Original Article

# Knowledge, attitude and practise toward COVID-19 among patients presenting to five tertiary eye care hospitals in South India - A multicentre questionnaire-based survey

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**Purpose:** The aim of this study was to assess the knowledge, attitude, and practice (KAP) pattern towards COVID-19, among patients presenting to eye care hospitals during the last phase of lockdown period. **Methods:** A multicenter cross-sectional survey was conducted from May 15 to June 15, 2020 in five tertiary eye care hospitals in South India to assess the KAP towards COVID-19. Each of the hospitals belonged to one of the three different zones assigned in India based on number of infections. Red zones represent hotspots and orange/green zones represent regions with medium and lower caseloads, respectively. A validated questionnaire was administered through telephone and responses were recorded on a Google form. **Results:** Out of the total ($n$ = 6119) participants, 3081 were from hospitals in green zone, 2110 from the orange zone, and 928 from red zone. Majority of participants were above 50 years of age (42%) and 15.54% were illiterate. The mean (percentage) scores of knowledge, attitude, and practice were 21.26 (82%), 9.37 (92%), and 10.32 (86%), respectively. KAP among patients more than 50 years of age and in illiterate individuals was significantly less ($P < 0.01$) when compared with all other groups. Participants from red zone had a significantly better attitude ($P < 0.01$) compared to other centers. **Conclusion:** Although the overall KAP regarding COVID-19 disease was robust (above 80% in all categories) in our participants, the high risk elderly population (>50 years) and illiterate individuals had a significantly lower KAP. These are populations in which education should be emphasized and appropriately delivered as a way to reduce COVID-19 risk.

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Coronavirus disease 2019 (COVID-19) is an acute respiratory disease caused by a novel coronavirus and was first detected in December 2019 in Wuhan, China.[1] Since then, it has rapidly spread to more than 200 countries and has been declared a global pandemic by the World Health Organisation (WHO). As of 31 July 2020, there are more than 17.1 million positive COVID-19 cases recorded with 668,910 deaths globally.[2]

India's response to the COVID-19 pandemic is one of the most stringent in the world, and it scored a perfect 100 on the "Oxford COVID-19 Government Response Tracker (OxCGRT)" that compares various government's responses to the coronavirus outbreak worldwide.[3] The initial rise in the numbers of cases was at a low rate in the country, which may be attributed to several government policies and implementation of a nation-wide lockdown at an early stage of the pandemic. As the second-most populous country, however, the eventual rapid rise to being the second-highest infected country in the world could not be restrained. The COVID-19 pandemic is at its peak in India and the fight is still continuing.

While controlling the movement of people can limit the spread, empowering citizens with the right information and encouraging their strict adherence to government advisories play a crucial role in outbreak management. Data from the SARS outbreak in 2003 suggest that knowledge and attitudes towards infectious diseases are usually associated with a high level of panic among the population, which can further complicate measures to prevent the spread of the disease.[4]

Though the entire healthcare system is focused on prevention and containment of COVID-19 infection, timely diagnosis and treatment of other diseases are equally important. Patients seeking healthcare during this lockdown period have a higher risk of exposure, thus awareness of ways to mitigate infection likelihood is important. Poor knowledge, attitude, and practice (KAP) patterns among these patients

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might reflect the danger of possible high transmission and the need for awareness campaigns.

In order to facilitate outbreak management and assess patient readiness to accept behavioral changes, this study aimed to analyze the KAP among patients who presented to eye care hospitals during the lockdown period.

## Methods

The study was conducted in five branches of a Tertiary eye care Hospital located in the state of Tamil Nadu and Pondicherry. To regulate the activities in various districts during the lockdown period, the Union Ministry of Health and Family Affairs categorized the districts in India into three zones based on the cumulative COVID 19 cases reported, doubling rate, extent of testing, and surveillance feedback. The three zones were Red zone/ hotspots, orange, and green zone with a decreasing rate of severity. The study included one hospital in a red zone (RZC1), two in orange zones (OZS2, OSC3), and two in green zones (GZP4, GZT5).

