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Use of Personal Protective Equipment's for Prevention of Covid-19 Infection among Students of Selected Nursing College of Kashmir

Ulfat Amin [a≡*], Asmat Parveen [a∞], Arjumand Ashraf [bφ], Inabat Ramzan [bφ], Ekleela Hamid [bφ], Binshee Bashir [bφ] and Shahid Manzoor [bφ]

[a] Department of Nursing, Islamic University of Science and Technology, Kashmir 192122, India.
[b] Islamic University of Science and Technology, Kashmir 192122, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Covid19 has affected people all over the world especially health care workers who are constantly exposed to this virus while providing services to their clients. They need to be up to-date regarding infection prevention measures like the use of personal protective equipment's.
Aim: To assess the pre-test and Post-test knowledge and Practice score related to use of personal protective equipment's. To find association of knowledge & practice with selected demographic variables.
Methods: A pre-experimental one group pre-test post-test design was adopted for the study. 60 B.Sc. Nursing students from SMMCNMT, IUST, Awantipora, Kashmir and Institute of Nursing, South Campus, University of Kashmir were selected by Convenient Sampling technique. A standardized questionnaire and observational checklist was used to collect the data. Descriptive & Inferential statistics was used to analyze the data.
Results: Study reveals that 6.7% of the subjects had inadequate knowledge, 93.3% subjects had moderate knowledge while only 0% subjects had adequate knowledge during Pre-test. Pretest practice score revealed that 8.3% of subjects had poor practice, 78.3% of subjects had average practice and 13.3% of subjects had good practice regarding the use of PPE's. Post-test knowledge score revealed that 0% subjects had inadequate knowledge, 13.3% subjects had moderate

[≡]MSc. (Child Health Nursing), DNA Teaching Faculty;
[∞]Principal of Syed Mantaqi College of Nursing & Medical Technology;
[φ]Bsc Nursing Interns of SMMCNMT;
**Corresponding author: Email: Ulfat.amin@islamicuniversity.edu.in, cuteulfat@gmail.com;*

knowledge and 86.7% subjects had adequate knowledge regarding the use of PPE's. Post-test practice score revealed that 0% subjects had poor practice, 15% subjects had average practice and 85% subjects had good practice regarding the use of PPE's.
This indicates that the mean post-test knowledge scores i.e. 23.47(78.20%) is higher than the mean pretest knowledge scores i.e. 13.72(45.7%). The mean posttest practice scores i.e. 9.93(82.80) is higher than the mean pretest practice scores i.e. 6.88(57.40).
Conclusion: The results revealed that Instructional Module was highly effective as there was significant increase in the post-test knowledge and practice scores among the B.Sc. Nursing students of SMMCNMT, IUST Awantipora, Kashmir and Institute of Nursing, South Campus, University of Kashmir.

Keywords: Impact; instructional module; personal protective equipment's.

1. INTRODUCTION

Covid-19 is a severe respiratory syndrome that is caused by Coronavirus 2 (SARS-COV-2). It was first recognized in Wuhan, China in Dec. 2019 & was declared a pandemic by WHO on 11th March 2020 [1]. Since the inception of this pandemic globally, more than 17,000 health care workers have lost their lives due to Covid-19 and its associated complications [2,3]. To disintegrate the spread of the virus, international recommendations principally focused on the appropriate use of personal protective equipment (PPEs) [4,5].

Firstly transmission of Covid-19 to health care workers likely occurred in Solano County, California in February 2020. At that moment, PPE precautions were not yet settled, so none of the health care workers wore PPE for Covid 19 protection. As a consequence of that, 121 health care workers were having a high, medium, or low risk of infection [6]. So it is clear that health care workers are at the highest risk of exposure to Covid-19 while dealing with patients affected by Covid-19 in all the health care settings [7]. The way they have to care for their patients involves close contact with blood and body fluids. So, they need appropriate protection to protect themselves from such hazards and this protection is provided only by Personal Protective Equipment's [8]. World Health Organization defines Personal Protective Equipment's as that equipment's that prevent and minimize the exposure of various biological, chemical radiological, electrical, and mechanical hazards. Personal Protective Equipment's protect health care workers from pathogens and hospital-acquired infections (HAI) at health care settings [9].

