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A cross-sectional survey of self-medication with Traditional Chinese Medicine for treatment and prevention of COVID-19

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ABSTRACT
Objective: To investigate user behavioural profiles and the prevalence of self-medication with traditional Chinese medicine (TCM) for COVID-19 among the general public in China.

Design: Cross-sectional study.

Setting: Self-administered online survey was carried out between January and June 2021 in China.

Results: A total of 1132 complete responses were received from a nationwide sample. A considerable proportion viewed TCM to be more effective than Western medicine for treating COVID-19 (67.1 %) and stated that it is safer to use TCM (63.5 %) and easier to access TCM for treating COVID-19 (63.5 %). A total of 16.4 % (95 % CI 14.3–18.7) reported ever self-medicating with TCM to resolve COVID-19 symptoms and 12.2 % (95 % CI 10.3–14.2) ever using TCM to prevent SARS-CoV-2 infection. Lianhua Qingwen capsule/granule (53.2 %), Ganmao granule (50.5 %) and Banlangen granule (44.6 %) were most commonly used to resolve COVID-19 symptoms whereas Banlangen granule (60.1 %) was commonly used for the prevention of SARS-CoV-2 infection. Older age participants, from rural areas, with chronic diseases, higher socioeconomic status, and a positive attitude towards TCM were more likely to self-medicate using TCM to resolve COVID-19 symptoms.

Conclusion: Self-medication with TCM during the COVID-19 pandemic for symptom control or prevention is prevalent. The findings of the user behavioural profile and types of TCMs commonly used in this study provide beneficial information for the development of strategies to improve public health-seeking behaviour and the performance of the country’s healthcare system in the era of the COVID-19 pandemic.

1. Introduction

The emergence of a novel coronavirus known as SARS-CoV-2 has caused a global pandemic; never in the history of public health has a pandemic of such disease threatened humanity in the same way as the novel coronavirus. Approximately a year and a half since its emergence in Wuhan, China, over 194 million cases and 4 million deaths have been reported in at least 177 countries globally. Before the approval of several drugs for treatment and management of COVID-19, the management of COVID-19 during the early phase of the pandemic is mostly limited to general supportive care and symptomatic treatment. The high levels of morbidity and mortality associated with COVID-19 across the world during the early phase of the pandemic have prompted urgent efforts toward effective remedies to save humanity from the ravaging devastation of COVID-19. Many alternative medicines emerged claiming to be able to prevent, treat or cure COVID-19. The emergence of a huge number of alternative medicines raised concerns as many have not been fully proven with regard to clinical efficacy and safety for COVID-19 treatment. The World Health Organisation (WHO) recognises that traditional, complementary and alternative medicine (TCAM) has many benefits and supports its use for COVID-19 treatment if its benefits have been scientifically proven. In China, the National Health Commission of the People’s Republic of China recommended, in the Guideline of Diagnosis and Treatment Plan for COVID-19 (5th edition), that

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Traditional Chinese Medicine (TCM) can be used for different phases of COVID-19 treatments. TCMs are commonly used on SARS-CoV-2 infected patients in combination with conventional medicine in the treatment of COVID-19. Recent clinical evidence also showed the therapeutic effectiveness of TCM for COVID-19. Given the importance of ensuring the clinical efficacy of TCM drugs and the safety of patients, guidelines have been put into place for the use of herbal medicine for the prevention and treatment of COVID-19.

In China, TCM is an integral part of the health system in parallel with Western medicine. TCMs are widely accepted compared to conventional Western medicines because of people’s beliefs and preferences for natural health products and alternative medicines. In China, over-the-counter TCM is often used without professional supervision and usually targets mild diseases. Even before the COVID-19 pandemic, self-medication in China was increasingly prevalent partly due to the popularity of online health information seeking. During the COVID-19 pandemic, the unavailability of effective treatment for COVID-19, general lockdown, and the congestion of treatment facilities prevented people from seeking medical assistance, leaving many to resort to self-care and self-medication. The practice of self-medication with TCM without medical supervision during the COVID-19 pandemic has become a major global concern and has serious consequences. Although TCM has been put to use in China to contain COVID-19, self-medication practices to prevent or cure COVID-19 are not recommended. Inappropriate self-medication with TCM can lead to serious adverse effects, drug interactions and death. In Hong Kong, approximately one-seventh of TCM poisoning cases have been reported to be attributed to self-medication with over-the-counter TCM products.

