

Impact of Health Education on Knowledge, Attitude and Practices of COVID-19 among Slum Dwellers of Nashik, India

SUPRIYA DHAKNE PALWE¹, MAANYA SUMEET BAJAJ²

ABSTRACT

Introduction: The spread of Coronavirus Disease 2019 (COVID-19) pandemic can be effectively curtailed by COVID-19 appropriate practices. Identifying knowledge gaps and giving health education to address the weak areas will be key to breaking the chain of COVID-19.

Aim: To assess the Knowledge, Attitude and Practices (KAP) of COVID-19 among slum dwellers and to assess the impact of health education on the same.

Materials and Methods: The quasi-experimental was conducted among the slum dwellers from July 2021 to August 2021 at three slums (Sant Kabir Nagar, Anandwalli slum behind Wasan bungalow, Kamgar nagar) of Nashik city, Maharashtra, India. To assess KAP using a prevalidated questionnaire with 16 knowledge questions, six attitude questions and eight practice questions. A brief video was utilised for health education regarding COVID-19. Knowledge was reassessed after the intervention. A total of 164 participants from three slums completed the preintervention and postintervention questionnaire. Data was analysed using appropriate statistical tests like Chi-square test, Wilcoxon signed-rank test.

Results: Satisfactory level of knowledge, attitude and practices was found in 72.56%, 82.32% and 51.83% of the study participants. Knowledge gap was found in social distancing (35.98%), possibility of re-infection (20.73%) and infection after vaccination (28.66%). Around 25.61% said that children need not follow COVID-19 appropriate practices. About 97.56% participants had taken at least 1st dose of COVID vaccine. There was high prevalence of inappropriate practices like not maintaining social distancing at workplace (21.95), using public transport (65.24%), etc. There was no association of socio-demographic characteristics and the COVID-19 KAP. There was significant increase in the knowledge level after the health education. Preintervention and postintervention knowledge scores was 10.82±2.39 and 12.91±1.79, respectively.

Conclusion: In spite of satisfactory knowledge level and attitudes, around half the population was involved in incorrect practices. There was no association of socio-demographic factors on the KAP of COVID-19. Post health education, knowledge level improved significantly.

Keywords: Coronavirus disease 2019, Mask, Pandemic, Social distancing

INTRODUCTION

Emerging viral diseases have been and will always be a threat to public health and indirectly to the development of nations. The world has witnessed several viral epidemics in the last twenty years, such as the Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV), H1N1 influenza, Middle East Respiratory Syndrome Coronavirus (MERS-CoV) and now the new SARS-CoV-2 (COVID-19) has plagued the world [1].

Coronavirus Disease 2019 (COVID-19) is a pandemic of dreaded global potential struck almost a century after Spanish flu. For a developing country like India, tackling this highly contagious disease is a furthermore difficult challenge owing to large population, predominance of rural population, high population density, lower educational and socio-economic status of population etc. Rapid urbanisation and industrialisation has led to emergence of temporary human settlements or slums in the cities of India. The living conditions in slums make the inhabitants more vulnerable to infectious diseases, more so for respiratory infections. Cornburn J et al., put forth that slums are more vulnerable to COVID-19 transmission since there are restraints of basic daily needs of sanitation [2]. Also, space limitations and overcrowding in slums make physical distancing and self-quarantine non feasible [2]. The educational qualification and income of a person and family may influence the acquisition of COVID-19 infection, health-seeking behaviour, course of the illness.

Islam S et al., in their study among slum dwellers in Bangladesh found poor level of knowledge and practices to prevent COVID-19 transmission [3]. In a developing country like India, with predominant rural and urban slum population, awareness activities are very much

needed for the prevention of transmission of COVID-19. A year and half since the first case of COVID-19, yet there is no 100% cure or effective medicine. This has underlined the fact yet again that 'Prevention is better than cure'. Health education for behavioural change remains the key for sustained control of transmission of COVID-19 as well as other communicable diseases. Wilder-Smith A and Freedman DO compared the COVID-19 pandemic with SARS pandemic and suggested potential impact of old-school public health tools for COVID-19 control [4].

