Ethnic and Individual Variations in Long COVID-19 Symptoms

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Abstract. Many countries, regions and ethnic groups have found that some people continue to have symptoms months or even years after being infected with the coronavirus, so researchers have studied the differences between different ethnic groups in order to better provide medical services. Therefore, on the basis of these studies, this paper summarizes some of these differences, hoping to be helpful in the future treatment, in the face of different races and their own conditions, to make the best treatment plan. All of the pertinent information for this review was retrieved from Pubmed using the search term "long COVID," which also included case-control studies, observational studies, cross-sectional studies, and retrospective studies from Chinese and English sources. According to the title and the content of the abstract, 10 articles were selected according to certain criteria. Standardized data extraction table was used to extract research features. In this review, we found that the main symptoms of COVID are similar, but there are subtle differences between different ethnic groups, as well as differences in individual factors. Various studies have shown that sequelae vary by race, with differences in nerve damage and lung damage. In addition, the age, obesity degree and gender of individuals within the same ethnic group can also have differences in the symptoms of long COVID. This review provides a new way to explore the differences in COVID-19 symptoms, search for racial and individual differences, provide new ideas for follow-up health policies, and draw people's attention to better protect their health.

Keywords: long COVID, enthnicl, difference, gender, age, symptom.

1. Introduction

The long-term impacts of "long COVID" on individuals' health has become a subject of widespread concern, both nationally and globally. Since the onset of the pandemic in 2019, the series of events and symptoms caused by COVID-19 continue to affect many people. COVID-19 is brought on by the SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2) virus[1]. Subsequently, persistent COVID-19 instances began gaining popularity among social support networks. In a practice known as "medical gaslighting," doctors first rejected their worries as mental health symptoms like stress or worry. But it quickly changed. The terms "long COVID" (also known as "post-COVID syndrome" or "long-haul COVID-19") have begun to acquire acceptance in the scientific and medical fields. According to the World Health Organization (WHO), by June 20, 2022, more than 535 million individuals will have the illness, which would have resulted in more than 6.3 million cases of fatalities[1]. Fortunately, many people survived and successfully cleared the virus from their bodies.

But even when patients have recovered from COVID-19 infection, the residual symptoms might endure for weeks or even months, drastically lowering their quality of life. These signs and symptoms are typically described as "long COVID" in popular literature[1]. According to recent studies conducted throughout the world, the prevalence of long-COVID appears to range between 9 and 64 percent overall and is up to 6 times higher than that of disorders connected to postviral infection[2]. The symptoms of long-COVID most frequently include exhaustion, breathing problems, mental impairment/brain fog, post-exertional fatigue, memory problems, musculoskeletal pain/spasms, cough, sleep disturbances, tachycardia/palpitations, altered smell/taste perception, headache, chest discomfort, and depression[2]. Chills, sweating, ear ache, and vision abnormalities linked to lengthy COVID are less prevalent pernio symptoms that have additionally been reported[3].

According to the available information, there are some differences in the after-effects of growing a new crown in every race, while the same race may also have differences in symptoms due to gender or age. Because it affects COVID-19 survivors at all different severity levels, including younger

individuals, youngsters, and those who are not admitted to hospitals this sickness is poorly recognized[3].

The aim of this review is to discuss the differences in the sequelae of long COVID by gender, age in different ethnic groups and within the same ethnic group. It is hoped that it will help to target the treatment of long COVID sequelae in the future and to intervene differently for different conditions.

2. Method

2.1. Search strategy

A thorough search of research published between 2019 (the year the COVID-19 outbreak first started) and 2023 was done on PubMed. The search strategy involved an initial screening of titles and abstracts of identified articles, followed by a full-text review based on predefined selection criteria. The search strings employed for this review were: ("long COVID") AND (“disparity

”). To narrow down the search to articles of utmost relevance, a stricter string was used: ("long COVID"). Furthermore, the reference lists of all included and identified reviews pertinent to COVID-19 were also consulted.

2.2. Inclusion and exclusion criteria

The inclusion criteria for this review were as follows :1) English and Chinese literature and 2) case-control studies, observational studies, cross-sectional studies, and retrospective studies. 3) Patients of different races and gender differences within the same race, age differences after long COVID 4) Patients all went to the hospital for examination and treatment. Following are the exclusion criteria for this review: 1) Animal research 2) Unreleased data collections.

