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Gender and Occupation Predict Coronavirus Disease 2019 Knowledge, Attitude and Practices of a Cohort of a South Indian State Population

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Abstract

Context: Coronavirus disease 2019 (CoViD 19) pandemic has induced the government to initiate strict control measures. Improvements to these measures and shortcomings could be gleaned with the understanding of the knowledge, attitude and practices (KAP) of the public. Aims: The aim of this study the CoViD 19 KAP of a south Indian state population. Settings and Design: This was a Cross-sectional observational study. Subjects and Methods: We conducted an online survey to elicit this information. Statistical Analysis Used: Mean, Standard deviation, Binomial and Multinomial logistic regression. Results: Of the 1837 subjects who answered the survey, 70% were youth (16–29 years), 54% were postgraduates and 47.8% were desk jobholders. The mean knowledge score was 9.92 ± 2.37/14 and 94.44% secured at least above-average score. The subjects had a positive (70%) attitude towards the CoViD 19 situation and 77% of subjects followed good preventive practices. However, we found that women, people with low education and nonmedical background were associated with poor knowledge and practices. The attitude was poor in subjects occupant in physical works. Conclusions: The health policy would better serve the purpose of the groups with poor scores are targeted.

Keywords: Coronavirus disease 2019, knowledge, attitude and practices, COVID 19 Indian study

INTRODUCTION

Coronavirus disease 2019 (CoViD 19), a respiratory disease caused by SARS COV 2[1] has been reported in 4,006,257 people worldwide. Moreover, it has killed 278,892 patients by 11 May 2020.[2] As of the 1st week of May 2020, there is no drug/vaccine against the virus.[3] Prevention, therefore, remains the key defence against the disease. To prevent the spread of the infection, countries worldwide have put their states into lockdown with restrictions of all travel and movement of people out of their homes except for emergency purposes.[4] India, the second most populated country in the world, announced lockdown very early in the epidemic.[5] It has recorded 67,152 cases, with 2206 deaths by 11 May 2020.[6] It has also launched public awareness campaigns through the media apart from the curfew to sensitise and update the citizens about CoViD 19.

The effectiveness of all these measures depends on the people’s adherence to the government directives and measures. This, in turn, is based on the knowledge, attitude and practices (KAP) regarding the virus in the general public. The pandemic is a totally unprecedented situation to the people, and thus, the response of the public to the unique circumstances needs to be understood for any effective disease control planning. The people’s knowledge about the disease, its mode of spread, symptoms and preventive measures form their attitudes and drive their actions. The sources through which most of the general public seek information about the situation can only be understood by
a survey from the people directly. An understanding of the attitude of the public towards CoViD19 can help predict the response to government measures. Since CoViD19 is contagious, the practices of the public towards transmission prevention need to be studied to plan strategies matching the deficiencies. This data of the KAP will provide light on the weakest links in disease prevention.[7] This information can improve efficient health policy planning. We studied the KAP aspects in a group of the Indian population of Andhra Pradesh state wherein the disease is on the rise in May 2020.

**Subjects and Methods**

In the South Indian state of Andhra Pradesh, we conducted a KAP study concerning the CoViD19 epidemic. A 55-point questionnaire [Supplement 1] was answered online by the subjects (age >15 years) who were recruited through Whatsapp/Facebook/Twitter or other social media. This online mode was chosen because of the strict lockdown. The response was limited to one per device. The questionnaire [Supplement 1] was opened to responses from 29th April 2020, to 2nd May 2020 on Google forms platform. Questions included demographic data, knowledge about CoViD 19, attitude towards CoViD 19 situation and infection preventive practices domains. Questions on knowledge carried one mark for the correct answer and zero for wrong/don’t know response. The questionnaire was initially tested for validity and reliability. Two experts in public health, one news personnel and a microbiologist assessed and commented on the questionnaire. Modifications were made accordingly. Pretesting of the questionnaire was done on 20 subjects. They answered the questionnaire twice 2 weeks apart. Cronbach’s alpha was 0.73 and the intraclass correlation coefficient was 0.96. The study was approved by the institutional ethical committee at the Great Eastern Medical School, Raguoli.(10/IEC/GEMS and H/2020). As participation was voluntary, it was considered as consent for the study. The data were extracted to the Microsoft excel sheet and analysed. The sample size was calculated based on a previous study.[9] The sample size obtained was 1632. Measures of central tendency and frequencies were described. Parametric quantitative data were described by the mean and standard deviation. Qualitative data were described by frequencies and analysed by binary logistic regression and multinomial logistic regression. Subgroup analysis was performed on similar lines. Statistical significance was set at P < 0.05. Missing data were excluded from analysis. Data analysis was performed with SPSS software-version 20.0 (SPSS Inc. Chicago, IL, USA). Responses were graded into three categories of knowledge. Score <5/14 = Poor knowledge. 6–10 = Average score. More than 10 = Very good score.

