

Understanding COVID-19: Awareness, Risk Perception, and Protective Behaviors among Undergraduate Students in Delhi-NCR

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Abstract

Preventive measures play a crucial role in controlling the spread of the disease by reducing the infection rate. The effectiveness of these measures depends on individuals' attitudes, knowledge, and practices regarding the disease. The study aimed to assess the perceived risk, awareness, and protective behavior toward COVID-19 among undergraduate students in Delhi and the National Capital Region (NCR), India. A random online survey was conducted among 600 undergraduate students to analyze the demographic characteristics, awareness levels, perceived risks, and protective behaviors related to COVID-19. The results indicated high overall awareness, perceived risk, and protective behavior among undergraduate students ($P = 0.000$, 0.000 , and 0.000 , respectively). However, when analyzed based on gender, area of residence, and field of study, there was no statistically significant difference in overall awareness among the participants ($P > 0.05$). In contrast, female students, urban residents, and science students showed a higher perception of the risk of COVID-19 compared to male students, rural residents, and non-science students ($P = 0.016$, 0.035 , and 0.036 , respectively). Additionally, urban students showed significantly higher protective behavior than rural students ($P = 0.048$), while no statistically significant differences were found in protective behavior between male and female students or between science and non-science students ($P = 0.189$ and 0.100 , respectively). The findings contribute to ongoing regional and global efforts to enhance crisis response strategies for COVID-19. This study highlights the importance of periodic educational webinars for undergraduate students to further strengthen awareness and promote preventive measures.

Keywords: Awareness, Pandemic, COVID-19, Protective behavior, Perceived risk, Students

Introduction

The global COVID-19 pandemic is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1, 2]. First identified in December 2019 in Wuhan, China, the World Health Organization (WHO) officially declared it a pandemic on March 11, 2020 [3, 4]. COVID-

19 has affected millions worldwide, primarily causing mild to moderate infections [5]. Common symptoms include high fever, fatigue, shortness of breath, sore throat, dry cough, and loss of smell. In severe cases, complications such as viral pneumonia and multi-organ failure may occur [6].

COVID-19 is a contagious disease that spreads through respiratory droplets from infected individuals and via contact with contaminated surfaces [7, 8]. Symptoms typically appear within 5–6 days of exposure and can last anywhere from 2 to 14 days [9]. Depending on the severity of the infection, some patients require hospitalization. Those who recover often experience post-traumatic stress disorder (PTSD) and a prolonged

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recovery period [10]. The primary diagnostic method for detecting the virus is the reverse transcription-polymerase chain reaction (rRT-PCR) test using a nasopharyngeal swab, along with chest X-rays for pneumonia assessment [11-13].

Beyond its direct health impact, the pandemic has also worsened the condition of individuals with pre-existing non-communicable diseases, further deteriorating their quality of life [14]. Preventive measures such as self-isolation, social distancing, mask-wearing, and vaccination have been crucial in controlling the spread of the virus. Studies suggest that maintaining a two-foot interpersonal distance while wearing masks significantly reduces transmission, especially in densely populated areas [15].

The healthcare system also faced unprecedented challenges, with many doctors and healthcare workers losing their lives due to continuous work under extreme conditions. The overwhelming patient load exposed weaknesses in the healthcare infrastructure, highlighting its inability to cope with such crises effectively [16]. Additionally, COVID-19 had a significant impact on mental health, particularly among the elderly, who experienced heightened levels of anxiety and depression [17].

As of July 12, 2020, the Ministry of Health and Family Welfare (MoHFW) reported 292,258 active cases, 534,620 recoveries, and 22,674 deaths in India. Maharashtra, Tamil Nadu, and Delhi accounted for nearly half of all active cases in the country [18]. In response, the Indian government imposed a 24-hour "Janata Curfew" followed by a 21-day nationwide lockdown starting on March 24, 2020 [19]. To enhance public awareness and monitor infections, digital tools such as the Aarogya Setu mobile application were introduced [20].

The effectiveness of COVID-19 control measures largely depends on individuals' adherence, which is influenced by their awareness, risk perception, and protective behaviors [21]. In this context, this pilot study aims to assess the level of perceived risk, awareness, and protective behavior among undergraduate students in India during the pandemic.

