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PPE Knowledge & Attitude among Nursing Students

Komalben Nandkishor Joshi

Department of Nursing, Shri Dayaman Institute of Nursing and Research, Jamnagar, Gujarat
Email: *komaljoshi2111996[at]gmail.com*

Abstract: ***This study assessed the knowledge and attitude of final-year nursing students toward personal protective equipment (PPE) in selected private nursing colleges in Ahmedabad, aiming to develop an informational booklet. The study was based on the Revised Health Belief Model (Rosenstock, 2003), which examines factors influencing health behavior and the likelihood of preventive action. A survey using a post-test only design was conducted with 250 nursing students selected by convenience sampling. Data were collected through a structured knowledge questionnaire and a Likert scale for attitude. Content validity was confirmed by seven experts, and reliability scores were 0.851 for knowledge and 0.902 for attitude tools using the split-half method. Results indicated that 95.6% of students had a positive attitude toward PPE. The mean scores for knowledge and attitude were 13.82 and 42.59, respectively. A strong positive correlation ($r = 0.845$, $p < 0.05$) was found between knowledge and attitude. Significant associations existed between knowledge and age, professional education, and sources of information on PPE, while gender showed no association. Attitude was significantly associated only with professional education. These findings underscore the need to improve nursing students' knowledge and attitudes to ensure effective PPE use and enhance safety practices.***

Keywords: COVID-19, MERS-CoV-Middle East Respiratory Syndrome Corona virus, Personal Protective Equipment, SARS-CoV, WHO

1. Introduction

Personal Protective Equipment (PPE) is essential in safeguarding healthcare professionals from occupational hazards and infectious diseases. It serves as a physical shield, reducing the risk of exposure to pathogens through contact with blood, bodily fluids, and other infectious materials. PPE includes items such as gloves, goggles, masks, gowns, shoe covers, and hair covers. Consistent and correct usage of PPE is vital for all healthcare providers, including support and laboratory staff, especially during patient care activities involving potential contamination.

The emergence of infectious diseases such as SARS, and the resurgence of tuberculosis and plague, have underscored the necessity for robust infection prevention protocols in healthcare settings. Proper adherence to PPE guidelines represents one of the most accessible yet impactful ways to minimize infection transmission. Assessing how well healthcare workers understand and comply with PPE standards is crucial in preventing nosocomial infections and maintaining safety.

India has seen localized outbreaks of COVID-19, primarily due to imported cases and their close contacts. Early interventions such as nationwide lockdowns and containment strategies have contributed to mitigating widespread community transmission. The vulnerable population, especially the elderly and those with underlying health conditions, remain at high risk, making PPE use among frontline workers even more critical.

2. Background of the Problem

PPE is critical in minimizing workplace risks for healthcare workers by forming a protective barrier against harmful pathogens. Despite the availability of PPE, breaches in infection control due to inadequate knowledge or incorrect usage can significantly elevate transmission risks. Therefore, it's imperative that all healthcare workers, including family caregivers, are well-informed and adequately trained in PPE application.

Globally, healthcare workers are at heightened risk during pandemics. For example, by April 2020, over 22,000 healthcare professionals in 56 countries were infected with COVID-19. Spain and Italy reported high infection rates among healthcare workers, highlighting a dire need for adequate PPE access and training. In India, numerous healthcare personnel have undergone quarantine due to suspected exposure.

Historically, pandemics such as the Spanish flu (1918-1920) caused substantial mortality worldwide, with India suffering significant losses. The COVID-19 pandemic, declared a public health emergency by WHO, presents a comparable if not greater threat, exacerbated by its rapid spread and impact on healthcare systems. Effective PPE usage is a cornerstone in protecting healthcare workers during such crises.

India's first COVID-19 case was reported in Kerala on January 30, 2020. In response, the government implemented strict containment measures, including a 21-day lockdown. The Indian Council of Medical Research (ICMR) facilitated widespread testing and promoted local containment strategies, such as the successful 'Bhilwara Model' in Rajasthan, which effectively controlled the virus spread within that district.

2.1 Statement of the Problem

"A STUDY TO ASSESS THE KNOWLEDGE AND ATTITUDE REGARDING PERSONAL PROTECTIVE EQUIPMENT (PPE) MEASURES AMONG FINAL YEAR NURSING STUDENTS OF PRIVATE NURSING

COLLEGE OF AHMEDABAD, GUJARAT WITH A VIEW TO DEVELOP AN INFORMATIONAL BOOKLET"

2.2 Objective of the Study

1) To assess the Knowledge of final year nursing students on personal protective equipment measures in selected private colleges of Ahmedabad.
2) To assess the Attitude of final year nursing students on personal protective equipment measures in selected private colleges of Ahmedabad.
3) To assess the correlation between Knowledge and Attitude of final year nursing students on personal protective equipment measures in selected private colleges of Ahmedabad.
4) To find out association between demographic variables and Knowledge of final year nursing students on personal protective equipment measures in selected private colleges of Ahmedabad.
5) To find out the association between demographic variables and Attitude of final year nursing students on personal protective equipment measures in selected private colleges of Ahmedabad.
6) To develop Information Booklet on personal protective equipment measures.