Responses to attitude questions were added, and responses with score <7 were considered as poor attitude. Responses to practice questions were added, and responses with a score <7 were equated to poor practices.

**Results**

A total of 1837 people answered the questionnaire. The demographic details are presented in Table 1.

Of the participants, 70.6% were youth with elderly people forming only 4.8%. Both the male and female gender were almost equal in number (Males-56.5%, Females-43.1%). Participants were predominantly educated, with 44.8% constituting the 10th standard to degree level and 54% more than degree level. Desk workers, including people working in offices, shops, clinics (47.8%) and students (39.4%), were also represented in the study. About 55% were related to the medical profession. Four CoViD-positive patients also responded.

**Knowledge**

The mean knowledge score of the subjects was 9.92 ± 2.37. Significantly 94.44% people had at least average knowledge (score >5) [Figure 1]. Figure 2 shows that most of the participants obtained knowledge regarding CoViD 19 from television and google search. Table 2 shows that age 35–50, female gender, intermediate education and non-medical background were the factors associated with poor knowledge of COVID-19. In our study, 15.6% of participants did not have accurate knowledge of CoViD 19 symptoms. And 13.4% of subjects did not recognise the higher risk for elderly people.

**Attitude**

Most of our participants (70%) had a positive attitude towards CoViD 19 situation [Figure 3]. Table 3 shows that people engaged in physical work when compared to desk work are associated with poor attitude towards CoViD-19. To the question of whether we could control the virus completely, 74.6% responded positively, 2.2% responded negatively and 23.2% were ambivalent. Multinomial logistic regression shows the negative responses to this question were associated with male gender (P = 0.002, odd’s ratio = 4.82,95% confidence interval [CI] 1.76–13.24) and housework occupation (P = 0.04, odd’s ratio = 8.03,95% CI 1.10–58.55).

**Figure 1:** Knowledge score categories among the subjects
In this study, 18% of subjects constantly worried about contracting the disease. Moreover, 29.9% of participants did not worry. The rest 52.1% worried sometimes but not all the time.

Practices

Figure 4 shows that a high proportion (77%) of people followed good practices to prevent CoViD 19 infection. Also, 9% of subjects had good practicing habits before CoViD 19 pandemic.

Table 4 shows that female gender, house working occupation and lower knowledge score are associated with poor practices. People who started wearing face masks after CoViD 19 epidemic were 81.7%, those who wore masks inconsistently were 9.3% and those who still did not wear masks were 4%. Moreover, 4.9% wore masks even before CoViD 19 epidemic. Multinomial logistic regression showed that intermediate
education (10th standard to degree) was associated with not wearing a mask ($P = 0.01$, odd’s ratio = 0.41, 95% CI 0.20–0.84).

After the epidemic, 85% of subjects avoided crowds. However, 9.5% of them opined that it is not always possible to avoid crowds. Moreover, 1.2% did not make any active attempt to avoid crowds. Interestingly, 4.3% of subjects had always avoided crowds long before the pandemic. Multinomial logistic regression showed that housework occupation ($P = 0.01$, odd’s ratio = 38.63, 95% CI 2.16–689.80) and currently married status ($P = 0.02$, odd’s ratio = 0.05, 95% CI 0.004–0.56) were associated with not avoiding crowd behaviour.

In this study, 77% of subjects used sanitiser/soap when they washed their hands. But 11.7% did not use it. Among the subjects, 11.3% had always had this practice.

