

Evaluation of the pattern of COVID-19 infection in hospital staff in Iran

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DOI: 10.22034/HBB.2023.02

Received: August 24, 2022; Accepted: January 16, 2023

ABSTRACT

Health-care workers are one of the most at-risk groups in Covid-19 pandemic. The aim of this study was to investigate the pattern of Covid-19 among hospital employees. Among the participants there were 58 % nurses, 12 % physicians, 26 % other wards paraclinical and 4 % service personnel. In terms of educational qualifications, 2 %, 8 %, 68 %, 12 % and 10 % had diploma, associate degree, bachelor's degree, master's degree and above, respectively. The type of ward and the number of working hours of hospital staff as well as poor hand washing increase the incidence of Covid-19. However, no significant relationship was found between the time interval between contact and infection, knowledge of the use of precautions, how to get infected, the pre-crisis workplace ward of Covid-19 and the shifts of employees with Covid-19 disease.

Keywords: COVID-19, hospital staff, Yazd

INTRODUCTION

Covid-19 disease appeared at the end of 2019 in Wuhan, Hubei Province, China. The rapid spread of the virus prompted the World Health Organization (WHO) to declare a global health emergency [1].

Covid-19 is dangerous to vulnerable groups through health insecurities. Many people in different countries were quarantined, and special social and communication restrictions in accordance with the cultural and social status of the countries have been imposed in many places [2]. The deadly

outbreak of coronavirus has exceeded the existing capacities of the health systems of many countries and as the epidemic accelerates, the lack of prevention equipment (personal protective equipment), diagnosis and treatment, especially among health workers in hospitals was the most serious dilemma. On the one hand, the lack of equipment (especially prevention and diagnosis) and on the other hand, the low usability of personal protective equipment has made the performance of work for hospital staff an important challenge.[3] At the outbreak of the epidemic, many health centers adopted a policy of reusing personal protective equipment, which itself had many health considerations. Prolonged use of personal protective equipment has also caused problems such as headaches, nausea and severe allergic skin reactions, mainly due to the low usability of this equipment. Reports indicate that the design of many of these devices does not take into account long-term use considerations [4]. According to the centers for disease control and health and the World Health Organization, the corona virus is transmitted in close proximity to air currents or respiratory droplets and direct contact of infected hands with the eyes,

nose, or mouth. Therefore, airflow or negative ventilation inside hospital wards plays an important role in controlling the transmission of the virus.[5] Nurses will mainly face the problem that by wearing insulated clothing (gowns, gloves and shields) they will be exposed to this double heat stress which can affect their performance and occupational health. Lack of attention to mental health is one of the important factors in reducing efficiency, loss of human resources and causing physical and mental complications, especially in professional services. There is no doubt that health care workers are at the forefront of the fight against this disease and are also exposed to more infection. Recent studies have shown that the percentage of infection rate of medical care workers during the prevalence of this disease is 3.8% with the main reason for those unprotected contacts with infected patients at the beginning of the outbreak of coronavirus [6].

Previous studies have shown that at the time of SARS and Ebola, health care workers experienced some of the most damaging psychological disorders, such as anxiety, fear, and anxiety. It should be noted that these results can severely affect

the quality and performance of their activities and services [7]. Risk factors including exposure to the pathogen, long working hours, mental distress, fatigue, burnout, physical and psychological violence. Therefore, it is necessary for health care workers to use N95 masks and protective clothing [8]. This study aimed to investigate the the pattern of COVID-19 infection in one of the main hospital in central Iran.

MATERIALS AND METHODS

This is a case-control study was performed between March 2020-May 2020. All staff of Shahid Sadoughi Hospital in Yazd, including specialists, residents, interns, head nurses, nurses, services, secretaries and administrative staff with Covid-19 disease were enrolled in this study (182 people). Inclusion criteria were confirmed diagnosis of COVID-19 using Polymerase Chain Reaction (PCR) test, pulmonary changes observed on CT scan or physician diagnosis. The number of samples in the control group was considered twice the number of the case group and they were randomly selected from the healthy staff and were matched to the cases. Data collection tool was a researcher-made questionnaire consisting of 38 questions.

The validity and reliability of the prepared questionnaire were evaluated by content validity and internal consistency methods, respectively, and were used after modifying and adding comments. In order to prevent the spread of the disease and quarantine the cases, the questionnaires were taken and completed by telephone by the questioner. In the control group, questionnaire were filled by the attending researcher.

