



Knowledge, Attitude and Practice Based Survey on Covid-19 Awareness Among the Undergraduate Students of Gujarat

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Abstract

Introduction: India is on the track to overtake US covid-19 caseload as India is rapidly climbing towards its peak. India faces an acute shortage of front-line doctors to fight against Covid-19. Thus, the recruitment of undergraduate medical students into the health care system has been considered by few state governments. This survey was conducted among undergraduate medical students to understand their knowledge, attitude, and preparedness towards the ongoing pandemic. Numerous international and national guidelines came forth. Government Of Gujarat and Plexus MD have launched CCMC [Certificate Course for Management of Covid-19] an online Training program which integrated all the current interim guidance by CDC, WHO, ICMR, MoHFW guidelines for all the medical students and healthcare workers. This study sought to determine the effectiveness of online Covid-19 Training program. This study intended to understand the level of Knowledge Attitude and Practice (KAP) among the Undergraduate students through online questionnaire survey. Questions were adapted from CCMC online training course.

Methodology: After taking Ethical approval, data have been collected from undergraduate medical students belonging to three different medical colleges of Gujarat using online Google form survey via what's app. The online questionnaire used in this study was drafted and validated by experts before hosting it online.

Result: Total 414 participants have given consent to participate in this study. Overall score of all the study participants were 46.15% which implied their moderate cognitive domain. This study disclosed that 49.27% study participants were trained in covid-19 management course, rest 50.72% were untrained. On applying Mann Whitney U test, statistically significant difference ($P < 0.05$) in between trained and untrained participants have been demonstrated. Mean attitude 3.87 score revealed positive attitude towards preventive measure and perception in controlling covid-19 infection. On applying Spearman's correlation test for non-parametric data, positive co-relation of knowledge with attitude and knowledge with practice was found to be significant ($P < 0.05$).

Conclusion: This study conveyed the significance of effective of Covid-19 management Training. This study recorded significant ($P < 0.05$) positive co-relation of knowledge with attitude and knowledge with practice. Good level of knowledge and positive attitude towards preventive measures with adherence to standard guidelines provided by state and central government would combat the covid-19 prevailing situation.

Keywords: Covid-19, Undergraduate Medical Students, Knowledge, Attitude, Practice

INTRODUCTION

First case of Covid-19 was reported from Wuhan China, then the (SARS-CoV-2) virus spread subsequently to the rest of the world. WHO declared coronavirus disease as a pandemic on March 11, 2020

[1]. India is on the track to overtake US in highest covid-19 caseload as India is rapidly climbing towards its peak. India faces an acute shortage of front-line doctors to fight against Covid-19. Thus, the

recruitment of undergraduate medical students into the health care system has been considered by few state governments. This survey was conducted among undergraduate medical students to understand their knowledge, attitude, and preparedness towards the ongoing pandemic. There are very limited data available to us about this new strain SARS COV-2 causing pandemic. It's the high time for all the researchers to work on it. Every day there is something new to know about Covid-19. We all the medical professionals need to update ourselves with new guidelines. Government Of Gujarat and Plexus MD have launched an online Covid-19 Training program CCMC [Certificate Course for Management Of Covid-19] for all the medical students and health care workers [2]. We all know prevention is better than cure, that's much applicable here in viral COVID -19 pandemic infection and there is no specific drug of choice, only symptomatic treatment is given.

Aims and Objective:

This study intended to determine the awareness about the Covid-19 and how undergraduate students implement their knowledge and attitude in practice through their action.

This study also aimed to determine the effectiveness of online Covid-19 Training program and the need for regular educational interventions and training programs on infection prevention for health workers.

Materials and Method:

Participants and Data collection:

After taking Ethical approval [EC approval No. 935/2020] from ethical committee Government Medical College Bhavnagar on 28th May 2020, this cross-sectional survey was conducted among the undergraduate students of Gujarat belonging to three different medical colleges of Gujarat, immediately after Government of Gujarat announced unlock1 with new set of relaxation for resuming economic activities. The data have been collected using Google form as an online survey. The online questionnaire used in this study was drafted and validated by experts before hosting it online. Offline pilot study of 10 participants were pretested, those participants were not included in this online study. Experts' opinion have been implemented in redesigning the questionnaire. The link of Google form was posted in What's app Groups by the principal investigator and head of the institute.

The study participants were informed about the details of the study objectives. Participation in this survey was anonymous, consensual and voluntary with informed consent given by all the study participants.

