Knowledge, Attitudes, and Practices toward COVID-19 among Indian Residents during the Verge of Lockdown Restrictions: A Quick Online Cross-Sectional Survey

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Abstract

Introduction   Prodigious restrictions and safety measures have been adopted by the government to control the spread of wildfire coronavirus disease 2019 (COVID-19) pandemic in India. However, the effective implementation of these measures depends upon the knowledge, attitudes, and practices (KAP) of the people. In this context, a cross-sectional online survey of a sample of Indian residents for assessing their KAP toward COVID-19 has been taken up during the verge of lockdown restrictions.

Methods   A self-developed online KAP questionnaire consisted of 21 questions related to clinical treatment and prevention aspects of COVID-19 including the safety measures completed by the participants. Assessments on their attitudes and practices toward COVID-19 included the confidence of people to overcome this pandemic and adapting safety measures such as wearing mask while going out in recent days.

Results and Discussion   A sample of 1,043 participants participated in this online survey. The overall correct rate of the knowledge questionnaire was 90%. More than half of the respondents (53.3%) had confidence that India can win the battle against COVID-19. All the participants believed that Ayurveda, Yoga, Unani, Siddha, and Homoeopathy (AYUSH) systems of medicine that are the rich heritage of India would be helpful in combating the viral illness (95.4%). Nearly all the participants (99%) wore masks when going out in recent days. In multiple logistic regression analyses, the COVID-19 knowledge score was significantly associated with a lower likelihood of negative attitudes and preventive practices toward COVID-19.

Conclusion   The Indian residents showed good knowledge toward COVID-19 and this in turn helped them to hold optimistic attitudes and have appropriate practices toward COVID-19. More community-based health education program strategies if aimed would help further. The limitation of sample representativeness restricts to generalize the findings to population of rural areas with low socioeconomic status.

Keywords
► COVID-19
► knowledge
► attitude
► practice
► cross-sectional survey
► online survey
► India
► lockdown
► AYUSH

Introduction

The pandemic coronavirus disease 2019 (COVID-19) is flaring up like wildfire leaving the world in a state of utmost uncertainty. The disease has been designated as COVID-19 by World Health Organization (WHO) in the month of February 2020 and on the basis of its alarming levels of spread and severity, the Director-General of WHO characterized the COVID-19 situation as a pandemic on March 11, 2020 and warned all countries to take action in the efficient detection of infection and to follow the prescribed safety measures to prevent spread.[1] In the wake of its high infectivity and mortality, all the countries across the globe have imposed strict lockdown restrictions to curb its spread. Many countries are using a combination of containment and mitigation activities with the intention of delaying major surges of patients and leveling the demand for hospital beds, while protecting the most vulnerable from infection, including elderly people and those with comorbidities.[2]

In India, since the detection of its first case on January 30, 2020, various stringent measures were taken up by the government. The Ministry of Health and Family Welfare (MOHFW) of India has raised awareness about the recent outbreak and has taken necessary actions to control the spread of COVID-19. The central and state governments have taken several measures formulating wartime protocols to achieve this goal. The Indian government implemented a 55-day lockdown throughout the country that started on March 25, 2020, to reduce the transmission of the virus.[3] Despite the stringent measures, the pandemic seems to be spreading at a rapid pace. Initially, the disease burden seemed to localize in metropolitan cities and district headquarters, but currently the disease has advanced to affect almost every region of the country, including rural areas. Though a good number of cases found recovering from the illness, no specific treatment regimen could be established leaving the outcome of an individual case to uncertainty.[4] As the lockdowns are creating a havoc in the economy of the country, the government started slowly relaxing its restrictions one by one as unlock 1.0, 2.0, 3.0, and so on.[5,6] The strongest and most effective weapon that society has against this virus is prevention with the implementation of safety measures as hand hygiene, respiratory etiquette, social distancing, early detection of cases, and strict quarantine measures.[4,6] The MOHFW also designed specially an application named "Arogya Setu" to ensure the personal safety of every individual resident of India by notifying through the app the positive cases in the surrounding area of an individual by online geographical mapping.[7] Another strength of Indian health sector is its own rich heritage and culture to build up immunity that plays an important role in combating any new infections with AYUSH (Ayurveda, Yoga, Unani, Siddha and Homoeopathy) systems of medicine as an added benefit to the health prospects of Indian residents.[8,9] Apart from the government, it is the responsibility of every individual of the society to be conscious and cognizant to break the chain of transmission. It is the knowledge, attitudes, and practices (KAP) of the people that ultimately decides the effective implementation of various measures taken up by the government. At this juncture, it is the need of the hour to assess the KAP of the people and to understand the public awareness critically to plan the future strategies to be followed for further motivation of the public in the containment of the pandemic.

