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Knowledge, Attitudes and Practices (KAP) Related to the Coronavirus Disease 2019 (COVID-19) in a Village in Southern China: A Cross-sectional Survey

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Abstract: Since December 2019, the coronavirus disease 2019 (COVID-19) has quickly swept across the country, followed by a global pandemic. The whole 228 rural residents from a village in southern China were selected as the participants, and a self-administered questionnaire was used to assess knowledge, attitudes and practices (KAP) related to COVID-19. The news media from television/websites (92.98%) and radio from the village (75%) were the main source of information about COVID-19. More than 80% of respondents correctly identified the causative agent, incubation period, transmission route and typical symptoms of COVID-19. Almost all the respondents supported the government's current prevention and control strategy and were confident of controlling COVID-19. Nearly 90% of respondents had worn masks in public and washed their hands frequently. Eight respondents (3.51%) were in a state of anxiety, with a mean self-rating anxiety scale (SAS) score of 52.63±2.00. Multivariate logistic regression analysis showed that middle school education (compared with primary school and the illiterate group), students (compared with farmers and other occupations) and SAS score were independent factors associated with the key practices of wearing masks in public, washing hands frequently and avoiding going to crowded areas (odds ratio (OR)=3.410, 95% confidence interval (CI)=1.472–7.901; OR=1.502, 95% CI=1.203–3.351; OR=0.919, 95% CI=0.869–0.972, respectively). The KAP toward COVID-19 among rural residents in a village in southern China was optimistic and without public anxiety, which provided certain reference value for further targeted prevention and control measures.

Keywords: COVID-19, Epidemiological, Knowledge, Attitudes, Practices

1. Introduction

At the end of December 2019, a cluster of cases of pneumonia of unknown etiology was detected in Wuhan, a city in Hubei, China. The Chinese Center for Disease Control and Prevention (China CDC) and Chinese health authorities subsequently confirmed and announced that a new coronavirus (2019-nCov) was the cause of the outbreak of this novel pneumonia in Wuhan [1, 2]. Since then, it has rapidly spread across China and this has been followed by ongoing spread all over the world in a short period. On February 11, 2020, the World Health Organization (WHO) named this epidemic disease Coronavirus Disease 2019 (COVID-19) and raised its pandemic alert level to the highest level [3]. The 2019-nCoV has been renamed severe acute respiratory syndrome coronaviruse-2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses. Studies have shown that the SARS-CoV-2 can be transmitted from human to human through droplets or direct contact [1, 4] Owing to the high transmission efficiency of SARS-CoV-2, on January 30, 2020, the WHO declared the outbreak of COVID-19 as the sixth

public health emergency of international concern [3].

It is well known that confusion and negative attitudes towards new outbreaks of infectious diseases may lead to unnecessary worry and confusion and even excessive panic, which may exacerbate an epidemic [5]. In 2002, public misunderstanding and excessive panic about severe acute respiratory syndromes (SARS) accelerated its rapid spread and led to huge economic losses [6-8]. At present, the COVID-19 outbreak appears similar to the SARS event. Thus, the Chinese government has quickly taken a series of preventive measures, including restricting traffic in Hubei province, promoting public knowledge of COVID-19 through mass media, treating patients at designated sites, quarantining close contacts, and halting activities and production that might lead to mass gatherings. Previous experience has shown the importance of assessing the awareness of epidemic control in the general population, because this may affect public compliance with prevention strategies. China is a large agricultural country, and the village is the most important basic unit of its society. During the epidemic in February 2020, villages became relatively closed units, a move driven by national prevention and control policies. To date, there are few public reports assessing the effectiveness of these policies and the level of knowledge, attitudes and practice (KAP) associating with COVID-19 among rural residents in a closed village.

The public's understanding of epidemic information, relevant attitudes and behavior are crucial to the prevention and control of the epidemic. In order to investigate the response of rural residents to the novel coronavirus pneumonia, we conducted a network survey on a village in Hunan province of China, to describe the KAP of the villagers with regard to COVID-19, and to provide certain reference value for further targeted prevention and control measures.

