications.

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