In the above context, this online cross-sectional survey was aimed at assessing the KAP of general public of India with respect to the current pandemic of COVID-19. The survey is based on a self-developed questionnaire with 21 questions pertaining to the clinical picture, treatment, and preventive aspects of COVID-19. Further, the survey highlights the importance of social distancing, wearing mask, and use of sanitizers.

Methods

Duration of Survey

This online cross-sectional survey was conducted from May 20 to June 30, 2020, the timeline where the country is moving from the verge of lockdowns toward slow and steady unlock measures in India. Due to the pandemic it was not feasible to carry a community-based survey, it has been decided to take up an online real-time survey to collect the data.

Participants

Relying on the author's networks with local people living in the city of Hyderabad, Telangana, and other parts of India, a single-page Google survey form recruitment link has been posted/reposted in the "What's app" groups. This survey form includes a brief introduction on the background, objective, procedures, voluntary nature of participation, declaration of anonymity, and confidentiality and notes for filling in the questionnaire, as well as the link of the online questionnaire. Although the questionnaire was distributed among the local residents of Hyderabad, no restrictions were addressed, and it was kept open to all the residents of India.

The ethics committee of the Extension Clinical Research Unit located in Princess Durru Shehvar Children's & General Hospital has approved the procedures for this online survey. Participants reading the introduction and taking up the survey itself were taken as their voluntary willingness to participate in this online survey. As freedom is given to the participants that at any point of answering the questionnaire, they can opt to quit the survey.

Online Survey Questionnaire

The questionnaire consisted of two parts: demographics and KAP. Demographic variables included age, gender, marital status, education, occupation, and current place of residence (any part of India). According to the guidelines in the clinical and community management of COVID-19 by the MOHFW, Government of India, a COVID-19 KAP questionnaire has been developed by the authors. The questionnaire had 21 questions, where (►**Table 1**) K1 to K13 were depicting the knowledge of disease and treatment aspects of COVID-19, and A1 to A5 were depicting the attitude of the people in containing the spread of COVID-19 and the confidence they have in the capacity of India to fight against the pandemic,

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

S. No.	Questions	Responses	Desired response	Aspects
K1	1. COVID-19 is the highly infectious disease caused by recently discovered strain of coronavirus (98.6%)	Yes, no, don't know	Yes	Knowledge of disease and treatment aspects of COVID-19
K2	2. The main symptoms of COVID-19 are fever, cough, and breathing difficulty (99.4%)	Yes, no, don't know	Yes	
K3	3. Currently there is no known treatment/vaccine for COVID-19 available (97.4%)	Yes, no, don't know	Yes	
K4	4. Old age and presence of other medical conditions increase the risk of COVID-19 infection (98.2%)	Yes, no, don't know	Yes	
K5	5. A person with no symptoms cannot spread the disease and is not a carrier of infection (38.5%)	Yes, no, don't know	No	
K6	6. Majority cases of COVID-19 will be mild with complete recovery (89.5%)	Yes, no, don't know	Yes	
K7	7. COVID-19 can spread through droplets when an infected person coughs/sneezes as well as through contaminated surfaces (98.8%)	Yes, no, don't know	Yes	
K8	8. Physical distancing of ~1 m from a person who is sick will be protective against COVID-19 (96.4%)	Yes, no, don't know	Yes	
K9	9. Hand washing should be with soap and water or with an alcohol-based hand rub for a period of minimum 20 seconds (99.6%)	Yes, no, don't know	Yes	
K10	10. COVID-19 can be transmitted from eating nonvegetarian food (84.9%)	Yes, no, don't know	No	
K11	11. Children and young people need not follow any preventive measures to contain infection (91.9%)	Yes, no, don't know	No	
K12	12. Quarantine is an effective means of stopping the spread of COVID-19 infection (84.5%)	Yes, no, don't know	Yes	
K13	13. People who are COVID-19 positive, need to be isolated in a proper place and be observed for a period of 14 days (98.8%)	Yes, no, don't know	Yes	
A1	14. Do you feel that India would be successful in the battle of containing COVID-19 infection	Agree, disagree	Agree	Confidence of fighting capacity of India to COVID-19
A2	15. Do you agree to follow the safety measures for the containment of the infection for a long period	Agree, disagree	Agree	Attitude toward containment of spread of COVID-19
A3	16. Self-medication with antibiotics helps the fight against COVID-19	Agree, disagree	Disagree	
A4	17. Do you think that alternative systems of medicine like Ayurveda, Homoeopathy, Unani, have a role in the treatment of COVID-19 (95.4%)	Agree, disagree	Agree	
P1	18. Would you like to visit any mall/theater/crowded place in the coming days (95.6%)	Yes, no	No	Practice of safety measures
P2	19. Do you wear a mask before leaving home (99%)	Yes, no	Yes	
P3	20. Do you use "Arogya Setu" mobile app released by Government of India for your personal safety from COVID-19	Yes, no	Yes	
A5	21. In case of any requirement, will you participate in frontline rescue operations of COVID-19	Yes, no	Yes	Attitude toward containment of spread of COVID-19