The study protocol, information sheet, questionnaire validation and consent form were approved by the hospital's ethical committee and followed the Declaration of Helsinki guidelines. All walk-in patients above 15 years of age, who were presenting to the eye care hospital during the lockdown period from May 15th to June 15, 2020 were invited to participate in the questionnaire survey. Patients with ocular emergencies like severe pain/ trauma were excluded from the study. Trained study coordinators then administered the questionnaire by phone to avoid direct contact with the patients. Each participant's response was transcribed in a Google form as the survey was completed.

The Knowledge, Attitude, and Practices questionnaire was designed based on the extensive literature review published on COVID-19.[5-8] The questionnaire was validated by two different co-investigators during pilot testing. Two individual bilingual translators translated the questions into the native language (Tamil), which was then approved by the ethical committee. The questionnaire consisted of four main parts: 1) Demographic data including socio-demographic information, including gender, age, state of residence, occupation, and education status; reason for presentation and source of COVID-19 awareness. 2) Knowledge about COVID-19; 3) Attitudes towards COVID-19; and 4) Practices relevant to COVID-19. Demographic details, which included age, sex, highest level of education, occupation, and center at which they were examined were documented.

Knowledge was assessed using a 13-item questionnaire adapted from a KAP study conducted in China by Zhong *et al.*,[5] and it was modified to suit our patient population. The questions assessed knowledge of clinical symptoms, spread, treatment, and prevention of COVID-19. Each correct response was given a score of 2, not sure of the answer was given a score of 1 and for incorrect responses a score of 0 was given. Maximum scores were 26 for knowledge, 10 for attitude and 12 for practice questions. The higher the total score, more knowledgeable the participant was considered. Attitudes were assessed using a 5-item questionnaire. The questions were related to the perceived efficacy of common preventive measures to control the spread of COVID-19 like, regular handwashing, wearing tight-fitting masks and maintaining strict quarantine when infected. These questions were framed in accordance with the guidelines of health ministry. Practices were assessed using a 6-item questionnaire. These questions were based on recommended practices for prevention of COVID-19 transmission i.e., wearing masks when going outside, frequent hand washing, maintaining social distancing, avoiding crowded places and handshakes. Apart from the routine KAP questions published in previous literature, we also included the patient's awareness on the Indian government-introduced mobile application called 'Aarogya Setu.'[9] This App aims to proactively reach out to people in order to educate them on risks, best practices, and relevant advisories pertaining to the containment of COVID-19. Compared to the other practice questions which were subjective, we also included a question which objectively assessed the number of participants who have actually downloaded the app in their mobile devices. This can be seen as a true indicator of adherence among the participants to government's initiatives.

### Statistical analysis

Fully completed questionnaires were extracted from Google forms and exported to Microsoft Excel 2007 for coding. Mean (SD) and frequency (percentage) were used to describe the summary statistics. Knowledge, attitude, and practice scores were compared using the Kruskal Wallis test for demographic variables like age, gender, etc. Linear regression analysis was used to find the factors associated with knowledge, attitude, and practice scores. $P$ values <0.05 were considered as statistically significant. All the statistical analyses were performed using STATA version 14.0.

## Results

### Demographic characteristics

A total of 6119 participants were included in the study. Of these, 928 were included from hospitals in red zone (RZC1), 2110 were from hospitals in the orange zone (OZS2, OZC3), and 2081 from hospitals in the green zone (GZP4, GZT5). Males constituted about 56% of the total sample. The majority of the participants were more than 50 years of age (42%), followed by the 41–50 years age group (22%). Among the total participants, 15.5% were illiterate, 49.7% had school level education and the remaining 34.8% were graduates. Nearly 16% presented for emergent eye conditions like minor injury, pain and redness [Table 1]. For about 99% of participants, the primary source of COVID-19 awareness was from the newspaper or other forms of media. Table 2 summarizes the socio-demographic characteristics of the participants.

