

Impact of Different Traditional Chinese Medicine Constitutions on the Clinical Outcomes of COVID-19 Patients Infected with SARS-CoV-2 Omicron Variant: A Retrospective Observational Study

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Purpose: Traditional Chinese Medicine (TCM) constitution and disease occurrence, development, and prognosis are interrelated. This study aimed to investigate the association between TCM constitution and the time to negative nucleic acid test results in patients with coronavirus disease 2019 (COVID-19) infected with the SARS-CoV-2 Omicron variant.

Patients and Methods: We identified COVID-19 patients (≥ 18 years) infected with the SARS-CoV-2 Omicron variant and collected clinical data, including clinical symptoms, time to negative nucleic acid test results, and TCM constitution. Linear and logistic regression analyses explored the relationship between TCM constitution and the time to negative nucleic acid test results in patients with the COVID-19 Omicron variant.

Results: We included 486 patients with COVID-19, with a mean age of 40.2 years; 321 (66.0%) men and 165 (34.0%) women. Balanced constitution accounted for 43.8%, and unbalanced constitution accounted for 56.2%. Chi-square test showed that different TCM constitutions had significant differences in the influence of clinical symptoms of COVID-19 patients ($P < 0.01$). After controlling for various factors, multiple linear regression analysis revealed that an unbalanced constitution was significantly positively correlated with time to negative nucleic acid test results ($P < 0.05$). After controlling for various factors, logistic regression analysis revealed that an unbalanced constitution was closely related to the 7-day nucleic acid test conversion rate (odds ratio (OR): 0.53, 95% confidence interval (CI): 0.36–0.80, $P < 0.05$). After dividing the unbalanced constitution into deficiency constitution and non-deficiency constitution, the non-deficiency constitution was closely associated with the 7-day nucleic acid test conversion rate (OR = 0.45, 95% CI: 0.28–0.74, $P < 0.05$). Further analysis revealed that damp-heat constitution in the non-deficiency constitution was associated with the 7-day nucleic acid test conversion rate (OR = 0.33, 95% CI: 0.18–0.60, $P < 0.05$).

Conclusion: In patients with COVID-19, an unbalanced constitution is associated with a longer time to negative nucleic acid test results and lower 7-day nucleic acid test conversion rates.

Keywords: traditional Chinese medicine constitution, COVID-19, SARS-CoV-2 omicron variant, time to negative nucleic acid test, seven-day conversion rate to negative

Introduction

In early 2022, a new Omicron variant of coronavirus disease 2019 (COVID-19) emerged and spread in Shanghai, China. Several studies showed that the clinical course and prognosis of COVID-19 may be related to age, weight, underlying diseases, and vaccination status.^{1–6} However, these indicators cannot fully reflect the general physical health status and prognosis of COVID-19 patients, while traditional Chinese medicine (TCM) constitution can reflect the general physical health status of patients and affect the occurrence, development and prognosis of the disease.^{7–12}

Traditional Chinese Medicine (TCM) Constitution, proposed by Wang Qi in 1978,¹³ refers to the comprehensive and relatively stable inherent characteristics of the human body's morphological structure, physiological function, and psychological state formed during life processes based on both innate endowments and acquired factors.¹³ It could be classified into nine types, including balanced, qi-deficient, yang-deficient, yin-deficient, Phlegm-dampness, damp-heat, stagnant blood, stagnant qi, and inherited special constitution. A balanced constitution represents an optimal overall health status, whereas the other 8 constitutions (unbalanced constitutions) represent a suboptimal health status.¹⁴

Several thousand years ago, the Huangdi Neijing (the Yellow Emperor's Inner Canon) mentioned the differences between individual and population constitutions since birth, which can affect disease prognosis. As stated in Ling Shu, "The form can be slow or fast, qi can be strong or weak, the bones can be big or small, the flesh can be hard or brittle, and the skin can be thick or thin, which determines one's lifespan". Modern research has also revealed a correlation between the occurrence, development, and prognosis of many internal medical diseases and the TCM Constitution.⁹ For example, individuals with a phlegm-dampness constitution are prone to hyperglycemia, hyperlipidemia, and other metabolic diseases.^{15,16} Women with a Yang-deficient constitution are more likely to experience infertility, osteoporosis, irritable bowel syndrome, joint diseases, and dysmenorrhea.⁹ Those with a damp-heat constitution are more likely to experience acne, chronic gastritis, chronic hepatitis B, human papillomavirus infection, and hyperuricemia. Unbalanced constitutions can also affect the prognosis of diseases such as breast hyperplasia,^{17,18} age-related cognitive decline,¹⁹ and allergic rhinitis.¹² Studies have also used the TCM constitution to predict the risk of developing diseases.^{20,21}

A recent study²² revealed that patients with COVID-19 with a damp-heat constitution are more prone to "recurrence". However, there has been no research on the correlation between TCM constitution and the time to negative nucleic acid test results in patients with novel coronavirus infection. We investigated at the Shanghai Lingang Shelter Hospital, starting with the TCM constitution of patients, and studied the relationship between the clinical outcomes and time to negative nucleic acid test results in patients with COVID-19 and their TCM constitution types to provide a reference for traditional medicine prevention and treatment of COVID-19 and other epidemics.