Materials and Methods

Study participants

This study utilized a random online survey targeting undergraduate students between 18 and 21 years old, starting from June 20, 2020. A structured questionnaire was distributed across various educational institutions, and 605 students responded within the designated period. The participants were from both science and non-science backgrounds and resided in either rural or urban regions of Delhi and NCR. The survey had a higher number of female participants compared to males.

Data collection

Given the high transmission risk of COVID-19, data was collected through Google Forms. The survey link was randomly shared with students via WhatsApp groups and email. The questionnaire included multiple-choice questions assessing:

1. Level of awareness
2. Perceived risk
3. Protective behaviors

Additionally, demographic details such as age, gender, residential area (urban or rural), education level, and academic field were gathered.

Statistical analysis

Data analysis was conducted using SPSS software (version 26.0; SPSS Inc., Chicago, IL, USA). A box plot analysis was used to evaluate demographic distributions. An independent t-test was applied to measure overall awareness, perceived risk, and protective behavior. The chi-square test was performed to examine whether demographic factors (gender, residential area, and academic field) influenced these variables.

The analysis followed two approaches:

- General evaluation, comparing overall awareness, perceived risk, and protective behavior across demographic groups.
- Question-specific assessment, analyzing individual responses within each category.

Significance levels were categorized as follows:

- $P < 0.01$ (highly significant)
- $P < 0.05$ (moderately significant)
- $P < 0.1$ (marginally significant)

Results and Discussion

Demographic characteristics of participants

A total of 605 undergraduate students participated in the survey. The study considered three key demographic factors: gender, area of residence, and academic field.

Among the respondents, 67 students (11.1%) were male, while 538 students (88.9%) were female. In terms of residence, 240 participants (39.7%) were from rural areas, whereas 365 participants (60.3%) lived in urban regions. Regarding academic disciplines, 460 students (76.0%) were enrolled in science-related courses, while 145 students (23.9%) were pursuing non-science subjects at the undergraduate level.

Data distribution analysis

To ensure a balanced distribution of participants across demographic factors such as gender, area of residence, and field of study, a box plot analysis was performed. The results demonstrated that the median values for different demographic categories—male and female, urban and rural, and science and non-science students—were approximately similar. The data was evenly distributed, with only a few outliers observed at the minimum and maximum score values among participants. This suggests that the sample provided a fairly representative overview of undergraduate students from different backgrounds (Figure 1).

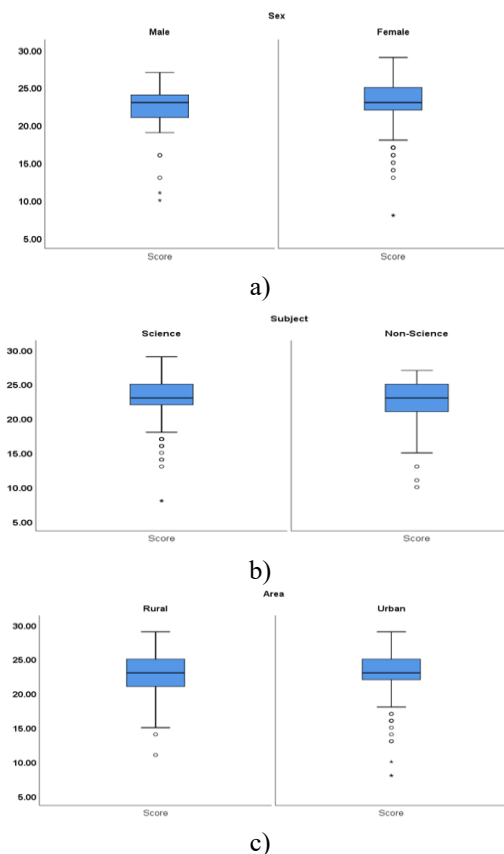


Figure 1. Box plot analysis for even distribution of data

Overall awareness, perceived risk, and protective behavior for COVID-19 among north indian undergraduate students

The findings of the study revealed a high level of awareness, perceived risk, and protective behavior regarding COVID-19 among undergraduate students. The participants demonstrated 72.7% awareness, 73.9% perceived risk, and 82.1% adherence to protective behaviors. Statistical analysis confirmed that these three variables were significantly high among students, with P-values of 0.000 for awareness, perceived risk, and protective behavior (Figure 2). These results indicate that the student population had substantial knowledge about COVID-19, recognized its risks, and actively engaged in preventive measures to mitigate the spread of the virus.