Authentic knowledge and sustained adherence to preventive and control practices will help curb the spread of the pandemic. Iboi E et al., through a mathematical simulation model, showed the prospect of an effective public health education program in reducing both the cumulative and daily mortality of the novel coronavirus [5].

The Knowledge, Attitude and Practices (KAP) regarding COVID-19 will determine the willingness of a society to adopt certain behavioural changes necessary to curb the pandemic spread. The KAP studies provide baseline information to identify the gaps, misconceptions, malpractices [6]. This data can be utilised for proper mitigation of the current pandemic and future outbreaks [7]. Social media or informal groups may spread some inappropriate messages which have a low educational value. Hence, there is need to reach out to population which has lesser access to authentic scientific information, assess their knowledge and provide authentic scientific information.

This study aimed to assess the KAP of urban slum dwellers of Nashik city in Maharashtra about COVID-19 to determine some factors affecting the Knowledge, Attitude and Practices (KAP) of COVID-19 and to study the impact of health education on the same.

MATERIALS AND METHODS

The present study was quasi-experimental study in which a brief health educational video was used as an intervention. The study was conducted on slum dwellers from July 2021 to August 2021. Three slums (Sant Kabir Nagar, Anandwalli slum behind Wasan bungalow, Kamgar nagar) were selected from Nashik city, Maharashtra, India. Approval for the present study was obtained from the Institutional Ethics Committee. (Ref no. Dr.VPMCH & RC/IEC/24/2021-22). Key contact persons were identified from each of the three study slums. They helped to build rapport, circulate the questionnaire and health education material on social media.

Inclusion and Exclusion criteria: Slum dwellers those are willing to participate with age more than 18 years and irrespective of gender were included in the study. Participants those who are not willing were excluded from the study.

Sample size calculation: Sample size was calculated (minimum of 158) using 35.9 % prevalence of knowledge [3] by formula:

$$n = Z^2 p (1-p) / d^2$$

Questionnaire

A structured questionnaire consisting of socio-demographic variables and KAP questions was prepared based on previous studies [1,3,6,7] and prevalidated by subject experts. The questionnaire was translated in vernacular language and converted into a Google form. Trial run of the Google form was done among 10 key contact persons to ensure the content and construct validity. The pretest questionnaire was open for response for one week. After the intervention, the postintervention questionnaire was open for four days.

Google form had five main components:

1. Study purpose, voluntary participation, anonymity and confidentiality and consent.
2. Socio-demographic information- Age, gender, education, occupation, income, total family members, number of family members >60 years and <15 years of age, number of family members with co-morbidities, history of COVID-19 infection in the family.
3. Knowledge questions about COVID-19- 16 items
4. Attitude questions about COVID-19- 6 items
5. Practice questions about COVID-19- 8 items

Scoring system of the KAP questionnaire: A score of 1 for correct response and a score of 0 was given for incorrect/not sure responses for each K, A and P question. Individual KAP scores were obtained for each participant. A knowledge score of more than 9, attitude score more than 3, practice score more than 4, was considered satisfactory. Association of various socio-demographic variables to the KAP scores was analysed.

Intervention: A video regarding appropriate use of mask, social distancing and steps of hand washing, common presenting symptoms, timely healthcare seeking, isolation, etc., was shared with the participants as well as other families in the slum through snowball sampling.

Postintervention: The knowledge questions of the questionnaire were shared with the study participants through a new Google form within one week of the health education.

STATISTICAL ANALYSIS

Data gathered through the Google forms was exported to MS Excel sheet and analysed. Quantitative data like mean KAP scores were presented as mean±SD and qualitative data in proportions (%) as appropriate. The Chi-square test used to study the association of socio-demographic factors affecting KAP. Kolmogorov-Smirnov Goodness of Fit Test was used to test the normality of the data. Wilcoxon signed-rank test was used to compare pre and postintervention knowledge scores and to analyse the impact of the health education intervention.

Data was analysed using MS Excel worksheet and Statistical Package for the Social Sciences (SPSS) version 21.0. The p-value <0.05 was considered statistically significant.