Materials and Methods

In this retrospective study, we used a cross-sectional research method to collect clinical data on TCM constitution during hospitalization from April 10, 2022, to May 20, 2022, at the Shelter Hospital in Lingang, Shanghai. This study was approved by the Ethics Committee of Zhongda Hospital, affiliated with Southeast University (Approval No.2022ZDSYLL222-P01), and the requirement for informed consent was waived.

Study Design and Participants

Inclusion criteria: ① COVID-19 patients infected with SARS-CoV-2 omicron variant in the Lingang Shelter Hospital; ② age ≥ 18 years; ③ ability to complete the questionnaire survey. Exclusion criteria: ① severe cardiovascular or cerebrovascular disease; ② patients with severe liver, kidney, blood, or immune system diseases; ③ patients with a history of major surgery; ④ those with unstable emotions or mental disorders who could not cooperate.

Measurement of TCM Constitution Types

The "Self-Assessment Form for Traditional Chinese Medicine Constitution Classification"²³ was used to evaluate the constitution of all participants. The TCM constitution self-assessment was designed as a questionnaire using the "TCM Constitution Self-Assessment Form" on the Wenjuanxing platform. The participants scanned the QR code and completed the questionnaire based on their conditions. The form comprises nine subscales, each evaluating a different TCM constitution,

including balanced, qi-deficient, yang-deficient, yin-deficient, phlegm dampness, damp-heat, stagnant blood, stagnant qi, and inherited special constitution. The form comprises 60 questions, each scored on a 5-point scale, with participants selecting one of five responses (“never”, “seldom”, “sometimes”, “often”, “always”) and providing their score (1–5). The raw score of each subscale was calculated by adding the scores of all items, and the transformed score was calculated using the following formula: $[(\text{raw score} - \text{number of items}) / (\text{number of items} \times 4)] \times 100$. The constitution type was determined according to a standard based on the transformed score. A balanced constitution was defined as a transformed score ≥ 60 for the balanced constitution sub-scale and transformed scores < 40 for all other sub-scales. An unbalanced constitution was diagnosed if the score of any unbalanced constitution sub-scale was ≥ 40 . Patients with two or more unbalanced constitution subscale scores ≥ 40 were diagnosed with the constitution type of the highest subscale score. In this study, we also classified the unbalanced constitutions as deficiency constitution (including qi-deficient constitution, yang-deficient constitution and yin-deficient constitution) and non-deficiency constitution (including phlegm-dampness constitution, damp-heat constitution, stagnant blood constitution, stagnant qi constitution and inherited special constitution).

Clinical Characteristics Collection

Within 24 h of admission, the attending physician collected general patient information and traditional Chinese medical symptom data. All doctors involved in the data collection underwent unified training before the study. The content included common respiratory symptoms, such as fever, chills, cough, sputum production, chest tightness, shortness of breath, headache, runny nose, and sore throat, and systemic symptoms, such as thirst, fatigue, muscle aches, palpitations, appetite, gastrointestinal reactions, urine and stool conditions, and sleep status. After a patient was discharged, the patient's age, sex, body mass index (BMI), smoking history, vaccination status, chronic diseases, nucleic acid diagnosis time, and nucleic acid conversion time were collected through background data collection. Underlying diseases included hypertension, diabetes, coronary heart disease, and a history of tumors. A smoking history indicated that the patient was a smoker, whereas no smoking history indicated that the patient did not smoke. Patients who had not received the COVID-19 vaccine never received a dose, whereas those who had received the vaccine received one, two, or three doses.

Outcome

The primary outcomes of this study were the duration of nucleic acid conversion and conversion rate within 7 days (7-day conversion rate). Nucleic acid results were confirmed using pharyngeal swab nucleic acid testing. Nucleic acid conversion duration was calculated from the day the patient first tested positive for nucleic acids. The end date was the second consecutive day of negative nucleic acid results. The time from polymerase chain reaction (PCR) positive to negative was defined as the nucleic acid conversion time.