By caring for Covid-19 patients, health care workers act as frontline warriors in this pandemic. They are involved in the collection of Covid samples, carrying invasive and non-invasive procedures, dealing closely with Covid positive patients, and are at high risk of getting Covid-19 infection. Many protocols and guidelines for the prevention of Covid 19 infection are put forward by various international organizations and regulatory bodies like the Centre for Disease Control and Prevention (CDC), World Health Organization (WHO), European Agency for Safety and Health, Ministry of Health and Family Welfare (MoHFW) like Hand washing, use of alcohol-based sanitizers, maintenance of social distance and use of Personal protective equipment's. The use of Personal protective equipment's is one of the most essential elements for the prevention and control of Covid-19 infection [10].

PPE helps to secure that health care workers are safe from various hazards that they encounter in their working environment. PPE prevents health care workers from different environmental threats but no equipment is appropriate for all individuals, risks and threats: preferably, equipment must be selected and properly used according to setting and the level of threat or risk. It involves a selection of appropriate personal protective equipment according to the threat, proper sequence of donning and doffing, and proper disposal [11].

To overcome staff shortage in hospitals, on May 2021 central Government decided to rope in final year medical and nursing students for Covid-19 duty. Here arises the need of training programs for donning and doffing of Personal protective equipment's to protect these students from opportunistic infections [12].

1.1 Objectives

To assess the pre-test and Post-test knowledge and Practice score related to use of personal protective equipment's. To find association of

knowledge & practice with selected demographic variables

2. MATERIALS AND METHODS

Quantitative pre-experimental one group pre-test post-test research design was used in this study. 60 B.Sc. nursing students were selected by Stratified random sampling technique from Syed Mantaqi Memorial college of Nursing & Medical Technology, IUST Awantipora and Institute of Nursing South Campus, University of Kashmir. Data was collected in the month of November, 2021 from Institute of Nursing, south campus, university of Kashmir and in December 2021 from Syed Mantaqi Memorial College of nursing, IUST, Awantipora.

A standardized questionnaire of 30 questions & observation checklist of six items was used to collect data regarding use of personal protective equipment's for the prevention of Covid-19 infection.

2.1 Categorization of Knowledge Score

Knowledge	Score
Good	21-30
Average	11-20
Poor	0-10

Each correct answer was given a score of 1 mark & 0 for wrong answer.

2.2 Categorization of Practice Score

Practice	Score
Good	8-12
Average	4-8
Poor	0-4

Each correct step was given a score of 1 mark & 0 for wrong step.

The tool used for data collection was semi-standardized [13] and was validated by Dr. Tajali N Shora, Assistant Professor, Department of Community Medicine, Govt. Medical College, Anantnag.

- Ms. Rubeena Hakak, Associate Professor, Department of Microbiology, Govt. Medical College Anantnag.
- Ms. Asmat Parveen, Principal Syed Mantaqi Memorial College of Nursing & Medical Tech. IUST Awantipora. The collected data was summarized & tabulated by descriptive statistics such as mean, mean percentage, standard deviation, correlation & inferential statistics. Data analysis was done by Aneja coaching & Data analysis centre, NH1, Sahnewal Ludhiana-141120, 98884-07254.

3. RESULTS AND DISCUSSION

The results were discussed under following sections.

Section A:

Demographic Variables

Table 1. Frequency distribution of socio demographic variables

Demographic Variables	Category	Frequency	Percentage
Age in years	Up to 18 Years	0	0.0%
	19-22 Years	60	100.0%
	23 Years or Above	0	0.0%
Gender	Male	25	41.7%
	Female	35	58.3%
Domicile	Rural	39	65.0%
	Urban	21	35.0%
Class	BSc Nursing 1st year	20	33.3%
	BSc Nursing 2nd year	20	33.3%
	BSc Nursing 3rd year	20	33.3%
Occupation of Father	Health worker	16	26.7%
	Businessman	24	40.0%
	Any other occupation	20	33.3%

Demographic Variables	Category	Frequency	Percentage
Occupation of Mother	Health worker	23	38.3%
	Businesswoman	4	6.7%
	Any other occupation	33	55.0%
Previous Source of information	Family	16	26.7%
	Teachers	29	48.3%
	Health personnel	10	16.7%
	Electronic media	5	8.3%

Section B:

Pre-test and Post-test knowledge & practice of subjects regarding personal protective equipment's for the prevention of Covid-19 infection.