RESULTS

In the present study, 227 participants responded to the preintervention Google form for KAP of COVID-19. Out of these, 164 (72.25%) responded to the postintervention COVID-19 knowledge questionnaire. Hence, data from these 164 participants was used in the final analysis. The key contact persons from each slum helped the participants to fill the Google form.

Socio-demographic characteristics of study participants: In the present study, majority of the study participants (95.12%) belonged to 18 to 45 years' age group [Table/Fig-1a]. Around 36.59% families had one or more members from >60-year-old age group and 50% families had at least one child less than 15 years of age. Most common source of information of COVID-19 among the study participants was social media and internet (39.02%) followed by television (32.32%). Around 45 (27.44%) had history of COVID infection in the family, of which 29 (64.44%) were home quarantined and 16 (35.56%) needed hospitalisation [Table/Fig-1b].

Socio-demographic variable	n (%)
Age (years)	
18-30	86, 52.44%
31-45	70, 42.68%
46-60	8, 4.88%
Gender	
Male	90, 54.88%
Female	74, 45.12%
Education	
Illiterate	0
Primary school	20, 12.20%
Secondary school	52, 31.71%
Higher secondary school	63, 38.41%
Graduate and above	29, 17.68%
Occupation	
Industry/Company worker	57, 34.76%
Manual/Farm labourers	42, 25.61%
Housemaid	38, 23.17%
Housewife	17, 10.37%
Student	7, 4.27%
Self-employed	3, 1.83%
Per capita income per month (INR)	
1000-5000	73, 44.51%
6000-10000	58, 35.37%
11000-15000	21, 12.80%
>15000	12, 7.32%
Total	164

[Table/Fig-1a]: Socio-demographic variables of study participants.

[Table/Fig-2a-c] shows the responses to individual KAP of COVID-19 questions by the study participants.

Knowledge: Most of the participants gave correct responses to knowledge questions like mode of transmission, isolation period, timely treatment, high risk population, touching face or outer aspect of mask, etc. A knowledge gap was found in case of few areas like symptomatology, social distancing, re-infection possibility, preventive practices in children. About 20.12% participants mentioned abdominal pain, nausea, vomiting or skin rash as common symptoms of COVID-19; around 25% participants chose fever and cough as uncommon symptoms. A 32.32% responded that all COVID-19 infections lead to severe disease [Table/Fig-2a].

Variable	n (%)
Number of members in the family	
1 to 4	94, 57.32%
5 to 8	61, 37.20%
>8	9, 5.49%
Number of members >60-year-old in the family	
0	104, 63.41%
1	46, 28.05%
2	14, 8.54%
Number of members <15-year-old in the family	
0	82, 50.00%
1	43, 26.22%
2	29, 17.68%
>2	10, 6.10%
Most common source of COVID-19 related information	
Social media/Internet	64, 39.02%
Television	53, 32.32%
Newspaper	25, 15.24%
Friends and family members	12, 7.32%
Family doctor	10, 6.10%
History of COVID-19 infection in the family	
Yes	45, 27.44%
No	119, 72.56%
If yes, was the patient (n=45)	
Home quarantined	29, 64.44%
Hospitalised	16, 35.56%

[Table/Fig-1b]: Family composition and COVID-19 history of study participants.

Sr. No.	Knowledge questions	Correct response	Incorrect response
		n, %	n, %
K1	Mode of transmission	150, 91.46%	14, 8.54%
K2	Most common symptoms	131, 79.88%	33, 20.12%
K3	Uncommon symptoms	122, 74.39%	42, 25.61%
K4	Isolation period	135, 82.32%	29, 17.68%
K5	Social distancing	105, 64.02%	59, 35.98%
K6	Breathlessness indicates severe disease	152, 92.68%	12, 7.32%
K7	No 100% effective treatment	110, 67.07%	54, 32.93%
K8	Timely treatment can cure COVID-19	151, 92.07%	13, 7.93%
K9	All COVID-19 infections lead to severe disease	111, 67.68%	53, 32.32%
K10	High risk population	139, 84.76%	25, 15.24%
K11	Children and youth need not follow COVID-19 appropriate behaviour	122, 74.39%	42, 25.61%
K12	Re-infection of COVID-19 is possible	130, 79.27%	34, 20.73%
K13	COVID-19 infection is possible after vaccination	117, 71.34%	47, 28.66%
K14	No need of COVID-appropriate behaviour after vaccination	141, 85.98%	23, 14.02%
K15	Should we touch our face, nose, mouth, eyes?	160, 97.56%	4, 2.44%
K16	Should we touch outer aspect of mask?	143, 87.20%	21, 12.80%

