ORIGINAL ARTICLE ASIAN JOURNAL OF MEDICAL SCIENCES

Parental apprehension, knowledge, attitudes, and practices regarding COVID-19 infection in children: A cross-sectional study

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Submission: 06-11-2022 Revision: 28-12-2022 Publication: 01-02-2023

ABSTRACT

Background: With the anticipation of the coronavirus disease 2019 (COVID-19) third wave, there were reports of increased rates of infection among children. So naturally, there will be apprehension among parents regarding this. Knowledge, attitudes, and practices (KAPs) play an important role in effectively controlling the infection. **Aims and Objectives:** The study is an attempt to understand parental apprehension and their KAP regarding COVID-19 infection in children. **Materials and Methods:** A total of 367 parents participated. Statistical analysis of the data was performed using R language. **Results:** Higher scores of knowledge were reported among higher age ($P = 0.003$), higher education ($P < 0.001$), professionals ($P < 0.001$), urban area ($P < 0.001$), and two or more children ($P = 0.022$). Good practices were noted among unemployed ($P < 0.001$), Hindu religion ($P = 0.045$), and single child ($P = 0.002$). Higher educated and employed had good knowledge, but practices were better among unemployed and illiterate. Knowledge was positively correlated with attitude ($r + 0.54$, $P < 0.001$, 95% CI [0.47, 0.61]) and practices ($r + 0.26$, $P < 0.001$, 95% CI [0.17, 0.36]); and attitudes with practices ($r + 0.32$, $P < 0.001$, 95% CI [0.22, 0.41]). **Conclusion:** The study finds that generally, parents have good KAP toward COVID-19. However, they have limited knowledge regarding COVID-19 infection in children contributing to parental apprehension. It is time we spread awareness on KAPs regarding COVID-19 infection in children.

Key words: Knowledge, attitudes, and practices; Coronavirus disease in children; Fear of COVID-19; Parental apprehension

Access this article online

Website: http://nepjol.info/index.php/AJMS

DOI: 10.3126/ajms.v14i2.49290

E-ISSN: 2091-0576

P-ISSN: 2467-9100

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a disease caused by a novel virus belonging to coronaviruses. It was first described to be causing respiratory infection in Wuhan city of China in late December of 2019. The disease was later classified as a pandemic by the World Health Organization due to its nature of rapid and global spread.[1] Although the spread of infection was not limited by any characteristics of the host, relatively fewer children were affected in India during waves one and two. However, there is an increase in apprehension among the parents that the anticipated third wave could affect more children.

Various stakeholders have been clarifying to the public regularly that even though children might get affected, the severity of symptoms may be minimal or even asymptomatic.[2,3] Even with this assurance, there has been an increase in apprehension among the parents regarding COVID-19 infection and its effects on their children from mainstream media, social media, and hearsay.[4] This can create a panic among the public leading to unavoidable problems.

Parents become generally fearful even when a mild infection sets in their children. They fear that children would require urgent medical attention and rush them to the hospital

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even when with minimal or no symptoms. This behavior is especially increased due to the ongoing pandemic. This may be attributed to the higher mortality rates reported in adults infected with COVID-19. The uncertainty related to the disease severity, presentation, symptoms, and management among the public also might add up to the apprehension.

Parents' awareness regarding COVID-19 infection is one of the essential measures in not only tackling the ongoing pandemic but also reducing the apprehension. Assessing the parents' knowledge, attitudes, and practices (KAPs) toward COVID-19 concerning infection in their children will help to understand their awareness, myths, and design health strategies to address the gaps and strengthen the ongoing fight against the pandemic.[5] In KAP, knowledge refers to an understanding of the COVID-19 infection; attitude refers to the feelings and preconceived ideas toward COVID-19, and practices refer to how they demonstrate the knowledge and attitude through actions.[6]

There is a need for our understanding regarding parental apprehension and KAP concerning COVID-19 in children. With the social media and mainstream media focusing on the increased rate of infection in children during the anticipated third wave, the related fears will naturally increase. Although studies were conducted evaluating the KAP and parental apprehension, as per our understanding, there is a lack of literature to our setting and evaluating the relationship between these two. We feel that this is an ideal time to evaluate and better understand the issue, so appropriate measures could be taken.

Aims and objectives

This study aims to evaluate and better understand the issue, so appropriate measures could be taken.