Statistical Analysis

Statistical analyses were performed using SPSS version 23.0. Count data were expressed as percentages (%), while measurement data were expressed as mean \pm standard deviation(s). Descriptive analysis was used for general data. Chi-square test was used to evaluate the correlation between TCM constitution and clinical symptoms, whereas regression analysis was used to compare the relationship between physical fitness and nucleic acid conversion time. Logistic regression was used to model the relationship between physical fitness and the 7-day conversion rate to obtain odds ratios (ORs) and 95% confidence intervals (CI), with nucleic acid conversion time ≤ 7 assigned a value of 1 and nucleic acid conversion time > 7 assigned a value of 0. The confounding factors included age, sex, BMI, smoking status, chronic diseases, and vaccination status. Statistical significance was considered at $P < 0.05$.

Results

As of May 20, 2022, 544 patients with COVID-19 were identified to have temporarily met the inclusion criteria; 37 patients could not have their nucleic acid test results confirmed because they were transferred to other makeshift hospitals, nucleic acid test results were not confirmed in 1 patient after transfer to a designated hospital, 6 patients did not meet the age criteria, and 14 patients were excluded due to incomplete information. Ultimately, 486 patients were included in this study (Figure 1).

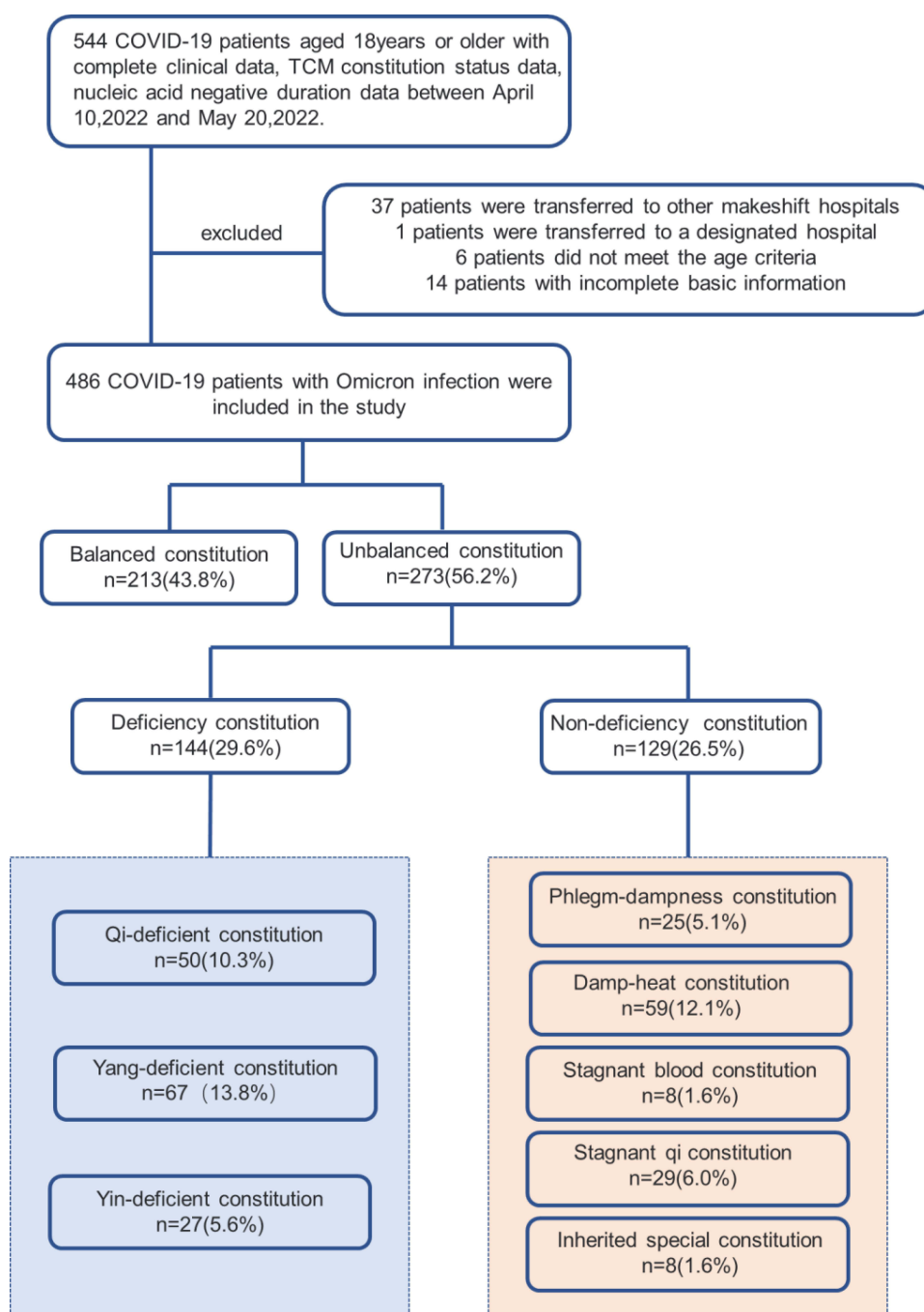


Figure 1 The flowchart of patients according to inclusion and exclusion criteria.