### Knowledge assessment

The knowledge of participants in regards to symptoms, spread, and prevention of COVID-19 was good with a mean (SD) score of 21.26 (2.97) and 82% correct answer rates. A high score was considered to be at a score above 80%, a cut-off identified by Olum *et al.*[8] Among the 13 questions, there were a few questions on which participants generally scored poorly. Only 26.9% of our participants were aware that conjunctivitis can be a possible symptom of COVID-19 infection and only 35.3% were aware of possible COVID-19 transmission from animals to humans. Awareness about the Aarogya Setu mobile application was present in only 35.3% of our participants. Overall knowledge, attitude, and practice scores were significantly less among participants more than 50 years of age by Dunn's pairwise comparison ($P$-value <0.001). Multiple linear regression analysis showed that compared to the educated, illiterate participants had significantly lower scores ($P$-value <0.01) [Table 3]. Compared to all other centers, the knowledge score in OZS2 center in the orange zone was significantly higher ($P < 0.001$) by Dunn's pairwise comparison.

**Table 1: Reasons for presentation among study participants**

| Reason | *n* | % |
|---|---|---|
| Defective vision | 1,413 | 23.09 |
| Routine follow up | 1,335 | 21.82 |
| Glass Prescription | 518 | 8.47 |
| Cataract Surgery | 468 | 7.65 |
| Pain | 442 | 7.22 |
| Post-operative follow up | 393 | 6.42 |
| Speciality follow up | 308 | 5.03 |
| Minor Injury | 288 | 4.71 |
| Redness | 239 | 3.91 |
| Headache | 233 | 3.81 |
| Speciality Surgery | 169 | 2.76 |
| Watering | 124 | 2.03 |
| Others | 73 | 1.19 |
| Irritation | 57 | 0.93 |
| Routine check up | 26 | 0.42 |
| Yag cap | 22 | 0.36 |
| Retinal Laser | 11 | 0.18 |
| Total | 6,119 | 100 |

**Table 2: Demographics of the study participants**

| Variable | *n* | % |
|---|---|---|
| Age | | |
| >50 years | 2,577 | 42.11 |
| 41-50 years | 1,358 | 22.19 |
| 31-40 years | 1,003 | 16.39 |
| 21-30 years | 833 | 13.60 |
| <20 years | 348 | 5.69 |
| Sex | | |
| Male | 3,424 | 55.96 |
| Female | 2,695 | 44.04 |
| Education | | |
| Illiterate | 951 | 15.54 |
| School level | 3,038 | 49.65 |
| Graduate level | 2,130 | 34.81 |
| Centre | | |
| RZC1 (Chennai) | 928 | 15.17 |
| OZS2 (Salem) | 1,168 | 19.09 |
| OZC3 (Coimbatore) | 942 | 15.39 |
| GZP4 (Pondicherry) | 1,519 | 24.82 |
| GZT5 (Tirunelveli) | 1,562 | 25.53 |

### Attitude assessment

The overall attitude of participants on following infection prevention guidelines were strong with a mean (SD) score of 9.37 (1.27) and 92%. Notably, 78.7% had positive hope that COVID-19 infection can be eradicated from India and 90% of the participants agreed that people in their neighboring community are strictly practicing the recommended guidelines as well. Multiple linear regression analysis showed that higher education level (illiterate vs graduates) was significantly associated with a high score on attitude (*P*-value <0.01). Participants in the red zone (RZC1) had significantly higher attitude scores when compared with all other centers. (*P*-value <0.01) [Table 4].

### Practice assessment

Practice pattern among participants were similarly high, with a mean (SD) score of 10.32 (0.87) and 86%. More than 99% agreed that they have been following the government regulated guidelines for containing COVID-19 spread. However, only 18% of them had actually downloaded the Indian government introduced Aarogya Setu mobile application in their phones. Multiple linear regression analysis showed that illiterate participants (vs graduates, *P*-value <0.01) and those in one of the green zone centers (GZT5) ($\beta$ = -0.13, *P*-value <0.01) had a significantly lower practice score [Table 5].