2.3. Data extraction

Reviewers used a standardized data extraction form for the following study characteristics: 1) Sample size 2) Sex distribution 3) Location 4) Ethnicity 5) Duration of long COVID sequelae, symptoms, significant manifestations

3. Result

3.1. System search results

The database search was conducted from August 8, 2023, to August 13, 2023,. The initial search yielded a total of 26,966 articles, of which 10 were screened for title and abstract, and were ultimately included in the study.

3.2. Study characteristics

Nine of the ten articles talk about the research and elaboration of various ethnic groups for the late symptoms of LONG COVID. One of the articles deals with the effect of gender on symptoms within the same ethnic group, and another discusses the effect of age on symptoms in the late stages of COVID within the same ethnic group. The remaining article provides background and future perspectives on long COVID. The study centers around the various issues that arise as a result of having a long COVID and discusses the differences between them.

3.3. Symptoms of east Asian populations

3.3.1 Long-term tissue damage

Even while severe pneumonia affected less than 10% of participants in a three-month follow-up study of COVID-19 survivors, 71 percent and 25 percent of individuals, respectively, exhibited lung radiological abnormalities and functional impairments[3]. Despite the severity of the disease at first, the study also found that 42 percent of COVID-19 survivors had decreased lung diffusion capacity

three months after leaving the hospital, which was linked to radiological abnormalities[3]. In addition, a number of additional studies have found radiographic evidence of lung fibrosis among COVID-19 survivors for up to six months after hospital discharge, which was likewise related to the severity of the original illness[3]. Another study found that discharged patients with mild COVID-19 had impaired pulmonary exchange of gas in comparison to healthy subjects[3]. Additionally, in this investigation, such pulmonary problems could not be seen on a regular chest computed tomography (CT), indicating that routine radiological exams may have missed them[3]. Additionally, a study revealed that at around a 45-day follow-up, young recruits with symptomatic COVID-19 had reduced maximum aerobic capacity than recruits without the condition[3]. These investigations suggest that COVID-19 may frequently result in lung scarring, which may be the cause of long-lasting dyspnea and cough[3]. Taken together, this evidence confirms that lung disease is a major sequelae of long COVID, that most patients have related symptoms, and that the severity of different illnesses is related to the original COVID-19 depending on the disease. Because of this close relationship with the lungs, the patient basically has some problems with breathing, which causes the patient to breathe and cough later in the day.

3.3.2 Lasting neurological complications

Other pathologies besides pulmonary lesions, such as long-lasting neurological sequelae, may be involved in long COVID[3]. According to a research that included 43 cases of significant brain disorders brought on by COVID-19, such as encephalopathies, delirium, hemorrhages, and strokes, the severity of COVID-19 at the time of exposure had minimal bearing on the likelihood that these conditions will develop[3].Long-term neurological symptoms are more likely in COVID-19 instances that are more severe and cause delirium in roughly 20–30% of patients in hospitals[3].A neuropsychological diagnosis was given to one-third of 236 379 COVID-19 survivors within six months of the onset of the first symptom, which was 44 percent more frequently than influenza survivors[3]. These diagnoses included stroke, dementia, sleeplessness, anxiety, and mood disorders[3]. According to studies, sequelae can include neurological and cardiac sequelae that harm neurons and infrequently repair neurons, which results in neurological function following the disease[3].In addition, a study of almost four thousand COVID-19 patients who had been released discovered higher odds of new cases of cardiovascular, pulmonary, and diabetic illnesses emerging during the next 140 days in comparison to controls[3]. It can be seen that the late symptoms of long COVID are not only lung disease, but also brain damage. The probability of brain damage is extremely high, the degree is extremely severe, and the effects it brings are serious, and some are irreversible. A series of abnormal phenomena, such as the inevitable fatigue and mood disorders of patients during illness, are mostly caused by brain damage. In addition, the non-regeneration of neurons can cause permanent damage to people.

3.3.3 Pathological inflammation

Quantitative RT-PCR studies have shown instances of SARS-CoV-2 shedding in the respiratory tract for up to four months[3].At four months after the commencement of the disease, 50% of asymptomatic COVID-19 subjects had SARS-CoV-2 nucleic acids and proteins in their small intestines, according to a more recent research[3]. In summary, COVID-19 also causes damage to the body's immune system, and even asymptomatic COVID-19 is actually responsive to the body.