Abbreviation: COVID-19, coronavirus disease 2019.

lastly P1 to P3 were depicting the effective implementation of the safety measures by the people against COVID-19. These questions were designed to answer yes/no, true/false, agree/disagree with an additional "I don't know" option. The correct answer is given "1" point, whereas the wrong answer given "0" points. The total knowledge score was 0 to 13 and the higher score depicted a higher KAP for COVID-19 among the residents of India. The Cronbach's α coefficient of the knowledge questionnaire was 0.71 in our sample, indicating acceptable internal consistency.[10]

Statistical Analysis

KAP scores of different persons according to different persons according to their demographic characteristics were compared with independent samples t-test, one-way analysis of variance (ANOVA), or chi-squared 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. Regression coefficients and odds ratios (OR) and their 95% confidence intervals were used to quantify the associations between variables and KAP. Data analyses were conducted with SPSS version 17.0. The statistical level of significance has been taken at $p < 0.05$ (two-sided).

Results

Participants who completed the survey questionnaire were 1,043. Among this sample, the average range of age was 30 to 49 years (standard deviation [SD]: 11.7), and 590 (56.6%) participants were men, 503 (48.2%) held bachelor's degree or above, 800 (76.7%) were married, and 840 (80.5%) were residents of Telangana state. Other demographic characteristics are shown in ►Table 2.

The right answer rates of the 13 questions on COVID-19 knowledge questionnaire were 84.5 to 99.6% (►Table 1) except one question (K5) where the participants' response for right answer was 38.5%. The mean COVID-19 knowledge score was 11.7 (SD: 1.9, range: 0–21), suggesting an overall 90% (11.7/12 × 100) correct rate on this knowledge test. Knowledge scores significantly differed across age

groups, education levels, and place of residence, but no difference found among gender, marital status, and occupation ($p \leq 0.05$) (►Table 2). Multiple linear regression analysis showed that female gender (vs. male, β:−0.166, $p < 0.039$), age-group of 18 to 29 years (vs. 30–49 years, β:−0.011, $p < 0.002$), and education of bachelor's degree or lower (vs. master's degree and above, β:−0.139, $p < 0.004$) were significantly associated with poor knowledge score (►Table 3).

More than half of the respondents agreed that India will be able to fight the crisis of COVID-19 and would succeed (53.3%). The attitude toward the final success in controlling COVID-19 differed significantly across the education, occupation, and residence places ($p < 0.05$). And also, respondents reporting "disagree" and "Don't know" had significantly observed to have poor knowledge scores than those responding to the "agree" option (►Fig. 1). Multiple logistic regression analysis found that education status graduation and above (vs. others, OR: 1.432, $p < 0.05$), economic status low income (vs. others, OR: 3.908, $p < 0.05$), and COVID-19 knowledge score (OR: 0.338, $p < 0.05$) were significantly associated with the answer of "disagree" on A1 (►Table 4). The COVID-19 knowledge scores were significantly lower in persons without than that of with confidence of winning ($p < 0.05$) (►Fig. 1). Also, people showed their interest in the positive role of AYUSH systems of medicine in combating the COVID-19 crisis (95.4%).

