Rural and Female Patients with Old Myocardial Infarction Lacked Knowledge and Preventive Measures During the Beginning of the COVID-19 Epidemic in Chongqing, Southwest China

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Background:
Coronavirus disease 2019 (COVID-19) has emerged as a global threat. This study was performed to gain an understanding of COVID-19-related knowledge, attitudes, and practices among susceptible individuals.

Material/Methods:
Patients who had been diagnosed with old myocardial infarction were followed up via telephone survey based on an established follow-up system at the beginning of the COVID-19 outbreak (January 2020) in Chongqing, Southwest China.

Results:
A total of 631 eligible patients participated in this survey, and 40.6% of the rural respondents did not know the transmission routes of SARS-CoV-2, which was higher than the proportion of urban respondents (40.6% vs 31.0). Rural residents had a lower rate of adopting preventive measures than urban residents, such as wearing masks (76.7% vs 90.1%), avoiding meetings and gatherings (58.6% vs 68.5%), and hand washing (56.0% vs 63.8%). A higher percentage of women than men did not take any preventive measures (11.3% vs 7.6%), while a lower percentage of women than men wore masks (77.7% vs 84.5%). Multiple logistic regression revealed that rural patients were more likely to lack knowledge about transmission (odds ratio (OR): 1.51). Rural patients had an increased risk of failing to implement protective measures.

Conclusions:
Female and rural populations lacked knowledge and failed to adopt protective measures during the beginning of the COVID-19 epidemic. Therefore, these populations may benefit from health education campaigns and policies.

Keywords:
Circumcision, Female • Myocardial Infarction • SARS Virus

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Background

Since December 2019, pneumonia patients with fever, cough, fatigue, and dyspnea have been identified in Wuhan, China, and the disease is currently known as coronavirus disease 2019 (COVID-19) [1-3]. Chinese scholars isolated the RNA of the related virus from patient secretions and named the entity the 2019 novel coronavirus (2019-nCoV) [4]. Later, the virus was given the name severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Analysis of the structure of SARS-CoV-2 revealed that the receptor-binding domain (RBD) of the S protein of SARS-CoV-2 is similar to that of SARS-CoV, allowing the virus to bind to angiotensin-converting enzyme 2 (ACE2) protein. The ACE2 gene and protein are mainly expressed in the airway epithelium of the lung, cardiac endothelium, vascular endothelium, intestinal epithelium, and eccrine glands [5,6]. These anatomical foundations suggest that SARS-CoV and SARS-CoV-2 can spread through not only the respiratory tract, but also the digestive tract, and cause lung inflammation and heart injury [4]. In autopsies of patients with SARS, 35% of heart tissue sections contained SARS-CoV RNA and showed evidence of SARS-CoV-induced inflammatory responses. Among patients infected with SARS-CoV-2, 12% had heart injuries [7].

On the one hand, studies have reported that 40% of patients infected with SARS-CoV-2 suffer from cardiovascular and cerebrovascular diseases, 15% suffer from hypertension, and 32-51% of all patients have chronic underlying diseases [7,8]. Therefore, patients with these heart diseases constitute a high-risk population susceptible to COVID-19 [7,8]. On the other hand, during the pandemic, patients with heart disease have been unwilling to visit emergency departments due to the fear of COVID-19, which led to a poor prognosis for such patients [9,10]. Hence, an understanding of the level of mastery of COVID-19-related knowledge and the level of adoption of preventive measures in this susceptible population is conducive to COVID-19 prevention in high-risk patients with heart diseases. However, no survey to date has focused on knowledge and preventive measures among these high-risk patients. Thus, the aim of this study was to assess knowledge, attitudes, and practices (KAP) related to COVID-19 in this high-risk population with heart disease at the beginning of the COVID-19 outbreak in Chongqing, Southwest China.

Material and Methods

This study was an epidemiological investigation involving eligible patients who were diagnosed with ST-segment elevation myocardial infarction (STEMI) at the Yongchuan Hospital of Chongqing Medical University between January 2012 and October 2019. To understand COVID-19 awareness and behaviors and psychological states among these patients, we conducted telephone surveys over a 4-day period (January 27, 2020, to January 30, 2020) using a previously constructed follow-up system for patients with myocardial infarction [11]. A standard structured Chinese questionnaire was designed (Supplementary Material).

