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Knowledge and belief towards covid-19 pandemic among the pharmacy students and professionals

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Abstract

Objectives: To understand the scope and level of knowledge and belief on COVID 19 among the Pharmacy professionals of the Indian population.

Materials and Methods: A prospective, cross-sectional and web-based online survey was conducted on assessing the knowledge and beliefs among pharmacy students and graduates regarding the pandemic COVID-19 in India from 15th May 2020 to June 1st 2020. An 18-items Semi-structured questionnaires were developed and randomly distributed among the pharmacy professionals.

Results: During this study, almost 700 participants were enrolled in the study in which only 662 have provided consent and actively participated in the study. Among the study, the mean age measured in years was 23.8 ± 6.5 (18- 36), In which 398(60.1) were females, and males were 264(39.9). The present study highlights that 75.8% of the participants were knowledgeable about the clinical features of COVID-19. Also, 70.4% of the participants were knowledgeable about the diagnosis and management of COVID-19. 73.7% of the participants knew about the right diagnosis technique for COVID-19. A clear association is observed between knowledge score and an increased- age group, level of education, experience in the pharmacy field.

Conclusion: In this pandemic era, it is very relevant for the pharmacy professionals to update their knowledge on the Novel Coronavirus. Since, the pharmacist has always been considered as the front line healthcare professionals, enabling rational healthcare to the community. From the perspective of our study, we found that only 22.7% of participants had a thorough and well-updated knowledge on COVID 19.

Keywords: coronavirus, knowledge, belief, pharmacy, pharmacology, plasma therapy

Introduction

According to World Health Organization (WHO), Several viral epidemics of the coronaviridae class have been identified in the last two decades, such as the severe acute respiratory syndrome coronavirus (SARS-CoV) in 2002 and the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) in 2012 are of great importance [1, 2]. The International Council of Taxonomy of Viruses (ICTV), which is responsible for the classification of viruses, has given that Coronavirus disease (COVID-19) is caused by the virus named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), was initially reported as a cluster of pneumonia cases during late December 2019 in the province of Hubei, China. As of 21 September 2020, a total of 31 Million confirmed cases and more than 961,000 deaths had been reported worldwide, affecting more than 210 countries [3]. SAR CoV-2 virus most commonly causes respiratory problems, and in some patients, it may cause serious life-threatening problems, and this spreads through the air, which is why the WHO announced COVID-19 as pandemic on 11th March 2020.In India, the first positive case was identified in three students from Kerala (India) on 30th January 2020 who had travelled from Wuhan, China. As of June 1st, the number of cases reported in India was (2, 07,392 confirmed cases with 95,527 recoveries and 5828 deaths) and Kerala with (1269 confirmed cases with 590 recoveries and 9 deaths). In the previous studies, most of the COVID-19 researches focused on assessing the level of awareness and precautionary measures scales that should be strictly followed during a pandemic spread. Pharmacy professionals play an inevitable and unique role with the healthcare team to optimize Patients care [4, 5].

Unfortunately, preventing this worldwide pandemic, no drug has been publicly approved, although medications such as hydroxychloroquine and remdesivir are under clinical examination [6]. Now, strictly acquiring and adherence to the universal safety precautions (USP) is the only choice in controlling the pandemic era. To defend against air droplets coming from any other respiratory disease patients, such as COVID-19, personal hygiene management is an important activity. Hand washing has been considered an effective measure in preventing cross-transmission from one to another [7]. Social distancing is a procedure in which steps are taken to minimize the number of interactions and establish a sufficient gap between people to restrict the spread of any infectious disease [8].

Usually, social distancing would be in-place where the spread has been believed to happen in a broader community. Other social distancing steps include isolation and quarantine, which can play a significant role, particularly in people with symptoms, including confirmed cases. Isolation distinguishes the infected from the non-infected to minimize the transmission of the disease [9]. Usually, isolation procedures are commonly observed in hospital settings. While quarantine is considered as one of the effective methods in controlling communicable outbreaks and