Methodology:

Government Of Gujarat and PlexusMD have launched an online Covid-19 Training program CCMC [Certificate Course for Management Of Covid-19] for all the medical students of Gujarat. 7 days prior to this survey of online Google questionnaire, CCMC online link was sent as a reminder to all the undergraduate medical students via What's app group by the principal investigator and co-investigators. Questions were adapted from CCMC online course which integrated all the current interim guidance by CDC, WHO, ICMR, MoHFW guidelines. Questions were based on knowledge, attitude and practice about infection control practices related to COVID-19 disease. Knowledge determined their level of awareness related to COVID-19 disease prevention. Attitude determined their assent (Agree/Disagree) or feelings (Concerned or Not at all Concerned) related to COVID-19 disease and its prevention. Practice demonstrated their knowledge and attitude through their action. After 7days CCMC online course reminder to the study participants, on 8th day Questionnaire based online Google form was send via What's app to all the medical students of three different medical colleges of Gujarat as potential responders. In the designation section of this online questionnaire, 'None of the above' option was kept for auto-exclusion of others. After 7 days of questionnaire Survey response, reminder was given every week for all the remaining participants to participate voluntarily via What's app. Each question was mandatory and Knowledge based questions carried 1 point. Percentage of the Score determined the status of awareness among the undergraduate students of Gujarat. Percentage of Study participants Strongly Agreeing, Agreeing, Disagreeing and Strongly Disagreeing with certain views related to Covid-19 & highly concerned, moderately concerned and not at all concerned about Covid-19 infection determined their Attitude. Percentage of Paramedical staff and students following (Yes) or not following (No) certain practices (Frequently, Occasionally, Infrequently or Never) for preventing Covid-19 infection. This study determined the need for regular educational interventions and

training programs on infection prevention for all undergraduate medical students.

Statistical analysis:

Data we recompiled as mean \pm SEM and categorical data were expressed as frequency and percentage. For normality test, Kolmogorov Smirnov test was applied. To compare between trained and untrained participants Mann Whitney U test has been applied. The statistical significance level of the test was expressed as $P < 0.05$. Spearman's correlation was implemented for non-parametric data to assess the correlation of their knowledge with attitude and knowledge with practice. Statistical analyses were performed using graph pad, version 3.2.

Result:

Out of 491 responses, 84% (n=414) participants have given consent to participate in this study. 49% (n=203) second year MBBS student, 26% (n=108) third year

part 1 MBBS student, 25% (n=103) Third year Part 2 MBBS student participated in this study. 31% (n=128), 40% (n=166), 29% (n=120) undergraduate medical students participated in this study from three different medical colleges A, B and C. 49.27% participants were trained in covid-19 management course, rest 50.72% were untrained. Mean score of trained and untrained participants were 11.80 ± 0.2 and 10.21 ± 0.24 respectively. Overall mean and median score of the study participants was 9.27 and 10 respectively. On applying Mann Whitney U test, statistically significant difference ($P < 0.05$) in between trained and untrained participants have been displayed. Mean attitude 3.87 Score revealed positive attitude towards preventive measure and perception in controlling covid-19 infection. On applying Spearman's correlation test for non-parametric data, positive co-relation of knowledge with attitude and knowledge with practice was found to be significant ($P < 0.05$).

QUESTIONNAIRE:

Knowledge Based Questions:

Table 1a. Frequency and Percentage of Correct Responses in each Knowledge based questions by the responders:

NUMBER	QUESTIONS with correct answers	Freq. of each response (n=414)	Percentage of CORRECT RESPONSES
K1	Important step to practice as a health care worker for preventing Covid-19 infection ? [According to WHO Guideline] a) Frequent hand-washing b) Wearing a face mask c) Both Frequent hand-washing and wearing a face mask d) None of the above	12 6 395 1	95%
K2	Minimum time needed for hand rub with Alcohol based hand sanitizer? a) 10 seconds. b) 20 seconds. c) 30 seconds	41 294 66 13	71%