[Table/Fig-2a]: Knowledge of COVID-19 among the study participants.

Attitude: Most of the study participants showed positive attitude about COVID-19 prevention; except that around 19.51% participants said no or not sure that wide vaccination coverage help control the spread of the pandemic and 18.29% didn't express

willingness to get tested if symptoms or contact with COVID-19 case [Table/Fig-2b].

Sr. No.	Attitude questions	Correct response	Incorrect response
		n, %	n, %
A1	If symptoms, I will isolate myself?	140, 85.37%	24, 14.63%
A2	Willingness to get tested if symptoms or contact?	134, 81.71%	30, 18.29%
A3	Which diagnostic test would be most appropriate/ preferred?	156, 95.12%	8, 4.88%
A4	Would you advise others about COVID-19 appropriate behaviour?	151, 92.07%	13, 7.93%
A5	Would you advise others to take vaccine?	154, 93.90%	10, 6.10%
A6	Would wide vaccination coverage help control the spread of the pandemic?	132, 80.49%	32, 19.51%

[Table/Fig-2b]: Attitude regarding COVID-19 among the study participants.

Practices: One of the most important practices for COVID-19 prevention, i.e., vaccine was taken by 160 (97.56%) participants. Out of these, 83 had completed 1st dose while 77 had taken both doses of vaccine. Many of the study participants agreed that they were involved in incorrect practices regarding COVID-19 [Table/Fig-2c].

Sr. No.	Practice questions	Correct response	Incorrect response
		n, %	n, %
P1	In the past three months have you attended a social gathering?	137, 83.54%	27, 16.46%
P2	Travelled by public transport	57, 34.76%	107, 65.24%
P3	Visited a market place/mall/theatre or any other crowded place	90, 54.88%	74, 45.12%
P4	Do you maintain social distancing at workplace	128, 78.05%	36, 21.95%
P5	Do you wash your hands frequently	102, 62.20%	62, 37.80%
P6	Do you take bath after coming home from work? Or outside?	64, 39.02%	100, 60.98%
P7	Do you wear mask every time you step out from home?	158, 96.34%	6, 3.66%
P8	Have you taken COVID-19 vaccine?	160, 97.56%	4, 2.44%

[Table/Fig-2c]: Practices regarding COVID-19 among the study participants.

[Table/Fig-3] shows the association of socio-demographic factors that could influence KAP of COVID-19. There was no association between-factors like age, gender, education, income, source of information or history of COVID-19 in the family and KAP of COVID-19.

[Table/Fig-4] shows the score categories and average scores of the participants on the KAP questionnaire. A 72.56%, 82.32% and 51.83% participants showed satisfactory level of knowledge, positive attitude and correct practices.

Impact of health education intervention on knowledge: The KAP score data was tested for normality using the Kolmogorov-Smirnov Goodness of Fit Test. It was found that the data was not normally distributed (Test statistic=0.3392, p-value >0.05). Hence, Wilcoxon signed-rank test was used to compare the pre and postintervention knowledge score of the participants. There was a statistically significant difference between the preintervention knowledge score (10.82±2.39) and postintervention knowledge score (12.91±1.79) {W=51, z=10.6367, p-value <0.00001}[Table/Fig-4].

DISCUSSION

KAP scores: In the present study, the overall correct rate of KAP was found to be 72.56%, 82.32% and 51.83% participants respectively.