MATERIALS AND METHODS

Study details

The study was approved by the Institution Ethics Committee with serial number IEC/PR/2021: 002/January 30, 2021. Due to COVID-19 restrictions, it was conducted using online Google Forms. All the study-related questions were entered in Google Forms attached to the Gmail of the primary author. A sharable link was created and it was shared on various social media platforms (WhatsApp, Facebook, etc.). The Snowball technique was used for data collection. A total of 400 responses were obtained, among them, 33 had incomplete or inaccurate responses hence removed from the analysis and 367 responses were analyzed.

Questionnaire

Participants were given the access to fill the forms only after accepting the consent sheet detailing the details of the study. It would take roughly 10–15 min for filling the form. Study questionnaire included:

Sociodemographic sheet

This was designed to capture the demographic details related to the participants.

Fear of COVID-19 (FOC)

This scale was developed by Ahorsu et al.,[7] to assess the fears/apprehension regarding COVID-19 among the participants. It has been used and validated in various settings.[8] The scores range from a minimum of 7 to a maximum of 35, higher score indicates greater FOC. This was used previously by Suffren et al.,[4] for assessing parental apprehension regarding COVID-19 infection in their children.

KAP regarding COVID-19 infection in children

To assess the parents' KAP s regarding COVID-19 in their children, we used data from studies by Tomar et al.,[5] Noori et al.,[6] Andrade et al.,[9] and Balasubramanian et al.,[10] and guidelines for the management of COVID-19 in children released from time to time by Ministry of Health and Family Welfare, Government of India.[11] A pilot study was conducted among 20 participants to validate the questionnaire before using it in the study. The results from the pilot study were used to make changes in the final KAP questionnaire. There questions were marked as "yes," "no," and "don't know." They were then scored based on Noori et al.,[6] study as "2" for correct answer, "1" for don't know, and "0" for wrong answer.

Statistical analysis

Data obtained from the Google Forms were downloaded in Microsoft Excel format. It was analyzed using R language[12] with R Studio[13] as Integrated Development Environment. In R, the packages used were "Summarytools,"[14] "dplyr,"[15] and "ggplot2."[16] Normality distribution was checked using the Shapiro–Wilk test. Descriptive statistics were done to obtain the mean, percentages, frequencies, and standard deviation (SD). Inferential statistics for two or more variables were conducted using an independent t-test and analysis of variance. For in-between group comparison; the Bonferroni *post hoc* test was used. To find a relation between two variables, Pearson's product-moment correlation was used. For the purpose of the study, $P<0.05$ was considered statistically significant with power of 80%.

RESULTS

Sociodemographic details (Table 1)

The study included participants from 20 to 45 years of age, with the majority from 26 to 30 years. Males constitute 55% of the sample. More than two-thirds of the sample was educated above the intermediate and almost half of the participants were employed as professionals. More than two-thirds of the sample belongs to the Hindu religion followed by Muslim and Christianity. More than three-fourths of participants hail from an urban background. Among the

Table 1: Sociodemographic sdetails of the participants

Variable (n=367)	Attributes	Frequency	Percentages (%)
Age (years)	20–25	94	25.6
	26–30	99	27.0
	31–35	89	24.3
	36–40	63	17.2
	41–45	22	6
Gender	Male	205	55.9
	Female	162	44.1
Education status	Illiterate	4	1.1
	Schooling	60	16.3
	Intermediate	49	13.4
	Post/graduation	142	38.7
	Professional	112	30.5
Occupation	Unemployed	28	7.6
	Skilled	91	24.8
	Clerical	30	8.2
	Professional	218	59.4
Religion	Hindu	262	71.4
	Christian	48	13.1
	Muslim	57	15.5
Domicile	Urban	284	77.4
	Rural	83	22.6
Type of family	Joint	75	20.4
	Nuclear	292	79.6
Number of children	One	212	57.8
	Two	126	34.3
	Three	23	6.3
Any physical health problem	Yes	40	10.9
	No	327	89.1
Any mental health problem	Yes	30	8.2
	No	337	91.8
Infected with COVID-19	Yes	165	45
	No	202	55

participants, 45% were infected by COVID-19 infection.

Comparison of demographic details with FOC (Table 2)

The mean score of FOC was 23.7 with a SD of 5.1 and 45% of the parents reported score more than 25 (high score). There were significant associations between demographic details: Age, education status, occupation, religion, and domicile of the participants with the FOC scores. Lower scores were reported by participants who were below 30 years, education of above graduation, unemployed, hailing from Hindu religion, and rural background.