The inclusion criteria were as follows: (1) age older than 18 years, (2) a diagnosis of STEMI, and (3) available contact information. Patients who met any of the following criteria were excluded: (1) death and (2) loss to follow-up.

Patient information was collected, including sex, age, diagnosis, and past medical history. Follow-up items included the residential addresses of the respondents, whether the respondents were aware of COVID-19, whether the respondents understood the main routes of transmission, how the respondents obtained correct epidemiological knowledge, whether the respondents knew about and adopted preventive measures (wearing masks, washing hands, opening windows for ventilation, disinfecting indoor air and objects), psychological states (not worried, worried, extremely worried), acceptance of local control measures, whether the respondents had had contact with people from Wuhan or other epidemic areas in Hubei Province, and whether the respondents were confident that the epidemic would be successfully controlled. At the same time, upon completion of this study, we provided information about COVID-19 and preventive measures for the respondents who lacked correct information. This study was approved by the Ethics Committee of the Yongchuan Hospital of Chongqing Medical University. Verbal consent was obtained from each participant at the beginning of the study. All collected data were anonymous.

Statistical Analysis

The data were analyzed using SPSS version 20.0 statistical software (SPSS, Inc., Chicago, IL, USA). Skewed data are presented as the medians and interquartile ranges. Categorical variables are expressed as frequencies (%) and were compared using the chi-squared test or Fisher’s exact test. Multivariate logistic regression was used to analyze the correlations of different demographic backgrounds and psychological states with knowledge about SARS-CoV-2 transmission routes and preventive measures. P<0.05 was considered statistically significant.

Results

A total of 1319 cases of old myocardial infarction were identified. After the 4-day telephone follow-up period, a total of 631 patients were successfully followed up, and the response rate was 53.4% (Figure 1). Male respondents accounted for 73.7% of the sample, respondents aged older than 60 years...
The percentages of rural vs urban women who adopted the preventive measures of wearing masks and hand washing were not know the transmission routes of SARS-CoV-2 was higher than the percentage (21.9%) of corresponding urban women. Specifically, the percentage (48.6%) of rural women who did not adopt any preventive measures (13.3% vs 5.6%, \( P=0.001 \)), while a lower percentage of female respondents than male respondents wore masks (77.7% vs 86.9%, \( P=0.005 \)). In terms of mental health and psychological states, no significant difference in the degree of worry was found between male and female respondents, who were all confident that the country could successfully control the epidemic (Table 2).

The percentage of rural respondents who did not know the transmission routes of SARS-CoV-2 was 40.6%, which was higher than the percentage (31.0%) of urban respondents \( (P=0.012) \). The rural respondents had lower rates than the urban respondents for the adoption of different preventive measures, such as wearing masks (76.7% vs 90.1%, \( P<0.001 \)), avoiding meetings and gatherings (58.6% vs 68.5%, \( P=0.011 \)), and hand washing (56.0% vs 63.8%, \( P=0.036 \)). The rural and urban respondents all had a calm mood, and 95.1% of the respondents believed that this epidemic could be overcome through the control measures of the state (Table 2).

Rural women lagged behind urban women in terms of their knowledge related to the transmission routes of SARS-CoV-2 and the adoption of relevant preventive and control measures. Specifically, the percentage (48.6%) of rural women who did not know the transmission routes of SARS-CoV-2 was higher than the percentage (21.9%) of corresponding urban women. The percentages of rural vs urban women who adopted the preventive measures of wearing masks and hand washing were not know the transmission routes of SARS-CoV-2 was higher than the percentage (21.9%) of corresponding urban women. Specifically, the percentage (48.6%) of rural women who did not adopt any preventive measures (13.3% vs 5.6%, \( P=0.001 \)), while a lower percentage of female respondents than male respondents wore masks (77.7% vs 86.9%, \( P=0.005 \)). In terms of mental health and psychological states, no significant difference in the degree of worry was found between male and female respondents, who were all confident that the country could successfully control the epidemic (Table 2).