## Discussion

The novel COVID-19 virus has resulted in an unprecedented and complex crisis within the short time since it was first detected in December 2019. Considering the novelty of the disease and the uncertainties associated with its pathogenesis, it is crucial to actively engage the population for managing the rapid spread. To date, there has been limited published data on knowledge, attitude, and practice (KAP) patterns toward COVID 19 among patients presenting to a hospital. Understanding KAP among patients is valuable considering the various amount of exposure risks that exists in a hospital during their treatment visits.

In our study, among the total 6,119 participants interviewed, majority (42%) were above 50 years of age, indicating that they needed or wanted in-person eye care most urgently during the lockdown period. According to the World Health Organisation, this is also the most vulnerable age group for high-risk COVID-19 infections. Contrary to the ideal KAP expected in these patients in order to protect themselves from the high exposure risk at hospital, this vulnerable age group had poorer knowledge, attitude, and practice patterns. This signifies the need to strengthen existing awareness initiatives with a focus on older age groups in future programs. Though the majority of the knowledge questions were answered correctly, 74% of the patients who presented for eye care were not aware of the fact that conjunctivitis can be a possible manifestation of COVID-19. Considering the high contagiousness associated with conjunctivitis, it is crucial that ophthalmologists encourage patients to take necessary precautionary measures to avoid spread.

Compared to the educated participants, illiterate individuals (15.54% of our study population) had poor knowledge, attitude, and practice patterns. This may be attributed to the limited use of social media for awareness and poor understanding of preventive guidelines, particularly in written sources like the newspaper. Visual representation of guidelines and awareness through mass audio campaigns will thus be helpful in targeting individuals with varying literacy levels.

The present study found that a large majority of participants had a positive attitude towards overcoming COVID-19. Approximately 79% of participants believed that the COVID-19 pandemic will be controlled in the near future in India. High levels of positive attitudes were also detected in the KAP study conducted in China[5] and Malaysia,[10] which may reflect the swift action of local and national government organizations. Similarly, the authors of our study attribute the largely positive attitudes to the drastic measures taken by the Indian state governments in mitigating the spread of the virus via early lockdown and rapid measures to uplift healthcare facilities. About 99.6% of our study population had a good practice score, in the form of taking precautions, such as avoiding crowded places, regular hand

**Table 3: Results of linear regression on factors associated with knowledge score**

| Variable | Univariate analysis | | | | Multivariate analysis | | | |
|---|---|---|---|---|---|---|---|---|
| | β | SE | *P* | CI | β | SE | *P* | CI |
| Age | | | | | | | | |
| >50 years (vs.) | | | | | | | | |
| <20 years | 1.00 | 0.17 | <0.01 | 0.67-1.33 | 0.72 | 0.16 | <0.01 | 0.41-1.03 |
| 21-30 years | 1.19 | 0.12 | <0.01 | 0.96-1.42 | 0.52 | 0.12 | <0.01 | 0.29-0.76 |
| 31-40 years | 0.76 | 0.11 | <0.01 | 0.55-0.98 | 0.52 | 0.11 | <0.01 | 0.32-0.73 |
| 41-50 years | 0.43 | 0.10 | <0.01 | 0.24-0.63 | 0.26 | 0.09 | 0.01 | 0.08-0.44 |
| Sex | | | | | | | | |
| Female (vs.) | | | | | | | | |
| Male | 0.10 | 0.08 | 0.17 | -0.05-0.25 | 0.04 | 0.07 | 0.62 | -0.1-0.18 |
| Education | | | | | | | | |
| Illiterate (vs.) | | | | | | | | |
| School level | 0.28 | 0.11 | 0.010 | 0.07-0.49 | 0.13 | 0.11 | 0.23 | -0.08-0.33 |
| Graduate level | 1.62 | 0.11 | <0.001 | 1.40-1.84 | 1.36 | 0.12 | <0.01 | 1.13-1.59 |
| Centre | | | | | | | | |
| OZS2 (Salem)(vs.) | | | | | | | | |
| RZC1 (Chennai) | -2.12 | 0.12 | <0.01 | -2.36--1.88 | -2.03 | 0.12 | <0.01 | -2.27--1.8 |
| OZC3 (Coimbatore) | -1.89 | 0.12 | <0.01 | -2.13--1.64 | -1.89 | 0.12 | <0.01 | -2.13--1.65 |
| GZP4 (Pondicherry) | -1.13 | 0.11 | <0.01 | -1.34--0.91 | -1.28 | 0.11 | <0.01 | -1.49--1.07 |
| GZT5 (Tirunelveli) | -2.42 | 0.11 | <0.01 | -2.64--2.21 | -2.53 | 0.11 | <0.01 | -2.74--2.32 |

