

Health effects among COVID-19 frontline health care professionals using level III personal protective equipment: A hospital-based descriptive study



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Submission: 12-11-2021

Revision: 04-01-2022

Publication: 01-02-2022

ABSTRACT

Background: Global outbreak of deadly Corona virus disease has forced health care professionals of various disciplines in Hospital and community setting to use personal protective equipment (PPE) which consists of completely encapsulated suit, led the frontline health care professionals to face not only the physical discomfort but also other health consequences. **Aims and Objectives:** This study is conducted to assess the physical, physiological, and psychological health consequences faced by health care workers using Level III PPE when attending COVID-19 patients. **Materials and Methods:** This is a cross-sectional study conducted in the month of December 2020 and January 2021 amongst Medicos, Paramedicals, Nurses and other health care professionals in a tertiary care hospital attending COVID-19 duty using an online questionnaire which included sociodemographic profile, frequency of the duty, physical, physiological, psychological difficulties faced while using PPE, and the responses was recorded according to three-point Likert's scale. Data were analyzed using suitable statistical methods with the help of SPSS V.23. **Results:** A total of 227 front line warriors were included in the study with 157 (69%) males, 70 (31%) females among them 121 (53%) medicos, 68 (30%) nurses, 23 (10%) paramedicals, 15 (7%) others. Majority of them that is 186 were in 21–30 years age group, 31 in 31–40 years, 10 in >41 years. 124 (55%) used PPE for 4–6 h, 84 (37%) >6 h and 19 (8%) used for <4 h. Physical symptoms are most commonly faced health consequences followed by psychological and physiological symptoms. Medicos faced more difficulty and regularly in all three health consequences comparing with nurses and others. **Conclusion:** This study provides insight into various health consequences and difficulties experienced by the health care professionals while on PPE. Surveillance of the physical, physiological and psychological health consequences enroute us to prepare efficiently for future outbreaks worldwide.

Key words: Personal protective equipment; Health care professionals; COVID-19

Access this article online

Website:

<http://nepjol.info/index.php/AJMS>

DOI: 10.3126/ajms.v13i2.40795

E-ISSN: 2091-0576

P-ISSN: 2467-9100

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INTRODUCTION

First case of novel corona virus disease (COVID-19) was reported on 8th of December 2019 in China, which later evolved into a global pandemic, finally affecting 218 counties and territories around the world including India.¹ The World Health Organization declared COVID-19 a pandemic and declared it a public health emergency of

international concern and named it as novel coronavirus disease 2019.² This unexpected life threatening acute respiratory disease resulted devastation in the field of Medicine all over the world.

The outbreak which started in Hubei and Wuhan cities of China, spread across the rest of the country and to other countries too within a short period of time.³ India reported

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first case of COVID-19 in Kerala on 30th January 2020 and within a couple of weeks it spread to 27 states and 7 union territories. Since the initial outbreak, health care professionals have faced risk of contracting the virus through contact with infected individuals or contaminated surfaces. All COVID-19 affected countries in the world are implementing containment interposition and trying their level best to fight against disease to halt further spread of infection and to reduce mortality. The major route of transmission of COVID-19 is through respiratory droplets, close contact and as well as via aerosol transmission.⁴ This critical situation of global outbreak forced the health care professionals of various disciplines to use personal protective equipment (PPE), which act as effective barrier between frontline warriors and contaminated material such as blood, body fluids, respiratory secretions, and aerosols while treating COVID-19 patients to avoid contracting the infection.⁵ In light of this pandemic, the importance of use of PPE that includes a disposable medical N95 protective mask, goggles, triple layers of medical gloves, a protective face shield, an isolation gown, and medical protective clothing in health institutions has become more important and critical than it was previously and it should be used consistently and effectively.⁶ Usage of this PPE led the health care professionals to face not only the physical discomfort but also physiological and psychological health consequences.