	d) Don't Know		
K3	Recommended concentration of sodium hypochlorite to be used as disinfectant in high contact surfaces like elevator buttons? a) 0.5% b) 1% c) 2% d) Don't Know.	100 191 41 82	46%
K4	Alcohol based sanitizer should contain at least a) 98% Iso-propyl Alcohol b) 95% Iso-propyl Alcohol c) 70% Iso-propyl Alcohol d) 60% Iso-propyl Alcohol e) Don't Know.	18 65 199 83 49	48%
K5	Which of the following you MUST avoid? [Choose answers- Check Box] a) Washing vegetables immediately after applying alcohol based hand sanitizer, b) Cooking food using gas cylinder, immediately after applying alcohol based hand sanitizer c) Eating food immediately after applying alcohol based hand sanitizer d) Lighting candles immediately after applying alcohol based hand sanitizer e) Don't know.	81 322 135 309 07	37.43%
K6	Which of the following is considered as Close contact: a) Being within approximately 10 feet (3 meters) of Covid-19 Patients b) Being within approximately 6 feet (2 meters) of Covid-19 Patients	10 32	

	c) Having direct contact with infectious secretions like sputum, blood, serum from covid-19 patients d) Both b & c e) Both a & c f) Don't Know	69 258 35 10	62.3%
K7	Highest risk of developing severe Covid-19 disease is found to be among [Choose correct answers] [According to WHO] a) Children b) People over 60 years of age c) Pregnant women d) Those with existing medical conditions e) Don't Know	84 194 66 198 3	21%
K8	Most of the people exposed to covid-19 develops symptoms within a) 24 hours b) 2 days to 2 weeks c) 3-4 weeks d) Longer than a month e) Don't Know	4 368 35 1 6	88%
K9	Which of the following, is confirmatory diagnostic test used in the diagnosis of COVID-19? a) Immunofluorescent assay (IFA) b) Real-time reverse transcription polymerase chain reaction (rRT-PCR) assay c) Virus isolation in cell culture d) Viral antigen detection test e) Don't Know	4 347 5 32 26	83.8%
K10	K10. In which of the following case Real time PCR test for Covid-19 is NOT mandatory? (ICMR Guideline)	46	

	a) All Symptomatic (Influenza Like Illness symptoms) within hotspots/containment Zones. b) All asymptomatic direct and high risk contacts of laboratory confirmed cases c) All hospitalized patients who develop ILI (Influenza Like Illness) symptoms d) All asymptomatic health care workers working with precautions e) Don't know	37 39 195 97	47%
K11	Which of the following is most commonly reported clinical finding in COVID19 patients? [According to CDC] a) Sneezing b) Hypotension c) Diarrhea d) Fever e) Don't Know	60 4 3 341 6	82.4%
K12	Select the following Personal protection equipment' that you should wear as a Health care provider, providing care to asymptomatic patients with history of exposure to covid-19 who are being evaluated for a non-infectious complaint of hyperglycemia and hypertension. [Check boxes select answers as per your need] a) Head cap b) Foot wear covering c) Gown d) Gloves e) Eye protection f) Respirator N95 masks g) Don't know	252 237 275 354 301 391	50.96%
K13	How will you correct the position of the worn face masks after it gets displaced? a) By touching from the front of the masks		

	b) By touching from below upward of the masks c) By touching from the side of the masks d) By touching the elastic straps of the masks e) Don't know	22 33 46 293 20	71%
K14	Where to discard PPE (Face masks, Gown, Cap) and gloves respectively a) Yellow and Blue colored bag b) Red and Yellow colored bag c) Yellow and Red colored bag d) Blue and Red colored bag e) Don't Know.	76 81 146 34 77	35%
K15	What are the contraindications of Hydroxy-chloroquine Prophylaxis? a) Retinopathy b) Cardiac disorder with QT prolongation c) G6PD deficiency d) Age less than 15 years e) All of the above f) Don't know	21 54 43 4 221 71	53.4%
K16	According to ICMR Guideline, asymptomatic health care workers involved in the care of suspected or confirmed cases of Covid-19 should take hydroxychloroquine prophylaxis after taking physician's advice as a) 400mg twice a day on Day 1 , followed by 400mg once a weekly for 3 weeks. b) 400mg twice a day on Day 1 , followed by 400mg once a weekly for 7 weeks. c) 400mg once a week for 3 weeks d) 400mg once a week for 7 weeks e) Don't know.	106 124 24 23 137	30%
K17	According to ICMR Guideline, asymptomatic household contacts of laboratory confirmed cases of covid-19 should take		