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Factors Affecting Knowledge About Transmission and Protection and Prevention Methods Among Patients

Multiple logistic regression revealed that rural patients had a higher risk of lacking knowledge about transmission (odds ratio \( \text{OR} \): 1.51, 95% confidence interval \( \text{CI} \): 1.08-2.11). At the same time, they had a lower risk of acquiring knowledge about droplet transmission (\( \text{OR}: 0.63, 95\%\text{CI}: 0.45-0.87 \)). Additionally, psychological states, especially extreme worry, significantly increased the risk of lacking knowledge about droplet transmission (\( \text{OR}: 2.04, 95\%\text{CI}: 1.04-4.01 \)) (Table 4).

In terms of protection and prevention methods, females were less likely to wear masks (\( \text{OR}: 0.46, 95\%\text{CI}: 0.28-0.75 \)). Rural patients were less likely to adopt protective measures, including wearing a mask (\( \text{OR}: 0.31, 95\%\text{CI}: 0.19-0.50 \)), avoiding meetings and gatherings (\( \text{OR}: 0.64, 95\%\text{CI}: 0.46-0.89 \)), opening windows for ventilation (\( \text{OR}: 0.51, 95\%\text{CI}: 0.34-0.77 \)), washing hands frequently (\( \text{OR}: 0.72, 95\%\text{CI}: 0.52-0.73 \)), disinfection (\( \text{OR}: 0.45, 95\%\text{CI}: 0.28-0.73 \)), and none (\( \text{OR}: 3.16, 95\%\text{CI}: 1.66-5.99 \)). In addition, the degree of worry may affect patients’ willingness to adopt protective measures.
Table 2. Cross-tabulation of knowledge, attitudes, and practices regarding SARS-CoV-2 among respondents.

|                                | Total (n=631) | Sex          | Male (n=465) | Female (n=166) | χ²  | P    | Sex          | Male (n=266) | Female (n=365) | χ²  | P    |
|--------------------------------|---------------|--------------|--------------|----------------|-----|------|--------------|--------------|----------------|-----|------|
| Awareness rate                 |               |              |              |                |     |      |              |              |                |     |      |
| Awareness                      | 625 (99.0)    | 164 (98.8)   | 461 (99.1)   |                | 0.656 | 262 (98.5) | 363 (99.5)   | 0.0246 |
| Transmission routes            |               |              |              |                |     |      |              |              |                |     |      |
| Do not know                    | 221 (35.0)    | 55 (33.1)    | 166 (35.7)   |                | 0.354 | 0.552 | 108 (40.6)   | 113 (31.0)   | 6.287 | 0.012 |
| Droplet transmission           | 380 (60.2)    | 103 (62.0)   | 277 (59.6)   |                | 0.314 | 0.575 | 143 (53.8)   | 237 (64.9)   | 8.017 | 0.005 |
| Transmission through the digestive tract | 6 (1.0) | 3 (1.8) | 3 (0.6) | 0.190 | 4 (1.5) | 2 (0.5) | 0.246 |
| Bloodborne transmission        | 2 (0.3)       | 0 (0.0)      | 2 (0.4)      |                | 1.000 | 2 (0.8) | 0 (0.0)      | 0.177 |
| Contact transmission           | 77 (12.2)     | 20 (12.0)    | 57 (12.3)    |                | 0.005 | 0.943 | 31 (11.7)    | 46 (12.6)    | 0.129 | 0.719 |