3.4. Caucasian symptoms

3.4.1 Neuropsychiatric symptom

In Caucasian, neurological and neuropsychiatric symptoms also appear. The COVID-19 "brain fog" symptom of persistent mental retardation, which is characterized by reduced attention, focus, memory, speed of information processing, and executive function, stands out among these long-lasting neurological aftereffects[4]. Glial and nerve cell dysregulation brought on by neuroinflammation can result in brain circuit malfunction, which has a deleterious effect on cognitive and neuropsychiatric processes[4]. The consequences of immune-mediated dysregulation of brain

cellular function may be layered on top of other neural damage mechanisms as ischemia, infections of the central nervous system, or cytotoxic immunological responses[4]. Increased levels of autoantibodies that including those to the ACE2 (the receptor for SARS-CoV-2 entrance), 2-adrenoceptor, muscarinic M2 receptor, angiotensin II AT1 receptor, and the angiotensin converting enzyme 1-7 MAS receptor, have been discovered in extended COVID27 in numerous studies[5]. Similarly, Sudreet al.16 reported that patients with prolonged symptoms were more likely to be obese than those without[6]. These studies mentioned and explained the cognitive impairment not seen in east Asian population and found different nerve damage, and they also studied obesity caused by elevated antibody levels not seen in east Asian population. These are different from the symptoms of the east Asian population above.

3.4.2 Gender influence

The study found that even if people were white, the death rate was still affected by sex. The Global Health 50/50 study program provided an amazing overview of sex-disaggregated data from nations throughout the world, which clearly demonstrated the same amount of cases in women and men but a higher case fatality in males[7]. Whatsmore Men are hospitalized fifty percent more than women, according to new statistics on illness severity and course[7].The overall number of verified COVID-19 cases in Switzerland is currently evenly distributed between men and women of all ages, however the proportion of men hospitalized is 1.5 times higher than that of women[7]. In the nation of France, admission rates are distributed similarly by gender[7]. Caucasians also discovered the effect of gender on their race. Studies have shown that both morbidity and mortality are higher in males than in females.

3.4.3 Age influence

The study also revealed that prolonged COVID across all age groups and severe phases is related to disease severity[5]. Another from England found that 1.8 percent of children exhibited symptoms eight weeks or longer after the start of COVID-19, compared to 4.4% after four weeks of treatment[8].

3.5. The symptoms of the European population

In a lesser-known Belgian research of 134 patients, despite relatively modest lung function impairment and nearly full normalization of chest CT abnormalities after 6 months, a third of the patients reported still complained of fatigue and/or dyspnea[9].However, five percent of patients have major illnesses with complications such respiratory failure, acute respiratory distress syndrome (ARDS), sepsis and septic shock, thromboembolism, and multiorgan failure, and fifteen percent of patients have serious diseases that require oxygen support[10]. The emergence of the Europa race study led to new findings on lung problems and statistical summary of the extent of symptoms.

3.6. Synthesis of Results

According to the research data, there are slight differences in the long COVID sequelae between different ethnic groups, and there are also some differences between ethnic groups. The actual situation depends on the patient's own situation. Age, which was not mentioned earlier, was also raised here, and their study summarized the age group with the highest rate of diagnosis, and found that the severity and duration of symptoms were more severe and longer in children than in adolescents.

4. Discussion

4.1. Lung damage

Research has shown that different ethnicities, and personal conditions can still make a difference in symptoms in this long COVID study. Symptoms such as abnormal lung radiology, lung dysfunction, and severe pneumonia indicate that COVID-19 still lives up to its name, and that lung

problems persist even when the test results are negative. This also reflects the fact that during the course of the disease, the patient may experience diminished breathing, dyspnea, or even cessation of breathing. This is likely the main reason why COVID-19 is so deadly. At the same time, the inability of standard chest computed tomography (CT) scans to detect transverse problems suggests that such problems in many patients may have been overlooked to begin with. Doctors do not take these problems seriously and treat them based on verbal descriptions, which are likely to have no real effect. Needless to say, the availability of this study does help in the treatment of patients. This is different from the symptoms of the European race, this study showed that the patient had symptoms, after a series of physical tests did find some physical problems. But for some Europeans, even if the test results show that the body is normal, there are still similar symptoms to the east Asian population.