All over the world extensive studies were conducted on various aspects of COVID-19 caused by corona virus infection. Studies were also carried out to assess the various health challenges faced by health care professionals while using PPE.⁶⁻⁸ Globally, the users have often found wearing PPE were uncomfortable while working especially in summer season when facilities like centralized air conditioners were shut down due to fear of spreading of infection and users also found impaired visibility, difficulty in communication, heat stress, respiratory difficulties, nausea, vomiting, sweating, and skin injuries.⁸⁻¹¹

Based on our literature search, the study which comprehensively uncovers the potential physical physiological and psychological problems with the usage of PPE in an Indian scenario was not found. The comfort of these COVID-19 frontline warriors is utmost importance to execute medical actions including life-saving procedures. Thus, there is an immediate need to unravel these health hazards in health care workers. Hence, this study is conducted to understand the health consequences among the health care workers using PPE, which helps to plan necessary proactive measures for the wellbeing and efficient performance of health care personnel.

Aims and objectives

The study aims to explore physical, physiological, and psychological health consequences among health

care professionals using Level III PPE while treating COVID-19 patients.

MATERIALS AND METHODS

This is a cross-sectional study, conducted amongst health care professionals in a tertiary Care Hospital. Study was carried out in the month of December 2020 and January 2021. A total of 227 health care professionals which includes Medicos, Paramedicals, Nurses, and other health care related personnel (attenders) posted for COVID-19 duties and who worked for less than 4 h, 4–6 h and more than 6 h in a day using Level III PPE were included.

The study was pre-approved by the Institutional Ethics Committee (IEC) for the final permission. After obtaining ethical clearance from IEC, an online informed consent was taken from all the participants. Online questionnaire was designed on Google forms and to those who accepted to be a part of the study the form was circulated in WhatsApp group. The submission form was kept open for 30 days. This platform ensured only one submission from one individual. In the WhatsApp, participants received general information about the study and were also informed that their participation is completely voluntary, no personal data are required, study did not have any risk, their data and participation shall be kept anonymous.

Questionnaire included sociodemographic profile, frequency of the duty, various physical, physiological, and psychological health consequences faced while using PPE. To assess the physical, physiological, and psychological problems while using PPE five, seven, and fourteen questions (Tables 1-3) were used, respectively. The responses of the survey were recorded according to three-point Likert's scale. Each question of physical status was assessed to know the difficulty level, hence in the questionnaire participants had to select whether the particular physical problem they faced while wearing the PPE was very difficult, difficult or not at all difficult. In contrary, participants had to select whether particular physiological and psychological problem were faced occasionally, regularly or not all. Validation of data, preliminary analysis, data categorization, and graphical representation was done.

Statistical analysis

Data were entered in MS excel sheet and were analyzed to find frequency and percentages using descriptive and inferential statistic methods using Z test and Chi-square test with the help of software SPSS V.23.

Distribution of categorical data such as gender, age, duration of hours, and professionals was expressed as

Table 1: Physical symptoms faced by health care professionals

Physical symptoms	Responses	Medicos		Nurses		Paramedicals		Others	
		No.	%	No.	%	No.	%	No.	%
While using PPE did you face difficulty in moving around (restriction in movement)?	Very Difficult	21	17	40	59	14	61	4	27
	Difficult	89	74	18	26	4	17	10	67
	Not at all Difficult	11	9	10	15	5	22	1	7
Have you faced difficulty in donning?	Very Difficult	2	2	22	32	6	26	7	47
	Difficult	54	45	44	65	17	74	8	53
	Not at all Difficult	65	54	2	3	0	0	0	0
Have you faced difficult in Doffing?	Very Difficult	14	12	33	49	11	48	1	7
	Difficult	74	61	29	43	10	43	14	93
	Not at all Difficult	33	27	6	9	2	9	0	0
While using PPE did you face difficulty in communication?	Very Difficult	50	41	41	60	15	65	2	13
	Difficult	65	54	16	24	4	17	12	80
	Not at all Difficult	6	5	11	16	4	17	1	7
While using PPE did you face difficulty in hearing?	Very Difficult	33	27	42	62	16	70	7	47
	Difficult	75	62	20	29	6	26	8	53
	Not at all Difficult	13	11	6	9	1	4	0	0
While using PPE did you face difficulty in understanding surroundings?	Very Difficult	23	19	42	62	12	52	3	20
	Difficult	75	62	21	31	8	35	12	80
	Not at all Difficult	23	19	5	7	3	13	0	0
While using PPE did you face difficulty in seeing?	Very Difficult	73	60	36	53	13	57	4	27
	Difficult	47	39	16	24	2	9	10	67
	Not at all Difficult	1		16	24	2	9	1	7