pandemics such as COVID-19, at a community level, where the movement of a person is restricted to the home or a designated facility, who are presumed to have been exposed to a contagious disease, but without having any symptoms [10]. Pharmacy professionals act as a drug information expert in evaluating literature related to new or repurposed therapies and patient-specific treatment decisions, as well as ensure access to these therapies and other drugs on shortage due to the pandemic and there can be a higher risk of pharmacist to come in contact with an asymptomatic carrier of COVID 19.However, within this short span of this global pandemic condition, no studies have been conducted before. So, it becomes more relevant to understand the scope and level of knowledge on COVID 19, diagnosis, and its treatment among the pharmacy professionals of the Indian population. [11, 12]. In addition to their daily tasks, pharmacists are well trained to inform the population on the essence of the pandemic, signs, mode of transmission, encouraging protocols for the prevention and management of diseases as per the recommendations for public health. Pharmacists are involved in identifying patients with symptoms and act as a point of referral at the community level. Adequate knowledge of COVID-19 symptoms and the ability to distinguish these symptoms from seasonal influenza is instrumental in early diagnosis and further diagnosis referrals, as required. This involves team-based care and proactively collaborating with other health workers within the pharmacist's scope of practice while performing additional responsibilities [13].

Materials and Methods

Study design and participations

A prospective, cross-sectional and web-based online survey was conducted on assessing the knowledge and beliefs among pharmacy students and graduates regarding the pandemic COVID-19 in India from 15th May 2020 to June 1st 2020.

A18-items Semi-structured questionnaires were developed using WHO guidelines, course materials and internet sources. The questionnaire was designed and structured, validated by a team panel of professional experts in various research zones accordingly to assess the basic knowledge on COVID 19 by categorizing them into three sections, namely as IDP (Introduction and Clinical features, Diagnosis and Management, Pharmacology and Prevention) sections. Each section consists of 3, 5, 7 questions and has been assigned with an individual score of 1 for all the correct answers, and then the total score is added of respective sections. There were 15 open-ended questions with 4-5 Options and 2 closed-ended (Yes or No) questions. The scores obtained by the participants are out of 15 Marks and have been classified as 0-5,6-10,11-15 accordingly as Good, Average, Poor stages, respectively.

Reliability & Validity of Survey Instrument

A pilot pre-test has been done among the 20 respondents of the study to assess the validity and corrections of the questionnaire.

Distribution of the Survey Questionnaire

The survey questionnaire was distributed across the social media and professional platforms such as WhatsApp, Gmail, and LinkedIn using Google forms [13].

Ethical Considerations

Participants were explained about the study's purpose and asked to give voluntary willingness to consent before participating in the survey. All the activities undertaken in this research involving human beings have been in accordance with ethical principles. The study was performed and published according to the Internet E-Surveys Guidelines (CHERRIES) Checklist for Publishing Findings [14, 15].

Statistical Analysis

Statistical analysis was carried out using Statistical Package for the Social Science (SPSS) version 24.0 [16]. Mean, median, and standard deviation were used to describe the descriptive data, and percentage with frequency was used for categorical variables. Chi-Square test was used in assessing the association among the study variables and knowledge score. A P-value of less than 0.05 was considered statistically significant

Results

During this study, almost 700 participants were enrolled in the study in which only 662 have provided the consent and actively participated in the study. Among the study, the mean age measured in years was 23.8 ± 6.5 (18- 36), In which 398(60.1) were females, and males were 264(39.9). Considering the level of education in Pharmacy, the maximum enrolled participants, i.e. 77.3 % (512) were from the profession of Doctor of Pharmacy (PharmD), and the students who had active participation in the study rather than academician and community sectors. All the demographic details are given in Table 1 describes the sociodemographic characteristics of the study participants.

Table 1: Sociodemographic characteristics of study participants (N=662)

Characteristic	No of Participants	Percentage (%)
Age (years)		
Mean age ± S.D (range) 23.8 ± 6.5 (18- 36)		
18-22	318	48
23-27	328	49.5
≥28	16	2.5
Gender		
Male	264	39.9
Female	398	60.1
Level of Education		
D Pharmacy	18	2.7
B Pharmacy	102	15.4
M Pharm	30	4.5
Pharm D	512	77.3
Years of experience in the Pharmacy field (years)		
Mean age ± S.D (range) 4.8 ± 2 (1- 16)		
1-3	160	24.2
4-6	400	60.4
7-9	90	13.6
≥9	12	1.8
Occupation status		
Student	554	83.7
Industry/Company/ Community/Hospital	32	4.8
Academician	76	11.5

Introduction and Clinical Features

The first 3survey questions in the questionnaire measured students' knowledge of COVID-19 and clinical presentations.