| Droplet and contact transmission | 55 (8.7) | 17 (10.2) | 38 (8.2) | 0.658 | 0.417 | 21 (7.9) | 34 (9.3) | 0.390 | 0.532 |
| Access to knowledge            |               |              |              |                |     |      |              |              |                |     |      |
| WeChat or Internet             | 460 (72.9)    | 115 (69.3)   | 435 (74.2)   |                | 1.497 | 0.221 | 182 (68.4)   | 278 (76.2)   | 4.670 | 0.031 |
| TV                             | 437 (69.3)    | 113 (68.1)   | 324 (69.7)   |                | 0.148 | 0.700 | 165 (62.0)   | 272 (74.5)   | 11.274 | 0.001 |
| Newspaper                      | 10 (1.6)      | 3 (1.8)      | 7 (1.5)      |                | 0.728 | 5 (1.9) | 5 (1.4)      | 0.750 |
| Neighborhood/village committee | 237 (37.6)    | 66 (39.80)   | 171 (36.8)   |                | 0.465 | 0.495 | 112 (42.1)   | 125 (34.2)   | 4.052 | 0.044 |
| Other                          | 20 (3.2)      | 7 (4.2)      | 13 (2.8)     |                | 0.805 | 0.370 | 7 (2.6)      | 13 (3.6)     | 0.434 | 0.510 |
| Do you trust the new media platforms? |       |              |              |                |     |      |              |              |                |     |      |
| Yes                            | 454 (71.9)    | 119 (71.7)   | 335 (72.0)   |                | 0.032 | 0.851 | 10 (3.8)     | 13 (3.6)     | 2.210 | 0.331 |
| No                             | 23 (3.6)      | 5 (3.0)      | 18 (3.9)     |                | 0.324 | 0.851 | 10 (3.8)     | 13 (3.6)     | 2.210 | 0.331 |
| Uncertain                      | 154 (24.4)    | 42 (25.3)    | 112 (24.1)   |                | 0.032 | 0.851 | 57 (21.4)    | 97 (26.6)    | 0.434 | 0.510 |
| Source of accurate information |               |              |              |                |     |      |              |              |                |     |      |
| New media                      | 145 (38.6)    | 35 (35.7)    | 110 (39.6)   |                | 0.454 | 0.500 | 57 (38.0)    | 88 (38.9)    | 0.033 | 0.855 |
| TV                             | 294 (78.2)    | 75 (76.5)    | 219 (78.8)   |                | 0.214 | 0.643 | 107 (71.3)   | 187 (82.7)   | 6.889 | 0.009 |
| Official apps and websites     | 67 (17.8)     | 17 (17.3)    | 50 (18.0)    |                | 0.020 | 0.887 | 26 (17.3)    | 41 (18.1)    | 0.040 | 0.841 |
| Official hotlines              | 1 (0.3)       | 0 (0.0)      | 1 (0.4)      |                | 0.000 | 1 (0.7) | 0 (0.0)      | 0.399 |
| Other (broadcast, community notification, unit file, etc.) | 54 (14.4) | 17 (17.3) | 37 (13.3) | 0.960 | 0.327 | 21 (14) | 33 (14.6) | 0.027 | 0.871 |
| Do not know                    | 29 (7.7)      | 7 (7.1)      | 22 (7.9)     |                | 0.060 | 0.806 | 11 (7.3)     | 18 (8.0)     | 0.050 | 0.822 |
to wear a mask, with extremely worried people being 3.77 times more likely to wear a mask (95%CI: 1.28-11.13) (Table 5).