frequency and percentage. The qualitative data such as gender, age, duration of hours and professionals are associated with the parameters such as physical, physiological, and mental to know if there is any significant difference exists between the parameters with gender, age, duration of hours, and professional s using Chi-square test. To know the proportion of higher difference exists between different professional groups Z-test is used. All the statistical analysis was carried out at 5% level of significance and a $P < 0.05$ was considered as significant.

RESULTS

A total of 227 respondents were included in the study depicted in Figure 1.

This sample included 157 (69%) males and 70 (31%) females. Majority of the Health Care Professionals were in the age group of 21–30 years 186 (82%), 31 (14%) were in 31–40 years and only 10 (4%) were in the age group >41 years and majority 124 (54.6%) of the health care professionals used the PPE for 4–6 h, 84 (37%) participants used for >6 h and 19 (8.4%) used for <4 h. Comorbidities suffered by health care professionals include Asthma 7 (3%), hypertension 1 (0.44%), Asthma 7 (3%), allergies 22 (10%), and majority of the health care workers 197 (87%) didn't have any other medical co-morbidities.

Physical, physiological, and psychological health consequences faced by frontline warriors using PPE and their responses according to three-point Likert's scale, profession wise is shown in Tables 1-3, respectively.

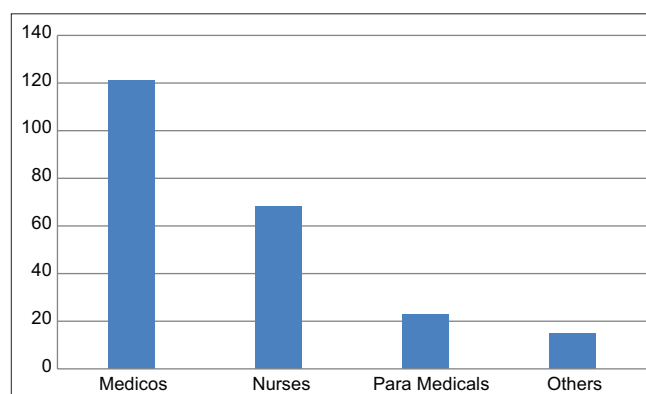


Figure 1: Distribution of study participants according to profession profession wise

A gender-wise association of health care professionals in physical, physiological, and psychological health consequences was not found to be statistically significant as (P-value was 0.312, 0.683, and 0.551).

An association between physical, physiological, and psychological health consequences with duration of PPE usage that is with less than 4 h, 4–6 h and more than 6 h was compared in all the professionals (Table 4), and it was found that there was no significant difference between Physical, physiological, and psychological in less than 4 h and 4–6 h duration. There is significant difference in less than 4 h and more than 6 h with only respect to psychological symptoms. Significant difference in all three health consequences with 4–6 h and more than 6 h was observed (Considering $P < 0.05$ as statistically significant).