Table 2. Pre-test level of knowledge of subjects regarding personal protective equipment's

Pre-test knowledge	Score level	Frequency	Percentage
Inadequate	1-10	4	6.7%
Moderate	11-20	56	93.3%
Adequate	21-30	0	0%

Maximum Score=30 Minimum Score=0

Table 3. Pre-test practice related to use of personal protective equipment's for the prevention of Covid-19 infection

Pre-test practice	Score level	Frequency	Percentage
Poor	1-4	5	8.3%
Average	5-8	47	78.3%
Good	9-12	8	13.3%

Table 4. Post-test knowledge related to use of personal protective equipment's for the prevention of Covid19 infection

Post-test knowledge	Score level	Frequency	Percentage
Inadequate	1-10	0	0%
Moderate	11-20	8	13.3%
Adequate	21-30	52	86.7%

Table 5. Post-test practice related to use of personal protective equipment's for the prevention of Covid19 infection

Post-test practice	Score level	Frequency	Percentage
Poor	1-4	0	0%
Average	5-8	9	15%
Good	9-12	52	85%

Section C:

Effectiveness of self-Instructional Module on knowledge of subjects regarding personal protective equipment's

Table 6. Comparison of pre-test & post-test knowledge of subjects

					n=60		
Paired T Test	**Mean± S.D.**	**Mean%**	**Range**	**Mean Diff.**	**Paired T Test**	**P value**	**Table Value at 0.05**
Pretest Knowledge	13.72±2.034	45.70	10-19	9.750	45.402 *Sig	<0.001	2.00
Posttest Knowledge	23.47±2.652	78.20	19-29				

*** Significance Level 0.05; Maximum=30; Minimum=0*

Table 7. Comparison of pre-test & post-test practice scores

N=60

Paired t- test	**Mean+-SD**	**Mean%**	**Range**	**Mean diff.**	**Paired T test**	**P value**	**Table value at 0.05**
Pre-test Practice	6.88+-1.541	57.50	3-10	3.050	27.722*sig	<0.001	2.00
Post-test Practice	9.93+-1.528	82.80	6-12				

***Significance level 0.05. Maximum score=12, Minimum score=0.*

Section D:

This section deals with the association of knowledge & practice scores with demographic variables

Table 8. Association of pre-test & post-test knowledge score with socio- demographic variables

Association of Pretest Knowledge Scores with Selected Socio-Demographic Variables									
Variables	**Opts**	**Adequate**	**Moderate**	**Inadequate**	**Chi Test**	**P Value**	**df**	**Table Value**	**Result**
Age in years	Up to 18 Years	0	0	0	NA				
	19-22 Years	0	56	4					
	23 Years or Above	0	0	0					
Gender	Male	0	23	2	0.122	0.726	1	3.841	Not Significant
	Female	0	33	2					
Domicile	Rural	0	37	2	0.424	0.515	1	3.841	Not Significant
	Urban	0	19	2					
Class	BSc Nursing 1st year	0	17	3	3.750	0.153	2	5.991	Not Significant
	BSc Nursing 2nd year	0	19	1					
	BSc Nursing 3rd year	0	20	0					
Occupation of Father	Health worker	0	16	0	3.616	0.164	2	5.991	Not Significant
	Businessman	0	23	1					
	Any other occupation	0	17	3					
Occupation of Mother	Health worker	0	23	0	3.506	0.173	2	5.991	Not Significant
	Businesswoman	0	4	0					
	Any other occupation	0	29	4					
Previous Source of information	Family	0	16	0	2.752	0.431	3	7.815	Not Significant
	Teachers	0	27	2					
	Health personnel	0	9	1					
	Electronic media	0	4	1					

There is no significance association between the pre-test level of knowledge scores and socio demographic variables (Age, gender, domicile, class, occupation of father, occupation of mother, previous source of information). The calculated chi-square values were less than the table value at the 0.05 level of significance.

Table 9. Association of post-test knowledge scores with selected socio-demographic variables

Variables	Opts	Adequate	Moderate	Inadequate	Chi Test	P Value	df	Table Value	Result
Age in years	Up to 18 Years	0	0	0	NA				
	19-22 Years	52	8	0					
	23 Years or Above	0	0	0					
Gender	Male	21	4	0	0.264	0.608	1	3.841	Not Significant
	Female	31	4	0					
Domicile	Rural	33	6	0	0.406	0.524	1	3.841	Not Significant
	Urban	19	2	0					
Class	BSc Nursing 1st year	15	5	0	5.481	0.065	2	5.991	Not Significant
	BSc Nursing 2nd year	17	3	0					
	BSc Nursing 3rd year	20	0	0					
Occupation of Father	Health worker	16	0	0	3.462	0.177	2	5.991	Not Significant
	Businessman	20	4	0					
	Any other occupation	16	4	0					
Occupation of Mother	Health worker	21	2	0	1.715	0.424	2	5.991	Not Significant
	Businesswoman	4	0	0					
	Any other occupation	27	6	0					
Previous Source of information	Family	16	0	0	3.422	0.331	3	7.815	Not Significant
	Teachers	24	5	0					
	Health personnel	8	2	0					
	Electronic media	4	1	0					