2. Methods

2.1. Study Population

During the outbreak of COVID-19, Chinese villages were semi-closed and health care workers and epidemic prevention and control workers (village committee staff) went to the villagers' homes one by one to promote knowledge of COVID-19. A total of 309 rural residents from Shengli village, Shimeitang town, Dingcheng district of Changde city, Hunan province, China, were selected as the respondent. Fifty-six children under the age of 14 years and 25 residents with severe mental illness or communication disorders were excluded. From February 18 to February 20, 2020, 228 self-designed electronic questionnaires, designed using the Wenjuanxing application (WJX Inc., Changsha, China), were distributed through the Wechat application (Tencent Inc., Shenzhen, China). The questionnaire was anonymous and sent by the village committee, and all the suitable villagers were required to fill in. Final 228 questionnaires were all collected. All respondents gave informed consent and we promised to protect their identity. Among the interviewees, there were one close contact to COVID-19, two suspected patients and no confirmed patients.

2.2. Self-administered Questionnaire

According to the latest authoritative prevention and control guidelines published by the China CDC and WHO, a self-administered electronic questionnaire was designed using the Wenjuanxing application. Most of the questions were closed and the variables were given as category options, except age. There were five questions related to demographics (age, gender, educational background, occupation and health status), one about COVID-19 information sources, and twenty-three about KAP related to COVID-19 (eight referring to knowledge, eight related to attitudes and seven concerning referral practices). Simultaneously, the Zung self-rating anxiety scale (SAS) was used to evaluate the psychological status of the respondents [9]. According to the Chinese norm, the threshold value of the SAS score was 50, above which 50–59 indicated mild anxiety, 60–69 moderate anxiety, and 70 or more severe anxiety.

2.3. Quality Control of the Network Investigation

A preliminary survey was conducted among 25 villagers before the formal survey, and the questionnaire recovery rate was 100% with filling time of 7-13 minutes. After the questionnaire was modified and improved, an online survey was conducted on all villagers who met the inclusion criteria. The questionnaire was designed and conducted by a general medical doctor with bachelor degree of epidemiology. The questionnaire did not involve any private information and all questions were mandatory items to ensure the response rate. The questionnaire was limited to 15 minutes. If the filling time checked through the background was less than 5 minutes, it was considered suspicious and the content of the investigation needs to be reviewed.

2.4. Statistical Analyses

Continuous variables are represented as mean±standard deviation (SD), while categorical variables are expressed as frequency and percentage. Student's t-tests, analysis of variance (ANOVA), or nonparametric tests were used to compare continuous variables between groups. Differences between categorical variables were analyzed by chi-square tests or double-tailed Fisher exact tests, as applicable. According to age, the rural residents were divided into three groups: (young (<45 years), middle-age (≥45 years but < 60 years) and elder (≥60 years) [10]. A multivariate logistic regression model was used to study the relationships among socio-demographic characteristics, SAS score and practices related to COVID-19 among the rural residents (0=others, 1=worn masks in public + washed hands frequently + avoided going to crowded areas).

All values were double-tailed, and $P < 0.05$ was considered statistically significant. Data analysis was performed with IBM SPSS statistics version 25.0 for Windows (IBM, Armonk, NY, USA).

3. Results

3.1. Socio-demographic Characteristics

The mean age of the respondents was 42.16 years, and the sample included 39.91% young and 47.81% middle-aged residents. Among all the villagers, 55.26% were male and 44.74% were female. The educational background of 17.98% of residents was primary school or illiterate, junior and senior middle school accounted for 35.53% and 30.6% respectively, and 16.23% had received college education or above. There were only eight health care workers, eleven epidemic prevention and control workers (village committee staff) and forty-eight (21.05%) students (Table 1).

Table 1. *Characteristics of rural residents.*

Characteristics		Number	Percentage (%)
Age (year)	42.16±14.44	-	-
Age group (year)	<18	14	6.14
	18-44	91	39.91
	45-59	109	47.81
	≥60	14	6.14
Gender	Male	126	55.26
	female	102	44.74
Educational background	Primary school and illiterate	41	17.98
	Junior middle school	81	35.53
	Senior middle school	69	30.26
	College and above	37	16.23
Occupation	Health care worker	8	3.51
	Epidemic prevention and control worker (village committee staff)	11	4.82
	Students	48	21.05
	Farmers and others	161	70.62
Health status	Close contact	1	0.44
	Suspected patients	2	0.88
	healthy person	225	98.68

Age represented as mean ± standard deviation.