β- regression co-efficient; SE-standard error; *P*-*P* value; CI-confidence interval

**Table 4: Results of linear regression on factors associated with Attitude score**

| Variable | Univariate analysis | | | | Multivariate analysis | | | |
|---|---|---|---|---|---|---|---|---|
| | β | SE | *P* | CI | β | SE | *P* | CI |
| Age | | | | | | | | |
| >50 years (vs.) | | | | | | | | |
| <20 years | 0.14 | 0.07 | 0.05 | 0.00-0.28 | 0.12 | 0.07 | 0.09 | -0.02-0.26 |
| 21-30 years | 0.19 | 0.05 | <0.01 | 0.09-0.29 | 0.06 | 0.05 | 0.28 | -0.05-0.16 |
| 31-40 years | 0.13 | 0.05 | 0.01 | 0.04-0.22 | 0.08 | 0.05 | 0.09 | -0.01-0.17 |
| 41-50 years | 0.07 | 0.04 | 0.10 | -0.01-0.15 | 0.02 | 0.04 | 0.61 | -0.06-0.1 |
| Sex | | | | | | | | |
| Female (vs.) | | | | | | | | |
| Male | 0.06 | 0.03 | 0.06 | 0-0.13 | 0.03 | 0.03 | 0.33 | -0.03-0.09 |
| Education | | | | | | | | |
| Illiterate (vs.) | | | | | | | | |
| School level | 0.07 | 0.05 | 0.17 | -0.03-0.16 | 0.07 | 0.05 | 0.12 | -0.02-0.16 |
| Graduate level | 0.30 | 0.05 | <0.01 | 0.20-0.40 | 0.32 | 0.05 | <0.01 | 0.22-0.42 |
| Centre | | | | | | | | |
| RZC1 (Chennai)(vs.) | | | | | | | | |
| OZS2 (Salem) | -0.57 | 0.05 | <0.01 | -0.68--0.47 | -0.59 | 0.05 | <0.01 | -0.7--0.49 |
| OZC3 (Coimbatore) | -0.21 | 0.06 | <0.01 | -0.32--0.1 | -0.22 | 0.06 | <0.01 | -0.33--0.11 |
| GZP4 (Pondicherry) | -0.28 | 0.05 | <0.01 | -0.38--0.18 | -0.33 | 0.05 | <0.01 | -0.43--0.23 |
| GZT5 (Tirunelveli) | -0.88 | 0.05 | <0.01 | -0.98--0.78 | -0.92 | 0.05 | <0.01 | -1.02--0.82 |

β- regression co-efficient; SE-standard error; *P*-*P* value; CI-confidence interval

washing, hand hygiene, wearing mask and social distancing. This indicates a general willingness for participants to make behavioral changes in the face of the COVID-19 pandemic.

A possible limitation in our study is that individuals who prioritize their healthcare, even in the midst of a pandemic, may be more health literate than those who did not present to the hospital during May-June, thus were not included in the study. This factor may slightly inflate the practice scores compared to what they would be in the general population. However, the extremely high number of participants with strong precautionary habits is encouraging.