Azlan AA et al., conducted a KAP study on COVID-19 among 4850 participants in Malaysia and found overall correct rate of the knowledge 80.5% [6]. Most participants showed positive attitude

Variable	Categories	Knowledge score			Attitude score			Practice score			
		0 to 8 (n=45)	9 to 16 (n=119)	Statistical significance	0 to 3 (n=29)	4 to 6 (n=135)	Statistical significance	0 to 4 (n=79)	5 to 8 (n=85)	Statistical significance	Total
Age	18-30	28	58	$\chi^2=3.24$, df=2, p-value=0.197, NS	19	67	$\chi^2=3.32$, df=2, p-value=0.189, NS	46	40	$\chi^2=3.50$, df=2, p-value=0.173, NS	86
	31-45	14	56		8	62		28	42		70
	46-60	3	5		2	6		5	3		8
Gender	Male	24	66	$\chi^2=0.059$, df=1, p-value=0.807, NS	13	77	$\chi^2=1.44$, df=1, p-value=0.23, NS	48	42	$\chi^2=2.13$, df=1, p-value=0.14, NS	90
	Female	21	53		16	58		31	43		74
Per capita income (INR)	1000-5000	19	54	$\chi^2=1.97$, df=3, p-value=0.57, NS	10	63	$\chi^2=1.84$, df=3, p-value=0.60, NS	36	37	$\chi^2=1.84$, df=3, p-value=0.60, NS	73
	6000-10000	16	42		11	47		23	35		58
	11000-15000	8	13		5	16		13	8		21
	>15000	2	10		3	9		7	5		12
Source of COVID-19 information	Television and newspapers	20	58	$\chi^2=6.1758$, df=3, p-value=0.10, NS	14	64	$\chi^2=0.4679$, df=3, p-value=0.93, NS	37	41	$\chi^2=1.3833$, df=3, p-value=0.70, NS	78
	Social media	15	49		12	52		33	31		64
	Friends and family members	4	8		2	10		4	8		12
	Family doctor	6	4		1	9		5	5		10
History of COVID-19 infection in the family	Yes	12	33	χ^2 with Yate's correction=1.247, df=1, p-value=0.264, NS	10	35	χ^2 with Yate's correction=0.5007, df=1, p-value=0.479, NS	18	27	χ^2 with Yate's correction=1.238, df=1, p-value=0.266, NS	45
	No	33	86		19	100		61	58		119

[Table/Fig-3]: Association between socio-demographic variables and KAP of COVID-19.

NS: Non significant; df: Differential function; COVID-19: Coronavirus disease 2019; p-value <0.05 was considered statistically significant

Score	n, %
Knowledge score (Preintervention)	
0 to 8	45, 27.44%
9 to 16	119, 72.56%
Preintervention Knowledge score- Mean±SD	10.82±2.39
Knowledge score (Postintervention)*	
0 to 8	2, 1.22%
9 to 16	162, 98.78%
Postintervention Knowledge score- Mean±SD	12.91±1.79
Attitudes score	
0 to 3	29, 17.68%
4 to 6	135, 82.32%
Attitudes score Mean±SD	4.53±0.71
Practice score	
0 to 4	79, 48.17%
5 to 8	85, 51.83%
Practice score Mean±SD	4.94±0.73

[Table/Fig-4]: KAP scoring of study participants.

*Wilcoxon Signed-Rank Test z=10.6367, p<0.00001 was considered statistically significant

and appropriate practices such as avoiding crowds (83.4%) and practising proper hand hygiene (87.8%). However, the wearing of face masks was less common (51.2%) as compared to present study Ngwewondo A et al., from Cameroon found satisfactory KAP scores among 84.19%, 69% and 60.8%, respectively [1].

In spite of good knowledge and attitudes, both studies showed lower levels of correct practices. This emphasises the need of sustained motivation through health education for behavioural change. Incorrect practices like visiting crowded markets, travelling by public transport, etc., in the present study can be attributed to the lower socio-economic class of the participants. Also, many of them could not maintain social distancing at workplace due to the nature of industrial work.

