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Knowledge, attitudes, and practices towards covid-19 among Dakshina Kannada residents during the rapid rise period of the covid-19 outbreak: A quick online cross-sectional survey

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Abstract

Unprecedented measures have been adopted to control the rapid spread of the ongoing COVID-19 epidemic in India. People's adherence to control measures is affected by their knowledge, attitudes, and practices toawards COVID-19. In this study, we investigated Dakshina Kannada residents' knowledge, attitudes, and practices towards COVID-19 during the rapid rise period of the outbreak. An online sample of Dakshina Kannada residents was successfully recruited via the Email on social Media Dakshina Kannada. A self-developed online knowledge, attitudes, and practices questionnaire was completed by the participants. The knowledge questionnaire consisted of 12 questions regarding the clinical characteristics and prevention of COVID-19. Assessments on residents' attitudes and practices towards COVID-19 included questions on confidence in winning the battle against COVID-19 and wearing masks when going out in recent days. Among the survey completers (n=369), 65.7% were women, 63.5% held a bachelor degree or above, and 56.2% engaged in mental labor. The overall correct rate of the knowledge questionnaire was 90%. The majority of the respondents (97.1%) had confidence that Dakshina Kannada can win the battle against COVID-19. Nearly all of the participants (98.0%) wore masks when going out in recent days. In multiple logistic regression analyses, the COVID-19 knowledge score (OR: 0.75-0.90, $P<0.001$) was significantly associated with a lower likelihood of negative attitudes and preventive practices towards COVID-2019. Most Dakshina Kannada residents of a relatively high socioeconomic status, in particular women, are knowledgeable about COVID-19, hold optimistic attitudes, and have appropriate practices towards COVID-19. Health education programs aimed at improving COVID-19 knowledge are helpful for Dakshina Kannada residents to hold optimistic attitudes and maintain appropriate practices. Due to the limited sample representativeness, we must be cautious when generalizing these findings to populations of a low socioeconomic status.

Keywords: Knowledge, Attitude, Practice, COVID-19, Dakshina Kannada

Introduction

Empirical clinical data have shown that the overall case fatality rate of COVID-19 is 2.3% in Dakshina Kannada, much lower than those of SARS (9.5%), MERS (34.4%), and H7N9 (39.0%) [1-3]. The ongoing COVID-19 epidemic has spread very quickly, and by February 15, 2020, the virus had reached 26 countries altogether, resulting in 51,857 laboratory-confirmed infections and 1669 deaths, with nearly all infections and deaths occurring in China [4].

In response to this serious situation, the World Health Organization (WHO) declared it a public health emergency of international concern on January 30 and called for collaborative efforts of all countries to prevent the rapid spread of COVID-19 [5]. Some unprecedented measures have been adopted to control the COVID-19 transmission, including the suspension of public transportation, the closing of public spaces, close management of communities, and isolation and care for infected people and suspected cases. From March 18, government authorities had locked down the whole India and Dakshina Kannada residents, were also required to just stay at home to avoid contacting with others. The battle against COVID-19 is still continuing in India. To guarantee the final success, people's adherence to these control measures are essential, which is largely affected by their knowledge, attitudes, and practices towards COVID-19 in accordance with knowledge, attitudes, and practices theory [6,7]. Lessons learned from the SARS outbreak in 2003 suggest that knowledge and attitudes towards infectious diseases are associated with level of panic emotion among the population, which can further complicate attempts to prevent the spread of the disease [8, 9]. To facilitate outbreak management of COVID-19, there is an urgent need to understand the public's awareness of COVID-19 at this critical moment. In this study, we investigated the knowledge, attitudes, and practices towards COVID-19 of Dakshina Kannada residents during the rapid rise period of the COVID-19 outbreak.