2.3 Assumptions of the Study

1) There will be lack of Knowledge related to personal protective equipment measures among final year nursing students in selected private colleges of Ahmedabad.
2) There will be positive Attitude related to personal protective equipment measures among final year nursing students in selected private colleges of Ahmedabad.
3) There will be significant correlation between Knowledge and Attitude related to personal protective equipment measures among final year nursing students in selected private colleges of Ahmedabad.
4) There will be significant association between demographic variables and Knowledge related to personal protective equipment measures among final year nursing students in selected private colleges of Ahmedabad.
5) There will be significant association between demographic variables and Attitude related to personal protective equipment measures among final year nursing students in selected private colleges of Ahmedabad.

3. Method

3.1 Design and Setting

Descriptive survey design the study was conducted in private nursing colleges of Ahmedabad, Gujarat.

3.2 Sample Size and Sampling Technique

The study comprised 250 final-year nursing students who were selected through a convenience sampling technique. These participants were chosen based on their availability and willingness to participate

3.3 Assessment tools

Tool 1 -Captured data on variables including age, gender, course of study and sources of information related to PPE.

Tool 2 - Comprised 20 multiple-choice items assessing students' knowledge about PPE. Each correct response was awarded one point, with a maximum achievable score of 20. Knowledge levels were categorized as:

- Good: 15–20 points
- Average: 8–14 points
- Poor: 0–7 points

Tool 3 - Contained 10 statements rated on a five-point scale. Positive statements were scored from 5 (Strongly Agree) to 1 (Strongly Disagree), and the reverse for negative statements. Attitude scores ranged from 10 to 50, categorized as:

- Positive Attitude: 31–50
- Negative Attitude: 10–30

3.4 Validity and reliability

Content validity was established through expert review, involving nursing faculty and infection control specialists. Revisions were made based on their recommendations. The reliability coefficients were 0.851 for the knowledge questionnaire and 0.902 for the attitude scale, both determined using the split-half method with Karl Pearson's correlation formula—indicating strong reliability.

3.5 Data collection procedure

Formal permissions were obtained from institutional authorities. Participants provided written informed consent. Data were collected across four nursing colleges during scheduled working hours. The researcher personally distributed and collected questionnaires, ensuring consistency and participant cooperation throughout the process.

4. Result

4.1 Demographic Data

Frequency and percentage wise distribution of samples based on Demographic Variables. [N=250]

Sr No	Demographic variables	Variables	F	%
1	Age in Years	20 years	20	8%
		21 years	140	56%
		22 years	68	27.2%
		Above 22 years	22	8.8%
2	Gender	Male	56	22.4%
		Female	194	77.6%
3	Course of Study	B. Sc Nursing	150	60%
		G N M Nursing	100	40%
4	Source of Information	Workshop	36	14.4%
		Seminar / Webinar	114	45.6%
		Social media	50	20%
		Others	50	20%

Table 4.1 Shows the demographic characteristic of final year BSc nursing students, out of 250 samples, in age, 20(8%) were 20 years old, 140 (56%) were 21 years old, 68(27.2%) were 22 years old and 22 (8.8%) were above 22 years old. In gender 56 (22.4%) were males and 194(77.6%) were females. In professional education 150(60%) were B.Sc. nursing students and 100 (40%) were GNM nursing students. In source of information, 36 (14.4%) were having workshop as source of information, 114 (45.65) were responded for seminar / webinar, 50 (20%) participants responded for social media and 50 (20%) responded for other sources.

4.2 Analysis And Interpretation of the Data Related to Knowledge of Final Year Nursing Students Regarding Personal Protective Equipment Measures

Table 4.2.1: Frequency, Percentage Wise Distribution, Mean and Mean Percentage of Samples Based on Knowledge Score, [N=250]

Level of knowledge	Classification of score	F	%	Mean	Mean%
Poor	0-7	00	00%	13.82	69.1%
Average	8-14	126	50.4%		
Good	15-20	124	49.6%		
Total		100	100%		

Table 4.2.1 shows that, majority, 126 (50.4%) samples had average knowledge, 124 (49.6%) samples had good knowledge level and none of the sample had poor knowledge regarding PPE measures, The mean knowledge score was 13.82 and the mean percentage was 69.1%.

