



Infection Prevention and Control Practices During COVID 19 Pandemic and Its correlation with Psychosocial Health among Health Care Workers

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ABSTRACT

Background: In COVID 19 pandemic put 70% of HCWs under psychosocial distress, this study aimed to find an association between the psychosocial condition of health workers and ICP measured followed.

Materials and Methods: A study was conducted among the health workers who worked for COVID 19 through a self-reporting questionnaire. Demographical, ICP measure and psychosocial data were collected from 42 HCWs who have worked in COVID 19 for more than 30 days.

Results: By SEM (Structural equation model) association was found between the SSRS (Social Support Rate Scale) score effect on ICPM (ICP Measure Followed by HCW) score ($\beta = 0.38$, $P = 0.000$), Hour in PPE score effect on ICPM score ($\beta = 0.21$, $P = 0.023$), violence effect on ICPM score ($\beta = 0.32$, $P = 0.001$) and SRDS (Self-Rating Depression Scale) score negatively effect on ICPM score ($\beta = -0.17$, $P = 0.059$) with Adjusted R Square of 0.6 at $P=0.000$, RMSEA 0.000, SRMR 0.002, GFI 1.00, AGFI 1.00, NFI 1.00, NNFI 1.00, CFI 1.00, ECVI 0.571.

Conclusions: A significant association was found between ICP measures followed by HCWs and training education given to them, social support, hours spent in PPE, violence. Even a significant association was seen between violence and sleep quality, the anxiety of HCWs.

Key-words: COVID 19, health care worker, Infection control and prevention

INTRODUCTION

The prevalence of COVID 19 among the HCWs and factors thereof are well evident by the fact that as of 21 April 2020 countries reported to WHO that over 35,000 health workers were infected with COVID19^{1,2}. This number was significantly higher because of underreporting. The major occupational risks for COVID19 infection among health workers were late recognition or suspicion of COVID-19 in patients, working in a higher-risk department, longer duty hours, sub-optimal adherence to infection prevention and control measures^{3,4}, such as hand hygiene practices, and lack of or improper use of per-

sonal protective equipment (PPE)⁵. Other factors have also been documented, such as inadequate or insufficient ICP training for respiratory pathogens^{6,7}, including the COVID-19 virus, as well as long exposure in areas in healthcare facilities where large numbers of COVID-19 patients were being cared for. Health workers are also at high risk of violence all over the world. Between 8% and 38% of health workers suffer physical violence at some point in their careers¹. Many more are threatened or exposed to verbal aggression and social stigma because of their work and have often felt an absence of social acceptance and a sense of avoidance. Health workers

How to cite this article: Yadav OJ, Bharadva N, Nagar S, Rejoice RP, Jadhav RM, Jujara MA. Infection Prevention and Control Practices During COVID 19 Pandemic and Its correlation With Psychosocial Health Among Health Care Workers. Natl J Community Med 2022;13(5):279-286. DOI: 10.55489/njcm.130520221613

Financial Support: None declared

Conflict of Interest: None declared

Date of Submission: 25-01-2022

Date of Acceptance: 09-03-2022

Date of Publication: 31-05-2022

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face psychosocial hazards, which are exacerbated during emergencies where demands increase and they have to experience the risk of infection witness higher suffering or mortality. Long working hours, shift work, high workload, repeated duties, extreme patient loads, keeping away from family and near and dear for long and other psychosocial hazards can lead to fatigue, exhaustion, occupational burnout, increased psychological distress, or declining mental health - affecting the health of health workers, and the quality and safety of care delivered. Higher rate of positivity among Health care personnel as they have acquired the infection at work or in the community, it is necessary to protect the health and safety of this essential national workforce. Health care personnel have acquired the infection at work or in the community, it is necessary to protect the health and safety of this essential national workforce.^{8, 9, 10}

The COVID-19 has affected globally with reports which have stated that 70% of HCWs are under psychosocial distress¹¹ that's why it becomes more important to find out to what extent psychosocial distress has affected the knowledge of ICP and its quality of measures. So, it has become necessary to take important measures for decreasing psychosocial distress in HCWs for increasing ICP measures.