Table 2 describes the distribution of the study participants according to their understanding. The highest correct answer rate (95.5%) related to the COVID-19 related to the symptoms; The main clinical symptoms of COVID 19 are fever, dry cough, shortness of breath, fatigue. lowest correct response was (84.6%) question regarding the name of the virus "SARS-CoV-2" that causes the Novel coronavirus infection to emerged from Wuhan in late 2019.In the section, the most relevant question, which received a correct response of (88.5%) regarding the clinical and demographic factors that may promote the progression towards the severe form of coronavirus disease 2019,is mainly the presence of Cardiovascular Disease, Above 60 years, underlying malignancy.

Diagnosis and Management

In this section, the next following 5 questions measure the student's knowledge regarding the Diagnosis and Management.

The maximum score secured is 98.2%. The clinical samples that should be collected for initial testing for diagnosis corona virus disease 2019 are both nasopharyngeal swab and Oropharyngeal swab. The lowest correct response was (38.7%) regarding the elevated procalcitonin level indicates Bacterial Superinfection.

The most frequent lab abnormalities predicting severe coronavirus disease correct answer (57.1%) are Increased C reactive protein, increased bilirubin, decreased albumin, Decreased lymphocyte count. The leading clinical role of serological testing in COVID 19 chosen correct response (46.8%) for assessing immunization against the virus. In the next question (73.7%) selected a correct answer, "Real-time reverse transcriptase PCR and Loop-mediated Isothermal Amplification (LAMP) for the right diagnosis technique for COVID 19.

Pharmacology and Prevention

The level of knowledge regarding the pharmacology and prevention among the students was very crucial and more significant. The chemoprophylaxis dose of Hydroxychloroquine as per ICMR is 400mg BD is (61.6%). The lowest correct response was 9.6% about the question regarding the mechanism of action of hydroxychloroquine, mainly includes "It increases the endosomal PH, Glycosylation of cellular receptors of SARS Cov-2, Block the enzymes involved in infusion between the virus and lung cells, Zinc ionophores can improve the immunity response". The common side effects of hydroxychloroquine sudden cardiac arrest, Depression, Drowsiness, Irreversible blindness, and correct response were almost 55.8%. The Tocilizumab drug belongs to the class of Immunomodulatory agents and got a correct response (45%). The most commonly used Anti-viral drugs recommended by ICMR for the treatment of COVID 19 are Remdesivir, Ritonavir, Lopinavir, Oseltamivir in which most frequently used drug is Remdesivir, the correct response recorded for the question was 40.2%.The high-risk population for chemoprophylaxis with Hydroxychloroquine as per ICMR are Health care workers, Direct contact positive cases with recorded correct response of 35.6%. Since Health care workers will be more prone to the various exposure with COVID patients. It is important to educate the health team regarding the knowledge about the precautions and safety measures to be undertaken during the treatment of COVID 19, and only a few had recorded the correct response (27.1%).The main recommendation to limit the exposure of Health care workers "Avoid nebulisation as much as possible in stable patients and use MDI, Use extended tubing to keep infusion pumps outside of COVID patients' rooms (suspected and confirmed) into the hall, Disposable pillbox with a time of each medication mentioned in the box with standard timings, Avoid the drugs which are required to be given more frequently and wherever possible, use extended, sustained or prolonged-release formulation for applicable drugs".

Table 2: Knowledge of study participants on COVID-19

Questions	Correct answer	Correct Response N (%)	Incorrect Response N (%)
Part 1. Questions related to clinical features			
1. What is the name of the virus that caused the Novel Corona infection from Wuhan in late 2019?	SARS-CoV-2	560 (84.6)	102 (15.4)
2. What are the clinical and demographics factors that may promote the progression towards the severe form of coronavirus disease 2019?	All of the Above	586 (88.5)	76 (11.4)
3. What are the symptoms of COVID 19?	All of the Above	632 (95.5)	30 (4.5)
Part 2. Questions related to Diagnosis and Management			
4. According to the Centre for Disease Control and Prevention (CDC), what are the clinical samples that should be collected for initial testing for diagnosing coronavirus disease 2019?	Both Nasopharyngeal swab and Oropharyngeal swab	650 (98.2)	12 (1.8)
5. What are the most frequent laboratory abnormalities predicting severe coronavirus disease 2019?	Increased C reactive protein, Increased bilirubin, Decreased albumin, Decreased lymphocyte count	378 (57.1)	284 (42.9)
6. What does an elevated procalcitonin indicate in patients with SARS-CoV-2?	Bacterial Superinfection	256 (38.7)	406 (61.3)
7. What is the leading clinical role of serological testing in COVID-19?	For assessing immunization against the virus	310 (46.8)	352 (53.2)
8. Which of the following are the right diagnosis techniques for COVID-19?	Real-time reverse transcriptase PCR and LAMP (Loop-mediated Isothermal Amplification)	488 (73.7)	174 (26.3)