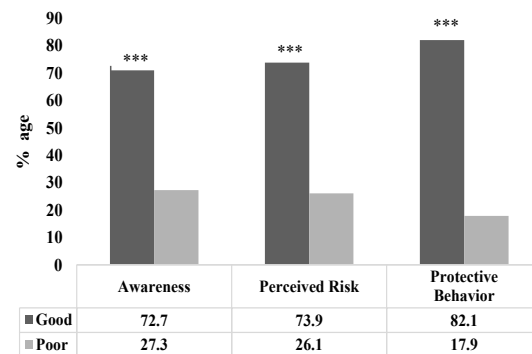


Figure 2. COVID-19-related overall awareness, perceived risk, and protective behavior; *** represents the level of significance at $P < 0.01$ value.

Analysis of awareness, perceived risk, and protective behavior based on gender and area of residence

An analysis was conducted to compare awareness, perceived risk, and protective behavior toward COVID-19 among male and female participants from rural and urban areas. The results showed that female participants from urban areas exhibited statistically significant differences in these areas compared to their rural counterparts. Specifically, urban females showed more significant differences in awareness ($P = 0.044$), perceived risk ($P = 0.048$), and protective behavior ($P = 0.045$). In contrast, no significant differences were found among male participants from rural and urban areas across these variables, with P-values of 0.285 for awareness, 0.426 for perceived risk, and 0.807 for protective behavior.

COVID-19 awareness analysis based on gender, area of residence, and academic discipline

The awareness levels of the 605 participants were also analyzed across different variables, including gender, area of residence, and academic discipline. The analysis revealed that there were no statistically significant

differences in overall awareness between male and female students, urban and rural students, or between science and non-science students ($P > 0.5$). This suggests that, regardless of gender, residential area, or field of study, students exhibited similar levels of awareness regarding COVID-19 (**Table 1**).

Table 1. Awareness about COVID-19 in North Indian undergraduate students.

Q. No	COVID variables	Awareness status	Male n (%)	Female n (%)	P-value	Rural n (%)	Urban n (%)	P-value	Science n (%)	Nonscience n (%)	P-value
1	Coronavirus	Good	4.5	50.4	0.011**	19.0	35.9	0.005***	43.3	11.6	0.067
		Poor	6.6	38.5		20.6	24.5		32.7	12.4	
2	Coronavirus genome	Good	6.1	58.3	0.094	26.8	37.7	0.206	52.2	12.3	0.000*
		Poor	5.0	30.6		12.9	22.6		23.8	11.7	
4	The causative organism of COVID-19	Good	10.4	86.4	0.159	38.5	58.3	0.798	73.7	23.2	0.807
		Poor	0.7	2.5		1.2	2.0		2.3	0.8	
7	Maximum COVID casualties	Good	8.4	64.8	0.570	29.8	43.5	0.424	54.9	18.3	0.299
		Poor	2.6	24.2		9.8	16.9		21.2	5.6	
8	Declaration of COVID-19 pandemic	Good	10.6	85.1	0.939	36.9	58.8	0.006***	72.9	22.8	0.71
		Poor	0.5	3.8		2.8	1.5		3.1	1.2	
9	COVID-19 cure	Good	7.9	71.9	0.076	31.4	48.4	0.740	62.0	17.9	0.065
		Poor	3.1	17.1		8.3	11.9		14.0	6.1	
10	COVID-19 tests	Good	7.6	35.9	0.000***	17.5	26.0	0.780	30.7	12.7	0.007*
		Poor	3.5	53.0		22.1	34.4		45.3	11.3	
11	Number of lockdowns in India	Good	6.0	43.0	0.287	19.0	30.1	0.639	36.5	12.6	0.359
		Poor	5.0	46.0		20.7	30.2		39.5	11.4	
12	PPE kit	Good	8.6	70.4	0.766	30.1	48.9	0.120	58.0	21.0	0.004*
		Poor	2.5	18.5		9.6	11.4		18.0	3.0	
13	Highly infected Indian state	Good	10.2	80.1	0.503	35.1	55.2	0.198	68.1	22.2	0.313
		Poor	0.8	8.9		4.6	5.10		7.9	1.8	
	Total awareness	Good	8.0	64.6	0.996	28.4	44.3	0.121	55.3	17.4	0.937
		Poor	3.1	24.3		11.3	16.0		20.8	6.5	

*, **, *** represents level of significance at $P < 0.01$, $P < 0.05$, $P < 0.1$ value, respectively.