Comparison of demographic details with KAP (Table 3)

The mean and SD for KAPs domains were 19.25 (SD 3.44) from a maximum possible score of 26, 7.22 (SD 1.45) from a maximum possible score of 8 and 7.20 (SD 2.54) from a maximum possible score of 10, respectively. There was a significant association between age, education status, occupation, domicile, and number of children with knowledge domain; the number of children with attitude domain; occupation, religion, and several children with

Table 2: Comparison of sociodemographic variables with fear of COVID-19 infection

S. No.	Variable (n=367)	Attributes	Mean (SD)	P-value
1	Age (years)	20–25	22.08 (5.88)	0.023*
		26–30	23.83 (4.33)	
		31–35	24.30 (5.21)	
		36–40	24.84 (4.62)	
		41–45	23.81 (4.04)	
2	Gender	Male	23.49 (5.25)	0.454
		Female	23.89 (4.88)	
3	Education status	Illiterate	24.25 (5.67)	0.007*
		Schooling	24.61 (5.13)	
		Intermediate	24.87 (4.59)	
		Post/graduation	22.19 (5.14)	
		Professional	24.49 (4.83)	
4	Occupation	Unemployed	22.96 (4.79)	0.008*
		Skilled	24.06 (5.36)	
		Clerical	25.90 (3.73)	
		Professional	23.29 (5.11)	
5	Religion	Hindu	23.18 (5.14)	0.007*
		Christian	24.31 (4.78)	
		Muslim	25.36 (4.73)	
6	Domicile	Urban	23.98 (4.98)	0.037*
		Rural	22.60 (5.34)	
7	Type of family	Joint	23.36 (5.02)	0.548
		Nuclear	23.75 (5.11)	
8	Number of children	One	23.32 (5.25)	0.069
		Two	24.42 (4.43)	
		Three	24.39 (5.16)	
9	Any physical health problem	Yes	22.71 (5.71)	0.266
		No	23.78 (5.00)	
10	Any mental health problem	Yes	22.03 (6.16)	0.132
		No	23.81 (4.97)	
11	Infected with COVID-19	Yes	24.21 (5.05)	0.063
		No	23.22 (5.09)	

Test used: Independent t-test or ANOVA; * P<0.05 is statistically significant

practices domain. There was significant correlation of knowledge domain with attitude domain (r+0.54, P<0.001, 95% CI [0.47, 0.61]) and practice domain (r+0.26, P<0.001, 95% CI [0.17, 0.36]); similarly, attitude domain with practice domain (r+0.32, P<0.001, 95% CI [0.22, 0.41]).

Comparison of KAP with FOC (Tables 4-6)

Higher parenteral apprehension or fear is associated with knowing that COVID-19 could spread through both symptomatic and non-symptomatic cases; fever, cough, breathlessness, fatigue, myalgia, and sore throat being most common symptoms in children; children presenting with gastrointestinal symptoms; requirement of oxygen only if saturation is below 94%, being vaccinated would protect their children against COVID-19 infection in children, and only severe/presence of comorbidity requiring laboratory investigations. Not knowing whether known medications have a role in children; black fungus involving children and flu vaccine protects against COVID-19 infection is