**Discussion**

One of the most important lessons learned from previously treated COVID-19 patients is that early diagnosis and symptomatic treatment can drastically improve the prognosis. Viral RNA screening is the main strategy for controlling COVID-19, and some other biomarkers, such as serum porphobilinogen and aminolaevulinic acid, might be used as screening tools for infected patients in the future [12]. Most importantly, however, prevention is key for individuals and especially healthcare professionals, since effective drugs to treat COVID-19 are lacking.

In our study, we used a previously constructed myocardial infarction follow-up system to interview a population that is susceptible to COVID-19. Among our target population, 70.5% of individuals were aged over 60 years, and 46.4% had a history of hypertension. The population composition in this study was consistent with reported distribution characteristics based on data from infected individuals [7,8]. Therefore, our target population was at high risk for COVID-19 infection.

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Table 2 continued. Cross-tabulation of knowledge, attitudes, and practices regarding SARS-CoV-2 among respondents.

| Total (n=631) | Sex | Place of residence | \( \chi^2 \) | \( p \) | Sex | Place of residence | \( \chi^2 \) | \( p \) |
|-------------|-----|-------------------|-------------|------|-----|-------------------|-------------|------|
|             | Female (n=166) | Male (n=465) | Rural (n=266) | Urban (n=365) |     |                   |             |      |
| Do you know about preventive measures? | Yes | 563 (89.2) | 144 (86.7) | 419 (90.1) | 1.437 | 0.231 | 227 (85.3) | 336 (92.1) | 7.219 | 0.007 |
| Have you purchased protective equipment? | Yes | 496 (78.6) | 127 (76.5) | 369 (79.4) | 0.59 | 0.442 | 188 (70.7) | 308 (84.4) | 17.190 | <0.001 |
| Preventive measures | Wearing masks | 533 (84.5) | 129 (77.7) | 404 (86.9) | 7.843 | 0.005 | 204 (76.7) | 329 (90.1) | 21.203 | <0.001 |
| Avoiding meetings and gatherings | 406 (64.3) | 108 (65.1) | 298 (64.1) | 0.051 | 0.822 | 156 (58.6) | 250 (68.5) | 6.502 | 0.011 |
| Opening windows for ventilation | 140 (22.2) | 39 (23.5) | 101 (21.7) | 0.223 | 0.637 | 43 (16.2) | 97 (26.6) | 9.658 | 0.002 |
| Washing hands | 382 (60.5) | 102 (61.4) | 280 (60.2) | 0.078 | 0.781 | 149 (56.0) | 233 (63.8) | 3.939 | 0.047 |
| Disinfection | 101 (16.0) | 27 (16.3) | 74 (15.9) | 0.011 | 0.916 | 27 (10.2) | 74 (20.3) | 11.729 | 0.001 |
| None | 48 (7.6) | 22 (13.3) | 26 (5.6) | 10.217 | 0.001 | 31 (11.7) | 17 (4.7) | 10.717 | 0.001 |
| Have you had contact with people returning from Wuhan or Hubei? | Yes | 78 (12.4) | 24 (14.5) | 54 (11.6) | 0.914 | 0.339 | 37 (13.9) | 41 (11.2) | 1.018 | 0.313 |
| Are you worried about being infected? | Not worried | 283 (44.8) | 68 (41.0) | 215 (46.2) | 114 (42.9) | 169 (46.3) | 91 (34.2) | 120 (32.9) | 0.098 |
| A bit worried | 211 (33.4) | 64 (38.6) | 147 (31.6) | 3.219 | 0.039 | 44 (16.5) | 40 (11.0) | 6.299 | 0.009 |
| Worried | 84 (13.3) | 19 (11.4) | 65 (14.0) | 0.001 | 0.960 | 44 (16.5) | 40 (11.0) | 6.299 | 0.009 |
| Extremely worried | 53 (8.4) | 15 (9.0) | 38 (8.2) | 17 (6.4) | 36 (9.9) | 17 (6.4) | 36 (9.9) | 6.299 | 0.009 |
| Do you think you live in a safe area? | Yes | 564 (89.4) | 142 (85.5) | 422 (90.8) | 3.499 | 0.061 | 237 (89.1) | 327 (89.6) | 0.039 | 0.843 |
| Do you have confidence that the SARS-CoV-2 epidemic will be overcome? | Yes | 600 (95.1) | 155 (93.4) | 445 (95.7) | 1.416 | 0.234 | 253 (95.1) | 347 (95.1) | 0.001 | 0.980 |
Our investigation found that among the high-risk population with heart disease, the rural population lacked relevant knowledge and failed to take protective measures, which is similar to observations in a study performed by Elelu, who reported that in Nigeria, the percentage of the population who had adequate knowledge about avian influenza was lower in rural areas than in urban areas (11.1% vs 39.3%, respectively) [13]. Our findings are also consistent with Shengen’s finding that the level of knowledge of the influenza virus H10N8 can be predicted by place of residence [14]. In Pakistan, respondents living in rural areas received lower scores for hepatitis B virus knowledge than did urban residents [15]. The same result was found in Malaysia, where researchers observed that aboriginal communities had lower levels of knowledge of malaria transmission, implementation of practices regarding seeking treatment, and understanding of effective preventive measures.

Table 3. The influence of sex and place of residence on the respondents’ awareness.