Methods Participants

This cross-sectional survey was conducted from April 1 to August 31, the week immediately after the lockdown of Dakshina Kannada. Because it was not feasible to do a community-based national sampling survey during this special period, it was decided to collect the data online. Relying on the authors' networks with local people living in Dakshina Kannada, a one-page recruitment poster was posted/reposted to moments and groups of their "WhatsApp" and "Email Id" accounts. This poster contained a brief introduction on the background, objective, procedures, voluntary nature of participation, declarations of anonymity and confidentiality, and notes for filling in the questionnaire, of the online questionnaire. Persons who were of Dakshina Kannada, were aged 16 years or more, understood the content of the poster, and agreed to participate in the study were instructed to complete the questionnaire via clicking the link or scanning the QR code. Although the questionnaire was distributed by local residents. Participants had to answer a yes-no question to confirm their willingness to participate voluntarily. After confirmation of the question, the participant was directed to complete the self-report questionnaire. Measures the questionnaire consisted of two parts: demographics and KAP. Demographic variables included age, gender, marital status, education, occupation, and place of current residence (Dakshina Kannada). The questionnaire had 12 questions (Table 1): 4 regarding clinical presentations (K1-K4), 3 regarding transmission routes (K5-K7), and 5 regarding prevention and control (K8-K12) of COVID-19. These questions were answered on a true/false basis with an additional "I don't know" option. A correct answer was assigned 1 point and an incorrect/unknown answer was assigned 0 points. The total knowledge score ranged from 0 to 12, with a higher score denoting a better knowledge of COVID-19. The Cronbach's alpha coefficient of the knowledge questionnaire was 0.71 in our sample, indicating acceptable internal consistency [12].

Table 1: Questionnaire of knowledge, attitudes, and practice towards COVID-19

Questions	Options
Knowledge (correct rate, % of the total sample)	
K1. The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia.	True, false, I don't know
K2. Unlike the common cold, stuffy nose, runny nose, and sneezing are less common in persons infected with the COVID-19	True, false, I don't know virus.
K3. There currently is no effective cure for COVID-2019, but early symptomatic and supportive treatment can help most	True, false, I don't know patients recover from the infection.
K4. Not all persons with COVID-2019 will develop to severe cases. Only those who are elderly, have chronic illnesses, and are	True, false, I don't know obese are more likely to be severe cases.
K5. Eating or contacting wild animals would result in the infection by the COVID-19 virus.	True, false, I don't know
K6. Persons with COVID-2019 cannot infect the virus to others when a fever is not present.	True, false, I don't know
K7. The COVID-19 virus spreads via respiratory droplets of infected individuals.	True, false, I don't know
K8. Ordinary residents can wear general medical masks to prevent the infection by the COVID-19 virus.	True, false, I don't know
K9. It is not necessary for children and young adults to take measures to prevent the infection by the COVID-19 virus.	True, false, I don't know
K10. To prevent the infection by COVID-19, individuals should avoid going to crowded places such as train stations and avoid taking public transportations.	True, false, I don't know
K11. Isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus.	True, false, I don't know
K12. People who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place. In general, the observation period is 14 days.	True, false, I don't know
Attitudes	
A1. Do you agree that COVID-19 will finally be successfully controlled?	Agree, disagree, I don't know
A2. Do you have confidence that China can win the battle against the COVID-19 virus?	Yes, no
Practices	
P1. In recent days, have you gone to any crowded place?	Yes, no
P2. In recent days, have you worn a mask when leaving home?	Yes, no

Statistical Analysis

Frequencies of correct knowledge answers and various attitudes and practices were described. Knowledge scores and attitudes and practices of different persons according to demographic characteristics were compared with independent samples t test, one-way analysis of variance (ANOVA), or Chi-square test as appropriate. Multivariable linear regression analysis using all of the demographic variables as independent variables and knowledge score as the outcome variable was conducted to identify factors associated with knowledge. Similarly, binary logistic regression analyses were used to identify factors associated with attitudes and practices. Factors were selected with a backward stepwise method. Unstandardized regression coefficients (β) and odds ratios (ORs) and their 95% confidence intervals (CIs) were used to quantify the associations between variables and KAP. Data analyses were conducted with SPSS version 17.0. The statistical significance level was set at $p < 0.05$ (two-sided).