Zhong BL et al., conducted a KAP survey among 6910 Chinese residents and found overall correct rate of the knowledge questionnaire was 90% [8]. Around 97.1% had positive attitude and confidence that China can win the battle against COVID-19. A 98% participants wore masks when going out.

The mean KAP scores of present study participants were 10.82±2.39 (out of 16), 4.53±0.71 (out of six) and 4.94±0.73 (out of eight), respectively. Moradzadeh R et al., in their study of 544 participants in Central Iran found that from the maximum attainable KAP scores of 1, 6, and 6, COVID-19-related mean KAP scores were 0.77 (0.13), 4.97 (0.63), and 5.35 (0.70), respectively [9].

Factors affecting KAP of COVID-19: In the present study, no association was found between the KAP of COVID-19 and the socio-demographic characteristics (age, gender, education, income, source of COVID-19 information, history of COVID-19 in the family) of study population. This underlines that inappropriate COVID-19 practices are prevalent; irrespective of educational or socio-economic status. Azlan AA et al., found higher knowledge scores were obtained among female participants, above 50 age group, people in the higher income category [6]. Moradzadeh R et al., in their study in Central Iran, also found a higher practice score among females than males [9].

In a study by Rahman A and Sathi NJ among 441 Bangladesh citizens, respondents of age 30 years and above showed more positive attitude compared to respondent of age 18-29 [10]. Ngwewondo A et al., in their study, found that, age >20 years was associated with a high knowledge of COVID-19 and females had lower practice scores compared to men (OR=0.72; 95% CI 0.56-0.92) [1]. Al-Hanawi MK et al., surveyed 3388 Saudi Arabia citizens and found that men have less scores in KAP of COVID than women [11]. Also, older adults showed better knowledge and practices, than younger people. A study by Srichan P et al., among 520 participants from Thailand found that women, higher education and younger age (<60 years), were associated with better KAP of COVID-19 [12]. Kaim A et al., found higher knowledge scores in higher income category [7]. There was no association of age or education with KAP of COVID-19. A relatively small sample size in the present study may be one of the reasons for non association of factors that could affect KAP of COVID-19.

Impact of health education: The present study found a significant impact on the knowledge level of participants after the health educational video. The prevalence of satisfactory knowledge level increased from 72.56% to 98.78% (p<0.00001). Kaim A et al., studied the impact of brief health education video tutorial on the knowledge, resilience and perceived safety and they also found significant

increase in KAP after the educational intervention [7]. A mathematical simulated model by Iboi E et al., in the US depicted the potential impact of effective public health education in reducing cumulative and daily COVID-19 mortality [5]. Continuously on-going health education and thereby bringing behavioural changes in appropriate direction will be a key to control the COVID-19 pandemic.

Limitation(s)

Due to logistic and time constraints, sample size of the present study was limited. Also, the response rate for the postintervention questionnaire was around 72%.

CONCLUSION(S)

The present study found satisfactory level of knowledge and positive attitude about COVID-19 among the slum dwellers. However, the prevalence of COVID-19 appropriate practices was not found satisfactory. No influence of age, gender, education, income or source of information was seen on the KAP of COVID-19. The health education video and posters had significant impact on the knowledge of study participants. This signifies the need of health education for behavioural change to curb the pandemic. With an unpredictable further course of the pandemic, reinforcement of awareness activities is necessary for sustained motivation for coronavirus disease-appropriate behaviour.

Acknowledgement

Authors sincerely acknowledge the key contact persons from each slum population for mediating between the investigators and participants. Authors sincerely thank all the study participants for the time and efforts taken to participate in the study.