Knowledge of COVID-19 based on gender, area, and academic discipline

The study revealed statistically significant differences in the knowledge of COVID-19 among different demographic groups. Female participants exhibited a higher level of understanding of the virus and its testing methods, with significant differences observed between genders ($P = 0.011$ for knowledge of the virus, $P = 0.000$ for testing methods). Similarly, students from urban areas had more knowledge about the coronavirus and the organizations responsible for monitoring its spread

compared to their rural counterparts ($P = 0.005$ for virus knowledge, $P = 0.006$ for monitoring organizations). Additionally, science students demonstrated more detailed scientific knowledge, particularly regarding the genome of the coronavirus, PPE kits, and COVID-19 testing, compared to non-science students ($P = 0.000$ for the genome, $P = 0.007$ for PPE kits, $P = 0.004$ for tests).

Perceived risk of COVID-19 based on gender, area, and subject discipline

An analysis of participants' perceived risk of COVID-19 revealed significant differences between gender, area of

residence, and academic discipline. Female students were found to have a significantly higher perception of the risk of COVID-19, especially regarding prevention measures, the role of respiratory droplets, and the availability of an effective cure ($P = 0.000$ for prevention, $P = 0.019$ for droplets, and $P = 0.000$ for cure). In terms of academic discipline, science students demonstrated a greater understanding of the risks associated with the prevention of the virus, the role of respiratory droplets, and the effective cure compared to non-science students ($P =$

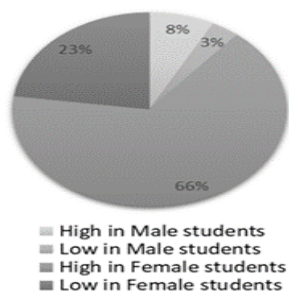
0.021 for prevention, $P = 0.013$ for droplets, and $P = 0.003$ for cure). Moreover, urban participants showed a greater understanding of the role wild animals play in COVID-19 transmission compared to rural participants ($P = 0.023$). In conclusion, females, urban residents, and science students were more attuned to the risks associated with COVID-19, demonstrating more accurate perceptions than their male, rural, and non-science counterparts (**Figure 3, Table 2**).

Table 2. Perceived risk of COVID-19 in North Indian undergraduate students.

Q. No	COVID variables	Perceived risk	Male n (%)	Female n (%)	P-value	Rural (%)	Urban (%)	P-value	Science (%)	Non-Science (%)	P-value
3	Origin site for COVID	High	4.1	42.5	0.106	18.2	28.4	0.756	35.5	11.1	0.911
		Low	6.9	46.5		21.5	31.9		40.5	12.9	
5	Prevention of COVID spread	High	10.1	87.6	0.000***	38.7	59.0	0.805	74.9	22.8	0.021**
		Low	1.0	1.3		1.0	1.3		1.2	1.1	
13	Indian state with the highest incidence	High	10.2	80.1	0.503	35.1	55.2	0.198	68.1	22.2	0.313
		Low	0.8	8.9		4.6	5.1		7.9	1.8	
1	Clinical symptoms of COVID-19	High	9.8	81.8	0.273	35.7	55.9	0.260	70.0	21.5	0.341
		Low	1.3	7.1		4.0	4.4		6.0	2.5	
19	Age and risk of COVID-19 infection	High	6.8	56.7	0.681	23.5	40.0	0.075	49.1	14.4	0.319
		Low	4.3	32.2		16.2	20.3		26.9	9.6	
20	Role of respiratory droplets in COVID	High	8.8	79.2	0.019**	34.9	53.1	0.992	68.2	19.7	0.013**
		Low	2.2	9.8		4.8	7.2		7.8	4.3	
2	COVID-19 symptoms	High	5.1	43.1	0.729	19.2	29.1	0.978	37.9	10.4	0.183
		Low	6.0	45.8		20.5	31.2		38.1	13.6	
25	Effective cure for COVID-19	High	8.4	82.1	0.000***	36.0	54.4	0.776	70.2	20.2	0.003***
		Low	2.6	6.9		3.6	6.0		5.8	3.8	
30	Wild animals and COVID-19 infection	High	6.3	42.3	0.158	17.0	31.6	0.023**	36.2	12.4	0.387
		Low	4.8	46.6		22.6	28.8		39.8	11.6	
	Total perceived risk	High	7.7	66.2	0.016**	28.7	45.2	0.035**	56.7	17.2	0.036**
		Low	3.3	22.8		11.0	15.1		19.3	6.8	