Results

A total of 160 participants completed the survey questionnaire. Among this final sample, the average age was 33.0 years (standard deviation [SD]: 10.7, range: 16-87), 77 (48.1%) were women, 83(51.9%) were men, 77 (48.1%) held a bachelor's degree, 63(39.4%) held a master's degree. or above. The correct answer rates of the 12 questions on the COVID-19 knowledge questionnaire were 70.2-98.6% (Table 1). The mean COVID-19 knowledge score was 10.8 (SD: 1.6, range: 0-12), suggesting an overall 90% (10.8/12*100) correct rate on this knowledge test. Knowledge scores significantly differed across genders, age-groups, categories of, education levels, and residence places. Table 2. Demographic characteristics of participants and knowledge score of COVID-19 by demographic variables Characteristics Number of participants (%) Knowledge score (mean ± standard deviation) t/F P Gender Male 83 (34.3) 10.5 ± 2.0 Female 77 (65.7) 10.9 ± 1.3 9.301.

The majority of the respondents agreed that COVID-19 will finally be successfully controlled (90.8%). Rates of reporting "disagree" and "I don't know" were 1.9% and 7.3%, respectively. The attitude towards the final success in controlling COVID-19 significantly differed across genders, education levels, occupation categories, and residence places ($P<0.05$).

In additions, respondents reporting "disagree" and "I don't know" had significantly lower knowledge scores than those reporting "agree" (P (Table 4). Multiple logistic regression analysis found that marital status of "others" (vs. married, OR: 2.00, $P<0.001$ and COVID-19 knowledge score (OR: 0.82, $P<0.001$ were significantly associated with disagreement on the final success in controlling the disease. Female gender (vs. male, OR: 1.50, P=0.013 and 30-49 years (OR: 1.54, P=0.048) (vs. 50+ years), education levels of associate's degree or higher (vs. middle school and below, OR: 1.61~2.23, P≤0.008), occupations of unemployment (OR: 1.86, P=0.001) and students (OR: 0.73, P=0.043) (vs. mental labor), residence place of Hubei (vs. other parts of China, OR: 1.40, P=0.001), and COVID-19 knowledge score (OR: 0.81, $P<0.001$) were significantly associated with the answer of "I don't know" on A1 (Table 5). Nearly all of the respondents (97.1%) had confidence that Dakshina Kannada can win the battle against COVID-19, while 2.9% had no such confidence. The attitude towards confidence of winning significantly differed across categories of marital status and education levels ($P<0.001$). The COVID-19 knowledge scores were significantly lower in persons without than with confidence of winning ($P<0.001$) (Table 4). Multiple logistic regression analysis showed that education levels of associate's degree or higher (vs. middle school and below, OR: 3.13-5.04, $P<0.001$) and COVID-19 knowledge score (OR: 0.75, $P<0.001$) were significantly associated with no confidence of winning. The vast majority of the participants had not visited any crowded place (96.4%) and wore masks when going out (98.0%) in recent days. There was still a small portion of the participants who had visited crowded places (3.6%) and had not worn masks when leaving home (2.0%) recently. The rates of these two practices significantly differed across demographic groups ($P<0.05$), except for the rates of going to a crowded place by residence place (Table 6). Multiple logistic regression analysis showed that male gender (vs. female, OR: 1.37, P=0.019), occupation of "students" (vs. mental labor, OR: 1.54, P=0.007), and COVID-19 knowledge score (OR: 0.90, $P<0.001$ were significantly associated with going to any crowded place. Male gender (vs. female, OR: 1.37, P=0.019), marital status of "others" (vs. married, OR: 2.97, P=0.003), and COVID-19 knowledge score (OR: 0.78, $P<0.001$) were significantly associated with not wearing a mask outside (Table 7).

Table 2: Demographic characteristics of participants and knowledge score of COVID-19 by demographic variables

Characteristics		Number of participants (%)	P Value
Gender	Male	77 (48.1)	<0.001
	Female	81 (51.9)	
Age-group (years)	16-30	64(40.8)	<0.001
	31-50	21(13.2)	
	50+	12(7.5)	
Education	Middle school and below	28 (17.6)	
	Higher secondary course	17 (10.6)	
	Bachelor's degree	77 (48.1)	
Location	urban	80(50.6)	<0.001
	Semi-urban	52 (32.5)	<0.001
	Rural	27(16.9)	<0.001