Statistical methods

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) software version 16 (Chicago, USA). The Shapiro-Wilk t-test was used to test normal distribution of numerical variables. Categorical variables were compared using Fisher's exact or χ^2 tests, and continuous variables were compared using student's t-test, ANOVA, and Chi-Square. Data was presented as mean \pm Standard Deviation (SD) for continues variables and wo-sided P-value less than 0.05 was considered statistically significant.

RESULTS

Demographic characteristics of the experimental and control groups based on gender, degree of education, employment status and occupation were shown in Table

1. In the experimental group median age was 28.33 ± 11.73 years and the youngest and the oldest were 22 and 56 years old, respectively. Most participants were female (86 %), those who held bachelor's degree (68 %), formal employment (62 %) and Nurse (58 %).

In the control group median age was 26.19 ± 9.33 years going from 20 to 56 years. Most participants were female (78 %), those who held bachelor's degree (59 %), formal employment (58 %) and Nurse (63 %) (Table 1).

As shown in Table 2 it can be said that at the 95 % confidence level, the working hours with a regression coefficient of 0.431 and a critical value of 4.563 has a positive and significant effect on COVID-19. The current part of the workplace with a regression coefficient of 0.581 and a critical value of 4.410 has a positive and significant effect on COVID-19. Also, hand washing with regression coefficient of 0.378 and critical value of 4.596 has a significant positive effect on COVID-19.

Table 3 showed that in terms of working hours, 68 % of patients with Covid-19 had more than 200 working hours in experimental group, while only 12 % of the control group had more than 200 hours (about 6 times in the experimental group compared to the control group). In the experimental group, 86 % of the patients worked in the inpatient wards of COVID-19 patients and cared for COVID-19 patients, while only 8 % of the control group worked in the COVID-19 patients wards and had a direct connection with patients. The rate of hand washing was reported to be about 16 % in the experimental group, while this rate was reported to be about 94 % among the control group.

Table 4 illustrates in both control and experimental groups, no significant relationship was found between knowledge of using precautionary measures, mode of infection, pre-crisis workplace, shift work of staff and the time interval between exposure to the virus and infection with COVID-19 disease.

Table 1. The demographic characteristics of the experimental and control group

		Experimental (%)	Control (%)
Gender	Male	14	22
	Female	86	78
Degree of education	Diploma	2	6
	Associate degree	8	12
	Bachelor's Degree	68	59
	Master's Degree	12	8
	Above	10	15
Employment Status	Formal	62	58
	jobless	38	42
Occupation	Nurse	58	63
	Medical Doctor	12	12
	Paraclinical and administrative departments	26	21
	Services	4	4

Table2. Hypothesis test results

	Regression coefficient	Critical value	<i>p</i> value
Working hours	0.431	4.563	<0.001
Current part of the workplace	0.581	4.410	<0.001
Hand washing	0.378	4.596	<0.001

Table3. Hypothesis test results in experimental and control groups

	Experimental group	Control group	p value
Working hours	68%	12%	<0.001
Current part of the workplace	86%	8%	<0.001
Hand washing	16%	94%	<0.001

Table4. Hypothesis test results in experimental and control groups

	Experimental group (p-value)	Control group (p-value)
knowledge of using precautionary measures	>0.05	>0.05
mode of infection	>0.05	>0.05
pre-crisis workplace	>0.05	>0.05
shift work of staff	>0.05	>0.05
time interval between exposure to the virus and infection	>0.05	>0.05

DISCUSSION

The present study investigated the pattern of COVID-19 disease among the staff of Shahid Sadoughi Hospital in Yazd.

According to the research findings, it can be said that working hours with a regression coefficient of 0.431 and a critical value of 4.563 have a positive and significant effect on COVID-19 infection.