Part 3. Questions related to Pharmacology and Prevention			
9. Who should be considered as a high-risk population for chemoprophylaxis with Hydroxychloroquine as per ICMR?	Health Care Workers, Direct Contact Positive Cases	236 (35.6)	426 (64.4)
10. What is the dose of the Hydroxychloroquine for chemoprophylaxis as per ICMR?	400mg BD	408 (61.6)	254 (38.4)
11. What are the side effects caused by hydroxychloroquine?	Sudden cardiac arrest, Depression, Drowsiness, Irreversible blindness	370 (55.8)	292 (44.2)
12. How do hydroxychloroquine act against COVID 19?	All of the Above 1. It increases the endosomal pH 2. Glycosylation of cellular receptors of SARS-CoV-2 3. Block the enzymes involved in infusion between the virus and lung cells 4. Zinc ionophores can improve the immunity response	64 (9.6)	598 (90.4)
13. Which of the following are the most commonly used Anti-viral Drugs recommended by ICMR for the treatment of Covid-19?	1. Remdesivir 2. Ritonavir 3. Lopinavir 4. Oseltamivir	266 (40.2)	396 (59.8)
14. What is the class of the drug Tocilizumab used in COVID 19?	Immunomodulatory agent	298 (45)	364 (55)
15. What recommendation can be given in order to limit the exposure of healthcare worker (HCW) during Covid-19?	All of the Above ▪ Avoid nebulisation as much as possible in stable patients and use MDI ▪ Use extended tubing to keep infusion pumps outside of COVID patients' rooms (suspected and confirmed) into the hall ▪ Disposable pillbox with a time of each medication mentioned in the box with standard timings ▪ Avoid the drugs which are required to be given more frequently and wherever possible, use extended, sustained or prolonged-release formulation for applicable drugs	180 (27.1)	482 (72.9)

Characteristics of Knowledge level

The knowledge assessment was carried out by categorizing the questionnaire into the 3 sections, mentioned in Table 1.of which 68% (450) had an average score of 6-10, whereas 22.7% had secured a good score 11-15, and 9.4% had a very poor score. Table 3 describes the distribution of study participants according to each knowledge question domain.

Table 3: Distribution of study participants based on a score of 3 domains

Knowledge Score	Number of Participants	Percentage
Overall Score (Part 1+2+3)		
Mean age ± S.D (range) 8.6 ± 2.4 (1-15)		
Poor (0-5)	62	9.4
Average (6-10)	450	68
Good (11-15)	150	22.7
1. Introduction and Clinical features		
Mean age ± S.D (range) 2.6 ± 0.6 (0-3)		
0	6	0.9
1	40	6
2	114	17.2
3	502	75.8
2. Diagnosis and Management		
Mean age ± S.D (range) 3.1 ± 1 (0-5)		
0	4	0.6
1	34	5.1
2	158	23.9
3	216	32.6
4	178	26.9
5	72	10.9
3. Pharmacology and Prevention		
Mean age ± S.D (range) 2.5 ± 1.5 (0-7)		

0	38	5.7
1	136	20.5
2	184	27.8
3	158	23.9
4	82	12.4
5	34	5.1
6	16	2.4
7	14	2.1

Characteristics of Belief and Safety precautions

In this study, the majority of the study participants about 646 (97.6%) agree that self-isolation and home quarantine helps to prevent transmission of infection. In contrast, only 16(2.4%) disagree with the concept of self-isolation and home quarantine. Almost (70.1%) agree that Plasma convalescent therapy is beneficial than other drugs for the treatment of COVID 19.