**Table 5: Results of linear regression on factors associated with Practice score**

| Variable | Univariate analysis | | | | Multivariate analysis | | | |
|---|---|---|---|---|---|---|---|---|
| | β | SE | *P* | CI | β | SE | *P* | CI |
| Age | | | | | | | | |
| >50 years (vs.) | | | | | | | | |
| <20 years | 0.19 | 0.05 | <0.01 | 0.09-0.28 | 0.15 | 0.05 | <0.01 | 0.06-0.24 |
| 21-30 years | 0.48 | 0.03 | <0.01 | 0.41-0.55 | 0.25 | 0.04 | <0.01 | 0.18-0.32 |
| 31-40 years | 0.26 | 0.03 | <0.01 | 0.20-0.33 | 0.14 | 0.03 | <0.01 | 0.07-0.2 |
| 41-50 years | 0.16 | 0.03 | <0.01 | 0.10-0.21 | 0.09 | 0.03 | <0.01 | 0.03-0.14 |
| Sex | | | | | | | | |
| Female (vs.) | | | | | | | | |
| Male | -0.01 | 0.02 | 0.67 | -0.05-0.03 | -0.03 | 0.02 | 0.17 | -0.07-0.01 |
| Education | | | | | | | | |
| Illiterate (vs.) | | | | | | | | |
| School level | -0.021 | 0.03 | 0.49 | -0.08-0.04 | -0.02 | 0.03 | 0.61 | -0.08-0.05 |
| College level | 0.46 | 0.03 | <0.01 | 0.39-0.52 | 0.39 | 0.04 | <0.01 | 0.32-0.46 |
| Centre | | | | | | | | |
| GZT5 (Tirunelveli) vs | | | | | | | | |
| RZC1 (Chennai) | 0.01 | 0.04 | 0.74 | -0.06-0.08 | 0.08 | 0.03 | 0.03 | 0.01-0.14 |
| OZS2 (Salem) | 0.03 | 0.03 | 0.40 | -0.04-0.09 | 0.06 | 0.03 | 0.06 | 0-0.12 |
| OZC3 (Coimbatore) | 0.31 | 0.04 | <0.01 | 0.24-0.38 | 0.33 | 0.03 | <0.01 | 0.26-0.4 |
| GZP4 (Pondicherry) | 0.21 | 0.03 | <0.01 | 0.15-0.27 | 0.20 | 0.03 | <0.01 | 0.14-0.26 |

β- regression co-efficient; SE-standard error; *P*-*P* value; CI-confidence interval

The study is unique in that it included patients from different districts of a state in Tamil Nadu with varied restrictions imposed during lockdown based on the number of COVID-19 infections. This stratification of KAP scores based upon the severity of cases in specific regions is key to understanding the context of participant's experience with COVID-19, both personally and through local media. On comparing KAP among participants from all five centers in different zones [Table 6], one hospital in an orange zone (OZS2) had the best knowledge scores. This finding might be due to the significantly higher proportion of a younger population (<30 years) among the study group, which was confirmed by chi-squared test ($P < 0.05$). Because of the vast amount of resources accessible on social media, it is logical that a younger cohort who is generally more active on social platforms and savvy in accessing media would have a higher level of knowledge. The hospital in a red zone (RZC1) had the best attitude scores as expected, since the COVID-19 spread was at its peak and strict lockdown measures were implemented in that particular zone. We hypothesize that participants felt compelled to support guidelines out of concern for their community, as it was at an elevated risk during this period. One of the hospitals in a green zone (GZT5) had the lowest practice score among all centers, probably due to a low infection rate and less fear of infection among participants. One alternative explanation could be the significantly higher number of illiterate individuals in this center when compared with to similar hospital in green zone (GZP4) by the proportion test ($P < 0.01$).