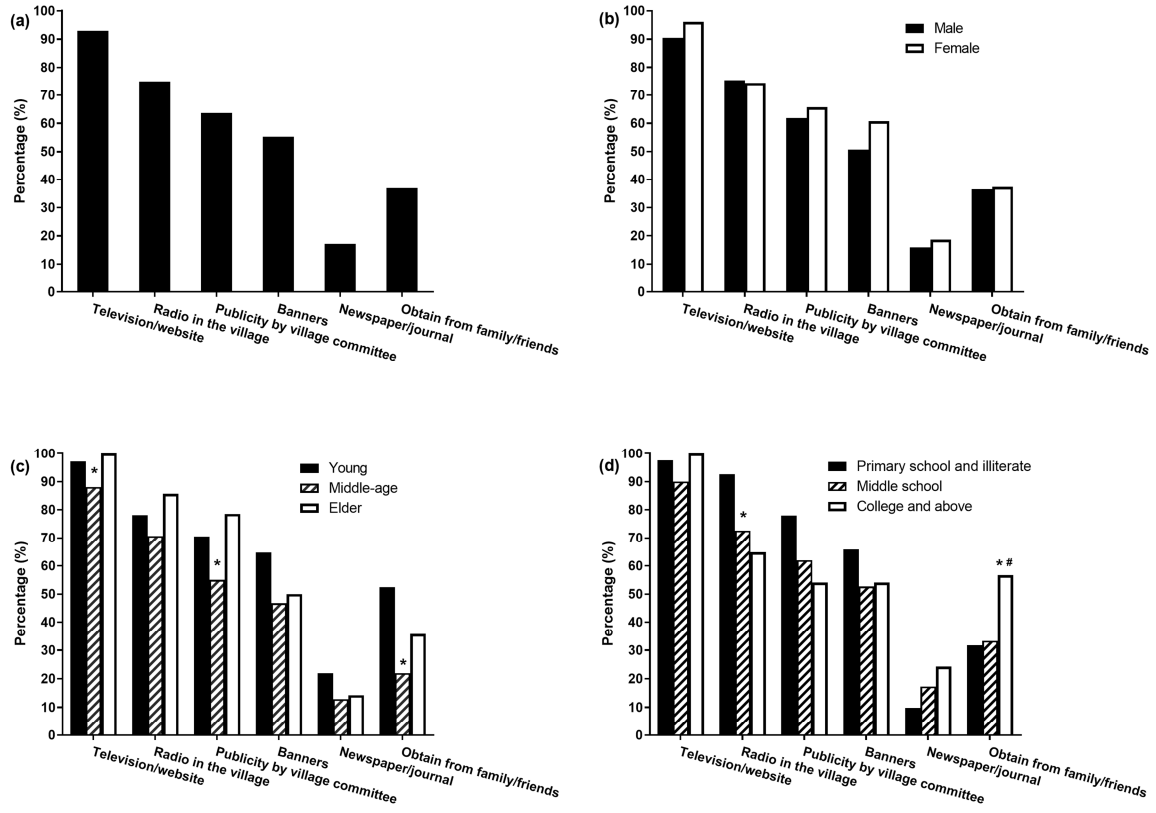

Figure 1. *Sources used by rural residents to obtain information related to COVID-19. (More than one information source could be selected by each respondent. A: Total; B: comparison between male and female; C: comparison in different age, * indicated comparison with young group, $p < 0.05$; D: comparison in different educational background, * indicated comparison with primary school and illiterate group, $p < 0.05$, # indicated comparison with middle school group, $p < 0.05$).*