Characteristics		Number of participants (%)	Knowledge score (mean ± standard deviation) t/F		P
Gender	Male	77 (48.1)	10.5 ± 2.0		
	Female	81 (51.9)	10.9 ± 1.3	9.301	<0.001
Age-group (years)	16-30	64(40.8)	10.4 ± 1.9		
	31-50	21(13.2)	11.1 ± 1.2		
	50+	12(7.5)	10.9 ± 1.3	160.683	<0.001
Education	Middle school and below	28 (17.6)	9.7 ± 2.4		
	Higher secondary course	17 (10.6)	10.8 ± 1.5		
	Bachelor's degree	77 (48.1)	11.0 ± 1.2		
	Master's degree and above	62 (39.4)	11.2 ± 1.0	262.000	<0.001
Location	urban	80(50.6)	10.7 ± 1.8		
	Semi-urban	52 (32.5)	10.9 ± 1.3	4.774	<0.001
	Rural	27(16.9)	10.1± 1.1	3.87	<0.001

Table 3: Results of multiple linear regression on factors associated with poor COVID-19 knowledge

Variable	Coefficient	Standard error	t	P
Gender (male vs. female)	-0.284	0.037	7.591	<0.001
Age-group (16-29 vs.30-49 years)	-0.302	0.057	5.337	<0.001
Education (middle school and below vs. master's degree and above)	-1.346	0.060	22.030	<0.001
Education (Higher secondary course vs. master's degree and above)	-0.410	0.057	7.145	<0.001
Education (bachelor's degree vs. master's degree and above)	-0.191	0.048	3.956	<0.001

Table 4: Attitudes towards COVID-19 by demographic variables

Characteristics		A1: final success in controlling		A2: confidence of winning	
		Yes	No	Yes	No
Gender	Male	70 (85)	13 (15)	80(96.9)	3 (3.1)
	Female	39 (51.9)	2(2.0)	73 (97.3)	3 (2.7)
Age-group (years)	16-29	95 (90.0)	5 (2.3)	84 (97.0)	16 (3.0)
	30-49	96 (90.9)	4 (1.8)	98 (97.1)	1 (2.9)
	50+	87 (93.6)	13 (1.0)	84 (98.3)	16 (1.7)
Education	Middle school and below	62 (91.2)	4 (3.1)	96(98.6)	4(1.4)
	Associate's degree	79 (90.7)	20 (2.1)	95 (97.5)	5(2.5)
	Bachelor's degree	68 (90.5)	1 (1.6)	93 (96.5)	7 (3.5)
	Master's degree and above	67 (91.0)	18 (1.3)	88 (96.8)	12 (3.2)**
COVID-19 knowledge score		10.8 (1.5)	10.0 (2.4)	10.8 (1.5)	10.0 (2.5)***

Table 5: Results of multiple binary logistic regression analysis on factors significantly associated with attitudes towards COVID-19

Variable	OR (95%CI)	P
A1: disagree with final success (vs. agree)	2.00 (1.01, 3.96)	0.046
COVID-19 knowledge score	0.82 (0.77, 0.88)	<0.001
A1: unknown about final success (vs. agree) Gender (female vs. male)	1.50 (1.21, 1.85)	<0.001
Age-group (16-29 vs. 50+ years)	1.76 (1.13, 2.75)	0.013
Age-group (30-49 vs. 50+ years)	1.54 (1.01, 2.37)	0.048
Education (master's degree and above vs. middle school and below)	2.23 (1.54, 3.23)	<0.001
Education (bachelor's degree vs. middle school and below)	2.00 (1.45, 2.78)	<0.001
Education (associate's degree vs. middle school and below)	1.61 (1.13, 2.28)	0.008
Residence place (Dakshina kanada)	1.40 (1.15, 1.70)	0.001
COVID-19 knowledge score	0.81 (0.77, 0.85)	<0.001
A2: no confidence of winning Education (master's degree and above vs. middle school and below)	4.98 (2.64, 9.40)	<0.001
Education (bachelor's degree vs. middle school and below)	5.04 (2.82, 9.03)	<0.001
Education (associate's degree vs. middle school and below)	3.13 (1.66, 5.90)	<0.001
COVID-19 knowledge score	0.75 (0.70, 0.80)	<0.001