Table 2: Physiological symptoms faced by health care professionals

Physiological symptoms	Responses	Medicos		Nurses		Paramedicals		Others	
		No.	%	No.	%	No.	%	No.	%
While using PPE did you suffer from Headache?	Occasionally	73	60	31	46	15	65	3	20
	Regularly	36	30	10	15	2	9	2	13
	Not at all	12	10	27	40	6	26	10	67
While using PPE did you face skin indentation (impression)?	Occasionally	46	38	15	22	7	30	6	40
	Regularly	69	57	14	21	3	13	0	0
	Not at all	6	5	39	57	13	57	9	60
While using PPE did you face difficulty in attending to Nature's call?	Occasionally	61	50	22	32	11	48	10	67
	Regularly	43	36	25	37	6	26	0	0
	Not at all	17	14	54	79	6	26	5	33
While using PPE did you have sweating (perspiration)?	Occasionally	20	17	18	26	2	9	3	20
	Regularly	101	83	40	59	18	78	7	47
	Not at all	0	0	10	15	3	13	5	33
While using PPE did you feel thirsty often?	Occasionally	53	44	23	34	8	35	7	47
	Regularly	58	48	27	40	9	39	5	33
	Not at all	10	8	18	26	6	26	3	20
While using PPE did you have dizziness?	Occasionally	62	51	19	28	8	35	3	20
	Regularly	18	15	10	15	3	13	0	0
	Not at all	41	34	39	57	12	52	12	80
While using PPE did you have breathing difficulties?	Occasionally	56	46	23	34	8	35	2	13
	Regularly	60	50	27	40	12	52	1	7
	Not at all	5	4	18	26	3	13	12	80
While using PPE did you experience palpitations?	Occasionally	50	41	22	32	6	26	1	7
	Regularly	19	16	13	19	4	17	0	0
	Not at all	32	26	33	49	13	57	14	93
While using PPE did you face fatigue?	Occasionally	59	49	20	29	9	39	1	7
	Regularly	46	38	17	25	3	13	2	13
	Not at all	16	13	31	46	11	48	12	80
While using PPE did you have skin itching?	Occasionally	39	32	18	26	6	26	0	0
	Regularly	14	12	9	13	2	9	1	7
	Not at all	67	55	41	60	15	65	14	93
While using PPE did you have dry skin?	Occasionally	30	25	8	12	1	4	3	20
	Regularly	27	22	27	40	4	17	0	0
	Not at all	64	53	33	49	18	78	12	80
While using PPE did you suffer from joint pains?	Occasionally	25	21	11	16	4	17	0	0
	Regularly	9	7	15	22	3	13	0	0
	Not at all	86	71	42	62	16	70	15	100
While using PPE did you have nausea/vomiting?	Occasionally	31	26	14	21	3	13	2	13
	Regularly	9	7	6	9	0	0	1	7
	Not at all	81	67	48	71	20	87	12	80
While using PPE did you face heat stress/exhaustion?	Occasionally	57	47	19	28	15	65	2	13
	Regularly	39	32	16	24	2	9	0	0
	Not at all	25	21	33	49	6	26	13	87

Table 3: Psychological symptoms faced by health care professionals

Psychological symptoms (50)	Responses	Medicos		Nurses		Paramedicals		Others	
		No.	%	No.	%	No.	%	No.	%
While using PPE did you feel restlessness?	Occasionally	69	57	20	29	12	52	5	33
	Regularly	38	31	25	37	5	22	0	0
	Not at all	14	12	23	34	6	26	10	67
While using PPE did you feel anxious?	Occasionally	74	61	24	35	14	61	3	20
	Regularly	23	19	11	16	0	0	0	0
	Not at all	24	20	33	49	9	39	12	80
While using PPE did you face difficulty in making decisions?	Occasionally	59	49	17	25	5	22	1	7
	Regularly	15	12	14	21	6	26	0	0
	Not at all	47	39	37	54	12	52	14	93
During COVID-19 duty time did you face sleeplessness?	Occasionally	41	34	15	22	10	43	1	7
	Regularly	42	35	26	38	4	17	1	7
	Not at all	38	31	27	40	9	39	13	87
During COVID-19 duty time did you have the fear of getting infected/transferring infection to family members	Yes	16	13	23	34	10	43	6	40
	No	9	7	27	40	11	48	6	40
	Not Sure	96	79	18	26	2	9	3	20

Table 4: Duration-wise association in physical, physiological, and psychological symptoms in health care professionals