| Awareness rate                  | Rural (n=70) | Urban (n=96) | χ² | P    | Rural (n=196) | Urban (n=269) | χ² | P    |
|--------------------------------|-------------|-------------|----|------|-------------|-------------|----|------|
| Awareness                      | 68 (97.1)   | 96 (100.0)  | 0.176 | 0.624 | 267 (99.3)  | 278 (99.3)  | 0.430 | 0.056 |
| Transmission routes            |             |             |     |      |             |             |     |      |
| Don not known                  | 34 (48.6)   | 21 (21.9)   | 13.023 | <0.001 | 74 (37.8)   | 92 (34.2)   | 0.624 | 0.430 |
| Droplet transmission           | 32 (45.7)   | 71 (74.0)   | 13.714 | <0.001 | 111 (56.6)  | 166 (61.7)  | 1.214 | 0.271 |
| Transmission through the digestive tract | 2 (2.9)     | 1 (1.0)     | 0.574 | 0.457 | 2 (1.0)     | 1 (0.4)     | 0.576 | 0.177 |
| Bloodborne transmission        | –           | –           | –   | –    | 2 (1.0)     | 0 (0.0)     | –   | –    |
| Contact transmission           | 7 (10.0)    | 13 (13.5)   | 0.479 | 0.489 | 24 (12.2)   | 33 (12.3)   | 0.000 | 0.994 |
| Droplet and contact transmission | 6 (8.6)     | 11 (11.5)   | 0.367 | 0.545 | 15 (7.7)    | 23 (8.6)    | 0.122 | 0.727 |
| Access to knowledge            |             |             |     |      |             |             |     |      |
| WeChat or Internet             | 41 (58.6)   | 74 (77.1)   | 6.518 | 0.011 | 141 (71.9)  | 204 (75.8)  | 0.900 | 0.343 |
| TV                             | 41 (58.6)   | 72 (75.0)   | 5.027 | 0.025 | 124 (63.3)  | 200 (74.3)  | 6.593 | 0.010 |
| Newspaper                      | 1 (1.4)     | 2 (2.1)     | 1.000 | 0.312 | 4 (2.0)     | 3 (1.1)     | 0.462 | 0.149 |
| Neighborhood/village committee | 29 (41.4)   | 37 (38.5)   | 0.141 | 0.707 | 83 (42.3)   | 88 (32.7)   | 4.525 | 0.033 |
| Other                          | 4 (5.7)     | 3 (3.1)     | 0.457 | 0.497 | 3 (1.5)     | 10 (3.7)    | 1.995 | 0.158 |
| Do you know about preventive measures? |           |             |     |      |             |             |     |      |
| Yes                            | 55 (78.6)   | 89 (92.70)  | 7.037 | 0.008 | 172 (87.8)  | 247 (91.8)  | 2.103 | 0.147 |
| Have you purchased protective equipment? |           |             |     |      |             |             |     |      |
| Yes                            | 46 (65.7)   | 81 (84.4)   | 7.843 | 0.005 | 142 (72.4)  | 227 (84.4)  | 9.863 | 0.002 |
| Preventive measures            |             |             |     |      |             |             |     |      |
| Wearing masks                  | 46 (65.7)   | 83 (86.5)   | 10.057 | 0.002 | 158 (80.6)  | 246 (91.4)  | 11.685 | 0.001 |
| Avoiding meetings and gatherings | 41 (58.6)   | 67 (69.8)   | 2.242 | 0.134 | 115 (58.7)  | 183 (68.0)  | 4.313 | 0.038 |
| Opening windows for ventilation | 13 (18.6)   | 26 (27.1)   | 1.632 | 0.201 | 30 (15.3)   | 71 (26.4)   | 8.199 | 0.004 |
| Washing hands                  | 35 (50.0)   | 67 (69.8)   | 6.694 | 0.010 | 114 (58.2)  | 166 (61.7)  | 0.595 | 0.440 |
| Disinfection                   | 6 (8.6)     | 21 (21.9)   | 5.261 | 0.022 | 21 (10.7)   | 53 (19.7)   | 6.846 | 0.009 |
| None                           | 14 (20.0)   | 8 (8.3)     | 4.793 | 0.029 | 17 (8.7)    | 9 (3.3)     | 0.097 | 0.148 |
| Yes                            | 65 (92.9)   | 86 (93.5)   | 0.759 | 0.394 | 188 (95.9)  | 257 (95.5)  | 0.040 | 0.842 |