**DISCUSSION**

Our online survey to understand the KAP of a group of subjects in Andhra Pradesh, a state with rising CoViD 19 cases in India (May 2020), showed that >90% of subjects had
above-average knowledge. The subjects acquired information of CoViD 19 from television and Google search (Internet). Predictors of poor knowledge were middle age, female gender, intermediate education and lack of medical background. In our study, 70% of subjects had a positive attitude towards the control of CoViD 19. The subjects occupied in physical work had a poor attitude. Importantly, 77% of participants followed good practices against CoViD 19 infection. And, 9% even practiced them before the epidemic. Female gender, low knowledge and housework occupation were associated with poor practices.

The presence of a high proportion of youth, educated people and desk job workers in our study may be due to the nature of the recruitment of subjects. As we recruited subjects through social media linked to smartphones, which are mostly used by these groups, our study was represented by them. Other online studies also showed a similar profile of responders. A study performed in China had a similar demographic profile. A large United States (US) and United Kingdom (UK) study with 6000 participants was constituted by a high proportion of youth. An Egyptian CoViD 19 KAP study reported 48% of youth and 52.2% university graduates. Young subjects were the predominant responders in two other different locations. Two other studies reported subjects constituting 75%–85.58% of responders who had university-level education.

The high proportion (94.44%) of participants with at least average knowledge of CoViD 19 shows that the subjects were well informed. This result was in line with a large study in China with 90% correct responses. This was 69% in a Ugandan study and 62% in a study from Paraguay. Television and Google (Internet search) were the predominant sources of information in our study, mirrored in a Thailand study. The use of television and social media by the Indian central and state governments to disseminate CoViD 19 news and education has thus been utilised by the public. Our study supports the continuation of this usage policy. In the Egyptian study, social media (66.9%), the Internet (58.3%) and television (52.6%) were the main sources of CoViD 19 information. A study from the United Arab Emirates showed that 61% participants accessed CoViD 19 information through social media. It was as high as 83.5% in a study from Kuwait. While social media (74%), television and radio (72%), were a significant source of knowledge for Ugandan health workers, the government website (79%) and the World Health Organisation (WHO) (88%) were more accessed sources of information.

The middle age group (30–49), females, and the people educated up to 10° were associated with poor knowledge in our study. This may be due to preoccupation with day to day work/worry. Women busy with household work may have less access to information and factual knowledge. The undereducated by way of social communication via phone, etc., and the highest educated by continuous news and digital media updates may be abreast with CoViD 19 knowledge. Nonmedical background with poor knowledge is understandable and is seen in other studies also. The comparative predictors of poor knowledge in four studies are shown in Table 5.

In our study, 15.6% of subjects did not know the signs and symptoms of CoViD 19. In the Thailand study, this was up to 56.7%. In the US, it was 21.2%, in the UK it was 16.4%, and in Kuwait, it was 12.4%–26.9%. It may mean that either the subjects had not had a strong sensitization to the clinical signs and symptoms or are not confident to answer affirmatively regarding this aspect. As this is an important factor to identify or suspect a CoViD 19 victim, more penetrant knowledge providing measures on this aspect may be planned by the knowledge providers.

Compared to 3.7% of subjects in the US and 1.7% subjects in the UK, 13.4% of our study subjects did not know that the elderly are more severely affected by CoViD 19. This may be due to differences in the knowledge between the Western and Eastern world.

In our study, 70% of subjects had a positive attitude towards CoViD 19 prevention and course. It was over 90% in the...
This confidence may be due to the strict lockdown control measures by the government[5] the success of these measures in Chinese and also due to the low case fatality rate in the Indian peoples.

The poor attitude in subjects occupied in physical labour may be due to loss of work, potential layoffs[23] and also the low educational status (associated with poor attitude). This is also seen in the Thailand study data[8][8].

Table 7 shows the attitude predictors across studies regarding the control of the epidemic.