Parameters	Responses	Less than 4 h	4-6 h	Chi-square (df=2)	P-value
Physical	Very Difficult	3	31	0.89	0.641
	Difficult	12	66		
	Not at all Difficult	4	27		
Physiological	Occasionally	8	47	0.296	0.863
	Regularly	5	37		
	Not at all	5	40		
Psychological	Very Difficult	11	59	0.554	0.758
	Difficult	5	31		
	Not at all Difficult	4	34		

Parameters	Responses	Less than 4 h	More than 6 h	Chi-square (df=2)	P-value
Physical	Very Difficult	3	9	2.05	0.36
	Difficult	12	43		
	Not at all Difficult	4	32		
Physiological	Occasionally	8	22	3.18	0.204
	Regularly	5	21		
	Not at all	5	41		
Psychological	Very Difficult	11	23	7.34	0.025
	Difficult	5	18		
	Not at all Difficult	4	43		

Parameters	Responses	4-6 h	more than 6 h	Chi-square (df=2)	P-value
Physical	Very Difficult	31	9	10.1	0.007
	Difficult	66	43		
	Not at all Difficult	27	32		
Physiological	Occasionally	47	22	6.01	0.049
	Regularly ²	37	21		
	Not at all	40	41		
Psychological	Very Difficult	59	23	13.1	0.001
	Difficult	31	18		
	Not at all Difficult	34	43		

Table 5 shows significant difference in physical, physiological, and psychological health consequences among medicos and nurses. Significant difference was observed among medicos and paramedical only in physiological and not in physical, psychological components, and there is significant difference between medicos and others with respect to physical and psychological and not in physiological component. There is higher chance of predicting for physical, Physiological, and psychological components between medicos and nurses and not in other professionals.

The proportion of medicos with parameters such as physical, physiological, and psychological health consequences is more than Nurses is tested using z-test for two population proportion. The value of z is 2.7483, 2.868 and 2.6105 and the *P* value was found to be 0.00298, 0.00205 and 0.00453; hence, it is concluded that the medicos face more difficult in all three parameters comparing with nurses (Table 5).

Table 6 shows there is no significant difference between physical, physiological and psychological health consequences in different age groups, however significant difference was seen only in psychological symptoms in age group of 21–30 years and 31–40 years.

DISCUSSION

Global outbreak of deadly corona virus disease has forced health care professionals of various disciplines in Hospital and Community setting to use full Level III PPE which form a very important part of protective armour to avoid contamination from covid patients. However, there are various physical, psychological, and physiological consequences on health which can influence users functioning and performance associated with usage of PPE.^{8,9,12} Hence, this study was carried out to assess these health consequences faced by health care professionals using PPE treating the COVID-19 patients for timely and effective redresses. For better comparison, this study included all strata of health care professionals who used PPE.

Among the physical symptoms most of the study participants found it difficult in both donning (putting on) and doffing (removing of), restriction in movements and difficult in hearing and understanding the surroundings and very difficult in visual perception and communication.

Similar study was conducted in a Bi-national survey in Portuguese and Israel by Parush et al., the PPE equipment

Table 5: Professional-wise association in physical, physiological, and psychological symptoms

Parameters	Reponses	Medicos	Nurses	Chi-square (df=2)	P-value
Physical	Very Difficult	48	19	7.58	0.02
	Difficult	40	17		
	Not at all Difficult	33	32		
Physiological	Occasionally	30	37	16.7	0.0002
	Regularly	69	24		
	Not at all	22	7		
Psychological	Very Difficult	61	19	10.1	0.006
	Difficult	29	19		
	Not at all Difficult	31	30		

Parameters	Reponses	Medicos	Para medicals	Chi-square (df=2)	P-value
Physical	Very Difficult	48	7	3.90	0.143
	Difficult	40	5		
	Not at all Difficult	33	11		
Physiological	Occasionally	30	13	9.40	0.009
	Regularly	69	7		
	Not at all	22	3		
Psychological	Very Difficult	61	10	1.82	0.402
	Difficult	29	4		
	Not at all Difficult	31	9		