Demographic Characteristics

Here, 486 individuals were infected with the COVID-19 Omicron variant, including 321 men (66.0%) and 165 women (34.0%), with a mean age of 40.16 ± 13.43 years. The average BMI was 23.5 ± 3.76 . A total of 153 (31.5%) individuals had a smoking history, whereas 333 (68.5%) did not. 75 (15.4%) individuals had a history of chronic diseases, and 454 (93.4%) individuals had been vaccinated (Table 1). Among all participants, 213 (43.8%) had a balanced constitution, and 273 (56.2%) had an unbalanced constitution, including 50 (10.3%) with qi-deficient, 67 (13.8%) with yang-deficient, 27 (5.6%) with yin-deficient, 25 (5.1%) with phlegm-dampness, 59 (12.1%) with damp-heat, 8 (1.6%) with stagnant blood, 29 (6.0%) with stagnant qi, and 8 (1.6%) with inherited special constitution (Figure 1 and Table 2).

Table 1 Baseline Demographic and Clinical Information of Participants

Category	Mean±SD or No. (%)
All	486
Sex (men/women)	321 (66.0%)/165 (34.0%)
Age (years)	40.16±13.43
BMI (body mass index)	23.48±3.76
Smoking (with/without)	153 (31.5%)/333 (68.5%)
Chronic disease (with/without)	75 (15.4%)/411 (84.6%)
Vaccination (with/without)	454 (93.4%)/32 (6.6%)

Table 2 The Number and Proportion of Each Traditional Chinese Medicine Constitution

TCM Constitution Type	Number	%
Balanced constitution	213	43.8%
Unbalanced constitution	273	56.2%
Balanced constitution	213	43.8%
Deficiency constitution	144	29.6%
Non-deficiency constitution	129	26.5%
Balanced constitution	213	43.8%
Qi-deficient constitution	50	10.3%
Yang-deficient constitution	67	13.8%
Yin-deficient constitution	27	5.6%
Phlegm-dampness constitution	25	5.1%
Damp-heat constitution	59	12.1%
Stagnant blood constitution	8	1.6%
Stagnant qi constitution	29	6.0%
Inherited special constitution	8	1.6%

Abbreviation: TCM, traditional Chinese medicine.

The Relationship Between Symptoms and TCM Constitution

Among the participants, 55 had asymptomatic infections (11.32%), and 431 were symptomatic infections (88.68%). Among the patients with balanced constitution, there were 43 asymptomatic infections (20.2%) and 170 symptomatic infections (79.8%). The most common clinical symptoms were cough (50%), fever (36%), and headache (26%). Among patients with an unbalanced constitution, 12 were asymptomatic infections (4.4%), and 261 were symptomatic (95.6%). The top three clinical symptoms were cough (73%), fever (53%), and sore throat (45%). Chi-square test showed that different TCM constitutions had significant differences in the influence of clinical symptoms of COVID-19 patients ($P < 0.01$) (Table 3).

Table 3 Proportion of Asymptomatic and Symptomatic COVID-19 Patients with Two Kinds of TCM Body Constitution

TCM Constitution Type	No. of Cases(%)	Asymptomatic Infections No. (%)	Symptomatic Infections No. (%)	χ^2/P
Balanced constitution	213 (43.8%)	43 (20.2%)	170 (79.8%)	29.73/0.00**
Unbalanced constitution	273 (56.2%)	12 (4.4%)	261 (95.6%)	

Notes: ** $P < 0.01$.

Abbreviation: TCM, traditional Chinese medicine.

Table 4 Correlation Between the Time of Negative Transformation of COVID-19 Nucleic Acid and Traditional Chinese Medicine Constitution in COVID-19 Patients Infected by SARS-CoV-2 Omicron Variant

Variables	Standardized Beta	95% CI	P
TCM Constitution Type (Balanced / Unbalanced)	0.17	0.58–1.93	0.00 **
Gender	−0.08	−1.40–0.18	0.13
Age	−0.01	−1.34–1.21	0.92
BMI	−0.03	−1.30–0.71	0.57
Smoking Status	−0.07	−1.34–0.23	0.16
Chronic Disease	0.10	0.08–2.05	0.03*
Vaccination	0.04	−0.74–1.99	0.37

Notes: **P < 0.01, *P < 0.05.

Abbreviation: TCM, traditional Chinese medicine.