Our investigation found that among the high-risk population with heart disease, the rural population lacked relevant knowledge and failed to take protective measures, which is similar to observations in a study performed by Elelu, who reported that in Nigeria, the percentage of the population who had adequate knowledge about avian influenza was lower in rural areas than in urban areas (11.1% vs 39.3%, respectively) [13]. Our findings are also consistent with Shengen’s finding that the level of knowledge of the influenza virus H10N8 can be predicted by place of residence [14]. In Pakistan, respondents living in rural areas received lower scores for hepatitis B virus knowledge than did urban residents [15]. The same result was found in Malaysia, where researchers observed that aboriginal communities had lower levels of knowledge of malaria transmission, implementation of practices regarding seeking treatment, and understanding of effective preventive measures.
Female and rural respondents lacked knowledge about virology, which directly led to a lower likelihood of adopting preventive measures, such as wearing masks, avoiding meetings and gatherings, and washing hands. A lower level of knowledge of virology has been shown to correspond to a lower percentage of individuals adopting self-protecting measures [21]. Perception of the threat of avian influenza H5N1 and knowledge of the risk of eating infected birds were factors that motivated respondents to seek healthcare in Vietnam [22].

Wearing masks, especially N95 respirators, offers important protection against airborne and droplet-spread transmission of infectious agents. Unfortunately, we found that the degree of adoption of the practices of wearing masks and hand washing was insufficient in rural areas. Hand washing is the most economical and effective means of preventing digestive tract diseases. Since the ACE2 receptor is also expressed in the intestines and skin [6], SARS-CoV-2 transmission through the digestive tract is possible. Therefore, hand washing should be strongly promoted, especially in rural areas. Although an analysis of clinical data suggested that males are more susceptible to SARS-CoV-2 than females [7,8], females should still strictly follow preventive measures. The next step in prevention and control should focus on female and rural populations. Public dissemination of knowledge about COVID-19 prevention can facilitate control of the epidemic and help decision-making bodies make appropriate decisions.

Our results also showed that new media platforms such as WeChat (TikTok) and Weibo have become major information sources for an increasing number of people. While these
platforms facilitate the exchange of useful information, they also provide space for rumors and false news, which may increase the public’s anxiety, especially during the epidemic. Although our results showed that mild anxiety was the main public mood, some intervention guidelines and measures had been released to intervene in psychological disorders [20], reflecting great progress compared with the situation during SARS when such interventions were seldom reported [24]. This study was performed in a province neighboring Hubei Province (the epidemic center). The conclusions can be applied to neighboring provinces of Hubei Province as well as other rural areas. However, this study had some limitations. First, this survey reflected only the degree of SARS-CoV-2 infection prevention knowledge among patients during the follow-up period at the beginning of the epidemic. With the strengthening of publicity, patients may be continuously exposed to information about virology and accumulate relevant knowledge, which may lead to changes in related data. Second, the preventive measures described in the current investigation were based on current recommendations. Further in-depth studies of this virus may reveal new mechanisms of infection and pathogenesis and may consequently result in new preventive measures. For example, high expression of ACE2 protein in the digestive tract and skin epithelia [16] suggests that the digestive tract and direct contact are possible transmission routes of SARS-CoV-2. Third, due to economic reasons [20], patients with myocardial infarction who sought treatment at tertiary hospitals may not represent all patients with myocardial infarction. Lastly, we did not acquire education data from our respondents, which have proven that a lower education level was associated with an increased risk of SARS-CoV-2 infection [25]. The participants’ education levels were difficult to evaluate, as their mean age was 66 years (range 57-73 years).