Table 3: Comparison of sociodemographic variables with KAP

Variable (n=367)	Attributes	Knowledge domain		Attitude domain		Practice domain	
		Mean (SD)	P-value	Mean (SD)	P-value	Mean (SD)	P-value
Age (years)	20–25	18.08 (3.78)	0.003*	6.91 (1.69)	0.077	7.38 (2.42)	0.301
	26–30	19.93 (3.31)		7.16 (1.56)		7.61 (2.65)	
	31–35	19.75 (3.02)		7.41 (1.24)		6.84 (2.65)	
	36–40	19.25 (2.98)		7.42 (1.18)		6.76 (2.30)	
	41–45	19.95 (3.49)		7.68 (0.83)		7.54 (2.55)	
Gender	Male	19.25 (3.67)	0.987	7.12 (1.65)	0.107	7.30 (2.61)	0.406
	Female	19.25 (3.13)		7.35 (1.13)		7.08 (2.45)	
Education status	Illiterate	19.50 (2.51)	<0.001*	6.50 (3.00)	0.277	8.50 (1.91)	0.087
	Schooling	18.53 (3.11)		7.13 (1.15)		7.46 (2.16)	
	Intermediate	18.59 (4.23)		7.40 (1.64)		6.85 (2.68)	
	Post/graduation	18.75 (3.62)		7.04 (1.43)		7.58 (2.29)	
	Professional	20.56 (2.60)		7.44 (1.44)		6.70 (2.90)	
Occupation	Unemployed	17.10 (3.04)	<0.001*	7.00 (1.30)	0.076	7.60 (2.09)	<0.001*
	Skilled	19.25 (3.84)		7.37 (1.54)		6.96 (2.56)	
	Clerical	19.33 (2.63)		7.23 (1.27)		6.43 (2.16)	
	Professional	20.07 (3.16)		7.41 (1.37)		7.10 (2.74)	
Religion	Hindu	19.41 (3.47)	0.202	7.26 (1.35)	0.687	7.37 (2.46)	0.045*
	Christian	19.35 (2.89)		7.20 (1.55)		7.14 (2.83)	
	Muslim	18.45 (3.67)		7.05 (1.77)		6.37 (2.53)	
Domicile	Urban	19.73 (3.24)	<0.001*	7.30 (1.40)	0.069	7.14 (2.61)	0.360
	Rural	16.61 (3.62)		6.95 (1.59)		7.42 (2.32)	
Type of family	Joint	19.78 (3.05)	0.105	7.13 (1.35)	0.516	7.45 (2.42)	0.338
	Nuclear	19.11 (3.52)		7.25 (1.47)		7.14 (2.57)	
Number of children	One	19.26 (3.69)	0.022*	7.23 (1.44)	0.001*	7.65 (2.52)	0.002*
	Two	19.42 (3.16)		7.25 (1.53)		6.57 (2.56)	
	Three	19.00 (2.43)		7.39 (0.94)		6.86 (2.09)	

KAP: Knowledge, attitudes, and practices, test used: Student's t-test and ANOVA; *P<0.05 is statistically significant

associated with higher parental apprehension/fear.

In the attitudes domain; higher parental apprehension or fear was associated with agreeing that lockdown would prevent the spread of COVID-19 infection and not knowing whether COVID-19 infection could be controlled successfully.

In the practices domain; higher parental apprehension or fear is associated with not getting the flu vaccine to their children and not discussing or contacting pediatricians regarding COVID-19 infection in their children.

DISCUSSION

A cross-sectional study in South India by Kadambi et al.,[17] during the initial days of the COVID-19 outbreak found that 85% of the parents (with children below 12 years of age) were having high apprehension regarding their children contacting COVID-19 infection. They felt that it is natural for a parent to fear their child's health and were increased by social media due to many circulating unscientific messages and promulgated rumors. Similarly, Biradar and Dalvi[18] have reported that 78% of parents are fearful of COVID-19 infection in children. In another cross-sectional study in Canada by Suffren et al.,[4] it was found that more the parental fear more is the fear among their children regarding the COVID-19 infection. In the present study, apprehension was reported among 45% of the parents. This is could be because of the timing of the study, awareness regarding the disease, availability of the vaccine, decreasing number of daily cases, and associated mortality.

Apprehension was high among those who were not sure about the role of imaging, medications (which were routinely used in adults), and black fungus infection in children. This is in line with Zhou et al.,[19] who found that parents lacked awareness regarding COVID-19 infection in children. Similarly, a study by Taubman-Ben-Ari and Ben-Yaakov[20] among parents of infants reported that apprehension could be because of the pandemic's impact on infant's growth, lack of social and family gatherings, and untoward circumstances. The findings in our study could be because the awareness which was being circulated never covered children-related issues specifically. During the initial days, the concern and evidence were more available on the adult infections and infection among children was considered to be having mild manifestations. However, as the pandemic progressed, more information was available on the evolution of the virus and variety of manifestations. With increased awareness, probably, parents were not in a position to take informed decisions and hence the higher apprehension.