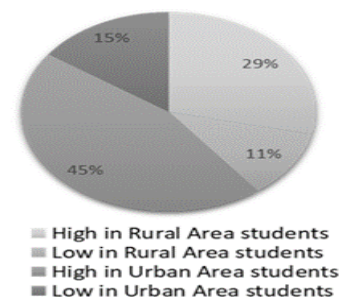
*, **, *** represents level of significance at $P < 0.01$, $P < 0.05$, and $P < 0.1$ value, respectively

Gender Based Perceived Risk



a)

Area Based Perceived Risk



b)

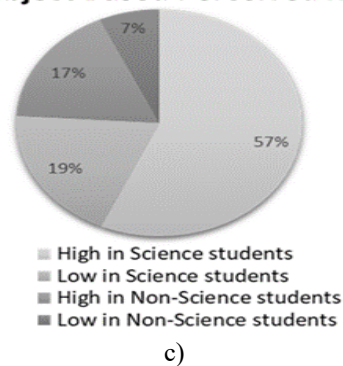
Subject Based Perceived Risk

Figure 3. Total risk perceived for COVID-19 in North Indian undergraduate students

Protective behavior towards COVID-19 by gender, location, and academic stream

The study analyzed protective behaviors toward COVID-19 across different demographics. There were no significant differences in overall protective behavior

between male and female participants or between science and non-science students ($P = 0.189$ and 0.100 , respectively). However, urban participants demonstrated higher protective behaviors compared to their rural counterparts, with this difference being statistically significant ($P = 0.048$).

When examining specific protective behaviors, males and females differed in their approach to reducing virus spread, preventive measures for children and young adults, and mask-wearing practices ($P = 0.028$, 0.032 , and 0.003 , respectively). Rural and urban participants also exhibited different behaviors in terms of using hand sanitizers and their knowledge about effective COVID-19 treatments ($P = 0.004$ and 0.026 , respectively). Furthermore, science students showed significantly more protective behavior related to mask-wearing compared to non-science students ($P = 0.000$). These results underline how gender, area of residence, and field of study influence protective behavior in response to COVID-19 (Table 3).

Table 3. Protective behavior towards COVID-19 in Indian undergraduate students.

Q. No	COVID Variables	Protective behavior	Male (%)	Female n (%)	P-value	Rural (%)	Urban (%)	P-value	Science (%)	Non-Science (%)	P-value
6	Indian government app for COVID-19	Good	10.7	86.6	0.854	38.6	58.7	0.857	74.5	22.8	0.060
		Poor	0.3	2.4		1.0	1.7		1.5	1.2	
14	Sanitizer for COVID	Good	4.3	32.9	0.772	17.5	19.7	0.004* **	28.6	8.6	0.704
		Poor	6.8	56.0		22.1	40.7		47.4	15.4	
15	Effective drugs for COVID-19 treatment	Good	3.1	24.0	0.807	12.7	14.4	0.026* *	20.8	6.3	0.780
		Poor	7.9	65.0		26.9	46.0		55.2	17.7	
16	Duration of quarantine period	Good	10.7	87.2	0.617	38.8	59.1	0.928	74.3	23.5	0.939
		Poor	0.3	1.8		0.8	1.3		1.7	0.5	
21	COVID prevention	Good	10.2	82.4	0.993	36.6	55.9	0.962	70.2	22.3	0.776
		Poor	0.8	6.6		3.0	4.5		5.8	1.7	
22	Role of crowded places in COVID spread	Good	10.7	85.0	0.574	37.9	57.9	0.779	72.7	23.0	0.913
		Poor	0.3	4.0		1.8	2.4		3.3	1.0	
23	Effective reduction of the spread of the virus	Good	9.8	84.3	0.028**	36.5	57.5	0.097	71.9	22.2	0.340
		Poor	1.3	4.6		3.2	2.8		4.1	1.8	
27	Role of self-isolation in infected person	Good	10.6	84.6	0.898	37.5	57.7	0.561	72.7	22.5	0.361
		Poor	0.5	4.3		2.2	2.6		3.3	1.5	
28	Preventive measures for children and young adults	Good	9.3	81.5	0.032**	37.1	53.7	0.075	69.2	21.5	0.604
		Poor	1.8	7.4		2.6	6.6		6.8	2.5	
29	Masks-based COVID-19 prevention	Good	9.4	84.1	0.003***	37.1	56.4	0.873	72.7	20.8	0.000* **
		Poor	1.7	4.8		2.5	4.0		3.3	3.2	
	Total Protective behavior	Good	8.9	73.2	0.189	33.1	49.0		62.8	19.4	0.100