Despite the tremendous efforts by the Indian government to spread awareness about COVID 19 through its mobile application 'Aarogya Setu,' among our study population, only 35% of the participants were aware of it and merely 18% had downloaded in their mobiles, reflecting that this effort failed to reach the masses. Low awareness among our participants may also be due to the limited smartphone usage. Only 68.2% of our participants had smartphones. Smartphones can be seen as an important source for constant updates on news related to COVID-19. Hence, a lack of smartphone usage, most notably in the elderly age group, can also have an effect on the overall KAP. As a part of social responsibility and useful learning from this study, downloading 'Aarogya Setu' app in mobile phones has been made mandatory for all patients registering in our institute. Measures like this by local and state organizations would help to more effectively implement government-initiated prevention strategies.

The majority of studies conducted in other countries have indicated higher levels of COVID-19 knowledge among the general population[5,10] and healthcare workers.[7,8]. Differences in measurement and scoring systems, however, prevent accurate comparisons of knowledge levels across these studies. Additionally, government-sponsored media may emphasize varying aspects of the disease in education campaigns, making it even more difficult to standardize KAP scores between studies.

The primary strength of our study lies in the large sample size collected during the last phase of lockdown period, during which rigorous campaigns had already been conducted. The temporality of our sampling ensures that the patients included in the study have already encountered or been impacted by awareness initiatives. The multicentric nature of the study, varied geographic population, and presence of walk-in patients to the eye hospitals may roughly simulate the general population KAP score. Consequently, our data may help health authorities identify the target populations for bolstered awareness campaigns. As discussed previously, our sample may represent a more health-conscious portion of the population due to their prioritization of seeking care; however, our large sample size and geographic variability may aid in reducing this confounder. As in any KAP

**Table 6: Results of demographics and KAP scores based on Centre**

| Variable | RZC1 Chennai *n* (%) | OZS2 Salem *n* (%) | OZC3 Coimbatore *n* (%) | GZP4 Pondicherry *n* (%) | GZT5 Tirunelveli *n* (%) |
|---|---|---|---|---|---|
| Age category | | | | | |
| >50 years | 442 (47.63) | 556 (47.6) | 402 (42.68) | 558 (36.73) | 619 (39.63) |
| 41-50 years | 221 (23.81) | 256 (21.92) | 222 (23.57) | 319 (21) | 340 (21.77) |
| 31-40 years | 113 (12.18) | 129 (11.04) | 162 (17.2) | 294 (19.35) | 305 (19.53) |
| 21-30 years | 99 (10.67) | 142 (12.16) | 129 (13.69) | 246 (16.19) | 217 (13.89) |
| <20 years | 53 (5.71) | 85 (7.28) | 27 (2.87) | 102 (6.71) | 81 (5.19) |
| Education | | | | | |
| Illiterate | 142 (15.3) | 187 (16.01) | 274 (29.09) | 137 (9.02) | 211 (13.51) |
| School level | 543 (58.51) | 599 (51.28) | 358 (38) | 781 (51.42) | 757 (48.46) |
| Graduate level | 243 (26.19) | 382 (32.71) | 310 (32.91) | 601 (39.57) | 594 (38.03) |
| **Scores** | **Mean (SD)** | **Mean (SD)** | **Mean (SD)** | **Mean (SD)** | **Mean (SD)** |
| Knowledge | 20.64 (2.15) | 22.77 (2.21) | 20.88 (2.33) | 21.64 (3.2) | 20.35 (3.46) |
| Attitude | 9.81 (0.66) | 9.24 (1.04) | 9.60 (1.06) | 9.53 (1.05) | 8.93 (1.75) |
| Practise | 10.22 (0.82) | 10.24 (0.71) | 10.52 (0.95) | 10.42 (1.01) | 10.21 (0.78) |

study, most of the questions answered from the questionnaire are subjective and might not truly reflect patient behaviors, particularly if they are hoping to avoid disapproval by a study administrator for habits that do not align with current guidelines. Similarly, it is challenging to accurately assess patient behaviors as they are subject to the individual's perspective on proper use. As discussed by Feng *et al.*,[11] among people wearing masks, improper use, and neglecting to change disposable masks could actually jeopardize the protective effect and even increase the risk of infection. Consequently, patients who reported wearing masks may not be doing so in an optimally hygienic nature, thus the high practice scores in our study may not accurately represent the expected public health benefit if improper use was common. In light of these limitations, future studies can be aimed at focusing more on objective assessments to audit practice patterns of the public, offering a more multidimensional measure of the success of awareness and education efforts.