The Relationship Between TCM Constitution and Nucleic Acid Conversion Time

The average time for nucleic acid conversion of patients with unbalanced constitution was 7.1 days, which was 1.2 days longer than that of patients with a balanced constitution. To evaluate the correlation between TCM constitution and nucleic acid conversion time, we used multiple linear regression analysis to compare the differences in nucleic acid conversion time between balanced and unbalanced constitutions and verified the correlation between constitution and conversion time. The multiple linear regression analysis revealed that after correcting for sex, age, BMI, smoking, underlying diseases, and vaccines, the unbalanced constitution was significantly positively correlated with the nucleic acid conversion time (beta value: 0.17, 95% CI: 0.58–1.93, $P < 0.05$) (Table 4 and Figure 2).

Subgroup Analysis Results

Subgroup analysis revealed that in men (66.0%), below 60 years (91.6%), with a BMI of less than 28 kg/m² (87.0%), smoking (31.5%) or not smoking (68.5%), with no chronic diseases (84.6%), and who had received the COVID-19 vaccine (93.4%), after controlling for multiple factors, an unbalanced constitution was significantly positively correlated with the duration to negative nucleic acid test results ($P < 0.05$). However, in women (34.0%), age 60 years or older (8.4%), with a BMI of 28 kg/m² or greater (13.0%), with chronic diseases (15.4%), no vaccination (6.6%), after controlling for multiple factors, no significant correlation was observed between an unbalanced constitution and the time to negative nucleic acid test results ($P \geq 0.05$) (Table 5).

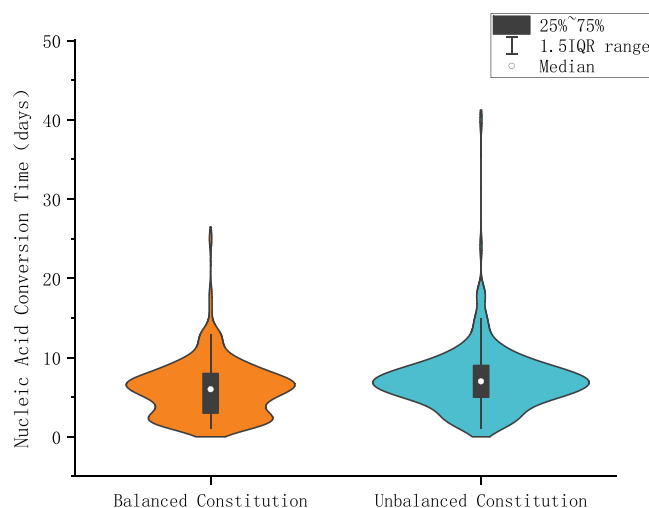


Figure 2 Correlation between the time of negative transformation of COVID-19 nucleic acid and traditional Chinese medicine constitution in COVID-19 patients infected by SARS-CoV-2 Omicron variant.

Table 5 Subgroup Analysis Results (Effects of Two TCM Constitutions in Each Group on the Negative Transition Time of COVID-19 Nucleic Acid)

Subgroup	No. of Cases (%)	No. of Balanced Constitution /Unbalanced Constitution	Standardized Beta	95% CI	P
Overall	486		1	Ref.	
Sex					
Men	321 (66.0%)	164/157	0.17	0.50–2.22	0.00**
Women	165 (34.0%)	49/116	0.13	–0.16–2.04	0.09
Age					
≥60 years	41 (8.4%)	11/30	0.20	–1.44 – 4.76	0.28
<60 years	445 (91.6%)	202/243	0.16	0.52–1.92	0.00**
BMI					
≥28 kg/m ²	63 (13.0%)	31/32	0.09	–1.09–2.19	0.51
<28 kg/m ²	423 (87.0%)	182/241	0.18	0.62–2.10	0.00**
Smoking					
With	153 (31.5%)	81/72	0.18	0.11–2.39	0.03*
Without	333 (68.5%)	132/201	0.17	0.45–2.16	0.00**
Chronic Disease					
With	75 (15.4%)	36/39	0.16	–0.82–3.30	0.24
Without	411 (84.6%)	177/234	0.17	0.56–2.00	0.00**
Vaccination					
With	454 (93.4%)	200/254	0.15	0.43–1.82	0.00**
Without	32 (6.6%)	13/19	0.38	–0.39–6.40	0.08

Notes: **P < 0.01, *P < 0.05.

Abbreviation: TCM, traditional Chinese medicine.