Poor	2.2	15.7	6.6	11.3	0.048*	13.2	4.6
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*, **, *** represents level of significance at $P < 0.01$, $P < 0.05$, and $P < 0.1$ value, respectively.

COVID-19, which originated in Wuhan, Hubei Province, China, quickly spread globally at the start of 2020. In March of that year, the World Health Organization (WHO) declared it a pandemic. The virus has significantly impacted both the social and economic structure of societies worldwide. While a definitive cure for COVID-19 is still being developed, various vaccines are in different stages of testing, though there is still a long way to go before widespread distribution. In the meantime, the most effective way to control the pandemic is through public awareness and preventive measures. The way people perceive the risk of COVID-19 and their attitude towards it will largely influence the trajectory of the disease. When individuals are more knowledgeable about the virus and its associated risks, it becomes easier for a country to manage and mitigate the pandemic. Many countries are successfully controlling COVID-19 largely due to public support and proactive behavior [22].

This study focuses on assessing awareness, perceived risk, and protective behaviors among India's young population. It found that participants showed a high level of awareness of COVID-19, with 72.7% demonstrating knowledge ($P = .000$). Previous studies have also noted high awareness rates among participants regarding COVID-19 [22-24]. For example, a study in Malaysia found that 80.5% of people were knowledgeable about the pandemic [22], and similar studies in India reported awareness rates as high as 80.64% [24]. Various factors, such as gender, education, income, and location, can influence awareness levels. In this study, no statistically significant difference was found in awareness between female and male participants, urban and rural residents, or science and non-science students ($P = 0.996$, 0.121 , and 0.937 , respectively). However, other studies have linked socio-economic status with awareness, revealing significant differences. In Egypt, males and females had similar knowledge scores, but urban participants had higher knowledge than rural residents ($P < 0.001$) [23]. This aligns with findings from Zhong *et al.* [25], which showed that younger participants with higher incomes and urban residents exhibited greater awareness of COVID-19 than older, lower-income, and rural participants.

Similarly, in Malaysia, females and higher-income urban participants showed more knowledge compared to males and low-income rural participants [22]. A study conducted in India during March and April also found that male participants, those with higher income, living in urban areas, and more educated individuals had greater awareness of COVID-19 [24]. Unlike these reports, our study did not show significant differences in awareness based on these variables. This may be due to our study focusing on a younger population that is highly engaged with smartphones and media, resulting in more widespread awareness. Additionally, differences in participant age, education level, income, the types of questions asked, and scoring methods could account for the variations between studies. Despite these differences, the Indian government has been actively working to raise awareness about the virus through television advertisements, street campaigns, mobile ringtones, and text messages, ensuring widespread dissemination of crucial information.

Risk perception plays a crucial role in shaping how people behave during a pandemic. The way individuals perceive the likelihood of contracting an infection greatly influences the effectiveness of control measures. For example, in some countries where people underestimated the risk of the pandemic, lockdown measures were not followed strictly, leading to a higher rate of infections. In contrast, in countries where people had a higher perception of the risk, infection rates were lower, indicating that risk perception can significantly impact epidemic control efforts [26]. Moreover, understanding risk perception helps government agencies devise better preventive measures and encourages the public to seek treatment or vaccination. In our study, a high-risk perception was found among the young population, with 73.9% showing concern ($P = .000$). This is consistent with global trends during the COVID-19 pandemic. A continental cross-sectional study conducted across Europe, Asia, and Africa showed a high rate of risk perception for COVID-19 ($F(9, 6904) = 33.12$, $P < 0.001$, $\eta^2 = 0.041$) [27]. Similarly, 86.9% of Egyptians demonstrated a high-risk perception toward COVID-19 [20], and Vietnamese people also showed considerable concern ($t\text{-stat} = 28.94$, $P < 0.001$), which helped them in

managing the spread of the virus despite being near the pandemic's epicenter in China [28].