Association of study variables with Knowledge score

The association between increase knowledge score and sociodemographic characteristics of patients such as age, gender, level of education, years of experience in pharmacy field and occupation status were assessed using the chi-square test. We observed a clear association between knowledge score and an increased age group, increased level of education and increase experience in pharmacy field, but no association was observed with gender as described in Table 4.

Table 4: Association of participant characteristics and their knowledge score.

Characteristic	Score of the participants			Chi-square test p-value
	Poor (0-5)	Average (6-10)	Good (11-15)	
Age (years)				
18-22	40	222	56	<0.001
23-27	22	220	86	
≥28	0	4	12	
Gender				
Male	30	166	68	0.113
Female	32	280	86	
Level of Education				
D Pharmacy	2	14	2	0.035
B Pharmacy	16	66	20	
M Pharm	0	18	12	
Pharm D	44	348	120	
Years of experience in Pharmacy field (years)				
1-3	22	108	30	<0.001
4-6	40	292	68	
7-9	0	44	46	
≥9	0	2	10	
Occupation status				
Student	58	398	98	<0.001
Industry/Company/ Community/Hospital	4	18	10	
Academician	0	30	46	

p- Value <0.05 were considered statistically significant.

Discussion

At present, COVID-19 is a severe health concern for the public, and it is a global topic of discussion among the people, Health Care Workers, and media as well [17]. COVID-19 cases are increasing at an unprecedented rate, and large-scale community transmission has been started in most countries. Pharmacy students and graduates are involved in pandemic planning response and play a vital role in the clinical setting. Moreover, pharmacist plays a significant role in the community setting and society by making prescription drugs available and growing public understanding of health [18]. This study was initiated for assessing the knowledge, attitude, and beliefs among the Indian pharmacy students, professionals in combating the spread of COVID-19 disease. Despite many educational intervention programs undertaken by the government, World Health Organization and private organizations to control the spread of COVID-19. Pharmacy professionals must update their knowledge on the precautions and safety strategies that should be adopted to stop the community transmission of COVID-19 [19]. Pharmacist working in hospitals and community settings act as moderators between the physician and a patient [20]. Pharmacy professionals play a vital role in educating people about their disease, medications and other risk factors. On the other, Pharmacy professionals also inform people on the incubation period of new coronavirus, the survival time of COVID-19 on various objects that would help people to understand the need for disinfecting the items with appropriate disinfectants [21]. Providing education intervention to people at increased risk of acquiring COVID-19 will help people stop further spread of infection. However, pharmacists will be the 1st health care provider with the primary contact who pave the way for prevention, patient management functions to manage COVID 19 and future disease outbreaks [22]. So, it is imperative for a pharmacist to update his knowledge regarding the mechanism, sign & symptoms, diagnostic markers, treatment strategies adopted and follow the protocol and policy procedures according to the WHO and ICMR guidelines. I hope this is the first study conducted among India's pharmacy professionals, and still no recent studies have been published among the Pharmacist in India.

The present study showed a significant relationship between the knowledge score and age, level of education, years of experience in pharmacy fields and occupational status. As mentioned earlier, the overall mean knowledge score among pharmacy students and professionals was 8.6 ± 2.4. Most of the participants possessed an average knowledge (68%, n= 450) and good knowledge (22.7%, n= 150) on COVID-19, since the Ministry of Health, the Government of India (MoH) and the World Health Organization are providing up to date information on COVID-19 through their websites. The present study highlights that 75.8% of the participants were knowledgeable about the clinical features of COVID-19. Also, 70.4% of the participants were knowledgeable about the diagnosis and management of COVID-19. 73.7% of the participants knew about the right diagnosis technique for COVID-19. On the other, only 57.1% of the participants learned about the most frequent laboratory abnormalities used to predict severe coronavirus disease. Besides, 88.5% of the participants learned about the risk factors that may promote the progression towards the extreme form of