The Relationship Between TCM Constitution and the 7-Day Nucleic Acid Conversion Rate

We used binary logistic regression to analyze the relationship between TCM constitution and the 7-day nucleic acid conversion rate. A value of 1 was assigned for nucleic acid conversion within 7 days, whereas a value of 0 was assigned for nucleic acid conversion after 7 days. After adjusting for sex, age, BMI, smoking, chronic diseases, and vaccines, the results revealed that unbalanced constitution was an independent risk factor for nucleic acid conversion rate within 7 days (OR: 0.53, 95% CI: 0.36–0.80, $P < 0.05$). When the unbalanced constitution was divided into deficiency constitution (144 people, 29.6%) and non-deficient constitution (129 people, 26.5%), no significant correlation was observed between deficiency constitution and nucleic acid conversion rate within 7 days (OR: 0.62, 95% CI: 0.39–1.00, $P \geq 0.05$). The non-deficient constitution was an independent risk factor for nucleic acid conversion rate within 7 days (OR: 0.45, 95% CI: 0.28–0.74, $P < 0.05$). Further analysis revealed that damp-heat constitution (59 people, 12.1%) within the non-deficient constitution was an independent risk factor for nucleic acid conversion rate within 7 days (OR: 0.33, 95% CI: 0.18–0.60, $P < 0.05$) (Table 6 and Figure 3).

Table 6 Relationship Between the Traditional Chinese Medicine Constitution and the 7-Day Negative Conversion Rate of COVID-19 in Patients Infected with the SARS-CoV-2 Omicron Variant

TCM Constitution Type	No. of Cases (%)	OR	95% CI	P
Balanced constitution	213 (43.8%)	1	Ref.	
Unbalanced constitution	273 (56.2%)	0.53	0.36–0.80	0.00**
Balanced constitution	213 (43.8%)	1	Ref.	
Deficiency constitution	144 (29.6%)	0.62	0.39–1.00	0.05
Non-deficiency constitution	129 (26.5%)	0.45	0.28–0.74	0.00**

(Continued)

Table 6 (Continued).

TCM Constitution Type	No. of Cases (%)	OR	95% CI	P
Balanced constitution	213 (43.8%)	1	Ref.	
Qi-deficient constitution	50 (10.3%)	0.55	0.28–1.06	0.08
Yang-deficient constitution	67 (13.8%)	0.66	0.35–1.22	0.18
Yin-deficient constitution	27 (5.6%)	0.74	0.31–1.82	0.52
Phlegm-dampness constitution	25 (5.1%)	0.49	0.21–1.18	0.11
Damp-heat constitution	59 (12.1%)	0.33	0.18–0.60	0.00**
Stagnant blood constitution	8 (1.6%)	0.62	0.13–2.87	0.54
Stagnant qi constitution	29 (6.0%)	0.98	0.39–2.41	0.96
Inherited special constitution	8 (1.6%)	0.32	0.07–1.36	0.12

Note: **P < 0.01.

Abbreviation: TCM, traditional Chinese medicine.

Discussion

In this study, we focused on patients infected with the COVID-19 Omicron variant at Shelter Hospital in Lingang, Shanghai, and investigated the clinical relationship between TCM constitution and novel coronavirus infection. Our study showed that the TCM constitution is related to the clinical symptoms of COVID-19, and unbalanced constitution prolongs the negative nucleic acid transition time. Previous studies have also shown that TCM constitution is closely related to the occurrence, development and prognosis of diseases.^{7–12,22} Therefore, a balanced TCM constitution has important potential application value in preventing and alleviating clinical symptoms of COVID-19 patients and accelerating the negative nucleic acid transformation of COVID-19 patients.