Majority of the participants do not want to visit any crowded place (95.6%) in the nearby time and wore masks

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

| Characteristics		Number of participants	Percentage	Mean ± standard deviation	t/f	p-Value
Gender	Male	590	56.6	11.80 ± 1.133	1.103	0.270
	Female	453	43.4	11.72 ± 0.939		
Age-group (y)	18–29	224	21.5	11.95 ± 1.017	8.691	0.000
	30–49	691	66.3	11.76 ± 1.026		
	50 and above	128	12.3	11.47 ± 1.190		
Marital status	Single	239	22.9	11.81 ± 1.157	0.491	0.483
	Married	800	76.7	11.75 ± 1.020		
Education	Below SSC	207	19.8	11.83 ± 0.579	15.372	0.000
	Intermediate	333	31.9	11.48 ± 1.099		
	Graduate	411	39.4	11.99 ± 1.042		
	Post graduate	92	8.8	11.64 ± 1.449		
Occupation	Government	115	11.0	11.62 ± 1.189	3.888	0.004
	Private	461	44.2	11.79 ± 1.157		
	Business	46	4.4	11.54 ± 0.808		
	Home maker	230	22.1	11.65 ± 0.847		
	Student	191	18.3	11.98 ± 0.940		
Place of current residence	Telangana	840	80.5	11.84 ± 0.909	3.471	0.001
	Other parts of India	203	19.5	11.46 ± 1.473		

Abbreviation: COVID-19, coronavirus disease 2019.
Note: $p < 0.05$.

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

Variable	Coefficient	Standard error	t	p-Value
Age	−0.011	0.004	3.038	0.002
Gender	−0.166	0.080	2.067	0.039
Country	0.974	0.427	2.281	0.023
Residing state	−0.469	0.181	2.587	0.010
Native place	−0.092	0.180	0.509	0.611
Family	−0.082	0.098	0.837	0.403
Marital status	0.097	0.115	0.842	0.400
Educational status	0.139	0.048	2.894	0.004
Economic status	−0.134	0.083	1.610	0.108
Profession	0.097	0.036	2.721	0.007

Abbreviation: COVID-19, coronavirus disease 2019.
Note: $p < 0.05$.
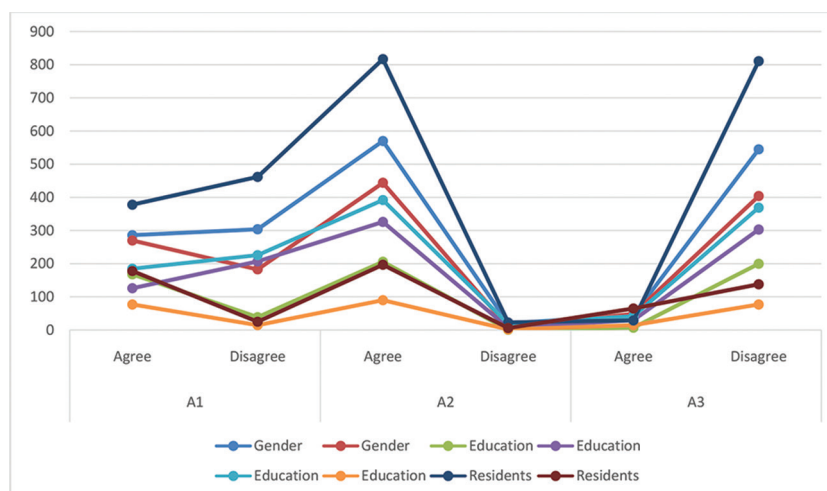
Fig. 1 Attitudes toward coronavirus disease 2019 (COVID-19) by demographic variables.

when going out (99%) in recent days. One of the interesting findings is that more than 50% of the participants have downloaded the "Arogya Setu" app designed by the Government of India for the public personal safety from COVID-19 (59%). The rates of these three practices differed significantly across demographic groups ($p < 0.05$) (►**Fig. 2**). Multiple logistic regression analysis showed that age, marital status, and education and COVID-19 knowledge were significantly associated with the Arogya Setu app download, but the mask wearing compliance and the dislike to visit a crowded place were perfectly followed by all irrespective of their demographic differences (►**Table 5**).