## Conclusion

In summary, the present multicentre study was able to provide a comprehensive analysis of the COVID-19 KAP among patients in different restriction zones. The findings suggest that although patients generally have an acceptable level of knowledge on COVID-19 and tend to be positive in their outlook on overcoming the pandemic, innovative awareness and preventive measures are urgently needed considering the high number of illiterate and elderly people in our study population who had lower KAP scores. Considering the possibility of a prolonged pandemic situation and possible second wave, consistent reinforcement of preventive guidelines from the government health authorities is essential to maintain strict adherence by the general public.

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### Conflicts of interest

There are no conflicts of interest.

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## Questionnaire

**Title:** Knowledge, Attitude and Practice toward Coronavirus disease (COVID-19) among patients presenting to five Tertiary Eye Care Hospitals in South India - A Multicentre Questionnaire-based survey.

Demographic details

1. Age:
2. Sex:
3. Level of education:
4. Occupation:
5. What was the reason which made you visit today?.....
6. Place travelled from…….

| S.NO | **Knowledge** | Options | | |
|---|---|---|---|---|
| K1 | The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia | Yes | No | Not aware |
| K2 | Patients infected with the COVID-19 virus can have no symptoms at all. | | | |
| K3 | Patients infected with COVID -19 can present with red eye(Conjunctivitis) | | | |
| K4 | Elderly age group and people with Diabetes, Hypertension, and Asthma are more prone to develop severe infection | | | |
| K5 | There currently is no effective treatment for COVID-2019, but early symptomatic and supportive treatment can help most patients recover from the infection | | | |
| K6 | Animals can be affected by COVID 19 and may have the risk of spreading the same | | | |
| K7 | The virus spreads by sneezing and droplets of infected individuals | | | |
| K8 | When fever and cough is not present in COVID-19 patient, he cannot infect other person | | | |
| K9 | Social distancing and use of mask can prevent infection to spread in normal individuals | | | |
| K10 | To prevent infection by COVID-19, people should avoid crowded places like trains, malls and public transport | | | |
| K11 | Patients infected with COVID-19 should be kept under isolation and must be treated to reduce spread of virus | | | |
| K12 | The quarantine period for COVID-19 infected patients is 14 - 21 days | | | |
| K13 | Are you aware of Arogya Setu App recommended by Government of India? | | | |
| | | | | |

| | **Attitude** | Yes | No | Not aware |
|---|---|---|---|---|
| A1 | Do you think regular hand wash can prevent the spread of COVID infection? | | | |
| A2 | Do you think wearing a tight fit mask will decrease the chance of you getting the infection? | | | |
| A3 | Do you think COVID-19 infection can be completely eradicated from India? | | | |
| A4 | Do you think, if affected people maintain strict quarantine, COVID spread can be controlled? | | | |
| A5 | Do you think people in your neighboring community are strictly practicing the precautions recommended by the government? | | | |
| | **Practice** | Yes | No | |
| P1 | In recent days, I have avoided crowded places | | | |
| P2 | In recent days, I have regularly worn mask while stepping out of the home | | | |
| P3 | In recent days, I have practiced regular hand washing | | | |
| P4 | In recent days, I have avoided shaking hands for greeting people | | | |
| P5 | In recent days, I have not gone to hot spots and maintained social distancing outdoors | | | |
| P6 | I have downloaded Arogya Setu App in my mobile | | | NA (No personal mobile) |

Source of COVID -19 awareness (Mark all that's applicable)

a) Television
b) WhatsApp
c) Newspapers
d) Family and friends
e) Family physician
f) Others