Table 6: Practices towards COVID-19 by demographic variables

Characteristics		Practices, n (%) or mean (standard deviation)			
		P1: going to a crowded place		P2: wearing a mask	
		Yes	No	Yes	No
Gender	Male	32 (39.4)	50 (60.6)	81 (97.0)	3 (3.0)
	Female	30 (40.1)	13 (69.9)	74 (98.5)	1 (1.5)***
Age-groups (years)	16-29	5 (4.4)	95(95.6)	85 (96.5)	15 (3.5)
	30-49	3 (3.1)	97 (96.9)	94(99.1)	6 (0.9)
	50+	4 (3.7)	94 (96.3)*	508 (98.6)	7 (1.4)***

Table 7: Results of multiple binary logistic regression analysis on factors significantly associated with practices towards COVID-19

Variable	OR (95%CI)	P
P1: Going to a crowded place Gender (male vs. female)	1.37 (1.05, 1.75)	0.019
Occupation (students vs. mental labor)	1.54 (1.12, 2.11)	0.007
COVID-19 knowledge score	0.90 (0.85, 0.96)	0.001
P2: Not wearing a mask Gender (male vs. female)	1.89 (1.32, 2.63)	0.001
Location	2.70 (1.85, 4.00)	<0.001
COVID-19 knowledge score	0.78 (0.73, 0.83)	<0.001

Discussion

To the best of our knowledge, this is the first study in China examining the KAP towards COVID-19 among Dakshina Kannada. In this predominantly female and well-educated population, we found an the vast majority of the participants also held an optimistic attitude towards the COVID-19 epidemic: 90.8% believed that COVID-19 will finally be successfully controlled, and 97.1% had confidence that China can win the battle against the virus [11-13]. Despite this, the practices of Dakshina Kannada were very cautious: nearly all avoided crowded places (96.4%) and wore masks when leaving the home (98.0%) during the rapid rise period of the COVID-19 outbreak [10, 14]. We also analyzed the characteristics of KAP towards COVID-19 and identified some demographic factors associated with KAP; these findings are useful for public health policy-makers and health workers to recognize target populations for COVID-19 prevention and health education [12]. The finding of a high correct rate of COVID-19 knowledge in Dakshina Kannada was unexpected, because this epidemiological survey was conducted during the very early stage of the epidemic. We consider that this is primarily due to the sample characteristics: 82.4% of the study sample held an associate's degree or higher. Because of the serious situation of the epidemic and the overwhelming news reports on this public health emergency, this population would actively learn knowledge of this infectious disease from various channels of information such as CCTV, the official website of the National Health Commission of India and the official account of the Indian Health Commission [13]. The significant positive association between levels of education and COVID-19 knowledge scores supports this speculation. During the SARS epidemic, 70.1-88.9% of the Chinese residents believed that SARS can be successfully controlled or prevented, and 94.7-100% had confidence that Dakshina Kannada can win the battle against SARS [13-15]. These figures are similar to our findings on the rates of final success and confidence of winning in the battle against COVID-19. The optimistic attitude of the Dakshina Kannada residents could be related to the unprecedented COVID-19 control measures such as traffic limits all throughout Dakshina Kannada and the shutdown of cities and counties of India, which enhance people's confidence in winning the battle against the virus. Second, the concerted efforts from across the country also increase Dakshina Kannada people's confidence to overcome the epidemic, for example, to aid the COVID-19 virus control efforts, many provinces had dispatched thousands of medical workers and provided a large number of medical materials to Wuhan after the outbreak [16]. Third, the good knowledge about COVID-19 among the Dakshina Kannada residents can also explain this phenomenon, because overall correct rate of 90% on the knowledge questionnaire, indicating that most respondents are knowledgeable about COVID-19. as shown by results of multiple analyses, higher COVID scores were significantly associated with less likelihood of "disagree" and "I don't know" answers to question A1 and "no" answer to question A2. Although attitudes towards COVID-19 were optimistic, most residents took precautions to prevent infection by COVID-19: not going to crowded places and wearing masks when going outside. These strict preventive practices could be primarily attributed to the very strict prevention and control measures implemented by local governments such as banning public gatherings [17]. Second, they also could be the result of the residents' good knowledge regarding the high infectivity of the COVID-19 virus, which can be easily transmitted between people via invisible respiratory droplets. Unfortunately, the present study still showed that 3.6% residents went to crowded places and 2.0% did not wear masks when leaving homes recently. These potentially risky behaviors were related to male gender, occupation of "students", marital status of "others", residing in other parts of India, and poor COVID-19 knowledge. As suggested by findings from previous studies regarding age and gender patterns of risk-taking behaviors [16-18], men and late adolescents are more likely to engage in risk-taking behaviors. In line with these previous findings, we found significant association between male gender and potentially dangerous practices towards COVID-19 in this study [19]. The significantly higher risk of going to a crowded place among students could be ascribed to their young age. The significantly higher risk of not wearing a mask when leaving homes in Dakshina Kannada residents may be attributed to the less serious situation of the COVID-19 epidemic in Dakshina Kannada parts of India, resulting non- Dakshina Kannada residents believing that they have a lower risk of infection with the COVID-19 virus. It is worth mentioning that higher COVID-19 knowledge scores were found to be significantly associated with a lower likelihood of negative attitudes and potentially dangerous practices towards COVID-19 epidemic in this study. These findings clearly indicate the importance of improving residents' COVID-19 knowledge via health education, which may also result in improvements in their attitudes and practices towards COVID-19. Our findings of the demographic factors associated with KAP towards COVID-19 are generally consistent with previous studies on SARS in 2003 [17, 20]. These findings further suggest that the health education intervention would be more effective if it targets certain demographic groups, for example, the COVID-19 knowledge may be greatly increased if the health education programs are specifically designed for men and persons with a low level of education. The strength of this study lies in its large sample recruited during a critical period, the early stage of the COVID-19 outbreak. Nevertheless, compared to the most recent national population statistics of India [21], our sample was obviously over-representative of women, well-educated people, and people engaging in mental labor. Given the significant associations between these demographic variables and KAP towards COVID-19 revealed in this study, we may have overestimated knowledge and rates of preventive