Little has been reported about self-medication behaviours and the use of TCM for COVID-19 in China. Understanding the self-medication practices of the public during the pandemic is important to ensure successful management of the COVID-19 outbreak. Thus, this study aimed to determine the behavioural profile and prevalence of self-medication with TCM for COVID-19 among the general public in China. Specifically, factors (namely demographics, health status, health risk behaviours, health-seeking experience with TCM, and attitudes towards the use of TCM for COVID-19) influencing self-medication with TCM for COVID-19 symptom experience and the prevention of SARS-CoV-2 infection were examined. The types of TCM used were also assessed.

2. Materials and methods

2.1. Study participants and survey design

We carried out a cross-sectional, web-based survey using an online questionnaire between January and June 2021. The inclusion criteria were that the respondents were citizens of China aged over 18 years. We used the social network WeChat, the largest social media platform in China, to circulate the survey link to the general public across all provinces in mainland China. The participants were informed that their participation was voluntary and that completing the survey questions indicates their agreement with the provided information and consent to participate in the research. The sample size was calculated for using the formula: \( n = Z^2 \frac{P(1-P)}{d^2} \) where \( Z = 1.96 \) for a confidence level of (α) of 95 %, \( P = \% \) of population probability, assumed to be 50 %, \( d = \) margin of error of 0.05. Using a margin of error of 0.05 (5 %), with a 95 % CI and 50 % response distribution, the calculated sample size was 384. The sample size was multiplied by the predicted design effect of two to account for the use of convenience sampling and an online survey. Hence, the optimal sample size for each region was set to 768 (384 \( \times \) 2).

2.2. Instruments

The survey questions consisted of four sections assessing: i) demographic background, health status and health risk behaviours, ii) previous health-seeking experience with TCM, iii) attitudes toward the use of TCM for COVID-19, and iv) the practice of self-medication with TCM for resolving COVID-19 symptom and prevention of SARS-CoV-2 infection.

2.2.1. Demographics, health status, and health risk behaviours

The participants were asked for their personal details, including age, gender, educational level, average monthly household income and location. Health status includes questions asking participants about their perceived health status, weight, height and history of chronic diseases. Participants were also asked about their current or past smoking behaviours.

2.2.2. Previous health-seeking experience with TCM

The participants were asked if they favour TCM or Western medicine when seeking treatment; they were asked to rate the effectiveness of TCM in resolving general illness symptoms. The response options were TCM could help resolve most of the illness symptoms, TCM could help resolve some but not all illness symptoms and TCM is usually unable to resolve illness symptoms. Finally, they were asked whether they had ever experienced unpleasant adverse reactions when using TCM.

2.2.3. Attitudes toward the use of TCM for COVID-19

Attitudes toward the use of TCM for COVID-19 consists of self-developed eight item questions assessing participants’ opinions on TCM for COVID-19. The response options were strongly disagreed, disagree, agree, and strongly agree. One item is reverse-scored from the total eight items. The lowest possible sum of the item score is 8 and the highest is 32, with a higher score on the scale indicating a higher level of positive attitudes toward the use of TCM for COVID-19.

2.2.4. TCM practice

Participants were asked if they have ever self-medicated with TCM to i) resolve COVID-19 symptoms and ii) prevent SARS-CoV-2 infection. We noted that “self-medication” is defined as the use of medicines to treat self-recognised illnesses or symptoms. We also noted that “prevention” implies taking TCM as the means of prevention despite experiencing no COVID-19-related symptoms. The option answer for both questions is yes or no. If the answer is yes, participants must specify the type(s) of TCM they have ever used. A list of TCMs, namely Yuye Jiedu granule, XuanFeiBaiDu granule, Shuanghuanglian oral liquid, Lung cleansing and detoxifying decoction, Lianhua Qingwen capsule/granule, Jinhua Qinggan granule, Huoxiangzhengqi oral liquid, Gammao granule, and Banlangen granule was available for participants to select using tick boxes. Original Chinese names for these TCMs are provided in Supplemental Table 1.

2.3. Statistical analysis

Data quality checks including detection and removing of duplicate and straight-lining responses were carried out prior data analyses. Descriptive data are expressed in mean \( \pm \) standard deviation (SD) for continuous variables and as numbers and percentages (%) for categorical variables. The prevalence of the proportion and their respective 95
The chi-squared statistic was used for testing relationships between assessing the internal consistency of the items representing the score. The model fit was assessed using the Hosmer–Lemeshow goodness-of-fit test. A p-value of less than 0.05 was considered statistically significant. Statistical analysis was performed using SPSS version 20.0 (IBM Corp., Armonk, NY, USA).