OBJECTIVE OF STUDY

The research was undertaken to study the association between the psychosocial condition of health workers and ICP.

METHODS

A study was conducted among the health workers who worked for COVID 19 through a self-reporting questionnaire with a google form. Demographical, ICP measure and psychosocial data were collected from 42 willing health care workers who have worked in COVID 19 from September 2020 to October 2020. Checklist for Reporting Results of Internet E-Surveys (CHERRIES) guidelines along with the Declaration of Helsinki as revised in 2013 was used for conducting the study. Electronic informed consent was taken on the initial page of the survey. Ethical Approval was taken from Parul Institute of Public

Health, Parul University, Vadodara, Gujarat. Inclusive criteria for the study were a health worker who has worked in COVID 19 at departments of respiratory medicine, fever clinics, isolation centres, IPD, COVID centres or the intensive care unit (ICU) for 15 days or more whereas Exclusive Criteria was a health worker who has not worked in COVID 19 or who have worked Less than 30 days. Descriptive statistics, SEM and multiple linear regression analyses were done with PSPP, Excel, R and epi info.

Cronbach's Alpha test was used for testing the internal consistency of each scale and values above 0.7 are acceptable for consistency of the scale. Anderson Darling test was used for normality. The fit Regression model was done between Infection Control and Prevention followed by HCWs scale was the dependent variable and independent variables were Training and Education, Social Support Scale, Self-Rating Anxiety Scale, Self-Rating Depression Scale, General Self-Efficacy Scale, Stanford Acute Stress Reaction, Pittsburgh Sleep Quality Index, hours spent in PPE, duty hours of HCWs, age and violence faced by HCWs. Variance Inflation Factor (VIF) was used for the measurement of multicollinearity in the model variables. Variables with VIF<5 were accepted in the model. SEM (Structural equation model) was used to analyse the relationship between measured variables & latent constructs for which standardised coefficient (Beta) was used as a "unit-free" measure of effect size, one that can be used to compare the magnitude of effects of predictors measured in different units. It also measures the relative strength and sign of the effect from a causal variable to an endogenous or outcome variable in units of standard deviation. The standardized coefficients (beta) value of "X" indicates that a change of one standard deviation in the independent variable results in an "X" standard deviation increases in the dependent variable in the model.

RESULTS

A total of 42 HCWs who participated in the study their mean± SD of age was 31.79 ±5.34 and Summary of various variables which are used in the study is as per table 1 and the significant association between violence and its effect on HCW are shown in table 2.

Table 1: Summary Statistics of variables

Variables	Mean	S.E. Mean	Std Dev	Variance	Kurtosis	Skewness	Cronbach's alpha
Age	31.79	0.82	5.34	28.47	0.44	0.28	NA
Duty hours per day	8.48	0.28	1.81	3.28	0.22	0.95	NA
Hours in PPE per day	4.42	0.38	2.45	6	-1.25	0.12	NA
ICPM (ICP Measure Followed)	52.07	1.59	10.29	105.82	0.85	-0.65	0.93
T & E (Training and Education)	8.93	0.23	1.5	2.26	0.94	-1.41	0.78
SSRS (Social Support Rate Scale)	59.12	2.92	18.93	358.45	-0.45	0.37	0.96
SRAS (Self-Rating Anxiety Scale)	36.14	1.39	9.03	81.49	5.54	1.52	0.83
SRDS (Self-Rating Depression Scale)	40.64	1.74	11.26	126.87	-0.43	-0.39	0.86
GSES (General Self-Efficacy Scale)	31.52	1.08	7.01	49.18	-0.74	-0.53	0.94
SASR (Stanford Acute Stress Reaction)	42.6	5.77	37.42	1400.44	0.97	1.06	0.98
PSQI (Pittsburgh Sleep Quality Index)	7.83	0.71	4.6	21.12	-0.05	0.65	0.38