An earlier small Indian study focusing on mental issues reported that 72% of participants worried about the risk for infection.[24] The Egyptian study reported that 86.9% of participants are worried of contracting the infection.[10] In Thailand,[8] 57.9% of participants reported that they worry about CoVid 19. In our study, 18% participants felt so. This comparatively lower value may be due to the early severe lockdown[5] measures by the government and the slow spread of the disease compared to other countries.[22]

In our study, 77% of participants followed good practices, while 9% of them had these habits before the epidemic. These good preventive practices were reported to be 47.37% in Thailand,[8] 97.2% in China,[19] and 89.7% in a Chinese healthcare worker study[23] and 74% in a Ugandan health worker study.[12] These suggest that a good number of people practice preventive measures against CoVid 19, and the proportion is understandably high in health care-associated people. As half of our participants had a medical background, we recorded a high percentage of good practices. The predictors for poor CoVid 19 infection preventive practice across studies included are shown in Table 8.

### Table 4: Binomial logistic regression for factors associated with poor coronavirus disease 2019 prevention practices

| Category                                    | B    | Exp (B) | P    | 95% CI Upper | 95% CI Lower |
|----------------------------------------------|------|---------|------|--------------|--------------|
| Adult versus youth                          | 0.35 | 1.42    | 0.73 | 0.19         | 10.12        |
| Elderly versus youth                        | 0.08 | 1.08    | 0.96 | 0.06         | 19.78        |
| Female versus male                          | 2.15 | 8.60    | 0.44 | 1.06         | 69.75        |
| Never married versus married                | -0.20| 0.82    | 0.84 | 0.11         | 5.96         |
| Others versus married                       | 15.20| 3,994,811.39 | 0.99 |              |              |
| Less than 5th standard versus more than degree | 16.04| 9,237,722.76 | 1    |              |              |
| 6th-10th standard versus more than degree   | 16.72| 18,246,216.90| 0.99 |              |              |
| 10th to degree versus more than degree      | -0.90| 0.41    | 0.20 | 0.1          | 1.65         |
| House work versus desk work                 | -2.19| 0.11    | 0.06 | 0.01         | 1.05         |
| Student versus desk work                    | 0.96 | 2.60    | 0.32 | 0.40         | 16.76        |
| Physical work versus desk work              | 16.67| 17,373,583.61| 0.99 |              |              |
| Not working                                 | -0.09| 0.92    | 0.94 | 0.09         | 9.16         |
| Nonmedical versus medical                   | 0.98 | 2.66    | 0.19 | 0.63         | 11.34        |
| Co-morbid people versus normal people       | 1.27 | 3.58    | 0.25 | 0.41         | 31.39        |
| Locked outside versus home                  | 15.98| 8,691,997.60| 0.99 |              |              |
| Government quarantine versus home           | 15.83| 7,489,026.50| 0.99 |              |              |
| Home quarantine versus home                 | 16.34| 12,529,335.04| 0.99 |              |              |
| Non-COVID versus COVID                      | 3.91 | 49.96   | 1    |              |              |
| Children <15 years                           | -0.82| 0.44    | 0.26 | 0.10         | 1.9          |
| Old people more than 50                     | 0.84 | 2.31    | 0.20 |              |              |
| Poor knowledge                              | -0.11| 0.89    | 0.93 | 0.08         | 10.62        |
| Knowledge score                             | 0.34 | 1.41    | 0.08 | 0.96         | 2.06         |

CI: Confidence interval, COVID: Coronavirus disease

### Table 5: Predictors of poor knowledge in different studies

| Category                          | Our study | China study[19] | Thailand study[8] | Egyptian study[19] | Paraguay study[11] |
|-----------------------------------|-----------|-----------------|-------------------|--------------------|--------------------|
| Age (years)                       | 35-50     | 16-29           | >50               |                    |                    |
| Gender                            | Female    | Male            |                   |                    |                    |
| Marital status                    | Never married | Married |                   |                    |                    |
| Education                         | 10-degree | <degree         |                   |                    |                    |
| Occupation                        | Unemployed | Agriculture    |                   |                    |                    |
| Medical background                | Nonmedical |                 |                   |                    |                    |
| Channel of information            | Television |                 |                   |                    |                    |

Chinese population.[9] This confidence may be due to the strict lockdown control measures by the government[5] the success of these measures in Chinese[21] and also due to the low case fatality rate in the Indian peoples.[22] The poor attitude in subjects occupied in physical labour may be due to loss of work, potential layoffs[23] and also the low educational status (associated with poor attitude). This is also seen in the Thailand study data[8][8].