| Table 5. Multiple logistic regression analysis of factors associated with the use of SARS-CoV-2 protection and prevention methods. |
|-------------------------------------------------|-----------------|-----------------|-----------------|
| | Wearing masks | Avoiding meetings and gatherings | Opening windows for ventilation |
| | OR (95% CI) | P | OR (95% CI) | P | OR (95% CI) | P |
| Sex | | | | | | |
| Female | 0.46 (0.28, 0.75) | 0.002 | 0.97 (0.66, 1.43) | 0.89 | 1.10 (0.71, 1.71) | 0.65 |
| Age | | | | | | |
| ≥60 | 1.02 (0.60, 1.7) | 0.93 | 1.32 (0.91, 1.92) | 0.13 | 1.18 (0.76, 1.82) | 0.45 |
| Residence | | | | | | |
| Rural | 0.31 (0.19, 0.50) | <0.001 | 0.64 (0.46, 0.89) | 0.009 | 0.51 (0.34, 0.77) | 0.001 |
| Degree of worry | | | | | | |
| A bit worried | 2.69 (1.58, 4.57) | <0.001 | 1.07 (0.73, 1.55) | 0.72 | 0.74 (0.47, 1.17) | 0.20 |
| Worried | 5.88 (2.23, 15.49) | <0.001 | 1.66 (0.97, 2.8) | 0.06 | 1.60 (0.92, 2.79) | 0.09 |
| Extremely worried | 3.77 (1.28, 11.13) | 0.01 | 2.70 (1.30, 5.62) | 0.008 | 1.05 (0.53, 2.11) | 0.87 |
| Washing hands frequently | | | | | | |
| OR (95% CI) | P | OR (95% CI) | P | OR (95% CI) | P |
| Sex | | | | | | |
| Female | 0.46 (0.28, 0.75) | 0.002 | 0.97 (0.66, 1.43) | 0.89 | 1.10 (0.71, 1.71) | 0.65 |
| Age | | | | | | |
| ≥60 | 1.02 (0.60, 1.7) | 0.93 | 1.32 (0.91, 1.92) | 0.13 | 1.18 (0.76, 1.82) | 0.45 |
| Residence | | | | | | |
| Rural | 0.31 (0.19, 0.50) | <0.001 | 0.64 (0.46, 0.89) | 0.009 | 0.51 (0.34, 0.77) | 0.001 |
| Degree of worry | | | | | | |
| A bit worried | 2.69 (1.58, 4.57) | <0.001 | 1.07 (0.73, 1.55) | 0.72 | 0.74 (0.47, 1.17) | 0.20 |
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| Extremely worried | 3.77 (1.28, 11.13) | 0.01 | 2.70 (1.30, 5.62) | 0.008 | 1.05 (0.53, 2.11) | 0.87 |

OR – odds ratios; 95% CI – 95% confidence interval.
Conclusions

Overall, we investigated awareness of the COVID-19 epidemic and the adoption of preventive measures in a susceptible population with previous myocardial infarction. We found that the overall awareness rate was high and that some preventive measures were being taken. Rural and female respondents lagged behind their urban and male counterparts in terms of knowledge of the transmission routes of SARS-CoV-2 and the adoption of preventive measures, and are therefore the focus of the next step in the prevention and control of the epidemic.

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Conflicts of Interest

None declared.

Declaration of Figures Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

Supplementary Material

The COVID-19 questionnaire

Hello! We are the doctors of the Yongchuan Hospital of Chongqing Medical University (The Second People’s Hospital of Chongqing City). We have experienced a new outbreak of coronavirus. We would like to share information with you and your family about the new situation of 2019 coronavirus. We guarantee that your personal privacy will be fully protected. Do you agree?

1. Are you currently living in an urban or rural area?
   A. Rural; B. Urban

2. Do you know about COVID-19?
   A. Yes; B. No

3. Through which channels have you accessed SARS-CoV-2-related knowledge?
   A. Posts on WeChat, Weibo, or Tik Tok; B. Web news or TV news; C. Newspaper; D. Residence/village committees; E. Other

4. Which channels do you think the most accurate information comes from?
   A. WeChat friend circle, Tik Tok, Weibo and other new media platforms; B. TV news; C. Official apps and websites; D. Official hotline consultation; E. Other (broadcast, community notification, unit file, etc.); F. None

5. Do you believe the information about SARS-CoV-2 on new media platforms such as WeChat, Weibo, and Tik Tok?
   A. Yes; B. No; C. Uncertain

6. What are the transmission routes of SARS-CoV-2?
   A. Do not know; B. Droplet transmission; C. Transmission through the digestive tract; D. Bloodborne transmission; E. Contact transmission

7. Do you know SARS-CoV-2-related preventive measures?
   A. Yes; B. No

8. Have you purchased protective equipment?
   A. Yes; B. No
9. What preventive measures do you take against SARS-CoV-2 in your home?
A. Wearing masks; B. Avoiding meetings and gatherings; C. Opening windows for ventilation; D. Washing hand frequently; E. Disinfection; F. None

10. Are you worried about yourself or your family being infected by SARS-CoV-2?
A. Not worried; B. A bit worried; C. Worried; D. Extremely worried

11. Do you think you live in a safe area?
A. Yes; B. No

12. Have you have contact with anyone returning from the Wuhan area of Hubei?
A. Yes; B. No

13. Do you have confidence that the SARS-CoV-2 epidemic will be overcome?
A. Yes; B. No

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