Table 2: Effect of violence on HCWs

Violence Yes vs No	Chi-square	Probability
Violence Affected (No, Physically, Profession, Psychological, Socially)	24.8777	0.0001
Self-Rating Anxiety Scale (Marked to severe anxiety, Minimal to moderate anxiety, Most extreme anxiety, Normal)	6.5879	0.0391
Pittsburgh Sleep Quality Index (Good VS Poor)	11.6955	0.0001
Psychosocial information		
Violence faced	Yes	19 (45%)
	No	23 (55%)
Grade Social Support Scale	Average level support	28 (67%)
	High-level support	12 (28%)
	Low-level support	2 (5%)
Grade Self-Rating Anxiety	Marked to severe anxiety	1 (2%)
	Minimal to moderate anxiety	18 (43%)
	Most extreme anxiety	1 (2%)
	Normal	22 (53%)
Grade Self-Rating Depression	Mildly Depressed	11 (26%)
	Moderately Depressed	1 (2%)
	Normal	30 (72%)
Pittsburgh Sleep Quality Index	Good sleep quality	15 (36%)
	Poor sleep quality	27 (64%)

Table 3: Model summary ICPM (ICP Measure Followed)

Model Summary	ICPM	Age	T & E	Violence	SSRS	SASR	SRAS	GSES	PSQI
Root mean square error of approximation (RMSEA)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Standardized Root mean square residual (SRMR)	0.002	0.002	0.004	0.005	0.007	0.005	0.001	0.001	0.001
Goodness-of-fit index (GFI)	1.000	0.999	1.000	1.000	1.000	1.000	1.000	0.999	1.000
Adjusted GFI (AGFI)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Normed fit index NFI	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
(Non) Normed-Fit Index (NNFI)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Comparative fit index (CFI)	1.000	1.000	1.000	0.999	1.000	1.000	1.000	0.999	1.000
Expected cross-validation index (ECVI)	0.571	0.19	0.095	0.095	0.095	0.143	0.238	0.238	0.238
R	0.84	0.47	0.31	0.38	0.34	0.69	0.75	0.68	0.72
R Square	0.71	0.23	0.09	0.15	0.12	0.48	0.56	0.47	0.52
Adjusted R Square	0.6	0.16	0.07	0.12	0.09	0.45	0.51	0.41	0.47
Std. Error of the Estimate	6.52	4.88	1.45	0.47	18.02	27.71	6.34	5.39	3.36
F	6.56	3.68	4.15	6.79	5.24	17.89	11.54	8.13	9.96
P-value	0.000	0.02	0.048	0.013	0.027	0.000	0.000	0.000	0.000

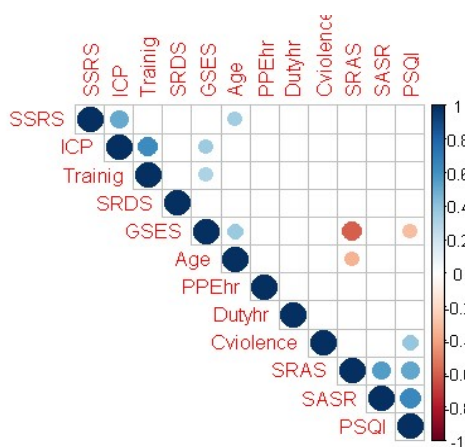


Figure 1: Significant correlation findings

In HCWs for measurement of the level of measures taken for infection control and prevention, training and education, Social Support, Anxiety, Depression, General Self-Efficacy, Acute Stress and Sleep Quality by the following scale were used respectively ICPM scale (ICP Measure Followed) which has 14 component, T & E scale (Training and Education) which has

5 component, SSRS (Social Support Rate Scale), SRAS (Self-Rating Anxiety Scale), SRDS (Self-Rating Depression Scale), GSES (General Self-Efficacy Scale), SASR (Stanford Acute Stress Reaction) and PSQI (Pittsburgh Sleep Quality Index). Pearson’s correlation between the significant findings of each scale from self-reporting questionnaires is shown in Figure 1.