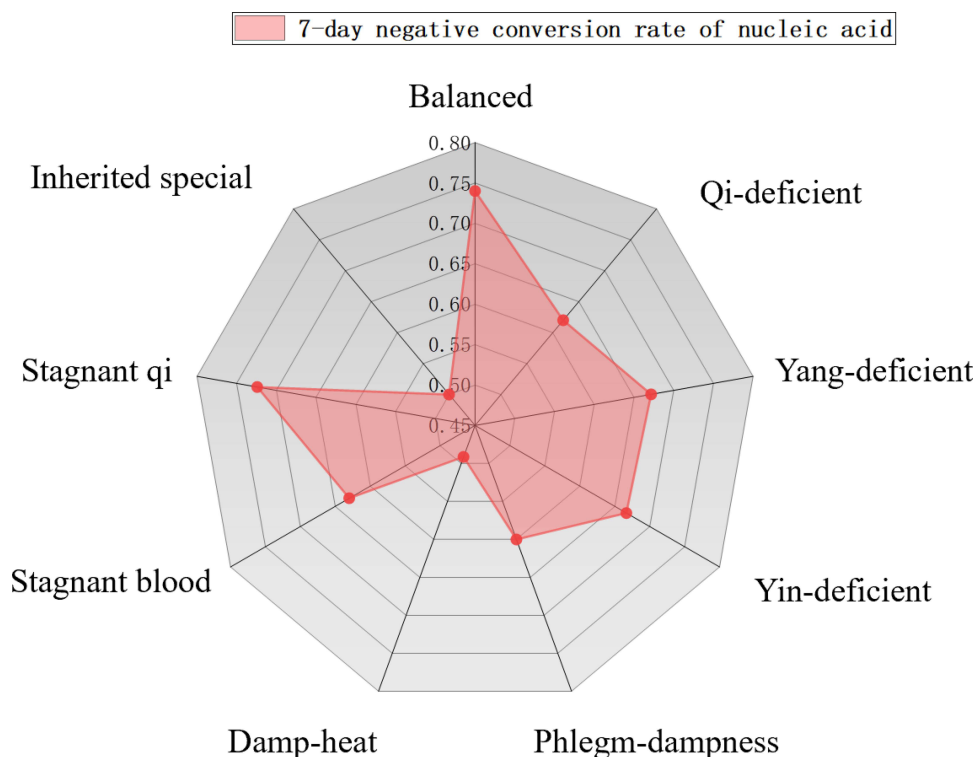


Figure 3 Relationship between the traditional Chinese medicine constitution and the 7-day negative conversion rate of COVID-19 patients infected by SARS-CoV-2 Omicron variant.

The time taken for COVID-19 nucleic acid conversion is related to sex, age, vaccination status,^{1–3} BMI,² chronic diseases,^{24,25} presence of sore throat symptoms,⁴ high nutrition risk²⁶ and plasma 25(OH)D levels.²⁷ In addition to the known risk factors, the results of this study suggest a novel factor: individuals with an unbalanced constitution have a prolonged duration of COVID-19 nucleic acid conversion to a negative status.

TCM is an important component of traditional world medicine. TCM constitution differences determine the susceptibility to certain diseases and the prognosis of the diseases.^{7–12} Traditional Chinese medicine constitution theory believes that through diet, exercise,²⁸ drug conditioning and other methods can improve people's unbalanced constitution, so as to prevent the occurrence of disease, or improve the condition of patients who have been sick, and promote the recovery of disease.^{29,30} Therefore, the TCM constitution has enormous potential for disease prevention and treatment applications. Our research revealed that among all patients with COVID-19, 43.8% had a balanced constitution, consistent with the constitution proportion in the Chinese population,³¹ indicating that all constitutional groups are susceptible to the COVID-19 Omicron variant. In this study, we observed that patients with unbalanced TCM constitutions were more likely to present with hallmark symptoms, and asymptomatic infections were less common ($P < 0.05$). The average time for nucleic acid conversion of patients with unbalanced constitution was 7.1 days, which was 1.2 days longer than that of patients with a balanced constitution. After adjusting for population characteristics and other potential confounding factors, an unbalanced TCM constitution was significantly positively correlated with nucleic acid conversion time ($\beta=0.17$, 95% CI: 0.58–1.93, $P < 0.05$). This is consistent with Fu et al,³² who revealed that patients infected with Omicron with continuously positive nucleic acid tests were mainly those with imbalanced constitutions, whereas those with normal constitutions were mainly in the negative group.

Subgroup analysis revealed that in men (66.0%), below 60 years (91.6%), with a BMI of less than 28 kg/m² (87.0%), with no chronic diseases (84.6%), and who had received the COVID-19 vaccine (93.4%), after controlling for multiple factors, an unbalanced constitution was significantly positively correlated with the duration to negative nucleic acid test results ($P < 0.05$). This indicates that an unbalanced constitution is more likely to affect nucleic acid conversion time in relatively healthy populations. Compared with women, the unbalanced constitution is more likely to affect nucleic acid conversion time in men. In some subgroups, the small sample size may have led to nonsignificant statistical differences.

In this study, we also classified the unbalanced constitutions as deficiency constitution group and non-deficiency constitution group. The deficiency constitution group has 144 people, its ratio is 29.6%, includes qi-deficient constitution, yang-deficient constitution and yin-deficient constitution. The non-deficiency constitution group has 129 people, its ratio is 26.5%, includes phlegm-damp constitution, damp-heat constitution, stagnant blood constitution, stagnant qi constitution and inherited special constitution. We showed that there is no significant correlation between deficiency type and the 7-day nucleic acid conversion rate (OR: 0.62, 95% CI: 0.39–1.00, $P \geq 0.05$), whereas non-deficient constitution was an independent risk factor for the 7-day nucleic acid conversion rate (OR: 0.45, 95% CI: 0.28–0.74, $P < 0.05$). No significant correlation was observed between phlegm dampness, blood-stasis, qi-stagnation constitution, special diathesis, and the 7-day nucleic acid conversion rate in the non-deficient constitution ($P \geq 0.05$). However, damp-heat constitution (59 people, 12.1%) in non-deficient constitution was an independent risk factor for the 7-day nucleic acid conversion rate (OR: 0.33, 95% CI: 0.18–0.60, $P < 0.05$). This study suggests that the damp-heat constitution population had a longer nucleic acid conversion time after COVID-19 than the balanced constitution population. Damp-heat constitution mainly has two characteristics: “damp” and “heat”. The “damp” nature is sticky and lingering in TCM theory, easily leading to prolonged illness. “Heat” represents an inflammatory response,^{33,34} which is consistent with the fact that COVID-19 infection can cause an inflammatory response in the human body,^{35–37} and the inflammatory state may worsen COVID-19 outcome, as reported in previous studies.^{37,38}