	hydroxychloroquine prophylaxis after taking physician's advice as a) 400mg twice a day on Day 1 , followed by 400mg once a weekly for 3 weeks. b) 400mg twice a day on Day 1 , followed by 400mg once a weekly for 7 weeks. c) 400mg once a week for 3 weeks d) 400mg once a week for 7 weeks e) Don't know.	122 75 47 15 155	29.5%
K18	Candidates for home quarantine: [According to MoHFW] a) All close contact (without Precautions) of laboratory confirmed positive cases, even if patients are asymptomatic. b) Asymptomatic Covid-19 patients discharged from hospital c) Both a and b d) Don't know.	52 49 295 18	71%
K19	Which of the following has been recognized as a significant risk factor for thromboembolism and death in patients with COVID-19? a) Decreased lactate dehydrogenase levels b) Elevated D-dimer levels c) Neutropenia d) Lymphocytosis e) Don't Know	57 123 39 29 166	29.7%
K20	Which of the following should be done in management of Asthma patient in COVID-19 pandemic? [According to GINA-2020] a) Steroid therapy should be stopped as it can flare up the infection. b) Spirometry and peak flow meter will be helpful in determining the lung function test in Asthma patients. c) Nebulize with Salbutamol respule. d) Use short acting beta2 agonist like salbutamol with pressurized metered dose	40 15 54 187	45%

	<p>inhaler and spacer, with a mouth piece or tightly fitting face masks.</p> <p>e) Don't Know</p>	118	
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Table 1b. Knowledge Assessment in different sub groups based on score:

Sub-groups	Mean Score	Percentage of mean score
Trained	11.80	59%
Untrained	10.21	51%
Second Year MBBS Students	14	70%
Third Year Part 1 MBBS Students	09	45%
Third Year Part 2 MBBS Students	09	45%

Table 2a. Attitude Based Questions

<u>Question Number</u>	<u>Attitude Based Questions</u>	<u>Frequency and Percentage of Each Response</u>
<u>A1</u>	<p>How much are you concerned about the Covid-19 pandemic?</p> <ol style="list-style-type: none"> Not at all concerned. Slightly concerned. Somewhat Concerned Moderately concerned. Highly concerned. 	<p>11 (2.7%)</p> <p>5 (1.2%)</p> <p>55 (13.3%)</p> <p>99(23.9%)</p> <p>244(58.9%)</p>
<u>A2</u>	<p>Most effective method for preventing Covid-19 infection in the health care centers is by avoiding exposure by using standard precautions, Contact precautions and air borne precautions and eye protection while patient care</p> <ol style="list-style-type: none"> Strongly disagree Disagree Neutral Agree Strongly Agree 	<p>5 (1.2%)</p> <p>4 (1%)</p> <p>19 (4.6%)</p>

		54 (13%) 332(80.2%)
<u>A3</u>	Herd immunity is the only solution to face this Covid-19 pandemic <ol style="list-style-type: none"> 1. Strongly Agree 2. Agree 3. Neutral 4. Disagree 5. Strongly Disagree 	77 (18.6%) 65 (15.7%) 125(30.2%) 65(15.7%) 82 (19.8%)

Table 2b. Percentage of each Attitude score:

SCORE	ATTITUDE	<u>A1+A2+A3</u> Total response	Percentage of each SCORE
1	Strongly Negative attitude	93/1242	7%
2	Negative attitude	74/1242	17.87%
3	Neutral	199/1242	16%
4	Positive attitude	218/1242	52.65%
5	Strongly Positive attitude	658/1242	52.29%

Table 3: Practice Based Questions:

Sl. No	<u>Practice Based Questions</u>	<u>Frequency and Percentage of Each Response</u>
P1	How often you wash your hands with soap and water or with Alcohol based sanitizer especially when you are in common Public Place? a) Frequently (At least once within a gap of 1 to 2 hours) b) Occasionally (As per your convenience) c) Infrequently d) Never	282(68.6%) 120(29%) 12 (2.4%)
P2	Do you wash your hand with soap and water for at least 20 seconds? a) Yes b) No	389(94%) 25(6%)
P3	Do you wear masks? a) Yes b) No	397(96.4%) 17(3.6%)
P4	Do you wash your hand with soap and water or with alcohol-based sanitizer before wearing masks and after removal of masks or after touching of masks? a) Yes b) No	364(88.7%) 50(11.3%)
P5	After covering your nose and mouth with masks do you ensure that there is no gaps between your face and masks? a) Yes b) No	376(91%) 38(9%)
P6	Do you wear disposable masks? a) Yes b) No	265(64.2%) 149(35.8%)
P6A.	If you wear disposable masks, where do you dispose it? a) Red bin b) Randomly anywhere as per convenience c) Garbage bin after wrapping it in a plastic or any bag tightly	76(18%) 8(2%) 159(38.4%)