There was a significant positive correlation between ICPM score and T & E score ($r = 0.621, P = 0.000$), SSRS score ($r = 0.509, P = 0.001$), GSES score ($r = 0.358, P = 0.02$). Significant positive correlation between T & E score and GSES score ($r = 0.306, P = 0.048$). Significant positive correlation between SSRS score and age ($r = 0.340, P = 0.027$)

Significant positive correlation between SRAS score and SASR score ($r = 0.554, P = 0.000$), PSQI score ($r = 0.516, P = 0.000$) and negative correlation between SRAS score and GSES score ($r = -0.591, P = 0.000$), age ($r = -0.345, P = 0.025$). Significant positive correlation between GSES score and age ($r = 0.369, P = 0.016$) and negative correlation with PSQI score ($r = -0.309, P = 0.046$).

Table 4: Coefficients of model ICPM (ICP Measure Followed)

Path	Unstandardized coefficient	Standard error	Standardization coefficient	z-value	P-value
ICPM ← T & E	3.67	0.72	0.54	5.13	0.000
ICPM ← SSRS	0.21	0.05	0.38	3.98	0.000
ICPM ← SRAS	-0.22	0.15	-0.20	-1.50	0.133
ICPM ← SRDS	-0.16	0.08	-0.17	-1.88	0.059
ICPM ← GSES	-0.08	0.18	-0.06	-0.47	0.642
ICPM ← SASR	0.00	0.03	-0.01	-0.05	0.958
ICPM ← PSQI	-0.15	0.28	-0.07	-0.54	0.588
ICPM ← Hr. PPE	0.88	0.39	0.21	2.27	0.023
ICPM ← Duty Hr.	-0.77	0.51	-0.14	-1.52	0.129
ICPM ← Age	0.19	0.20	0.10	0.92	0.356
ICPM ← Violence	6.54	2.03	0.32	3.22	0.001
Age ← SSRS	0.07	0.04	0.26	1.87	0.062
Age ← SRAS	-0.12	0.10	-0.20	-1.21	0.228
Age ← GSES	0.14	0.13	0.18	1.03	0.305
T & E ← GSES	0.07	0.03	0.31	2.09	0.037
Violence ← PSQI	0.04	0.02	0.38	2.67	0.008
SSRS ← Age	1.21	0.51	0.34	2.34	0.019
SASR ← SRAS	1.26	0.54	0.30	2.34	0.019
SASR ← PSQI	3.94	1.06	0.48	3.72	0.000
SRAS ← GSES	-0.53	0.15	-0.42	-3.61	0.000
SRAS ← SASR	0.08	0.03	0.35	2.59	0.010
SRAS ← PSQI	0.28	0.27	0.14	1.03	0.301
SRAS ← Age	-0.22	0.19	-0.13	-1.15	0.252
GSES ← T & E	1.43	0.54	0.31	2.64	0.008
GSES ← SRAS	-0.41	0.11	-0.53	-3.87	0.000
GSES ← PSQI	0.12	0.21	0.08	0.58	0.563
GSES ← Age	0.29	0.16	0.22	1.85	0.064
PSQI ← SRAS	0.05	0.08	0.10	0.62	0.536
PSQI ← GSES	-0.09	0.09	-0.14	-1.00	0.319
PSQI ← SASR	0.06	0.02	0.50	3.87	0.000
PSQI ← violence	2.47	1.02	0.27	2.42	0.016

Significant positive correlation between SASR score and PSQI score ($r = 0.641$, $P = 0.000$) Significant positive correlation between PSQI score and violence score ($r = 0.381$, $P = 0.013$)

Path analysis was done with structural equation model (SEM) to measure the associations and importance of training and education, Social Support, Anxiety, Depression, General Self-Efficacy, Acute Stress, Sleep Quality, age, hours spent in PPE, duty hours and violence faced by HCW on ICP measures taken by HCW with standardized beta weighting as shown in figure 2.