3.2. Sources of Information About COVID-19

Villagers had learned about COVID-19 from a variety of sources. The news media from television/websites (92.98%) and radio from the village (75%) were the most frequently cited sources. Publicity by the village committee and banners were used by 63.60% and 55.26% of respondents, respectively. About one-third of residents (36.84%) obtained information from family or friends. Only 17.11% of villagers had read a newspaper or journal to get relevant information. There was no statistically significant difference in the access to information between males and females (all $P > 0.05$). The percentage of young residents getting information through television/website, family/friends and publicity by the village committee was higher than that of middle-aged residents ($P=0.017$, <0.001 and 0.0238, respectively). Compared with villagers with only primary and secondary education, respondents with college education or above preferred to get information from family/friends ($P=0.039$ and 0.013, respectively). The primary school educated and illiterate villagers were more likely to learn about COVID-19 through village radio than those who had received middle school and college or above education ($P=0.006$ and 0.004, respectively, Figure 1).

3.3. Knowledge Related to COVID-19

In total, 81.58% of respondents correctly identified the novel coronavirus as the causative agent of COVID-19, 75% knew the types of susceptible person and nearly 95% knew the correct incubation period when presented with a list of options. Almost all residents (97.37%) knew that COVID-19 could be transmitted by droplets, and 71.93% believed in contact transmission, whereas 50.88% choose aerosol as the transmission route. More than 85% of respondents knew that fever and cough were typical symptoms of COVID-19, while a minority knew that COVID-19 could manifest as muscular soreness or weariness, headache and diarrhea (37.72%, 34.21% and 24.12%, respectively). Among the residents, 59.21% were aware that some COVID-19 infections were asymptomatic. The government's prevention and control strategy for COVID-19 in China and free treatment policy had a high awareness rate (83.77% and 86.84%, respectively). About three quarters of respondents were able to indicate the correct self-protective measures (Table 2).

Table 2. *Knowledge related to COVID-19 among rural residents.*

	Number	Percentage (%)
Know causative agent of COVID-19	186	81.58
Know susceptible person of COVID-19	171	75.00
Know incubation period of COVID-19	216	94.74
Transmission route of COVID-19		
droplet transmission (number for yes)	222	97.37
contact transmission (number for yes)	164	71.93
aerosol transmission (number for yes)	116	50.88
Know clinical feature of COVID-19		
fever	201	88.16
cough	198	86.84
muscular soreness or weariness	86	37.72
headache	78	34.21
diarrhea	55	24.12
dyspnea	101	44.30
asymptomatic	135	59.21
Know the government's prevention and control strategy	191	83.77
Know the free treatment policy	198	86.84
Know self-protective measures	165	72.37

Table 3. *Attitudes towards COVID-19 among rural residents.*

	Number	Percentage (%)
Approve the government's prevention and control strategy	220	96.49
Be confident in the control of COVID-19	219	96.05
Approve travel restrictions policy	198	86.84
Approve the initiative to ban parties and visits during the Spring Festival	188	82.46
Report to the village committee staff about the suspected symptoms of relatives or friends	176	77.19
Concern about COVID-19 knowledge		
Very often	27	11.84
One or two times per day	169	74.12
Sometimes or indifference	32	14.04
Daily life be disturbed by COVID-19	201	88.16
Worry about suffering from COVID-19	186	81.58

3.4. Attitudes Towards COVID-19

Almost all the respondents supported the government's current prevention and control strategy and were confident of controlling COVID-19. More than 80% of respondents supported the travel restrictions policy and the initiative to ban

parties and visits during the Spring Festival (86.84% and 82.46%, respectively). If a relative or friend had suspected symptoms, 77.19% villagers would report them to the village committee. In addition, 74.12% of villagers had paid attention to information related to COVID-19 once or twice a day, although only 11.84% paid attention to it very often, and 14.04% were occasionally concerned about relevant information. 88.16% of respondents considered that their daily life was disturbed, and 81.58% of them were worried about suffering from COVID-19 (Table 3).