4.2. Neurological damage

The brain disease range from asymptomatic infections to life-threatening clinical symptoms. For example, three months after discharge, COVID-19 survivors revealed brain structural and metabolic abnormalities, which were associated with lingering neurological manifestations such tiredness, anosmia, and memory loss[3]. Among them, neuroinflammation itself can cause dysregulation of glial and neuronal cells, and eventually lead to dysfunction of neural circuits, thus negatively affecting cognitive and neuropsychiatric functions [4].At the same time, the east Asian populaton has a condition called delirium, which is different from other races. Delirium is an acute clinical condition that can be severe and even lead to death. Delirium is usually accompanied by impaired consciousness, emotional instability, and delusions. The condition fluctuates and worsens at night. There are many causes of delirium, most of which are whole brain damage. Patients are mostly elderly. The study of the brain by east Asian population has attracted attention. As mentioned earlier, the severity of brain problems that develop after the disease is independent of the extent of the initial disease. From this data set, it appears that neurological disorders have become one of the most common problems after long-term COVID. Almost all men, women and children are not immune to some kind of brain damage. It can be as mild as memory loss or as fatal and disabling. This high prevalence seems to explain why most of the elderly people who became ill at the beginning of the COVID-19 outbreak were doomed to die. The results of the study go a long way to explaining that it is not COVID-19 that is truly frightening, but rather the series of sequelae that follow. The elderly are already in poor health, and with problems such as strokes and breathing difficulties, these sequelae seem to be the real cause of death. Based on the results of the Caucasian study, it appears that the psychiatric consequences of COVID in Caucasians are very different from the symptoms seen in Caucasians. Caucasians have more cognitive problems, such as memory loss, reduced information processing speed, and impaired executive function, as well as ischemia, neurological infections, or cytotoxic immune responses[4]. Whereas, according to the results of East Asian population study, the symptoms associated with neurological damage seem to be more severe than those of Caucasians, and can even be life-threatening. There is also a difference in opinion regarding the fatigue that accompanies the disease. The east Asian population study suggests that the chronic fatigue is caused by dysfunction of the autonomic nervous system, whereas Caucasians study suggests that the fatigue is caused by myalgic encephalomyelitis/chronic fatigue syndrome. These patients experience limb pain, fever, and fatigue. Nonetheless, the fact that the symptoms are so similar in east Asian population and Caucasian is worrisome, and it suggests that the psychiatric consequences are likely to be the same in both Caucasian and east Asian people. Neurological problems are likely to be unrelated to the primary illness and are highly likely to occur.

4.3. Obesity as a risk factor

According to Sudre et al.16, patients with chronic symptoms were more likely to be obese than those without[6]. Chest discomfort, dyspnea, tiredness, palpitations, and cough are frequent cardiovascular symptoms between long-haul drivers[6]. The findings are likely to raise concerns in the US and UK about obesity caused by overnutrition, as people with long-term conditions become

more obese than those without symptoms. Because being overweight tends to affect a person's heart and lung function, studies have shown that illness can make a person weigh more than before. This also suggests that cardiorespiratory pressure in obese people becomes greater after the disease. The sequelae after the disease will be accompanied by pulmonary fibrosis, chest pain, dyspnea, fatigue, palpitations, cough and other symptoms, so that the heart and lung injury becomes more serious than before. This means that obese people are at a higher risk than the general population.

4.4. Gender and age factors

At the same time, the study found that even among Caucasians, death rates were affected by gender. There are many reasons for all of this, may be because of different testing strategies in various regions, different situations, or like some areas of the ICU admission policy there is inequality between men and women, various reasons, but we can also see that men are more susceptible to respiratory diseases than women, which results in a lot more male patients than female patients in the hospital. The above data and summaries for age groups also show that there are some differences between age groups, even within the same ethnic group. Adolescents are more resistant to disease than children, so their prevalence and duration of illness are slightly smaller and shorter than those of children. Studies in the Europas have shown that their symptoms overlap with those described above, but they are much less severe than those in the east Asian population and Caucasian populations, further confirming that these symptoms are common in the long term sequelae of COVID, and that similar symptoms occur in almost all regions after infection with COVID-19. However, the severity of the symptoms varies slightly. Each piece of evidence in this review is based on available data that meet the criteria. However, due to the ongoing exploration of the available data, the conclusions of this review may still be incomplete and need to be further summarized. The findings of this review will hopefully provide targeted treatments to help subsequent patients with long-term COVID symptoms.

4.5. Potential benefits of long COVID

Although long COVID is more harmful than good, but from the increase in the antibody content in the body of patients, it seems that not everything brought by long COVID is harmful to the body, at least its arrival is conducive to the enhancement of the body's autoantibodies, which seems to be a huge test of the autoimmune system. The bodies of long-term COVID survivors will be stronger from the experience and will be able to respond more quickly to common illnesses like colds and fevers, thereby protecting our bodies from greater damage.

5. Conclusion

In conclusion, our research underscores the complexity of long COVID and the myriad factors that can influence its manifestation. Ethnicity, obesity, age, and gender all play significant roles in the severity and duration of symptoms. These findings highlight the need for personalized treatment strategies for long COVID patients and further research to fully understand the disease's long-term effects.

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