3. Results

A total of 1132 responses were received. The study received responses of previous health-seeking experiences with TCMs. The majority of the study participants (77.2 %) reported favoring Western medicine when seeking treatment, and the majority also reported that TCMs could help them to resolve some but not all illness symptoms (76.4 %). A total of 35.4 % reported ever experiencing side effects following TCM use.

Fig. 1 shows the proportion of strongly agree/agree responses for attitudes toward the use of TCM for COVID-19. A high proportion reported strongly agree/agree that TCM is more effective than Western medicine for treating COVID-19 (67.1 %), and that it is safer to use TCM (63.5 %) and easier to access TCM for the treatment of COVID-19 compared to Western medicine (63.5 %). Slightly over half believed that the use of TCM for COVID-19 would result in no side effects (50.1 %). A relatively lower proportion strongly agree/agree that one should try to use TCM to resolve COVID-19 symptoms before seeking treatment at the hospital (32.0 %). The eight items of attitudes toward the use of TCM for COVID-19 scale had a reliability (Cronbach’s α of 0.796. The mean (± SD) for the total attitudes score was 19.1 (± 3.4). The median was 19 (interquartile range [IQR], 17–21). The mean attitudes score was categorised as a score of 19–32 or 8–18 based on the median split; as such, 640 (56.5 %, 95 %CI 53.3–59.4) were categorised as having a score of 19–32 and 492 (43.5 %, 95 %CI 40.6–46.4) were categorised as having a score of 8–18.

In total, 189 (16.4 %, 95 %CI 14.3–18.7) reported ever self-medicating with TCM to resolve COVID-19 symptoms. Fig. 2 shows the types of TCM used to self-medicate to resolve COVID-19 symptoms. The majority reported using the Lianhuasheng capsule/granule (53.2 %). A considerably higher proportion used Gamnnao granules (50.5 %), Shuanghuanglian oral liquid (32.3 %), Banlangen granules (44.6 %) and Honeysuckle oral liquid (19.9 %), which are not recommended for COVID-19 treatment by the China National Health Commission. Several participants listed the use of types TCMs in the open-ended response which are not recommended by the China National Health Commission: Houttuynia cordata Thumb, Small Bupleurum granules, Lanting oral solution, Pudilan oral solution, Qingkailing granules, Shenqi, Yinhuang particle and Zhongsheng pills. The Chinese names of these TCM can be found in Supplemental Table 1.

The multivariable logistic regression analysis shown in Table 2 revealed that older age participants were more likely to self-medicate with TCMs to resolve COVID-19 symptoms. Participants with the highest educational achievement of technical school (OR = 3.82, 95 %CI 1.83–7.97) and university graduates (OR = 2.72, 95 %CI 1.34–5.55) were more likely to self-medicate with TCMs than those of high school education and below. Participants from rural areas (OR = 2.78, 95 %CI 1.68–4.57) were more likely to self-medicate with TCM than those from urban areas. Individuals with chronic diseases (OR = 1.88, 95 %CI 1.19–2.99) and who were common users of TCMs (OR = 1.91, 95 %CI 1.30–2.80) were more likely to self-medicate with TCM to resolve COVID-19 symptoms. It was also found that people who experienced adverse reactions from TCM use were also likely to self-medicate with TCM to resolve COVID-19 symptoms. Those with higher total attitude scores were also more like to self-medicate with TCM to resolve COVID-19 symptoms (OR = 1.67, 95 %CI 1.17–2.46).

A total of 138 (12.2 %, 95 %CI 10.3–14.2) individuals reported ever having used TCM to prevent SARS-CoV-2 infection. As shown in Fig. 2, the majority reported using Banlangen granules (60.1 %), followed by Lianhuasheng capsules/granules (47.8 %) in the prevention of SARS-CoV-2 infection. A considerable proportion reported ever using Gamnnao granules (25.4 %) and Honeysuckle oral liquid (22.5 %) in the prevention of COVID-19, both of which were not recommended by China’s National Health Commission. Other TCMs used for COVID-19 prevention reported in the open-ended responses were Small Bupleurum granules and Tongrentang preventive prescription. As shown in Table 2, there were no significant differences between demographic characteristics and the use of TCM to prevent SARS-CoV-2 infection. Former or current smokers (OR = 1.71, 95 %CI 1.02–2.88) were more likely to use