3.5. Practices Related to COVID-19

Nearly 90% of respondents had worn masks in public and washed their hands frequently; 78.95% of villagers had avoided going to crowded areas, while only 20.61% had done so occasionally. 171 (75%) respondents had worn masks in public, washed their hands frequently and avoided going to crowded areas at the same time. In addition, 73.25% of the participants in the survey regularly maintained indoor ventilation, but only 45.18% of them adhered to indoor disinfection and 33.33% monitored their temperature daily. There were 179 (78.51%) respondents who had accepted the epidemic propaganda by the village committee (Table 4). The multivariate logistic regression analysis showed that middle-school education (compared with the primary school and illiterate groups), students (compared with farmers and other occupations) and SAS score were independent factors associated with the key practices of wearing masks in public, washing hands frequently and avoiding going to crowded areas at the same time (odds ratio (OR)=3.410, 95% confidence interval (CI)=1.472–7.901; OR=1.502, 95% CI=1.203–3.351; OR=0.919, 95% CI=0.869–0.972, respectively; Table 5).

Table 4. *Practices related to COVID-19 among rural residents.*

	Always		Sometimes		Never	
	No.	%	No.	%	No.	%
Wear a mask in pubic	204	89.47	22	9.65	2	0.88
Wash hand frequently	201	88.16	18	7.89	9	3.95
Avoid crowd places or visit	180	78.95	47	20.61	1	0.44
Keep room ventilated	167	73.25	39	17.11	22	9.65
Frequent disinfection at home	103	45.18	61	26.75	64	28.07
Monitor temperature per day	76	33.33	45	19.74	107	46.93
Accept the epidemic propaganda by the village committee	179	78.51	-	-	49	21.49

Table 5. *Multivariate logistic regression analysis for the key practices related to COVID-19 among rural residents (0=others, 1=wearing masks in public + washing hands frequently + avoiding going to crowded areas).*

Variables	OR	95% CI for OR		P
		Lower	Upper	
Age group				
young	1			
middle-age	0.998	0.479	2.078	0.995
elder-age	0.645	0.168	2.469	0.522
Gender				
male	1			
female	0.545	0.282	1.053	0.071
Educational background				
primary school and illiterate	1			
middle school	3.410	1.472	7.901	0.004
college and above	1.985	0.590	6.682	0.268
Occupation				
farmers and others	1			
health care worker	3.211	0.102	6.431	0.598
epidemic prevention and control worker	2.309	0.277	19.260	0.439
students	1.502	1.203	3.351	0.014
SAS score	0.919	0.869	0.972	0.003

CI: confidence interval; COVID-19: coronavirus disease 2019; OR: odds ratio; SAS: self-rating anxiety scale.
Variables include age group, gender, education background, occupation and SAS score.

3.6. Psychological Status of the Respondents

The average SAS score was 34.09±5.43, and eight respondents (3.51%) were in a state of anxiety, with a mean SAS score of 52.63±2.00. There was no statistically significant difference in SAS scores between male and female residents (P=0.743). Elderly residents had higher SAS scores than young and middle-aged residents (37.71±7.04 vs. 34.30±5.39 vs. 33.43±5.09, respectively, all $P < 0.05$). Compared with villagers with middle-school and college or above education, primary-educated or illiterate respondents had higher SAS scores (33.91±5.52 vs. 36.15±6.37, P=0.018; 32.57±2.75 vs. 36.15±6.37, P=0.004; respectively). The SAS scores of students were higher than those of epidemic prevention and control workers (33.5±2.01 vs. 31.18±1.94, $P <0.05$), when respondents with farmers and other occupations had the highest SAS scores (Figure 2).