REFERENCES

- [1] Ngwewondo A, Nkengazong L, Ambe LA, Ebogo JT, Mba FM, Goni HO, et al. Knowledge, attitudes, practices of/towards COVID 19 preventive measures and symptoms: A cross sectional study during the exponential rise of the outbreak in Cameroon. *PLoS Negl Trop Dis*. 2020;14(9):e0008700. <https://doi.org/10.1371/journal.pntd.0008700>.
- [2] Corburn J, Vlahov D, Mberu B, Riley L, Caiaffa WT, Rashid SF, et al. Slum health: Arresting COVID-19 and improving well-being in urban informal settlements. *J Urban Health*. 2020;97(3):348-57. <https://doi.org/10.1007/s11524-020-00438-6>.
- [3] Islam S, Emran GI, Rahman E, Banik R, Sikder T, Smith L, et al. Knowledge, attitudes and practices associated with the COVID-19 among slum dwellers resided in Dhaka City: A Bangladeshi interview-based survey. *J Public Health (Oxf)*. 2021;43(1):13-25. Doi: 10.1093/pubmed/fdaa182. PMID: 33057666; PMCID: PMC7665690.
- [4] Wilder-Smith A, Freedman DO. Isolation, quarantine, social distancing and community containment: Pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak. *Journal of Travel Medicine*. 2020;27(2):taaa020. Doi: 10.1093/jtm/taaa020.
- [5] Iboi E, Richardson A, Ruffin R, Ingram D, Clark J, Hawkins J, et al. Impact of public health education program on the novel coronavirus outbreak in the United States. *Front Public Health*. 2021;9:630974. Doi: 10.3389/fpubh.2021.630974.
- [6] Azlan AA, Hamzah MR, Sern TJ, Ayub SH, Mohamad E. Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. *PLoS ONE*. 2020;15(5):e0233668. <https://doi.org/10.1371/journal.pone.0233668>.
- [7] Kaim A, Jae E, Siman-Tov M, Khairish E, Adini B. Impact of a brief educational intervention on knowledge, perceived knowledge, perceived safety, and resilience of the public during COVID-19 Crisis. *Int J Environ Res Public Health*. 2020;17(16):5971. Doi: 10.3390/ijerph17165971.
- [8] Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, et al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: A quick online cross-sectional survey. *Int J Biol Sci*. 2020;16(10):1745-52. Doi: 10.7150/ijbs.45221. PMID: 32226294; PMCID: PMC7098034.
- [9] Moradzadeh R, Nazari J, Shamsi Mand Amini S. Knowledge, attitudes, and practices toward Coronavirus Disease 2019 in the Central Area of Iran: A population-based study. *Front Public Health*. 2020;8:599007. Doi: 10.3389/fpubh.2020.599007.
- [10] Rahman A, Sathi NJ. Knowledge, Attitude, and Preventive Practices toward COVID-19 among Bangladeshi Internet Users. *Electron J Gen Med*. 2020;17(5):em245. <https://doi.org/10.29333/ejgm/8223>.
- [11] Al-Hanawi MK, Angawi K, Alshareef N, Qattan AMN, Helmy HZ, Abudawood Y, et al. Knowledge, attitude and practice toward COVID-19 among the public in the kingdom of Saudi Arabia: A cross-sectional study. *Front. Public Health*. 2020;8:217. Doi: 10.3389/fpubh.2020.00217.
- [12] Srichan P, Apidechkul T, Tamornpark R, Yeemard F, Khunthason S, Kitchanapaiboon S, et al. Knowledge, attitudes and preparedness to respond to COVID-19 among the border population of northern Thailand in the early period of the pandemic: A cross-sectional study. *WHO South-East Asia J Public Health*. 2020;9(2):118-25. Doi: 10.4103/2224-3151.294305.

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Community Medicine, Dr. Vasanttrao Pawar Medical College, Hospital and Research Centre, Nashik, Maharashtra, India.
2. Student, Fravashi International Academy, Nashik, Maharashtra, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Supriya Dhakne Palwe,
Associate Professor, Department of Community Medicine, Dr. Vasanttrao Pawar
Medical College, Hospital and Research Centre, Nashik-422003, Maharashtra, India.
E-mail: drsupriyadhakne@gmail.com

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Sep 14, 2021
- Manual Googling: Oct 12, 2021
- iThenticate Software: Oct 14, 2021 (6%)

ETYMOLOGY: Author Origin

Date of Submission: **Sep 13, 2021**
Date of Peer Review: **Oct 07, 2021**
Date of Acceptance: **Oct 15, 2021**
Date of Publishing: **Nov 01, 2021**