In the analysis of the mentioned hypothesis,

it can be said that in COVID-19 conditions, the tightness of work shifts and its complications, and on the other hand, the increase in the number of referrals and related care increases the incidence of COVID-19 disease. There was no study on the effect of working hours on COVID-19 disease in nurses. Gharache et al conducted a study on the effect of working hours on burnout in nurses. In their research, they found that long working hours and shifts

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have the greatest effect on burnout in nurses [9]. The results of this study are in line with their research. The results of this study also show that the workplace sector with a regression coefficient of 0.581 and a critical value of 4.410 has a positive and significant effect on COVID-19 disease. In the wards where COVID-19 or respiratory patients are hospitalized (internal two and ECU), the incidence of staff was higher. In this regard, Nemati et al. reported that nurses working in inpatient wards of COVID-19 patients experience high levels of anxiety in the field of Covid-19 disease for themselves and their families [10]. In general, many studies have shown that stress increases the risk of developing COVID-19 disease. Stress and fear of developing COVID-19 disease due to contact and care of patients can be one of the key drivers that increase the incidence of this disease. As known, stress affects the immune system. Therefore, being in a virus-affected environment and in constant fear of contracting it, turns stress into a morbid fear which could make a person suffer from the disease in a short period of time. The result of this hypothesis is consistent with the research of Rahimian et al. They found in their research that the nature of the disease increases severe

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stressful reactions such as fatigue, anxiety and depression in nurses.[11] In this study, we showed that low hand washing with regression coefficient of 0.378 and critical value of 4.596 has a significant positive effect on COVID-19 disease. Although hand hygiene methods are simple, the issue of hand hygiene by individuals is very challenging, which is reflected in the results of numerous studies in developed countries. Numerous studies have been conducted in this field, indicating low acceptance and poor performance of health workers in this regard.[12] Numerous studies (Arshadi Bustanabadi et al.) in concurrence with this study have concluded that hand washing with soap and water can play an important role in reducing the incidence of COVID-19 and is considered as a worldwide prevention protocol.[13-15] In most studies, there is a relationship between knowledge and information about the use of precautions in individuals and the incidence of infectious diseases, especially COVID-19 disease, and one of the ways to prevent these diseases is to increase the level of knowledge and awareness of individuals [16]. However, in our study, no correlation was found between the knowledge of the use of precautions and the incidence of Covid-19 disease. This may be

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due to the fact that the subjects had the same level of awareness, regardless of the level of education, place of work and type of activity, provided by the hospital education office and other means of communication. They received the necessary knowledge on how to catch and transmit the disease, and the mass media also played a role in raising the awareness of the whole community, especially the therapists. On the other hand, holding virtual training classes and webinars, as well as instructions issued by the hospital management to emphasize the observance of preventive health tips were all effective in raising this knowledge, and therefore, all participants in this study have some level of knowledge related to these cases. Golabadi et al., and Habibi et al. in two separate studies showed that high working hours and different shifts and more staff contact with patients and the hospital environment is effective in increasing the incidence of this disease.[17,18] However, in our study, no association was found between shift work and COVID-19 disease. Given that being on the move and taking turns creates a kind of diversity in people, and this in itself can be effective in reducing people's stress, so it can justify the lack of connection with the disease. Biganeh et al., Kim et al., in their

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study showed that burnout of nurses and working in wards where COVID-19 patients are admitted has a significant impact on nurses' incidence of infectious diseases such as Middle East Respiratory Syndrome (COV-MERS), but in wards where infectious patients are not admitted, the incidence does not make a difference.[19,20] In our study, the mode of infection was more due to contact with secretions and not washing hands, which is consistent with most studies.[21] This is in line with other findings of this study that one of the causes of the disease in the case group compared to the control group was not washing hands and was significantly associated with the incidence of the disease, because the relationship between hand contact with secretions and not washing it has been proven in many studies and our study also confirmed it [21,22]. For COVID-19, a two-week interval is considered from the time of contact to the onset of symptoms [23]. In our study, no correlation was found between the contact time interval with the disease, meaning that there was no difference in the duration of contact with patients and the infection. Perhaps one of the reasons is that contact with patients is accompanied by health and preventive measures, so that the control

group which works in COVID-19 ward with all safety protocols met does not contract the disease. Therefore, it cannot be said that duration of contact with COVID-19 patients as the main cause of this disease.

CONCLUSION

Since not washing hands, long working hours and working in COVID-19 wards have put hospital staff at greater risk for COVID-19 infection, it is recommended to reduce staff working hours, encourage and require employees to wash their hands before and after each procedure, place standardized posters and guidelines in a correct area that is accessible to all and rotate between different wards to prevent staff from getting infected. Also, hospital administrators can increase the number of forces, educating individuals to create a proper attitude and adaptation to the present and provision of suitable conditions for individual health which cause reduce complications due to long working hours of employee.

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