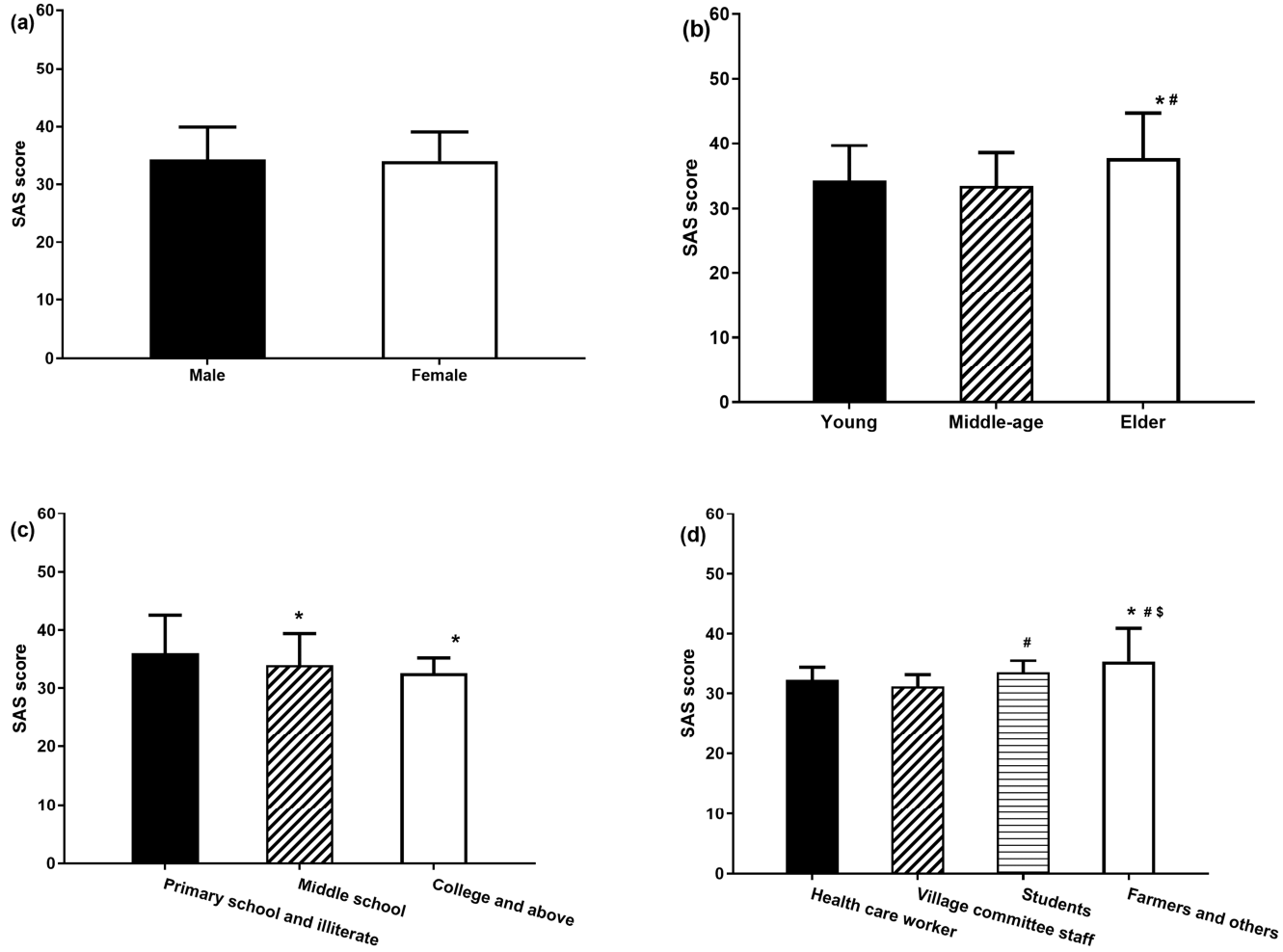

Figure 2. *Comparison of self-rating anxiety scale (SAS) scores. (A: comparison between male and female; B: comparison in different age, * indicated comparison with young group, $p < 0.05$, # indicated comparison with middle-age group, $p < 0.05$; C: comparison in different educational background, * indicated comparison with primary school and illiterate group, $p < 0.05$; D: comparison in different occupation, * indicated comparison with health care worker group, $p < 0.05$, # indicated comparison with village committee staff group, $p < 0.05$; $ indicated comparison with students group, $p < 0.05$).*