### Table 1
Comparison of demographic characteristics of the study population and the general adults population in China, 2018.

| Demographic characteristics | N  | % Study population, N = 1132 | % Total population, N = 1007093833 |
|-----------------------------|----|-----------------------------|----------------------------------|
| Age group (years)           |    |                             |                                  |
| 18–25                      | 476| 42.0                        | 11.97%                           |
| 26–35                      | 386| 34.1                        | 21.69%                           |
| 36–45                      | 155| 13.7                        | 19.13%                           |
| 46–70                      | 115| 10.2                        | 47.22%                           |
| Gender                     |    |                             |                                  |
| Male                       | 457| 40.4                        | 51.24%                           |
| Female                     | 675| 59.6                        | 48.76%                           |
| Average monthly household income (CNY)¹ |    |                             |                                  |
| <4000                      | 259| 22.9                        | 56.5                             |
| 4000–9999                  | 407| 37.3                        | 27.1                             |
| 10000–14999                | 200| 17.7                        | 11.2                             |
| ≥15000                     | 176| 15.5                        | 5.2                              |
| Region²                    |    |                             |                                  |
| North China                | 57 | 5.0                         | 12.01                            |
| Northeast China            | 33 | 2.9                         | 6.99                             |
| East China                 | 810| 71.6                        | 30.04                            |
| South Central China        | 131| 11.6                        | 29.07                            |
| Southwest China            | 90 | 8.0                         | 14.55                            |
| Northwest China            | 11 | 1.0                         | 7.34                             |

¹ Total number of adults 18–70 years of age according to China Statistical Yearbook of 2021.
² China household monthly income distribution

| Region³                    |    |                             |                                  |
| Northern region (Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia) | 57 | 5.0 | 12.01 |
| Northeast China (Liaoning, Jilin, Heilongjiang) | 33 | 2.9 | 6.99 |
| East China                 | 810| 71.6 | 30.04 |
| South Central China        | 131| 11.6 | 29.07 |
| Southwest China            | 90 | 8.0  | 14.55 |
| Northwest China            | 11 | 1.0  | 7.34  |

% confidence interval (CI) were calculated. The reliability of the attitudes toward the use of TCM for COVID-19 items was evaluated by assessing the internal consistency of the items representing the score. The chi-squared statistic was used for testing relationships between categorical variables. Multivariable logistic regression was used to model the relationship between predictor variables (demographics, health status and health risk behaviours, previous health-seeking experience and attitudes toward the use of TCMs) and the two main outcomes (self-medication with TCM for COVID-19 symptom treatment and the prevention of SARS-CoV-2 infection). Variables that are significant in the univariate analyses were selected for multivariable logistic regression analyses and included in the model using a pairwise forced-entry method. Odds ratios (OR), 95 % CI, and p-values were calculated for each independent variable. The model fit was assessed using the Hosmer–Lemeshow goodness-of-fit test. A p-value of less than 0.05 was considered statistically significant. Statistical analysis was performed using SPSS version 20.0 (IBM Corp., Armonk, NY, USA).
Table 2
Factors associated with self-medicate with TCM to resolve COVID-19 symptoms and prevent SARS-CoV-2 infection (N = 1132).