The diagnosis of damp heat constitution is mainly based on several related issues concerning dampness and heat. People with a damp-heat constitution tend towards obesity, oily skin on the face or nose, a tendency to develop acne or boils, a frequent bitter taste or bad breath, loose or sticky stools, yellow urine, or a burning sensation in the urethra during urination, yellowish vaginal discharge in women, and dampness in the scrotal area in men. In addition, people with a damp-heat constitution may reveal specific tongue characteristics, such as a redder tongue body, thicker tongue coating, and yellower tongue coating, compared to those with a balanced constitution.

Developing an unbalanced constitution may be related to innate individual differences, lifestyle behaviors, and dietary habits. For example, Hsu et al³⁹ revealed that individuals with a balanced constitution have healthier eating habits, whereas those with yang deficiency, yin deficiency, or phlegm stasis tend to eat more fried foods, bread, pickled foods, stir-fried dishes, and low-sodium foods and eat fewer vegetables or fruits to replace high-fat and sweet foods. People without exercise habits are more likely to have a phlegm-dampness constitution; smokers are more likely to have a yang deficiency, yin deficiency, or phlegm-dampness constitution; and those who eat late at night are more likely to have a yang deficiency or phlegm-dampness constitution. An imbalanced constitution can be improved through lifestyle adjustments and traditional Chinese herbal medicines.⁴⁰ Choosing the appropriate treatment or recovery method is the key to maintaining a balanced constitution.

Differences exist in the ability of different TCM constitutions to resist COVID-19 infection. A balanced constitution has a strong ability to resist COVID-19 infection. The results of this study have important clinical significance for COVID-19 prevention, relief of patient symptoms, and shortening the time to negative conversion through TCM constitution regulation. Perhaps actively improving imbalanced constitutions, particularly the damp-heat constitution, to achieve a more balanced state may alleviate the effects of COVID-19 on the human body.

This study had several limitations. First, Shanghai Lingang Shelter Hospital only treats asymptomatic and mild patients; few patients with common or severe symptoms are treated. Therefore, we could not evaluate the correlation between TCM constitution and clinical outcomes in patients with severe illnesses. Further large-scale studies are needed to investigate the clinical outcomes in these patient populations. The evaluation of the TCM constitution is based on Chinese national standards and is universally applicable; however, its limitations must also be acknowledged. Second, this epidemic is mainly caused by the Omicron BA.5.2 variant of the novel coronavirus; we only focused on the Omicron BA.5.2 variant, and the impact of TCM constitution on the clinical outcomes of other COVID-19 variants is still unknown. Third, TCM constitutional status in this study was mainly based on patient questionnaire surveys, which may have led to patients filling in incorrect or incomplete information. Finally, conclusions may have been subject to residual confounding bias because this was a retrospective observational study.

Conclusion

In this study which enrolled patients infected with SARS-CoV-2 omicron variant, we showed that traditional Chinese medicine constitution may be an important factor affecting the clinical outcome related to COVID-19 infection. Unbalanced constitution will aggravate the clinical symptoms of COVID-19 patients and significantly prolong the nucleic acid transition time of COVID-19 patients. As a result, approaches that targeted at managing the unbalanced TCM constitution, eg, by prescribing related Chinese herbs, might be helpful to improve the clinical outcome of COVID-19 patients, who were infected with SARS-CoV-2 omicron variant.

Data Sharing Statement

The data supporting this study's findings are available on request from the corresponding author.

Ethical Approval and Consent to Participate

This study was authorized by the Ethics Commission for Clinical Research of Zhongda Hospital, affiliated with Southeast University. Informed consent was waived due to the nature of the study as a retrospective study. The study was conducted in accordance with the principles described in the Declaration of Helsinki, and the confidentiality of patients was guaranteed.

Consent for Publication

All authors of this article have seen all the content of this article and have agreed to publish it.

Acknowledgments

We thank all participants for their cooperation in this study. Additionally, we want to express our gratitude to the heads of Lingang shelter hospital for their support.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

This study was supported by the National Major Epidemic Treatment Base Construction Project (2019-320831-84-02-524538) and the Chinese and Western Medicine Collaborative Medical Research Project, Zhongda Hospital affiliated to Southeast University (2023zxxyt16).

Disclosure

The authors declare no conflicts of interest in this work.

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