4. Discussion

The recent outbreak of COVID-19, caused by a novel coronavirus named SARS-CoV-2, started in December 2019, just one month before the Spring Festival of China. In addition to human-to-human transmission and lack of effective treatment, the massive population flow caused great challenges to the prevention and control of the epidemic [3]. According to research reports, SARS-CoV-2 has a common ancestor with the severe acute respiratory syndrome-associated coronavirus (SARSr-CoV) and Middle East respiratory syndrome-associated coronavirus (MERSr-CoV), but has greater infectivity and a lower fatality rate [2, 3]. The outbreak of SARS in 2002 brought a disaster to the Chinese people, but also left valuable experience of fighting a pandemic of severe infectious disease [11, 12]. Thus, the whole country was motivated to fight this new epidemic upon the emergence of COVID-19, and the prevention and control policies led by the National Health Commission have been quickly formulated and effectively implemented [9, 12] The SARS experience showed that public awareness of epidemic control in the general population may affect public compliance with prevention strategies. Therefore, correct knowledge and appropriate responses are important in allowing the public to take preventive actions. In this study, we selected the population from a village in southern China as participants in a survey to investigate the response of rural residents to COVID-19, to provide baseline data and reference measures for control of the current outbreak.

This study showed that rural residents acquired knowledge of COVID-19 from a variety of sources, among which the news media from television/websites was the dominant source, selected by up to 92.98% of survey participants, which was significantly higher than that during the SARS outbreak [13]. This may be attributed to the popularity of WeChat, QQ and other social network tools and the widespread use of mobile phones. The network information may spread quickly and be easy to obtain, but the authenticity of some epidemic information may be not guaranteed; therefore, the authoritative information from

official websites and apps should be recommended. Three quarters of respondents had obtained information from the village radio, and about 60% of them through the village committee propaganda and banners providing information on COVID-19. This suggests that community publicity on epidemic prevention is necessary, especially for primary school educated and illiterate villagers.

Timely and effective implementation of prevention and control measures is the fundamental means used to control the spread of the epidemic. In this study, 75% of respondents had worn masks in public, washed their hands frequently and avoided going to crowded areas at the same time. The multivariate logistic regression analysis showed that middle-school educated villagers and students were more likely to take appropriate personal protective measures. A survey conducted during the influenza A (H1N1) pandemic found that respondents with higher levels of education took more precautionary behaviors and, compared with students, office staff and farmers showed fewer preventive behaviors [14]. There was no difference in protective behaviors between residents with college education and above and those with primary education or illiteracy in this study, which may be because relatively few residents had college education and above. In rural areas of China, the majority of the populations are farmers with a generally lower education level. In contrast, 78.2% of participants in the survey led by Chen Yan et al. were students; compared with students, only health care workers and official staff had higher ability to prevent and control COVID-19. Similar results were not obtained in this study, most likely due to the small number of health care workers and village committee staff. Research during the SARS and influenza A pandemics showed the importance of appropriate knowledge in enabling individuals to have develop better attitudes and practices with regard to reducing the risk of epidemics [15]. Therefore, it is necessary to focus on conveying the correct knowledge to each individual, as this will affect both attitudes and practice.

There were some limitations to this survey. First, according to the preliminary survey, the awareness rate was approximately 70% and the allowable error was about 5%, so the sample size was estimated to be at least 485. However, the whole suitable residents of the village were only 218. Since village was an important constituent unit of Chinese society, all rural residents from a village might reflect the situation of the society to a certain extent. Second, the Cronbach α of the general and three dimensions (knowledge, attitudes and practice) evaluated by reliability analysis were 0.721, 0.753, 0.714 and 0.613, respectively. The Cronbach α of practice dimension was less than 0.7, might due to poor design and lack of expert argumentation. Third, the construct validity of the questionnaire was reasonable calculated by exploratory factor analysis. However, due to the time constraints during the epidemic outbreak, the questionnaire was lack of Delphi expert consultation and unable to calculate the face validity and content validity. Finally, the survey relied on self-reporting and may therefore not truly reflect practice.

5. Conclusion

The KAP toward COVID-19 among rural residents in a village in southern China was optimistic and without public anxiety. This provided certain reference value for further targeted prevention and control measures during the epidemic outbreak.

Availability of Data and Materials

Not applicable.

Authors' Contributions

GMY performed the survey, data collection and aided in manuscript preparation. YLY participated in the study design, performed literature review, and statistical analysis. NL assisted in collecting the data and the study design. All of the authors have read and approved the final manuscript.

Ethics Approval and Consent to Participate

This study was performed in accordance with the Declaration of Helsinki.

Competing Interests

The authors declare no conflict of interest.

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