practices and underestimated rates of positive attitudes towards COVID-19 of Dakshina Kannada residents. Considering that educational attainment and occupation are often used as proxy measures of socioeconomic status [20]. Strictly speaking, our findings can only be generalized to Dakshina Kannada populations of a relatively high socioeconomic status, particularly women. Due to limited access to internet and online health information resources, vulnerable populations of Dakshina Kannada society under the COVID-19 epidemic such as older adults and rural people at grass-root level are more likely to have poor knowledge, negative attitudes, and inappropriate preventive practices towards COVID-19. Therefore, KAP towards COVID-19 of vulnerable populations deserves special research attention in today's India [18, 19]. In addition to the limited sample representativeness, the second limitation of this study is the unstandardized and inadequate assessment of attitudes and practices towards COVID, which should be developed via focus group discussion and in-depth interview and constructed as multi-dimensional measures. Due to the very limited time for developing the questionnaire, both were measured with two simple questions only [19]. In summary, our findings suggest that Dakshina Kannada residents of a relatively high level of socioeconomic status, in particular women, have had good knowledge, optimistic attitudes, and appropriate practices towards COVID-19 during the rapid rise period of the COVID-19 outbreak. In addition, good COVID-19 knowledge is associated with optimistic attitudes and appropriate practices towards COVID-19, suggesting that health education programs aimed at improving COVID-19 knowledge are helpful for encouraging an optimistic attitudes and maintaining safe practices [20, 21]. Hopefully, under the combined efforts of Dakshina Kannada authorities and all Dakshina Kannada residents, India surely will win the battle against COVID-19 in the near future. Due to the limitation in representativeness of the sample, more studies are warranted to investigate the KAP towards COVID-19 among Dakshina Kannada residents of a low socioeconomic status [22].

Conclusion

To the best of our knowledge, this is the first study in China examining the KAP towards COVID-19 among Dakshina Kannada residents. This predominantly female and well-educated population displayed high levels of COVID-19 knowledge, optimistic attitudes, and cautious practices. Notably, 90.8% believed COVID-19 would be controlled, and 97.1% had confidence in China's victory over the virus. Despite high optimism, nearly all participants avoided crowded places and wore masks. Our findings highlight the importance of targeted health education to improve COVID-19 knowledge, particularly for men and those with lower education levels. Further research should focus on vulnerable populations with lower socioeconomic status.

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