Fit Indices of SEM for models are summarized in table 3. Cut-off for good fit are as follows $GFI \geq 0.95$, $AGFI \geq 0.90$, $NFI \geq 0.95$, $NNFI \geq 0.95$, $CFI \geq 0.90$, $RMSEA < 0.08$, $SRMR < 0.08$, $ECVI =$ Smaller the better and good for model comparison.

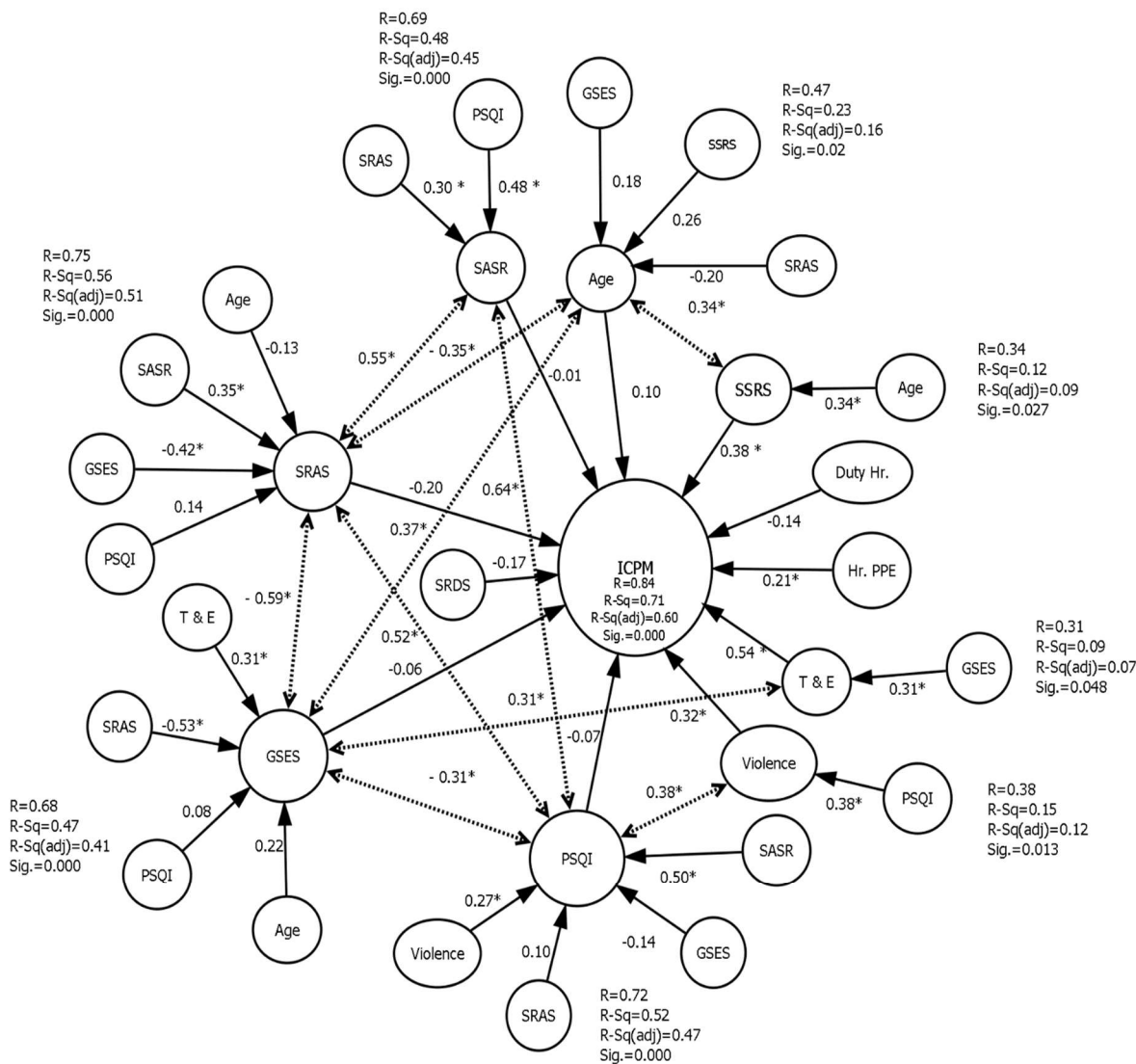
ICPM model explains associations of training and education, Social Support, Anxiety, Depression, General Self-Efficacy, Acute Stress, Sleep Quality, age, hours spent in PPE, duty hours and violence faced by HCW on ICP measures taken by HCW.