coronavirus disease. These findings confirm observations from previous studies, which reported that the majority of participants believed that the condition is more dangerous for the elderly and those suffering from chronic diseases [23, 24, 25, 26]. Our study observed that pharmacy professionals and students were scored lowered in pharmacology and prevention of COVID-19 domain questions. Of 7 items, the average score of the participants was 2.5 ± 1.5 (0-7). The students were least knowledgeable about the mechanism of action of hydroxychloroquine against COVID-19. Almost 60% of the participants didn't know about the most commonly used Anti-viral Drugs recommended by ICMR for the treatment of Covid-19. On the other, 72.9% of the participants were less knowledgeable about the recommendation that is being given to limit the exposure of healthcare workers (HCW) during COVID-19 [27]. A perceived lack of information regarding pharmacology and prevention of COVID-19 highlights the requirements for more educational intervention, seminars and workshops for pharmacy students and professionals. In our study, it was observed that awareness of pharmacists among all three aspects was suboptimal. Regarding the pharmacy student's attitude and beliefs towards the COVID-19 infection, in the present study, 97.6% participants agreed that self-isolation and home quarantine help prevent infection transmission. Implementing preventive measures across outbreaks such as exclusion, quarantine and group containment may face significant challenges, this involves the early identification of cases to protect oneself, the need for psychiatric assistance and the provision of necessities when being isolated from the public and, most notably, the treatment and administration of ethical rules, values, self-determination [28, 29]. Interestingly, 70.1% of the participants agreed that plasma convalescent therapy is beneficial than other drugs for the treatment of COVID-19. The majority of participants agreed with the effectiveness of plasma convalescent therapy used in severe COVID-19 patients.

Pharmacy students, Community and Clinical pharmacists play a multiple role in controlling the spread of the COVID-19 pandemic. Pharmacists are actively involved in monitoring the transmission of pathogens and adding to national statistics credibility and legitimacy. Moreover, a comparison with the pharmacist's role in disclosing adverse drug reactions should be drawn, particularly at the current time of the pandemic. It is vital to prevent undeclared or over-reporting that affects the accuracy of information [30]. Pharmacy students and professionals must keep up to date knowledge of published guidelines with reliable information sources about the COVID-19 pandemic [31, 32].

It has been shown that the risk of medical students being infected with coronavirus due to a lack of adequate information about COVID-19 is enhanced by the fact that coronavirus is transmitted asymptomatically.

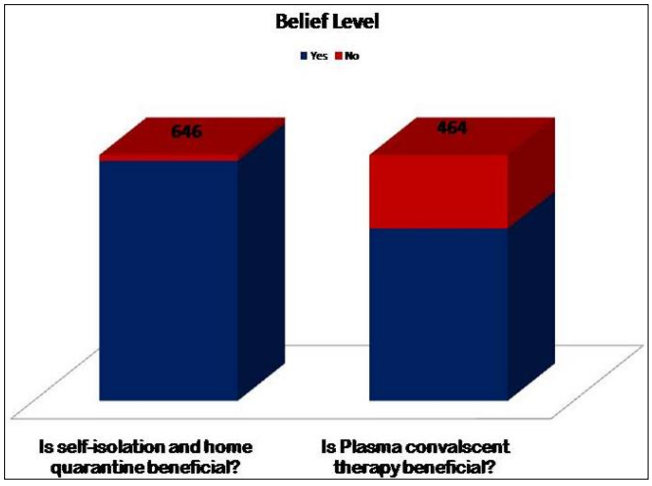

Fig 1: Beliefs among study participants regarding self-isolation and plasma convalescent therapy

Conclusion

In this pandemic era, it is very relevant for the pharmacy professionals to update their knowledge on the Novel Coronavirus. Since, the pharmacist has always been considered as the front line healthcare professionals, enabling rational healthcare to the community. In the perspective of our study, we found that only 22.7% participants had a thorough and well updated knowledge on COVID 19.

The study has shown that the pharmacist had to acquire and update their knowledge on Pharmacology and Prevention measures which is a need of the hour for a better patient care.

The accomplishment of this study had embarked an importance of updating the knowledge, sharing the information among the pharmacy students and professional in order to tackle the pandemic situation.

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Author Contributions

Author's role in study concept and design, acquisition of subjects and/or data, analysis and interpretation of data, and preparation of manuscript Study Concept: Dr. Rajesh Venkataraman, Dr. Hari Krishna, Dr. Kessia K Varghese Acquisition of subjects and/ or data: Dr. Hari Krishna, Dr. Rishabh Sharma, Interpretation of Data: Dr. Hari Krishna, Dr. Rishabh Sharma

Preparation of Manuscript: Dr. Hari Krishna, Dr. Rishabh Sharma, Dr. Kessia K Varghese

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All the information related to the study is embedded within the manuscript

Conflict of Interest
The authors declare no conflict of interest

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