	d) Garbage bin without wrapping it with anything e) Yellow bin f) If others then specify..... Burning, Deep burial.	33(8%) 137(33.4%) 1(0.2%)
P6B	If you use non disposable homemade cloth masks, how you reuse it? a) After washing it with warm water and detergent and sunlight dry. b) After washing it with normal water and sunlight dry c) After washing it with detergent and warm water and sunlight dry and reuse alternate cloth masks d) Reusing the same homemade cloth masks without washing it e) Reusing another homemade cloth masks without washing it f) If Others, specify..... Alcohol based sanitizer soaked and dry in sunlight.	215 (52%) 33(7.9%) 138(33%) 20(4.8%) 1(0.3%) 7(1%)

Table 4. Spearman's correlation table for relation between Knowledge with Attitude and Knowledge with Practice:

Correlation	Spearman's correlation (r)	P value
Knowledge with Attitude	0.12	0.01 (Significant)
Knowledge with Practice	0.10	0.02 (Significant)

Discussion:

With the emergence of this covid-19 infection swiping across the world as global pandemic, numerous international and national guidelines came forth, none of them being absolute hence obscuring its implementation. Government Of Gujarat and PlexusMD have launched an online Covid-19 Training program [Certificate Course for Management Of Covid-19] CCMC online course which integrated all the current interim guidance by CDC, WHO, ICMR, MoHFW guidelines. With the novelty of covid-19 and

its pathological and epidemiological uncertainties, this KAP study intended to identify the key areas of concerns and need of optimal community intervention.

Knowledge Domain:

Overall score of all the study participants were 46.15%, which implied their moderate cognitive domain. This study disclosed that 49.27% study participants were trained in covid-19 management course, rest 50.73% were untrained. On applying Mann Whitney U test between trained and untrained participants,

statistically significant mean score difference ($P < 0.05$) was displayed. 64% of the participants had misconception that on consuming Tab. Hydroxy-chloroquine (HCQ) as chemoprophylaxis, they would be immune to covid-19 infection. 50% of the study population were unaware that covid positive patients could be asymptomatic and asymptomatic covid-19 patients can spread the disease. 46% of the study participants were ignorant to close contact proximity for covid infection. According to CDC, a "close contact" is defined as: "being within approximately 6 feet (2 meters) of a COVID-19 case for a prolonged period of time or having direct contact with infectious secretions of a COVID-19 case [3]. Two basic methods to clean hands are hand rubbing and hand washing. The CDC recommends alcohol-based hand rub (ABHR) in most situations [4], recommended minimum time required for hand rubbing is atleast 20 seconds [5]. 37% of our study participants were unaware of minimum time required for hand rubbing. Correct hand hygiene practices play a crucial role in preventing the spread of infection. 25% of study participants were unaware of spread of covid-19 infection through fomites like case paper. 24% of the study participants carried an idea of consuming (HCQ) without physician's consultation. 23% of the study participants were ignorant about the method of repositioning the displaced worn face mask.

Attitude Domain:

About 34.6% of study population were convinced by the concept of herd immunity in facing covid-19 pandemic, but herd immunity would swipe out certain section of the society. So, in such context it's better to be skeptical and take all the best possible precautions on behalf of us as a responsible citizen rather than being optimistic towards herd immunity. Mean attitude 3.87 score revealed positive attitude towards preventive measure and perception in controlling covid-19 infection. On applying Spearman's correlation test for non-parametric data, positive co-relation of knowledge with attitude was found to be significant ($P < 0.05$).

Practice Domain:

Study participants were seeming to be aware of guidelines related to basic hand washing practices, but how much they implement their knowledge through action is questionable. Around 73% of our study

participants seem to use non-disposable masks and rest 27% wear non-disposable home-made cloth masks. Assuming their honest responses data extracted from their responses, revealed a wide variation in the method of disposal of disposable masks specially in the areas where yellow bins are not available, like in the residential areas. Wide range of discrepancy was also revealed in re-cycling procedures of non-disposable home-made cloth masks. This study data would like to cast lime light of attention to establish a strict guideline for disposal of disposable masks and reuse of non-disposable masks. On applying Spearman's correlation test for non-parametric data, positive co-relation of knowledge with practice imparts an insignificant ($P > 0.05$) result. This signifies that there is disparity in Knowledge and its execution through action.