Discussion and Conclusion

This may be one of the first study in India especially Telangana state assessing the KAP toward COVID-19 among the residents. In this survey, both genders have equally participated, and the overall positive rate seemed above 90% on the knowledge questionnaire, indicating that most participants are knowledgeable about COVID-19. More than half of the participants also had the optimistic attitude and had the confidence on India (53.3%) in combating this COVID-19 crisis. It is also evident that the residents were very cautious: nearly avoiding to visit crowded places (95.6%), wore masks before leaving home (99%), corroborating to other KAP studies of Malaysian, Saudi population,[11,12] and they also downloaded Arogya Setu app designed by the Government of India for personal safety of the public (59%). Here, the characteristics of KAP toward COVID-19 have been analyzed and identified some demographic factors associated with KAP; these findings would be useful for public health policymakers and health workers to recognize target populations for COVID-19 prevention and health education.

The results are positive as high correct rate of COVID-19 knowledge among the Indian residents and willingness to practice safety measures with an attitude to help others in this pandemic was unexpected. At this stage of unlocking the lockdown restrictions, as presently unlock 3.0 is in vogue and we are on the way to unlock 4.0 soon, this

Table 4 Results of multiple binary logistic regression analysis on factors significantly associated with attitudes toward COVID-19

Variable	OR (95% CI)	p-Value
A1. Agree that India would be successful in the battle of containing COVID-19 infection		
Residing state (Telangana vs. others)	1.282 (0.110–0.699)	0.007
Native place (Hyderabad vs. others)	1.298 (0.110–0.677)	0.05
Educational status (below SSC vs. others)	1.977 (0.053–0.364)	0.000
Educational status (intermediate vs. others)	2.329 (0.046–0.205)	0.000
Educational status (graduate vs. others)	1.432 (0.119–0.480)	0.000
Economic status (low income vs. others)	3.908 (8.858–280.15)	0.000
Knowledge	0.338 (0.595–0.855)	0.000
A 2. Agree to follow the safety measures for the containment of the infection for a long period		
Knowledge	0.355(1.093–1.862)	0.009
A3. Self-medication with antibiotics helps the fight against COVID-19		
Native place (Hyderabad vs. others)	2.168(2.778–27.513)	0.000
Knowledge	0.788(1.710 - 2.829)	0.000
A4. Agree that alternative systems of medicine like Ayurveda, Homoeopathy, Unani have a role in the treatment of COVID-19		
Educational status (below SSC vs. others)	1.851(1.267–32.006)	0.025
A5. Agree that you participate in frontline rescue operations of COVID-19		
Family (nuclear family vs. others)	1.011(0.183–0.724)	0.004
Educational status (intermediate vs. others)	1.467(2.192–8.575)	0.000
Educational status (graduate vs. others)	0.861(1.256–4.452)	0.008
Knowledge	0.263(1.105–1.533)	0.002

Abbreviations: CI, confidence interval; COVID-19, coronavirus disease 2019; OR, odds ratio.
Note: $p < 0.05$.

positive attitude of the public toward the practice of safety measures and government instructions is very much the need of the hour. This also depicts that the Indian government is successful in educating, disseminating, and motivating the public through mass media and official web sites of MOHFW. Also, the positivity of the public toward the AYUSH systems of medicine (95.4%) in their role of combating the pandemic shows their popular belief of the Indian heritage and culture. The significant positive association between levels of education and COVID-19 knowledge scores supports this speculation.

The optimistic attitude of the Indian residents could be related to the strict COVID-19 control measures. First, lockdown of cities and towns in India enhanced people's confidence in winning the battle against the virus as this survey was done just by the end of the lockdowns. Second, the unprecedented efforts of the Government of India also might be the reason for the confidence of the public to overcome the epidemic, for example, providing large number of medical materials all over the country and also promise for free testing and efficient treatment facilities in government hospitals all over the country. Third, the positive attitudes toward COVID-19 were associated and paralleled by the strict practices adopted by the public by avoiding crowded places and wearing masks. These are termed as nonpharmaceutical interventions that can significantly reduce the viral spread in these pandemics as established in a previous study.[13]

It is of utmost importance mentioning that higher COVID-19 knowledge scores were found to be significantly associated with a lower likelihood of negative attitudes and potentially dangerous practices toward COVID-19 pandemic in this study. This depicts the effective means of educating people through media campaigning that would be of larger help in combating the COVD-19 crisis and health education programs with effective campaigning of the public should be one of the active strategies in combating such pandemic emergencies.