Parameters	Reponses	Medicos	Others	Chi-square (df=2)	P-value
Physical	Very Difficult	48	3	9.61	0.008
	Difficult	40	2		
	Not at all Difficult	33	10		
Physiological	Occasionally	30	4	3.35	0.18
	Regularly	69	11		
	Not at all	22	0		
Psychological	Very Difficult	61	2	15.4	0.00045
	Difficult	29	10		
	Not at all Difficult	31	13		

Table 6: Age-wise association in physical, physiological, and psychological symptoms

Parameters	Reponses	21–30 years	31–40 years	Chi-square (df=2)	P-value
Physical	Very Difficult	70	13	1.81	0.404
	Difficult	87	16		
	Not at all Difficult	29	2		
Physiological	Occasionally	64	9	4.68	0.096
	Regularly	56	5		
	Not at all	66	17		
Psychological	Very Difficult	81	8	10.6	0.005
	Difficult	47	4		
	Not at all Difficult	58	19		

Parameters	Reponses	21–30	≥41	Chi-square (df=2)	P-value
Physical	Very Difficult	70	3	0.286	0.867
	Difficult	87	5		
	Not at all Difficult	29	2		
Physiological	Occasionally	64	3	0.934	0.627
	Regularly	56	2		
	Not at all	66	5		
Psychological	Very Difficult	81	4	0.366	0.833
	Difficult	47	2		
	Not at all Difficult	58	4		

Parameters	Reponses	31–40	≥41	Chi-square (df=2)	P-value
Physical	Very Difficult	13	3	1.7	0.427
	Difficult	16	5		
	Not at all Difficult	2	2		
Physiological	Occasionally	9	3	0.102	0.95
	Regularly	5	2		
	Not at all	17	5		
Psychological	Very Difficult	8	4	1.39	0.499
	Difficult	4	2		
	Not at all Difficult	19	4		

usage amongst health care professionals was found to be associated with difficulties related to discomfort of wearing PPE, hearing, seeing and doffing were observed in 78%, 50%, 89% and 44% of the study subjects respectively in Israel survey and 87%, 64%, 84% and 77% of study subjects, respectively, in a Portugal study.⁸

Difficulties faced while doffing and donning can be overcome by providing proper education to adhere to the protocol of doffing and donning and frequent practice to reduce the self-contamination. Other physical symptoms can be minimized to some extent by manufacturing PPEs which are user friendly and at the same time protect them from contracting the Covid infection.

Among the physiological symptoms majority of the medicos, nurses and paramedics regularly faced difficulty in breathing, sweating and felt thirsty whereas majority of other category participants did not have breathing difficulty but had difficulty in attending nature's call. Occasionally majority of medicos faced palpitations, headache fatigue and heat exhaustion. Majority of the nurses not at all experienced most of physiological symptoms except breathing difficulty, sweating and thirsty. Even the majority of the paramedics did not suffer most of physiological symptoms except breathing difficulty, sweating, felt thirsty and had heat exhaustion. Majority of the study participants of all the four categories did not suffer from either pressure or moist related skin injuries, joint pains, nausea/vomiting. It is interesting to know that more than 80% of the other category health care workers did not suffer from any physiological symptoms.

Similar to present study, in a North Indian study, conducted in all categories of health care workers, Agarwal *et al.*, observed heat exhaustion (100%) and breathlessness (61%) in majority of the PPE users.¹³

In another North Indian study performed among Forensic team using PPE, five team members felt discomfort, excessively hot, enhanced perspiration, dyspnea, suffocation, dehydration, or facial redness.¹⁴

Similarly, Yuan *et al.*, observed heat stress, respiratory difficulties, dizziness, nausea and varying degrees of facial skin indentation in their study participants.⁶ 94.57% of physiological adverse reactions were noticed in a study conducted by respiratory medicine department, China.⁶ Literature search did not find enough studies to compare the digestive symptoms during PPE usage.