| Socio demographic characteristics | Univariable analysis | p-value | Multivariable analysis | p-value | Univariable analysis | p-value | Multivariable analysis | p-value |
|----------------------------------|----------------------|---------|------------------------|---------|----------------------|---------|------------------------|---------|
|Resolve COVID-19 symptoms         |                      |         |                        |         | Prevent SARS-CoV-2   |          |                        |         |
| (Yes vs No)                      |                      |         |                        |         | (Yes vs No)          |          |                        |         |
|Age group (years)                 |                      |         |                        |         |                      |         |                        |         |
|18–25                            | 476 (42.0)           | 48 (10.1)| Reference              |         | 38 (8.0)             |         | Reference              |         |
|26–35                            | 386 (34.1)           | 75 (19.4)| p < 0.001              |         | 1.87 (1.23–2.83)*    |         | 54 (14.0)              |         |
|36–45                            | 155 (13.7)           | 36 (23.2)| 2.32 (1.39–3.89)*      |         | 23 (14.8)            |         | 1.46 (0.81–2.64)       |         |
|46 and above                      | 115 (10.2)           | 27 (23.5)| 1.97 (1.06–3.65)*      |         | 23 (20.0)            |         | 1.62 (0.83–3.15)       |         |
|Gender                           |                      |         |                        |         |                      |         |                        |         |
|Male                             | 457 (40.4)           | 86 (18.8)| Reference              |         | 68 (14.9)            |         | Reference              |         |
|Female                           | 675 (59.6)           | 100 (14.8)| 0.086                   |         | 70 (14.8)            |         |                        |         |
|Highest educational level        |                      |         |                        |         |                      |         |                        |         |
|High school and below            | 105 (9.3)            | 12 (11.4)| Reference              |         | 16 (15.2)            |         | Reference              |         |
|Technical school                 | 210 (18.6)           | 56 (26.7)| p < 0.001              |         | 3.82 (1.83–7.97)***  |         | 37 (17.6)              |         |
|Monthly household income (CNY)   |                      |         |                        |         |                      |         |                        |         |
|<4000                            | 259 (22.9)           | 36 (13.9)| Reference              |         | 29 (11.2)            |         | Reference              |         |
|4000–9999                        | 497 (43.9)           | 78 (15.7)| 0.279                  |         | 63 (12.7)            |         | 0.900                   |         |
|10000–14999                      | 200 (17.7)           | 36 (18.0)| Reference              |         | 26 (13.0)            |         | Reference              |         |
|> 15000                          | 176 (15.5)           | 36 (20.5)| Reference              |         | 20 (11.4)            |         | Reference              |         |
|Current location                 |                      |         |                        |         |                      |         |                        |         |
|Urban                            | 830 (73.3)           | 120 (14.5)| Reference              |         | 98 (11.8)            |         | Reference              |         |
|Sub-urban                        | 184 (16.3)           | 33 (17.9)| 0.001                  |         | 1.44 (0.92–2.25)     |         | 24 (13.0)              |         |
|Rural                            | 118 (10.4)           | 33 (28.0)| 2.78 (1.68–4.57)***    |         | 16 (13.6)            |         |                        |         |
|Self-perceived health status     |                      |         |                        |         |                      |         |                        |         |
|Excellent                        | 114 (10.1)           | 20 (17.5)| Reference              |         | 22 (19.3)            |         | Reference              |         |
|Very good                        | 361 (31.9)           | 52 (14.4)| 0.606                  |         | 46 (12.7)            |         | 0.074                   |         |
|Good                             | 348 (30.7)           | 58 (16.7)| 0.597                  |         | 37 (10.6)            |         | Reference              |         |
|Fair/Poor                        | 309 (27.3)           | 56 (18.1)| 0.544                  |         | 33 (10.7)            |         | Reference              |         |
|BMI category                     |                      |         |                        |         |                      |         |                        |         |
|Underweight                      | 134 (11.8)           | 20 (14.9)| Reference              |         | 14 (10.4)            |         | Reference              |         |
|Normal                           | 617 (54.5)           | 89 (14.4)| 0.279                  |         | 66 (10.7)            |         | Reference              |         |
|Overweight                       | 212 (18.7)           | 43 (20.3)| 0.112                  |         | 31 (14.6)            |         | 0.165                   |         |
|Obese                            | 169 (14.9)           | 34 (20.1)| Reference              |         | 27 (16.0)            |         | Reference              |         |
|Ever diagnosed with chronic diseases | 132 (11.7)      | 38 (28.8)| p < 0.001              |         | 1.88 (1.19–2.99)*    |         | 23 (17.4)              | 0.064   |
|No                               | 1000 (88.3)          | 148 (14.8)| Reference              |         | 115 (11.5)           |         | Reference              |         |
|Smoking status                   |                      |         |                        |         |                      |         |                        |         |
|Never                            | 982 (86.7)           | 156 (15.9)| 0.236                  |         | 105 (10.7)           |         | p < 0.001              | 1.71 (1.02–2.88)* |
|Former/Current                   | 150 (13.3)           | 30 (20.0)| Reference              |         | 33 (22.0)            |         | Reference              |         |
|Previous health-seeking experience with TCM | 258 (22.8)      | 70 (27.1)| p < 0.001              |         | 1.91 (1.30–2.80)*    |         | 54 (20.9)              |         |
|Traditonal medicine              | 874 (77.2)           | 116 (13.3)| Reference              |         | 84 (9.6)             |         | Reference              |         |
|Western medicine                 |                      |         |                        |         |                      |         |                        |         |
|Effectiveness of TCM in resolving illness symptoms when sick | 223 (19.7) | 44 (19.7) | Reference | 45 (20.2) | 2.86 (0.63–13.02) |         | Reference |         |
|TCM could help resolve most of the illness symptoms | 865 (76.4) | 136 (15.7) | 0.311 | 91 (10.5) | p < 0.001 | 1.75 (0.40–7.67) | Reference |         |
|TCM usually unable to resolve illness symptoms | 44 (3.9) | 6 (13.6) | Reference | 2 (4.5) |         | Reference |         |         |
|Ever experienced adverse reactions effects from TCM use | 401 (35.4) | 86 (21.4) | 0.001 | 1.70 (1.21–2.38)* | 62 (15.5) | 0.014 | 1.90 (1.29–2.80)* |         |
|No                              | 731 (64.6)           | 100 (13.7)| Reference              |         | 76 (10.4)            |         | Reference              |         |
|Attitudes towards the use of TCM for COVID-19 | 492 (43.5) | 54 (11.0) | p < 0.001 | Reference | 23 (4.7) | p < 0.001 | Reference |         |
|Low score (8–18) | 115 (18.0) | 3.22 (1.97–5.28)** |         |         |         |         |         |         |
|High score (19–32) | 118 (13.6) | 0.001 | 1.69 (1.17–2.46)* |         | 115 (18.0) | 3.22 (1.97–5.28)** |         |         |