Higher awareness on knowledge was reported by parents with higher age, educational qualification of postgraduation

Table 4: Responses in knowledge aspect of KAP and its association with FOC (only important findings included)

Question (n=367)	Response	Percentage	FOC mean (SD)	P-value
Do you think that the risk of spread of the COVID-19 is from both symptomatic and non-symptomatic cases?	Yes	89.9	23.90 (5.08)	0.016*
	No	6.3	20.95 (4.36)	
	Don't know	3.8	22.64 (5.27)	
	No	4.6	22.58 (5.52)	
	Don't know	9	22.75 (4.61)	
The common symptoms in children are fever, cough, breathlessness, fatigue, and myalgia sore throat	Yes	89.4	23.90 (5.07)	0.031*
	No	6.3	20.95 (4.94)	
	Don't know	4.4	22.87 (4.78)	
Few children can present with gastrointestinal symptoms	Yes	81.5	24.00 (5.03)	0.024*
	No	5.7	20.52 (5.96)	
	Don't know	12.8	22.97 (4.60)	
Mild cases of COVID-19 in children can be managed at home	Yes	86.6	23.96 (5.01)	0.038*
	No	5.7	22.14 (5.06)	
	Don't know	7.6	21.53 (5.43)	
There is no role of remdesivir, tocilizumab, and hydroxychloroquine in children	Yes	49.3	22.90 (5.12)	0.016*
	No	16.1	24.27 (5.18)	
	Don't know	34.6	24.49 (4.87)	
Oxygen is required only if saturation is <94%	Yes	81.2	24.04 (4.87)	0.034*
	No	7.1	22.73 (5.63)	
	Don't know	11.7	21.69 (5.79)	
In children, laboratory investigations are required only in severe cases or in those with comorbid diseases	Yes	70.6	24.18 (4.83)	0.021*
	No	13.6	22.26 (5.66)	
	Don't know	15.8	22.62 (5.39)	
Do you think black fungus will affect children?	Yes	57.5	23.48 (4.78)	0.002*
	No	14.4	21.86 (6.30)	
	Don't know	28.1	24.99 (4.70)	
Do you think COVID-19 vaccination in parents reduces the risk of children getting affected?	Yes	76.8	24.18 (4.68)	< 0.001*
	No	9.8	20.08 (5.62)	
	Don't know	13.4	23.34 (5.93)	
Do you think the flu vaccine can prevent COVID-19 infection in children	Yes	48.8	23.36 (4.81)	< 0.001*
	No	19.1	21.47 (6.24)	
	Don't know	32.2	25.44 (4.09)	

Test used: ANOVA; * *P*<0.05 is statistically significant, KAP: Knowledge, attitudes, and practices

Table 5: Responses in attitudes aspect of KAP and its association with FOC

Question (n=367)	Response	Percentage	FOC mean (SD)	P-value
Do you agree with the idea of lockdown to prevent the spread of COVID-19?	Yes	92.6	23.89 (5.04)	0.039*
	No	5.7	21.14 (4.50)	
	Don't know	1.6	19.83 (6.67)	
COVID-19 will be successfully controlled.	Yes	77.7	24.00 (4.84)	0.003*
	No	12.3	20.80 (6.22)	
	Don't know	10.1	24.59 (4.34)	
COVID-19 causes pneumonia, respiratory failure, and death	Yes	89.1	23.88 (4.94)	0.159
	No	6.3	21.95 (5.88)	
	Don't know	4.6	21.82 (6.21)	
Preventive behaviors are the only effective action for COVID-19	Yes	92.6	23.83 (5.04)	0.086
	No	5.2	22.73 (4.78)	
	Don't know	2.2	19.00 (5.87)	

Test used: ANOVA; * *P*<0.05 is statistically significant

or above, employed as professionals, staying in an urban area, and having two or more children. These findings were in line with the studies by Zhou et al.,[19] and Noori et al.,[6] in addition, they also reported that parental role and socioeconomic status play a role.

Good COVID-19 attitudes were reported by parents having two or more children whereas better practices were observed among unemployed, Hindu religion, and having one child. We also found that among the higher educated and employed the knowledge was good, but practices were better among unemployed and illiterate (although not statistically significant). The finding of high awareness among educated and employed was also found by Noori et al.,[6] and Zhou et al.,[19] but they have not reported good practices among unemployed and illiterate. We feel that this may be due to the fear, less awareness, and low economic status that drive these parents to