The age model explains the association of General Self-Efficacy, Social Support and Anxiety on the age of HCW. T & E model explains the association of General Self-Efficacy on Training and education of HCW. The violence model explains the association of Sleep Quality on Violence. SSRS model explains the associa-

tion of Social Support on the age of HCW. SASR model explains the association of Anxiety and Sleep Quality on Acute Stress. SRAS model explains the association of age, Acute Stress, General Self-Efficacy and Sleep Quality on Anxiety of HCW. GSES model explains the association of Training and education, Anxiety, Sleep Quality and age on the General Self-Efficacy of HCW. PSQI model explains the association of Violence, Anxiety, General Self-Efficacy and Acute Stress on Sleep Quality of HCW.

The normalised path coefficient of each Model is summarised are in table 4. The T & E score of HCW are significant and positively affect the ICPM score of HCW ($\beta = 0.54$, $P = 0.000$), SSRS score effect on ICPM score ($\beta = 0.38$, $P = 0.000$), Hr. PPE score effect on ICPM score ($\beta = 0.21$, $P = 0.023$), violence effect on ICPM score ($\beta = 0.32$, $P = 0.001$) and SRDS score negatively effect on ICPM score ($\beta = -0.17$, $P = 0.059$).

Based on the score from the self-reporting questionnaires the level of social support, training and education, hours spent in PPE and violence significantly affect their ICP measures taken by health care workers during donning to doffing of PPE, level of sleep quality and Anxiety significantly effect on Acute Stress of HCW, level of Acute Stress and General Self-Efficacy significantly effect on Anxiety of HCW, level of training & education and Anxiety significantly effect on General Self-Efficacy of HCW, violence and Acute Stress significantly affect Sleep Quality of HCW.



ICPM=ICP Measure Followed , T & E=Training and Education , SSRS=Social Support Rate Scale , SRDS=Self-Rating Depression Scale , SASR=Stanford Acute Stress Reaction , SRAS=Self-Rating Anxiety Scale , GSES=General Self-Efficacy Scale , PSQI=Pittsburgh Sleep Quality Index
 * is P < 0.05, <----> is correlation, --> Standardized coefficients (Beta)

Figure 2: Impact of variables on ICPM (ICP Measure Followed)