*p < 0.05, *p < 0.01, **p < 0.001.
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TCM to prevent SARS-CoV-2 infection. Likewise, people who have experienced previous adverse reactions following TCM use (OR = 1.90, 95% CI 1.29–2.80) and higher total attitudes scores were also more likely to self-medicate with TCM to prevent COVID-19 infection (OR = 1.67, 95% CI 1.17–2.46).

4. Discussion

The COVID-19 pandemic has presented an unprecedented challenge in its prevention and treatment, which has resulted in an incredible boost in the utilisation of TCM. TCMs are easily obtained over-the-counter for self-medication. Self-medication to prevent and resolve COVID-19 symptoms with TCM during the pandemic can have serious implications; hence, this study has investigated the practice of self-medication with TCM, its associated factors, and types of TCM used among the general public in China.

This study provides some preliminary findings that may lead to further exploration of the public’s attitudes towards the use of TCM for COVID-19. In this study, it was evident that the roots of TCM are deep within the Chinese population as a considerable proportion viewed TCM to be more effective and safer than conventional Western therapy in the treatment of COVID-19. There were also opinions that seeking TCM care is more accessible and less costly. It shall be mentioned that, although TCM has been clinically practised for thousands of years, most traditional Chinese medicine products do not possess up-to-date data regarding their safety and modern scientific evidence for their claimed clinical uses. This shortcoming of traditional Chinese medicine restricts its ongoing development and its acceptance and promotion by mainstream healthcare systems internationally. In Western countries, traditional Chinese medicine is usually been recognized as a popular form of complementary and alternative medicine with the belief that traditional Chinese medicine incurs fewer side effects, as it is generally extracted from natural products without artificial additives. Given the fact that the philosophy, diagnosis, prescription principles and processing methods of traditional Chinese medicine remedies are completely different to modern Western Medicine, attempts to manage and regulate it in a scientific and modernised manner have faced great challenges. In contrast, use of traditional Chinese medicine is prevalent throughout east and south-east Asian countries, including Japan, Korea and Vietnam. Currently, the Chinese government provides free medical treatment for COVID-19 patients and their costs of treatment are covered by the country’s healthcare system and local government funds.

Fig. 1. Proportion of strongly agree/agree responses for attitudes toward the use of TCM for COVID-19 (N = 1132).