There is no significance association between the post-test level of scores and Socio demographic variables (Age, gender, domicile, class, occupation of father, occupation of mother, previous source of information). The calculated chi-square values were less than the table value at the 0.05 level of significance.

D2: Association of pre-test & post-test practice scores with selected socio- demographic variables

Table 10. Association of Pre- test PRACTICE scores with selected socio-demographic variables

Variables	Opts	Poor	Average	Good	Chi Test	P Value	df	Table Value	Result
Age in years	Up to 18 Years	0	0	0	NA				
	19-22 Years	5	47	8					
	23 Years or Above	0	0	0					
Gender	Male	3	19	3	0.778	0.678	2	5.991	Not Significant
	Female	2	28	5					
Domicile	Rural	2	34	3	5.146	0.076	2	5.991	Not Significant
	Urban	3	13	5					
Class	BSc Nursing 1st year	3	14	3	2.148	0.709	4	9.488	Not Significant
	BSc Nursing 2nd year	1	16	3					
	BSc Nursing 3rd year	1	17	2					
Occupation of Father	Health worker	2	12	2	0.694	0.952	4	9.488	Not Significant
	Businessman	2	19	3					
	Any other occupation	1	16	3					
Occupation of Mother	Health worker	1	19	3	2.498	0.645	4	9.488	Not Significant
	Businesswoman	1	3	0					
	Any other occupation	3	25	5					
Previous Source of information	Family	2	13	1	3.231	0.779	6	12.592	Not Significant
	Teachers	3	21	5					
	Health personnel	0	9	1					
	Electronic media	0	4	1					

Table shows that there is no significance association between the pre-test practice level of scores and socio demographic variables (Age, Gender, Domicile, Class, Occupation of father, Occupation of mother, Previous source of information). The calculated chi-square values were less than the table value at the 0.05 level of significance.

Table 11. Association of post-test practice scores with selected socio-demographic variables

Variables	Opts	Poor	Average	Good	Chi Test	P Value	df	Table Value	Result
Age in years	Up to 18 Years	0	0	0	NA				
	19-22 Years	0	9	51					
	23 Years or Above	0	0	0					
Gender	Male	0	6	19	2.723	0.099	1	3.841	Not Significant
	Female	0	3	32					
Domicile	Rural	0	5	34	0.415	0.519	1	3.841	Not Significant
	Urban	0	4	17					
Class	BSc Nursing 1st year	0	5	15	3.137	0.208	2	5.991	Not Significant
	BSc Nursing 2nd year	0	1	19					
	BSc Nursing 3rd year	0	3	17					
Occupation of Father	Health worker	0	3	13	0.294	0.863	2	5.991	Not Significant
	Businessman	0	3	21					
	Any other occupation	0	3	17					
Occupation of Mother	Health worker	0	3	20	0.383	0.826	2	5.991	Not Significant
	Businesswoman	0	1	3					
	Any other occupation	0	5	28					
Previous Source of information	Family	0	2	14	1.271	0.736	3	7.815	Not Significant
	Teachers	0	5	24					
	Health personnel	0	2	8					
	Electronic media	0	0	5					

Table shows that there is no significance association between the post-test practice level of scores and socio demographic variables (age, gender, domicile, class, occupation of father, occupation mother and previous source of information). The calculated chi-square values were less than the table value at the 0.05 level of significance

3.1 Discussion

This study revealed nursing students had inadequate and moderated knowledge and practice regarding PPE for prevention of Covid 19 infection. Knowledge and practice was significantly increased after intervention with instructional modules was provided. Given the rapidly evolving nature of the COVID-19 pandemic coupled with the imminent re-introduction of nursing students into hospitals across the valley, this indicates a pressing need to incorporate novel COVID-19-specific PPE in the Nursing curriculum. Furthermore, it may be desirable to examine the competency of Covid Infection Preventions measures including 'donning and doffing' as a skill required of nursing graduates by their statutory bodies such as the INC, TNAI.