DISCUSSION

The psychosocial health of Health care Workers during the pandemic and its effect and correlation with Infection Prevention and Control practices followed were studied. Interestingly it was found that social support with mean and SD was 59.12 ± 18.93 whereas other studies have a mean of 34.172 and SD ±10.263²⁰ which were low from the current study. In our opinion cause for the increase in social support might be would be the isolation of HCWs in hotels with other colleagues which has provided emotional support by spending much relaxed time with each other and tangible support such as ready meals and helps from hotel staff in their daily chores. General self-efficacy with mean and SD 31.52 ± 7.01 whereas in other studies it ranges from mean 2.267 to 47.04 and SD ±0.767 to ±7.72^{20,21,22} which was similar to other study's findings. In other studies, Stanford's Acute Stress Reaction (SASR) scale mean was 77.589

and SD ±29.525²⁰ which was on the lower side with 42.6 ± 37.42. Whereas variation was seen for Self-Rating Anxiety Scale (SRAS) mean 42.91 to 55.256 and SD ±1.117 to ±14.183^{19, 20, 23} but it was on the lower side during the current study with 36.14 ± 9.03. Whereas Self-rating Depression Scale (SRDS) with a mean of 50.13 and SD ±1.813²³ in the previous study has been comparatively lower to 40.64 ± 11.26 in the present study. The decrease in acute stress reaction Decreased where notice in the acute stress reaction, anxiety and depression scale which might be would be due to deduction in duty hours to 6 hours a day and 2 days off in a week, training and education in the context of COVID 19 and reduction of patient load on HCWs and study was done during the declining phase of the epidemic curve of the first phase of COVID 19. Pittsburgh Sleep Quality Index (PSQI) ranges from mean 8.583 to 16.07 and SD ±3.761 to ±4.567^{20, 23} which was in the range of the previous study with 7.83 ± 4.6.