Fig. 2. Type of TCM used as self-medication to resolve COVID-19 symptoms (N = 186) and prevent SARS-CoV-2 infection (N = 138).
hospital may probably drive people to self-medicate with TCMs. Our findings on attitudes toward TCM for COVID-19 also suggest that TCM practitioners play an important role for cautious patients seeking TCMs for COVID-19. Patients should also obtain TCM from legitimate sources and administer them as prescribed. Although some TCM products have been approved by the Chinese government as part of standard therapy and for the management of COVID-19, the general public should enlighten about the risk of self-medication practices and the importance of using TCM under the guidance of TCM practitioners. Many unproven TCMs which claim to prevent or cure COVID-19 have spread through digital media since the pandemic onset. In this unprecedented time, with the severity of COVID-19 and the unavailability of effective treatment, many attempted to use TCM in the hope of finding it to be a potential coronavirus treatment. In this study, a considerable proportion of participants reported a willingness to try TCM despite the absence of scientific evidence. Enhanced public awareness about the proper use of TCM for COVID-19 is warranted. It is understandable, given the high number of infections and deaths that have occurred from coronavirus, that many people are turning to unconventional treatments, although these are not approved or authorised by the National Health Commission. It is important for healthcare providers to beware of health belief and practices of patients and to provide appropriate patient education. Effective doctor-patient communication is important to enlighten the public to be aware of the need to carefully evaluate scientific data on a particular TCM to ensure that it is both safe and effective for particular use. More importantly, the public should be instructed not to use TCMs to replace or delay seeking conventional care.

In the present study, 16.4% of individuals reported ever self-medicating with TCM to resolve COVID-19 symptoms to be an important concern. The widespread use of self-medicating with TCM for COVID-19 presents major challenges for safe TCM use. In addition to potential risks of the use of TCM, dependency on TCM to relieve COVID-19 symptoms may also potentially result in several other serious consequences. Firstly, reliance on self-medication with TCM may cause a delay seeking conventional medical care, miss out proper diagnosis and treatment, and hamper the government’s testing, tracing and, and quarantine efforts. Delayed or avoided medical care among patients infected with SARS-CoV-2 has been reported to result in an increased risk of experiencing negative health outcomes and heightened morbidity and mortality risks in otherwise treatable and preventable health conditions. To date, to our best knowledge, adverse events or TCM poisoning cases due to self-medication with TCM for COVID-19 have not been reported in China during the pandemic. Furthermore, the exact statistics of fatality due to the delay in seeking conventional treatment as a result of turning to TCM in the hope of finding a cure for COVID-19 have not been documented. The damage caused by using self-medication TCM during the COVID-19 pandemic warrants further investigation, hence its detrimental effects are pending further evidence. Nonetheless, the general public should be advised to not self-medicate with TCM but to seek medical advice and screen for COVID-19 if they develop symptoms of COVID-19. Further investigations are warranted to determine the reasons for the preference in reliance on TCM for the treatment of COVID-19-related symptoms among the public. Denial, stigma and fear about SARS-CoV-2 exposure were among the reasons that prevented or delayed timely healthcare seeking. Rumours and myths spreading through social media also greatly promoted TCMs during the COVID-19 pandemic. This requires more extensive investigations to promote appropriate help-seeking behaviours amidst COVID-19.

The findings of this study revealed that many used Lianhua Qingwen capsule/granule, which was recommended by the country’s National Health Commission to resolve COVID-19 symptoms. Nevertheless, a considerably higher proportion also used TCM, which is not recommended for COVID-19, such as Ganmao granules, Banlangen granules and Shuanghuanglian oral liquid. All these three over-the-counter TCMs were the most commonly used TCM among the Chinese population for treatment of common cold syndromes, such as fever, cough, sore throat and loss of appetite. Banlangen granules have been widely used during the fight against severe acute respiratory syndrome (SARS), although no governmental recommendations were established. At the start of COVID-19, Banlangen granules have been sold out in many cities after top Chinese respiratory expert Zhong Nanshan said it might be able to inhibit coronavirus. In addition, Shuanghuanglian oral liquid has previously been recommended by National Health Commission for the treatment of influenza and SARS. Although Shuanghuanglian oral liquid has also been suggested as a potential TCM treatment against SARS-CoV-2 infection, more evidence are still waiting from the ongoing clinical trials. In the open-ended response, some of the TCMs used were recommended by the regional guidelines, although not at the national level, such as the Lanqing oral solution and Small Burpleurum granules; both of these were recommended by the Yunnan and Guandong regional guidelines, respectively. Of particular concern is the use of Houttuynia cordata Thumb, Pudilan oral solution, Qingkailing granules, Yinhuang particles and Zhongsheng pills, which were neither recommended in national or regional guidelines. In China, these TCMs were used for treatment of wind-heat common cold-related symptoms including upper respiratory tract infection. The choice of TCMs to resolve COVID-19 symptoms is unknown and not queried in this study. There is a need to further investigate the reason why the particular TCM is used, and whether people are aware of the National Health Commission guidelines set forth for the TCM used in both the national and regional levels. The public should be warned against the use of the TCMs not listed in the guidelines for the treatment of COVID-19 symptoms.