Table 6: Responses in practices aspect of KAP and its association with FOC

Question (n=367)	Response	Percentage	FOC mean (SD)	P-value
Do you take proper preventive measures while leaving home?	Yes	94	23.90 (4.92)	0.085
	No	4.9	20.00 (6.57)	
	Don't know	1.1	20.00 (5.83)	
Do you feel more bonded to your family and friends in the duration of lockdown?	Yes	91.8	23.91 (4.98)	0.192
	No	7.6	20.89 (5.40)	
	Don't know	0.5	21.00 (9.89)	
Did you observe a distance of one or one and a half meters with others while waiting for the visit today?	Yes	67.8	23.41 (5.06)	0.218
	No	31.1	24.35 (5.07)	
	Don't know	1.1	20.25 (5.90)	
Have you got your child vaccinated with flu vaccine?	Yes	48	23.05 (5.03)	0.015*
	No	43.9	24.49 (5.11)	
	Don't know	3	22.23 (4.55)	
Have you discussed/contacted a pediatrician regarding COVID-19 infection in your child/children	Yes	53.1	22.73 (5.14)	<0.001*
	No	43.9	25.13 (4.41)	
	Don't know	3	18.81 (6.88)	

Test used: ANOVA; * P<0.05 is statistically significant, KAP: Knowledge, attitudes, and practices

practice what is being told by authorities to prevent the spread of infection.

In the study, the majority of parents had good COVID-19-related knowledge regarding the mode of transmission, presentation in children, and common treatment aspects; good attitude regarding lockdown and preventive measures; and also following proper precautionary measures. These findings were in line with studies on different groups of participants such as Agarwal et al.,[21] on the general public in India, Zhong et al.,[22] on the general public in China, and Padmanaban et al.,[23] on higher education students in India.

The majority of the parents were aware that the COVID-19 vaccine in adults could reduce the risk of infection in children, but they have reported higher apprehension. This could be probably because those who were more fearful of infection in their children look at vaccines as a ray of hope. In a study regarding the attitudes toward the COVID-19 vaccine, adults have not reported any mistrust toward the vaccine benefit, but there were other reasons for having negative attitudes such as unforeseen complications, commercial profiteering, and preference for natural immunity.[24] We also feel that there may be an element of emotional component attached because it is the adults (parents) who were getting vaccinated; hence, their children are free from any untoward effects due to the vaccine. In a way, children are only protected rather than facing any effects, but when asked about the willingness to give the flu vaccine to their children parents were divided in their opinion and had higher apprehension, as they may not be sure that flu vaccine will be helpful. Furthermore, parents might have two more concerns; first uncertainty that the child will be protected, and second the fear of side effects related to flu vaccine administration.

This study was an attempt to understand the apprehension, KAPs among Indian parents regarding COVID-19 infection in their children. Fears among parents could be due to the anticipated COVID-19 third wave and hype created regarding more infections among children. In the study, the number of parents reporting high apprehension was 45%, which is comparatively low among studies in other geographical areas. We observed that parents have poor knowledge and practices regarding COVID-19 in children, which could be due to the limited spread of information regarding the same. The stakeholders involved in spreading awareness should concentrate on filling this gap. Parents should be encouraged to communicate freely with health-care professionals; establishing hotlines to alleviate the apprehension and disseminating information regarding vaccination with a trusted face might come a long way in our fight against COVID-19.

Limitations of the study

The study is limited by cross-sectional design; probably, a follow-up would reveal more meaningful information. Being an online study, we do not have measures to check the authenticity of the information. As the study is conducted only in English, we might have missed the lower socioeconomic and illiterate participants whose inclusion could have added more to the findings.

CONCLUSION

Parents have good KAPs toward COVID-19. However, they have limited knowledge regarding COVID-19 infection in children contributing to parental apprehension. It is time we spread awareness on KAPs regarding COVID-19 infection in children.

ACKNOWLEDGMENT

We acknowledge the help provided by Himaja Arepalle, Varsha Vuddandam and Shivani Manchirevula in data collection.

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Authors' Contributions:
RB and RKD- Concept, and design of the study results in interpretation, review of the literature, and preparing the first draft of the manuscript; **PRPV-** Concept and design of the study results in interpretation, review of the literature, and preparing the first draft of the manuscript. **HKKB and PS-** Concept, and design of the study, statistical analysis, interpretation, and revision of the manuscript.

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Source of Support: Nil, **Conflicts of Interest:** None declared.

Kindly note AQ1 and AQ7(appendix) those corrections are not clear. Please check and advice.