4.2.3. Area wise knowledge score of final year nursing students on PPE measures.

S. no	Content area	Maximum score	Obtained Score	Mean score	Mean %
1	Introduction and purposes of PPE	5	975	3.90	78%
2	Types and use of PPE	7	1416	5.66	80.85%
3	Selection of PPE	2	259	1.03	51.5%
4	Donning and doffing of PPE	3	268	1.07	35.66%
5	Standards and expanded precautions of PPE	3	541	2.16	72%
Total		**20**	**3459**	**13.82**	

Table 4.2.3 shows the area wise knowledge score of samples on personal protective equipment measures. Highest mean percentage was found in the area of types and uses of PPE with mean score 5.66 and mean percentage 80.85%, followed by is introduction and purposes of PPE with mean score 3.90 and mean percentage 78%, Standards and expanded precautions of PPE with 2.16 mean and 72 % mean percentage, selection of PPE with 1.03 mean and 51.5% mean percentage and the lowest mean percentage was found in the area of donning and doffing of PPE with mean score 1.07 and mean percentage 35.66%.

4.3 Analysis and Interpretation of the Data Related to Attitude of Final Year Nursing Students Regarding Personal Protective Equipment Measures

Table 4.3.1 Frequency, percentage distribution, Mean and Mean Percentage of samples based on attitude score [N=250]

Level of attitude	Classification of score	F	%	Mean	Mean%
Negative attitude	10-30	11	4.4%	42.59	85.18%
Positive attitude	31-50	239	95.6%		
Total		250	100%		

Table 4.3.1 shows that, almost all, 239 (95.6%) samples had positive attitude, only 11(4.4%) samples had negative attitude regarding PPE measures. The mean attitude score was 42.59 and the mean percentage was 85.18%.

4.4 Analysis And Interpretation of Correlation Between Knowledge and Attitude of Final Year Nursing Students on Personal Protective Equipment Measures

Table 4.4: Correlation between knowledge and attitude of samples [N=250]

Knowledge mean score	Attitude mean score	*r* value (Karl Pearson Correlation Coefficient)	Inference
250	248	0.845	Strong positive correlation at 0.05 level of significance

Table 4.4 shows that value of "*r*" calculated by Karl Pearson Correlation Coefficient formula to find out correlation between Knowledge and Attitude at 0.05 level of significance. The value of "*r*" was 0.845. So it shows the strong positive correlation at the 0.05 level of significance.

Thus the table 4.4 revealed that there is strong positive correlation between Knowledge and Attitude on PPE measures. This shows that as Knowledge increases according to that Attitude improves.

4.5 Association Between Demographic Variables and Knowledge of Final Year Nursing Students on Personal Protective Equipment Measures.

Table 4.5: Association between age and knowledge level of subjects [N=250]

Age	Knowledge		Total	Calculated value of $\chi 2$	Tabulated value of $\chi 2$
	Average	Good			
20 years	18	2	20	16.059	7.815
21 years	60	80	140		
22 years	36	32	68		
Above 22 years	12	10	22		
Total	126	124	250		

***Significant at 0.05 level, df (3), $\chi 2$ =16.059**

Table 4.5. shows that calculated value of chi square (16.059) was more than tabulated value of chi square (7.815) so it statistically significant at 0.05 level of significance. Hence conclude that there is a significant association between age and knowledge of samples.

4.6 Association Between Demographic Variables and Attitude of Final Year Nursing Students on Personal Protective Equipment Measures.

Table 4.9: Association between age and attitude level of subjects [N=250]

Age	Attitude		Total	Calculated value of $\chi 2$	Tabulated value of $\chi 2$
	Positive attitude	Negative attitude			
20 years	18	2	20	5.891	7.815
21 years	133	7	140		
22 years	68	0	68		
Above 22 years	20	2	22		
Total	239	11	250		

***Significant at 0.05 level, df(3), $\chi 2$ =5.891**

Table 4.9. shows that calculated value of chi square (5.891) was less than tabulated value of chi square (7.815), so it statistically not significant at 0.05 level of significance. Hence conclude that there is no significant association between age and attitude of samples.

Table 4.10: Association between gender and attitude level of subjects [N=250]

Gender	Attitude		Total	Calculated value of $\chi 2$	Tabulated value of $\chi 2$
	Positive attitude	Positive attitude			
Male	53	3	56	0.157	3.84
Female	186	8	194		
Total	239	11	250		

***Significant at 0.05 level, df (1), $\chi 2$ =0.157**

Table 4.10 shows that calculated value of chi square (0.157) was less than tabulated value of chi square (3.84), so it statistically not significant at 0.05 level of significance. Hence conclude that there is no significant association between gender and attitude of samples.