Likewise, this study found that a considerable proportion of people used TCMs to prevent SARS-CoV-2 infection. A recent survey of healthcare workers in China reported a considerable high proportion (nearly 90%) reported ever use TCM for COVID-19 prevention. The vast majority of healthcare workers also viewed that in the absence of specific treatment for COVID-19, TCM could be used for the prevention of SARS-CoV-2. They also reported a willingness to take TCM to prevent COVID-19 despite uncertainties about its effectiveness. This implies general trust among the public and even healthcare providers in the use of TCMs. With regard to the use of TCMs to prevent SARS-CoV-2 infection, it is important to caution the public about unnecessarily taking TCMs without symptom experience, as this may have several consequences. Although most TCMs are generally safe when used as prescribed or as directed, using them without prescription unnecessarily, and especially over considerably longer periods of time, may potentially cause adverse effects and strains on the health budget. As the COVID-19 pandemic is still ongoing, it is unclear whether the participants use TCMs over a long period of time as means of prevention against SARS-CoV-2 infection. Most importantly, it has not been conclusively proven whether TCMs may effectively inhibit SARS-CoV-2 infection, hence caution should be taken as some TCMs should not be used for a prolonged time.

In the present study, we found distinct social demographic patterns regarding the use of TCMs. Older age participants, from rural areas and with chronic diseases were more likely to self-medicate using TCMs to resolve COVID-19 symptoms. People from more remote areas may have deep cultural roots in TCM use that are strongly woven into daily life. Our study also found that there was a higher proportion of TCM users among higher income groups, although the association was not significant. However, study participants with higher education levels were significantly more likely to use TCMs. These findings may be explained to people in lower socioeconomic backgrounds having higher barriers to access to healthcare including TCM treatment. Likewise, other studies also identified higher education and income as predictors of TCM or complementary and alternative medicine use among adults. The social demographic disparities in TCM use found in this study provide information on the populations at risk, as well as the population of interest for interventions. Of note, this study found that people who reported ever experiencing adverse reactions from the previous use of
TCMs were more likely to self-medicate with TCMs to resolve COVID-19 symptoms and prevent SARS-CoV-2 infection. This perhaps explains why they did not experience serious adverse events in their previous experience.

The main strength of this study lies in its use of a nationally representative sample in China. Nonetheless, this study has several limitations. First, despite the nationally representative samples, this study has an overrepresentation of participants from the younger age group and from the Eastern region of China. It is also important to note that individual who are not fluent in Chinese language may not be able to respond to the survey. Second, this is a cross-sectional study, so we cannot determine the cause-effect relationships. Third, the survey link was disseminated through WeChat, therefore, we are unable to obtain the denominator for a calculation of response rates and to report their reasons for non-participants. Lastly, a self-reported survey may be subjected to social desirability response bias, non-response bias and recall bias, which may potentially lead to biased results and erroneous study conclusions.

5. Conclusion

Turning to unconventional treatments in the unprecedented time of the COVID-19 pandemic is comprehensible. Nonetheless, encouraging the use of TCM with medical supervision is important. The use of TCMs for COVID-19 is not recommended by the National Health Commission and should therefore be avoided. A deeper understanding of the self-treatment behaviour during the COVID-19 pandemic is needed to uncover the service gaps and provide insights into the development of strategies to improve the country’s health care delivery system. A holistic approach should be taken to improve the appropriate use of TCM for COVID-19 through public education, the training of healthcare professionals, including TCM pharmacists, and the strict pharmaceutical regulations and regulatory of disseminating information about the efficacy of TCM for COVID-19 without scientific data on the safety and efficacy for a particular use.

Ethics approval and informed consent

This study was approved by the Biomedical Research Ethics Committee of the Fujian Medical University, Fuzhou, China (Approval: FJMU 2020 NO.1). This study was conducted in accordance with the principles of the Declaration of Helsinki. The study participants were informed as to the purpose of the study, and that informed consent included consent to have anonymized responses published. It was also noted in the survey form that consent was implied upon completion of the questionnaire. All responses were collected and analysed without identifiers.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.ctim.2022.102898.

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