A nationwide online KAP study on Indian community's Knowledge Attitude and Practice (KAP) towards Covid-19 was conducted with 8075 study participants during lock down 10th March to 18th April. On applying Pearson's correlation, weak positive correlation of knowledge score with Attitude ($r=0.023$; $p<0.01$) and knowledge score with practice ($r=0.019$; $p<0.01$) was found to be significant [6]. Another KAP study was conducted in Nigeria which significant relationship between knowledge of COVID-19 and attitude towards preventive measures ($r = 0.177$, $p = 0.004$, $r = 0.137$, $p = 0.001$ respectively) [7]. Sonam Maheswari et al conducted a study in Uttarakhand and 354 students of a government medical college participated in the study and it was found that majority of the participant had good knowledge, positive attitude and sufficient practice. They suggested that people should continue to strengthen knowledge, attitude and practice towards Covid 19 [8]. A study was conducted in Saudi Arabia to investigate KAP for the covid 19 outbreak among the general population. The study suggests that knowing the causes and transmission sources of a disease, increases the likelihood that people will become more aware of the spread of the disease and more emphasis should be placed on less educated and lower income group [9]. Noura Baniyas et al conducted a study on 712 medical and Health Science students in United Arab Emirates and found that, they are having high level of knowledge and good attitude and practice towards Covid 19 pandemic but did not recognize its routes of transmission.

As the questions are different, we actually can't compare these study findings with our study results. Due to rampant of Covid-19 pandemic, numerous KAP studies across the globe has been conducted at the online platform but there have been very limited study conducted in KAP questionnaire, questioning about the masks usage and it's disposal or re-usual especially in developing countries like India.

Conclusion:

This study provides a comprehensive assessment of knowledge attitude and practice. Based on the data extracted and analyzed, there was significant difference in the cognitive domain between trained and untrained participants. Thus, edict the effectiveness of Covid -19 management Training. Good level of knowledge and positive attitude towards preventive measures with adherence to standard guidelines provided by state and central government would combat the covid-19 prevailing situation. More such KAP studies with holistic and viable approach on targeted population preferably with indigenous language should be encouraged.

Reference:

1. World Health Organization (WHO). (2020). Coronavirus disease (COVID-19) Situation Report-126. Retrieved May 25, 2020, Available from https://www.who.int/docs/default-source/coronavirus/situation-reports/2020-05-25-covid-19-sitrep-126.pdf?sfvrsn=887dbd66_2.
2. Covid-19 E- training; Certificate Course in Management of Covid-19. A course focused on clinical management and prevention of transmission of covid-19 for Doctors, Nurses and Health care workers. Free online E course Available from covid19.plexusmd.com
3. Information for healthcare professionals. (2020). Accessed: March 19, 2020: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/index.html>.
4. Frequently Asked questions about hand hygiene for healthcare personnel responding to COVID-2019. (2020). Accessed: March 20, 2020: <https://www.cdc.gov/coronavirus/2019-ncov/infection-control/hcp-hand-hygiene-faq.html>.
5. Hand hygiene: why, how & when. (2020). Accessed: March 20, 2020: https://www.who.int/gpsc/5may/Hand_Hygiene_Why_How_and_When_Brochure.pdf.
6. Tomar, B. S., Singh, P., Nathiya, D., Suman, S., Raj, P., Tripathi, S., & Chauhan, D. S. (2020). Indian communitys Knowledge, Attitude & Practice towards COVID-19. In *medRxiv*. <https://doi.org/10.1101/2020.05.05.20092122>
7. Reuben, R. C., Danladi, M. M. A., Saleh, D. A., & Ejembi, P. E. (2020). Knowledge, Attitudes and Practices Towards COVID-19: An Epidemiological Survey in North-Central Nigeria. *Journal of Community Health*. <https://doi.org/10.1007/s10900-020-00881>
8. Sounam Maheswari, Punit kumar Gupta, Richa Sinha et al. Knowledge, Attitude and Practice towards Coranavirus disease 2019 (Covid 19) among medical students: A cross sectional Study; J. Acute Dis. 2020; 9: 100-4.
9. Mohammed K AL-Hanawi, Khadijah Angawc et al. Knowledge, Attitude and Practice towards Covid 19 Among the Public in the Kingdom of Soudi Arabia: A cross sectional study; Front. Public Health 2020; 8: 217
10. Noura Baniyas, Mohamud Sheek Hussein et al. Covid 19 Knowledge, Attitude and Practice of United Arab Emirates Medical and Health Science Students; A Cross Sectional Study. Plosone. 2021 May; 16(5); e0246226.