Nurses as front-liners play a vital role in COVID-19 management. They are first point of contact with different patients at various health care settings. Therefore, they are at high risk for Covid-19 infection. The best way for Nurses to prevent this infection is through practice and competency in donning, doffing, and proper use of personal protective equipment (PPE). Today's Nursing Students are tomorrows nurses, Hence, an assessment of the current status of knowledge and practice towards Use of personal protective equipment's for prevention of Covid-19 infection among Students of selected nursing colleges of Kashmir were duly needed.

According to the best of our knowledge, this is the first-ever study that entirely assessed the knowledge and practice towards Use of personal protective equipment's for prevention of Covid-19 infection among Students of selected nursing college of Kashmir. We found that in pre-test,93.3% of the participants had moderate knowledge regarding use of PPE, and none had Adequate level of knowledge. In the pre-test practice, 5 (8.3%) of students had poor practice, 47(78.3%) of students had average practice & 8 (13.3%) of students had good practice. Recent studies conducted by Kamkshi Garj, Anju Garewal…et al (10 April 2020) on knowledge, attitude, and practice of donning and doffing of Personal protective equipment's among 155 health care workers during COVID-19 pandemic. Results showed that 51% of health care workers were not able to done Personal protective equipment's and 35.5% of health care workers go out of doffing area without removing gloves [14].

In post-test knowledge 0 (0%) students had inadequate knowledge, 8(13.3%) of students had moderate knowledge & 52 (86.7%) of students had adequate knowledge. In post-test practice 0(0%) of students had poor practice, 9(15%) of students had average practice & 51(85%) of students had good practice. The findings are consistent with the cross sectional study conducted by Hossain MA,Sayeed S etal..(2020) to assess the knowledge, attitude & practice of 393 health workers regarding personal protective equipment's for the prevention of covid19. Study results showed that 99.5% had good knowledge, 88% had positive attitude & 51.7% had good practice. Our study results provide confidence in terms of the nursing students' knowledge regarding the transmission, protection, and preventive measures of COVID-19, which is a good sign in the present situation because prevention is better than cure [15].

As the fight against COVID continues, nursing students must remain familiar with all the precautionary steps regarding PPE because they work as health care workers during emergencies. Despite a good average score in the knowledge questionnaire, we found a remarkable absence of knowledge regarding the proper donning and doffing method indicating an absence of training regarding PPE among nursing students. As such a widespread outbreak had not happened in recent history, it is expected that not every nursing student would have adequate knowledge regarding donning and doffing. But the current situation necessitated training of all nursing students on the PPE. Hence, a lack of knowledge is reminiscent of inadequate preparedness of the health system to handle such a catastrophe.

Adequate knowledge and proper practices among nursing students guarding basic protective measures are necessary to deal with COVID-19 affected people as it decreases the chances of transmission. Moreover, the current pandemic has made it mandatory for HCWs to increase their protection. Proper practice of HCWs in complying with precautionary measures will not only save them from COVID-19 but also create awareness among the patients as well as the population in general.

4. CONCLUSION

COVID-19 is currently the trending topic all around the world, including Kashmir, due to its catastrophic nature. To our knowledge, our

current study is a unique one where we tried to describe the knowledge, and attitude of nursing students of our region regarding the use of PPEs in Prevention of Covid-19 infection. However, we identified a significant gap in Knowledge & practice toward using PPE among our nursing students. Interestingly, we found that education, reading guidelines, and lack of proper training opportunities are the steering factors leading to variation among our study participants. As the global threat of COVID-19 continues, more significant efforts through educational campaigns that target HCWs and the broader population beyond borders are urgently needed in our current context as most of us must adjust to this new normal phenomenon.

5. LIMITATIONS

- Due to limited time period Samples were selected only from two nursing colleges.
- Sample size was limited to 60 participants.

6. RECOMMENDATIONS

1. Educational programs should be organized for nursing students and other nursing professionals regarding personal protective equipments for prevention of Covid 19 infection.
2. Special training sessions related to use of personal protective equipments should be organized for nursing students and other nursing professionals.
3. Adequate supply of personal protective equipments should be provided to nursing students during Covid 19 pandemic
4. The research studies on personal protective equipments should be conducted on regular basis

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Ethical clearance was obtained from institutional ethics committee of Islamic university of science & technology, Awantipora Pulwama, under protocol number RP 031/2021.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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