Overheating due to PPE is the very common symptoms seen in all above studies including our study; PPE may cause an increase in body temperature by preventing heat loss by

evaporation of the sweat. India being a tropical country with both hot and humid climate, heat exhaustion will be even more troublesome. In addition to prevent the spread of droplet infection shut down of central air-conditioning system further adds to the problem.

In contrast to this study, a study done by Foo *et al.*, and Battista *et al.*, observed high rates of adverse skin reactions like dry skin, acne, itch and rash to PPE.^{15,16} Yan *et al.*, also found that health workers fighting against covid 19 are prone for skin and mucus membrane injury.¹⁷

In an American study by Rosner¹⁸ apart from the headache, skin related issues like skin break down and acne was observed in majority of the health care workers.

In a meta-analysis carried out by Galanis *et al.*,¹⁹ commonest physiological challenge faced was Headache, pressure and sweating related skin reactions and breathing discomfort.

The plausible solution to overcome the physiological symptoms suffered by the PPE users is by using effective reusable, water absorptive, customized PPE kits. Many health-related problems like obesity, respiratory diseases (Asthma, COPD) can exacerbate the physiological symptoms associated with PPE usage, this can be tackled by giving regular breaks and to report the symptoms related to PPE use.

Psychological status of the health care professionals was assessed, majority of paramedics felt restless and anxiousness occasionally but medicos faced sleeplessness regularly and felt anxiousness and restless occasionally. It was interesting to know that nurses did not have any of the psychological consequences. Majority of health care professionals didn't face difficulty in making decision during COVID-19 duty period and also were not sure whether they will get infected or not while taking care of COVID-19 sufferers. Similarly in an Indian study, it was found that the prevalence of anxiety, depression and distress in health care workers was 17.7%, 11.4% and 3.7% respectively.¹⁰

In a meta-analysis of Health care workers experienced high levels of depression, anxiety, insomnia, and distress.²⁰⁻²² In contrast to present study, in the meta-analysis^{20,21} female nurses were disproportionately affected more from mental health consequences. The difference may be due to that the frontline female nurses work in close contact with patients for longer working hours and may be accustomed to the duty.

These psychological issues may be overcome by providing proper training, psychological support being in contact

with the friends and family members through digital media, refraining from alcohol and smoking, psychological counseling.

Interestingly in present study, medicos experienced overall more symptoms and other category workers which mainly included attenders had less symptoms. The differences in the physical, physiological and psychological adverse events caused by PPE use among four different categories of health workers in this study may be due to comprehensive effect with sociodemographic, clinical job characteristics and associated health issues. However, these finding calls for further research to prepare better for the future pandemics.

This is the first study to best of our knowledge to uncover the various health effects which include physical, physiological and psychological consequences in the event of major public emergency. During an epidemic the infection of health care professionals will have major negative impact on capacity to treat patients on the morale of professionals and on public confidence because appropriate protection of health care professional is of utmost importance in response to COVID-19 in any health care system.

CONCLUSION

Medicos faced more difficulty and regularly in all the three health consequences comparing with nurses, paramedics and least by the other category health care workers. This study provides awareness of various health consequences and difficulties experienced by the health care professionals while on PPE, training of health care professionals physically, mentally and emotionally improves their well-being, thus during PPE usage they can execute the patient care effectively and efficiently. This study also serves as a professional health advisory for other front-line healthcare professionals globally who are working to treat patients with COVID-19. Further studies may provide a guide to improve the design and utility of PPE so that it will ensure not only the safety but also the comfort and well-being of healthcare professionals during any of the future epidemics of this century.

ACKNOWLEDGMENT

Sincere thanks to all the frontline COVID-19 health care warriors of Rajarajeswari Medical College and Hospital, Bengaluru.

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BCM - Concept and design of the study, prepared first draft of manuscript; **RR**- Concept, co-ordination, preparation of manuscript and revision of the manuscript
SAC- Concept, statistical analysis and interpretation **VG** - Concept, reviewed the literature and manuscript preparation; **CC** - Interpreted the results, Statistical analysis; **USMR** - Design of the study & reviewed the literature

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Source of Support: None, **Conflict of Interest:** None.