Table 4.11 Association between education qualification and attitude level of subjects [N=250]

Educational qualification	Attitude		Total	Calculated value of $\chi 2$	Tabulated value of $\chi 2$
	Positive attitude	Negative attitude			
BSc Nursing	149	1	150	12.426	3.84
GNM Nursing	90	10	100		
Total	239	11	250		

***Significant at 0.05 level, df (1), $\chi 2$ = 12.426**

Table 4.11 shows that calculated value of chi square (12.426) was more than tabulated value of chi square (3.84), so it statistically significant at 0.05 level of significance. Hence conclude that there is a significant association between educational qualification and attitude of samples.

Table 4.12: Association between source of information and attitude level of subjects [N=250]

Source of information	Attitude		Total	Calculated value of $\chi 2$	Tabulated value of $\chi 2$
	Positive attitude	Negative attitude			
Workshop	35	1	36	4.269	7.815
Seminar / Webinar	108	6	114		
Social media	50	0	50		
Others	46	4	50		
Total	239	11	250		

***Significant at 0.05 level, df(3), $\chi 2$ =4.269**

Table 4.12. shows that calculated value of chi square (4.269) was less than tabulated value of chi square (7.815), so it statistically not significant at 0.05 level of significance. Hence conclude that there is no significant association between source of information and attitude of samples.

5. Discussion

The Present Study Address the Knowledge and Attitude on Personal Protective Equipment Among Final Year Nursing Students in Selected Private Nursing Colleges of Ahmedabad. In this Survey, Total 250 Final Year Nursing Students were Participated Related to the Finding of Knowledge this Study Revealed that Majority of Sample 50.4 % Samples Having Average Knowledge and 49.6 % Samples having Good Knowledge. Related to Finding of Attitude this Study Revealed that 4.4 % had Negative Attitude and 95.6 % had Positive Attitude. A Cross-Sectional Study, Online and Offline Surveys Were Conducted Among a Sample Of 393 Healthcare Workers from Five Different Districts of Bangladesh. The Average Age of the 393 Participants Was 28.9±5.2 Years with a Male-Female Ratio of One. Of Them, 99.5% (N=391) Had Good Knowledge, 88.8% (N=349) Had Positive Attitude And 51.7% (N=203) Had Good Practice Regarding PPE.

6. Conclusion

From the above findings data revealed that in Age Group 56% of samples were lies in the 21 years and 8 % samples were in age of 20 years. In field of Professional Education 60% samples from the B.Sc. and 40% samples from G.N.M. In Case of Gender 77.6% Samples were Females and 22.4% Samples were males. In area of Source of Information 45.6% samples were Webinar/Seminar and 14.4% were Workshop. Samples were good Knowledge 80.85% in area of Types and Use of PPE was poor Knowledge 35.66% in area of Donning and Doffing of PPE. There was positive Attitude 95.6% on Personal Protective Equipment among Final Year Nursing Students in selected Private Nursing Colleges of Ahmedabad. There was strongly positive correlation between Knowledge and Attitude Final-year nursing students demonstrated good levels of knowledge and highly positive attitudes towards PPE, though some gaps were noted in donning and doffing practices. Educational materials and structured training are necessary to enhance understanding.

7. Future Scope

7.1 Nursing Research

The result of the study contributes in expansion of the body of Knowledge of nursing. In future, the investigators can use the findings and the methodology as reference material for other research work. It highlights the areas that required future exploration. Other researchers, conducting further study in same field, can utilize the suggestions and recommendations. Further studies can be conducted on this topic for broader and in-depth coverage of the sample population so as to get a more detail information regarding Knowledge and Attitude on Personal Protective Equipment among Final Year Nursing Students.

7.2 Nursing Administration:

Nurse as an administrator plays an important role in educating the society such as mass health education measures in community. Nurses have to play multidimensional role and their skills have to be combined with a specialized Knowledge base to ensure improved health status of the younger generation. The nurses could participate in public awareness program through mass media and administration should take initiative to organize educational program for health personnel on Personal Protective Equipment in nursing schools, colleges and hospitals. Necessary administrative support is provided for development of research educational material like guideline, information booklet, pamphlets etc. nursing personnel should be motivated and provision for nurses to develop their time for development of educational material.

7.3 Utilization

1) Conduct regular workshops and seminars for nursing students on PPE protocols.
2) Include hands-on PPE practice sessions in the nursing curriculum.
3) Develop and distribute standardized booklets and guidelines.
4) Encourage further studies on PPE awareness across different regions and nursing cadres.
5) Implement periodic evaluations of knowledge and attitude retention.

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Author Profile

Ms. Komalben Nandkishor Joshi, has taken M.Sc. Nursing and PHD [Pursuing] Worked as an Assistant Professor in Shri Dayaman Institute of Nursing and Research, Jamnagar, Gujarat