In our study, significant differences were found in risk perception based on gender, location, and academic discipline ($P = 0.016, 0.035$, and 0.036 , respectively). Females, urban residents, and science students had a higher risk perception compared to their male, rural, and non-science counterparts. Previous research supports the idea that females tend to have a higher risk perception than males [29, 30]. Urban residents are often more aware of risks due to better access to information, which was also reflected in our findings [31]. Similar results were observed in Uganda and Rwanda, where urban populations showed higher levels of risk perception due to greater exposure to information.

Preventive health behavior (PHB) refers to actions taken by individuals who believe they are healthy to avoid illness [32]. This behavior is crucial in determining how severely a population is impacted by a pandemic. Populations with strong preventive behaviors tend to experience less severe effects from diseases. For example, in China, wearing masks during the winter season due to high air pollution became a common practice, and this behavior was instrumental in controlling the COVID-19 pandemic. In our study, protective behavior was observed at a high level, with 82.1% of undergraduate students demonstrating good preventive actions ($P = 0.000$). Similar findings were reported among university students in the Czech Republic (Cronbach's $\alpha = 0.85$), and healthcare workers in Uganda also exhibited good protective practices, with 74% adhering to preventive measures [31]. Our study found a significant difference in protective behavior between rural and urban participants ($P = 0.048$), suggesting that urban populations may be more engaged in preventive health practices due to better access to resources and information.

The urban population exhibited better protective behavior compared to their rural counterparts. A cross-sectional study in China found that rural participants were less inclined to follow preventive measures against COVID-19, showing a negative attitude towards these measures and a lack of sufficient knowledge about the pandemic [33]. This reflects a broader trend where urban populations, with more access to information and resources, tend to adopt healthier practices. In contrast, rural populations may face challenges in accessing up-to-

date information and healthcare services, affecting their engagement in protective behaviors.

Interestingly, in our study, no statistically significant differences were found in protective behavior between male and female participants ($P = 0.189$ and 0.100 , respectively). Previous studies have suggested that females are often more conscientious about health, especially when it comes to caring for their families, leading to more proactive protective behavior compared to males [25]. However, the lack of significant difference in our study might be attributed to the fact that the participants were young undergraduate students, most of whom had access to sufficient knowledge about the pandemic. This suggests that for well-informed populations, the gender-based differences in protective behavior may not be as pronounced.

Our findings also highlight the interconnection between protective behavior, knowledge, and perceived risk, as demonstrated in previous research [25]. When individuals have good knowledge about COVID-19, perceive the risk to be high, and practice protective behaviors, it becomes easier for governments to manage the pandemic while minimizing economic disruptions. Moreover, individual actions play a crucial role in mitigating the spread of the virus and ultimately eradicating the pandemic from specific areas. The collective effort of informed and proactive individuals contributes significantly to public health outcomes during a pandemic.

Conclusion

In conclusion, our study found that undergraduate students exhibited a high level of awareness, a positive perception of COVID-19 risks, and appropriate protective behaviors. As COVID-19 continues to pose a global threat, it remains crucial to further enhance the knowledge and risk perceptions of students. More studies should be conducted to explore this further and help identify areas for improvement. The media plays a significant role in disseminating health information and travel guidelines, making it essential to align with directives from governing agencies [34].

Given these findings, health education and communication research are urgent priorities. Regular updates and guidelines from the Government of India, the Ministry of Health and Family Welfare, should continue

to emphasize the importance of preventive measures for reducing COVID-19 risk among students.

Additionally, integrating health education and disaster management, particularly focusing on pandemics, into the education system would be beneficial. Understanding the dynamics of risk perception, information gaps, and protective behaviors is crucial for developing effective policies and strategies to combat future pandemics.

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