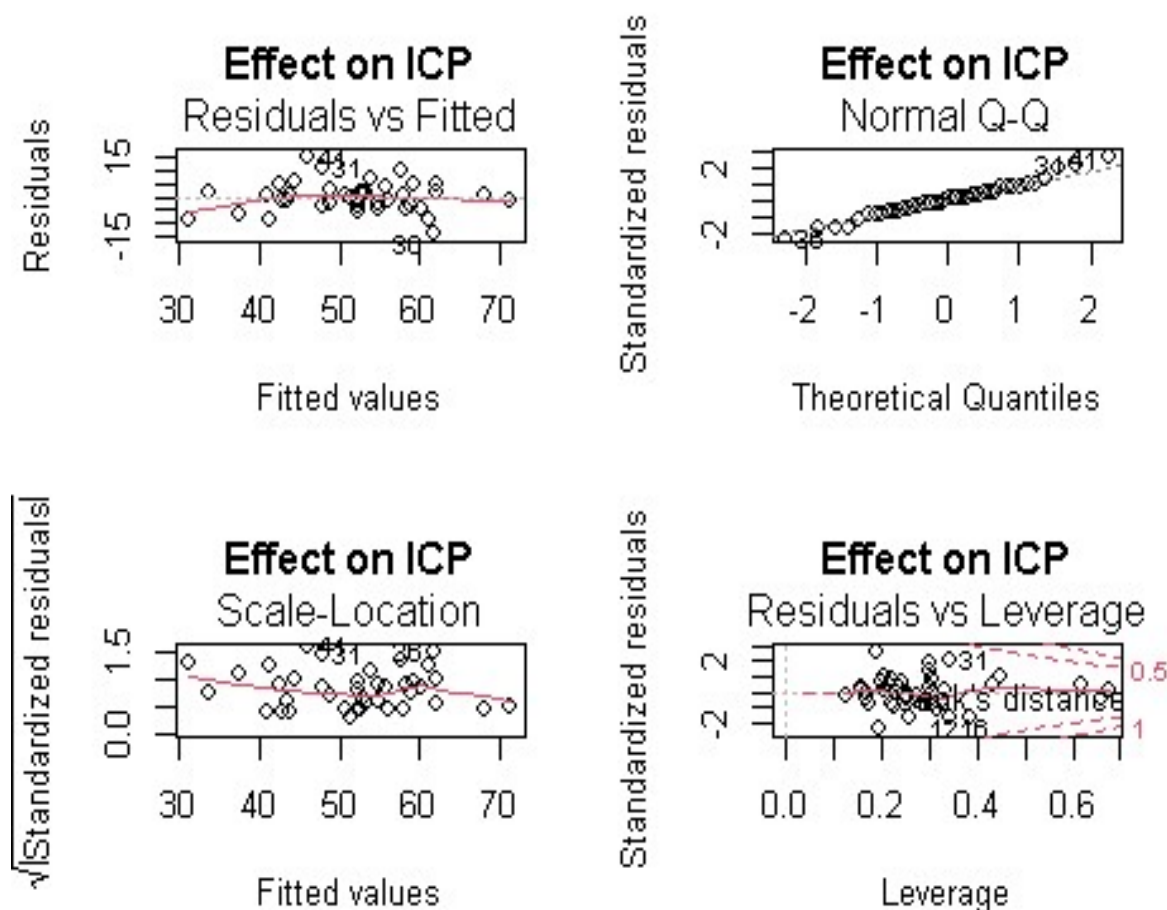


Figure 3: multiple linear regression model showing effect of Training + SSRS + SRAS + SRDS + GSES + SASR + PSQI + PPE hr + Duty hr + Age + violence on ICPM of HCW

In COVID 19 outbreak there were high rates of depression, anxiety, and insomnia which reported with over 70% reporting psychological distress¹². The lowest reported prevalence of anxiety and depression among HCWs was 24.1% and 12.1% respectively. Also, the highest reported values for the aforementioned parameters were 67.55% and 55.89% respectively^{11, 13, 14, 15, 16, 17, 18} whereas in the current study it was 47% and 28% respectively. Insomnia was reported 34% among HCWs^{17, 18} but in the current study, it was higher at 64%. It would seem significant cause which pointed toward an increase in anxiety and Insomnia was violence. Finding significantly suggests that one standard deviation change in Training & education ($P=0.000$), Social support ($P=0.000$), Hours spent in PPE ($P=0.023$) and violence ($P=0.001$) will respectively bring change in infection prevention and control measure followed by HCWs result by 0.54, 0.38, 0.21 and 0.32 standard deviations. The study had several limitations such as it is a cross-sectional study with a small sample size. Therefore, other studies designed with larger samples are needed to be investigated for the effects of psychosocial and violence on ICP quality measures followed by HCWs who are working with high-stress levels and workloads in the pandemic.

CONCLUSION

From the present study, it could be concluded that social support, Training & education Hour spent in PPE are associated with effective Infection Prevention and control measures practiced by HCWs such as workplace COVID 19 etiquettes, hand hygiene practice, wearing a mask in public places. Emotional support, Tangible support such as someone to prepare meals and someone to take care of them when they are in need, Affection support and positive social interaction such as relaxation and enjoyment have a positive effect on IPC measures of HCWs. Whereas violence has a significant association with anxiety factors such as unrest mind, sleep disturbance which harm on Infection Control and Prevention measures followed by HCWs.

RECOMMENDATIONS

Stakeholder's intervention is needed for including the importance of Psychosocial Effect and violence effect on the quality of ICP measures taken by HCW and give its importance to counter it in policymaking related to Infection Prevention and Control.

Educational & Training interventions such as Orient all responders, including nurses, ambulance drivers, volunteers, case identifiers, teachers and community leaders and workers in quarantine sites, on how to provide basic emotional and practical support to affected people using Psychological First Aid.

Using the platform of technology and online services such as online mental health education, online psychological counselling services and online psychological self-help intervention systems.

ACKNOWLEDGEMENT

I render my profound sense of gratitude to all the faculties of Parul Institute of Public Health, Parul University, for their inspiring and most keen guidance and extent, which cannot be expressed by mere words. Only with his kind and proper guidance, this work has seen the light of day. I thank them for the confidence they had in me. I take this opportunity to thank my family who has always been there with me and supported me in ways beyond their means. Finally, I would like to thank my colleagues who directly or indirectly helped me with the same.

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