Even though the sample size of this survey is limited, its strength lies in its timely implementation like exactly at the verge of the lockdown restrictions as this assessment
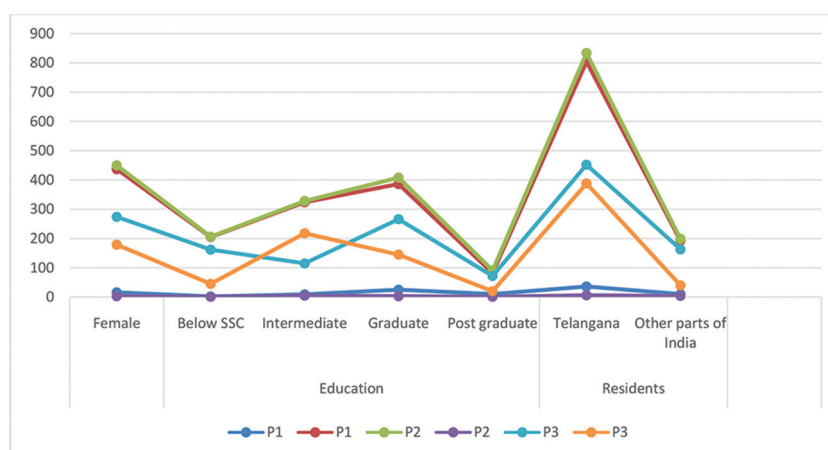

Fig. 2 Practices toward coronavirus disease 2019 (COVID-19) by demographic variables.

Table 5 Results of multiple binary logistic regression analysis on factors significantly associated with practices toward COVID-19

Variable	OR (95% CI)	p-Value
P1. Like to visit any mall/theater/crowded place in the coming days		
Educational status (1)	2.215(1.504–55.765)	0.016
Educational status (2)	1.508 (1.517–13.441)	0.007
Profession (1)	1.82 (0.043–0.600)	0.007
Knowledge	0.656(1.526–2.435)	0.000
P2. Agree to wear a mask before leaving home		
Knowledge	0.584(1.192–2.697)	0.05
P3. Agree to use "Arogya Setu" mobile app released by Govt. of India for your personal safety from COVID-19		
Age numeric	0.052(0.931–0.969)	0.000
Native place (1)	1.813(0.063–0.420)	0.000
Marital status (1)	0.851(1.048–5.239)	0.038
Educational status (2)	−2.164(0.056–0.234)	0.000
Educational status (3)	0.961(0.192–0.761)	0.006
Economic status (1)	2.049(1.707–35.274)	0.008
Profession (2)	0.802(0.855–5.818)	0.101
Knowledge	0.573(1.500–2.099)	0.000

Abbreviations: CI, confidence interval; COVID-19, coronavirus disease 2019; OR, odds ratio.
Note: $p < 0.05$.

would further help the policymakers to understand the future strategies in combating the pandemic situation. Such surveys need to be done among rural areas where the education levels are low and people are more vulnerable to the viral illness due to the lack of proper knowledge to develop more effective strategies for future. In addition to the limited sample representativeness, also the assessment questions for practices and attitudes should have been more in-depth to have more precise understanding through various standard parameters. As the questionnaire was developed within a limited time, it could not be much elaborated.

In summary, the findings depict that Indian residents of a relatively middle and high socioeconomic status, educated degree, and above irrespective of the genders have had good knowledge, optimistic attitudes, and appropriate practices toward COVID-19 during the rapid rise period of the COVID-19 outbreak; the findings corroborate with the study on KAP of COVID-19 among Tanzanian population.[14] In addition, good COVID-19 knowledge is associated with optimistic attitudes and appropriate practices toward COVID-19, suggesting that health education programs aimed at improving COVID-19 knowledge are helpful for encouraging an optimistic attitude and maintaining safe practices. A positive ray of hope is expected from the combined efforts of Indian government and Indian residents, thus helping India to win the battle against COVID-19 successfully. More studies are warranted to investigate the KAP toward COVID-19 in rural areas and low socioeconomic status people,[15] to understand the residents of the country in depth.

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