In our study, 77% of participants followed good practices, while 9% of them had these habits before the epidemic. These good preventive practices were reported to be 47.37% in Thailand,[8] 97.2% in China,[19] and 89.7% in a Chinese healthcare worker study[23] and 74% in a Ugandan health worker study.[12] These suggest that a good number of people practice preventive measures against CoVid 19, and the proportion is understandably high in health care-associated people. As half of our participants had a medical background, we recorded a high percentage of good practices. The predictors for poor CoVid 19 infection preventive practice across studies included are shown in Table 8.
Poor practices were associated with females, house workers and low knowledge in our study. Poor knowledge in the females who generally do the housework in India\cite{15,16} may be an important factor. This group then should be a target for better sensitization against CoViD 19.

In our study, 4% of subjects did not wear masks. It was 37% in the earlier Indian mental health study\cite{24} and 65% in the Egyptian study.\cite{12} This behaviour is as high as 83% in the Thailand study.\cite{8} This may be due to the rural background and lower education status of the Thailand study participants. A Paraguayan study reported 25.69% of participants not wearing a mask.\cite{11} Interestingly, a study done in an earlier phase of the pandemic reported that 46% of health-care workers did not wear a mask in duty.\cite{12} Conflicting guidelines from the Center for disease control\cite{26} and the WHO\cite{27} may be one reason. Across studies, the factors associated with not wearing masks are shown in Table 9.

In our study, 11.7% did not wash their hands with sanitizer soap. Among the Ugandan health workers, it was only 4%.\cite{12} In Thailand,\cite{8} 54.8% did not. Probably, due to lower education and rural residence of Thailand study participants.

Our study showed that 85% of the subjects avoided crowds to prevent infection. This is similar to 90% reported in the previous indian study.\cite{24} A study from Paraguay reported 88.35% crowd avoidance practice.\cite{11} This may be due to the awareness and intention of the public or due to the government imposed curfew. Across the different studied there were different predictors of avoiding crowds Table 10.

The responders of our study were mostly educated and young. Uneducated and elderly were not overtly represented in the study. The study is also subject to the honesty and recall bias of the subjects. Other limitations of the study were access to smartphone and knowledge of english language. Overall, the subjects had good knowledge of CoViD 19. Their information sources were television and the internet. Our study shows the need to improve the CoViD 19 knowledge in women, people with low education and no medical background and in the adult age group. There is a need to address the attitudes amongst physical workers.

**Conclusion**

Across the discussed CoViD 19 KAP studies, it is reflected that poor knowledge is associated with lower education, poor attitude with manual work and poor practices with house workers. These aspects should be considered under any global interventions against CoViD 19.

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**Conflicts of interest**

There are no conflicts of interest.

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SUPPLEMENT 1: QUESTIONNAIRE

General Questions
1. My age is
   16-29
   30-49
   50 and above
   Other:
2. I am a
   Male
   Female
   Other:
3. I am
   Never married
   Married
   Other:
4. I have studied
   <5th std
   6–10th std
   10%/diploma
   More than degree
5. My daily work before Covid19.
   Office
   Shop/clinic/hospital
   Housework
   Physical work
   Student
   Not working
6. I am a medical person/student
   Yes
   No
7. Presently I am living
   At home
   Locked outside due to curfew in another place
   In home quarantine
   In govt quarantine place
8. I am presently living
   In Andhra or Telangana
   Outside Andhra or Telangana but in India
   Outside India
9. There are children below 15 years of age in our family with us now
   Yes
   No
10. There are adults above 50 years age in our family with us now
    Yes
    No
11. I have diabetes (blood sugar)
    Yes
    No
12. I have kidney disease
    Yes
    No
13. I have lung disease
    Yes
    No
14. I am a smoker
15. I am using chemotherapy
   Yes
   No
16. I had a liver/kidney/major organ transplant
   Yes
   No
17. I have heart disease
   Yes
   No
18. I have liver disease
   Yes
   No
19. I have a body mass index (BMI)>40
   Yes
   No
20. I have HIV infection
   Yes
   No
21. I have/had CoViD19
   Yes
   No
22. I read/see about CoViD19 from
   - Newspaper
   - Television
   - Google
   - WhatsApp/Facebook/Twitter/Instagram
   - Other:

**Knowledge Questions**

1. CoViD19 in the body can be killed by taking medication 1 point
   - Yes
   - No
   - Don’t know
2. Elderly people are severely affected by the virus 1 point
   - Yes
   - No
   - Don’t know
3. People with lung problems are severely affected by CoViD19. 1 point
   - Yes
   - No
   - Don’t know
4. The USA has made a successful vaccine against CoViD19 1 point
   - Yes
   - No
   - Don’t know
5. Fever, cough and difficulty in breathing are seen in CoViD19 patients 1 point
   - No
   - Not sure
   - Yes
6. In India, home quarantine means 1 point
   - Staying in home + no visitors
   - Maintaining one meter distance from family members in home
   - Using face mask at home
   - Using separate utensils at home
All of the above
Other:
7. It is scientifically proven that eating wild animals causes CoViD19 infection 1 point
   Yes
   No
   Don’t know
8. Coronavirus positive persons can transmit infection without fever or cough 1 point
   True
   False
   Don’t know
9. Corona virus is spread by droplets from mouth and nose 1 point
   True
   False
   Don’t know
10. Coronavirus 19 infected people will show disease features within 14-28 days 1 point
    True
    False
    Don’t know
11. The country with the highest number of CoVirus positive cases till April 28 was 1 point
    USA
    Italy
    China
12. In India, CoViD 19 infection is tested (as of April 28th) by 1 point
    Throat/nasal swab
    Blood test
    Both
    Don’t know
13. Corona virus can spread through touch 1 point
    True
    False
    Don’t know
14. CoViD19 epidemic started in 1 point
    Italy
    China
    India
15. Older people should be more careful than younger ones
    Yes
    No need
    Other:

**Practice**

1. We started to clean all packets/substances (milk packets, chips, chocolate, packed food, plastics) brought from outside
   Yes
   No
   Most of the time but not every time
   I wash all items long before CoViD19 outbreak
2. I started washing hands with sanitizer/60% spirit
   Yes
   No
   I wash hands with sanitizer long before CoViD19 outbreak
3. I started washing hands for 20 seconds
   Yes
   No
   Not always
   I wash hands for 20 seconds before CoViD19 outbreak
4. I started washing my hands when I come from outside every time
Yes
No
Not every time but most of the times
I wash my hands long before CoViD19 outbreak

5. I started maintaining distance from other people when going out
   Yes
   No
   Not possible every time
   I maintain distance long before CoViD19 outbreak

6. I avoid groups of people nowadays
   Yes
   No
   It is not possible every time
   I avoid crowds long before CoViD19 outbreak

7. I started to wear a mask when I go out after CoViD19 outbreak
   Yes
   No
   Most of the time
   I am using mask long before CoViD19 outbreak

8. I have started washing hands frequently
   Yes
   No
   Not frequently but sometimes
   I wash my hands frequently long before CoViD19 outbreak

**Attitude**

1. I will be happy to isolation/quarantine if I am tested to be positive
   Yes
   No
   Other:

2. I will test myself for CoViD19 if it is available in private
   Yes
   No
   Not sure

3. I will go to a govt doctor if I have symptoms
   Yes
   No
   Maybe if symptoms are severe

4. Food, milk packets and cool drink bottles from outside should be washed with sanitizer
   Yes
   No
   Not always

5. I would like to check my CoViD19 status
   Yes
   No
   Not sure

6. I would like to check my CoViD19 status if it is free
   Yes
   No
   Not sure

7. I would like to check my CoViD19 status even if fee has to be paid
   Yes
   No
   Not sure

8. Anyone with the symptoms of the infection should report to the authorities themselves
   Yes
No
Depends on the situation

9. We will definitely control the CoViD19 epidemic spread
   Yes
   No
   Not sure

10. I worry about getting infected by the present epidemic coronavirus every day
    Yes
    No
    Sometimes, not everyday