

ORIGINAL RESEARCH

Assessment of COVID-19 among healthcare workers in Non-COVID pediatrics departments, Tehran, Iran: A cross-sectional study

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Abstract

Objective: The severe acute respiratory syndrome coronavirus 2(SARS COV 2) is an important health problem, which is widespread around the world. This study describes the characteristics of COVID-19 infections in healthcare workers (HCWs), related factors and deaths in Non- COVID pediatrics departments from the early phases of COVID-19 pandemic; February 20th, 2020 to January 19th, 2021 in Tehran-Iran.

Materials and Methods: It is a multi-center cross-sectional descriptive study. The standardized questionnaire was designed according Demographics information, Coronavirus disease (COVID-19) history in HCW and Using and access to Personal Protective Equipment (PPE). All data analysis was performed by SPSS software version 21.

Results: Of the 82 HCW, 67 (81.7%) was female. The median age was 37.6 ±10.3 years old (rang 24 to 65). 44 (53.6%) were nurses, 14 (17 %) pediatrics residents, 13 (15.9%) pediatrics faculty members, 8 (9.8%) environmental services staff and 3 (3.7%) secretaries. Twelve out of our cases (14.6%) have underlying medical diseases. Thirty-six (42.7%) confirmed COVID19. In COVID-19 positive group 28 (80%) were female. Among whom 51.4% were identified nurses, 17% faculty member and 14.3% pediatrics residents. Secretaries and environmental services staff are more vulnerable job category in this study. Eighty-six percent of them follow protective health protocol and use PPE. COVID-19 cases were infected more on July 2020 (25.7%), November 2020 (17.1%) and August 2020 (14.2%).

Conclusion: Approximately one half of HCWs in non-Covid-19 pediatrics department infected with corona virus 2 (SARS_COV_2) and most of them thought they were infected in workplace.

Keywords: COVID-19, Pediatric, Healthcare worker

Introduction

The severe acute respiratory syndrome corona virus 2(SARS-COV-2) pandemic is a crucial health issue around the world. Health care workers (HCWs) are at risk and vulnerable group for COVID-19 disease (1, 2). In Iran as of 19 February 2020 more than five thousand of HCWs are infected with corona virus and unfortunately hundreds of them were died (3). Although COVID-19 in pediatrics is asymptomatic or has milder clinical symptoms, they are able be a carrier and transmit the virus to others (4). As a result of that, Pediatrics department's staff are exposed to corona virus(5). They can have infected with COVID 19, whereas it is a neglected issue in hospitals. The aim of this study was to evaluate the epidemiology of COVID_19 diseases in Non-COVID pediatrics department's HCWs in Shahid Beheshti University of Medical Sciences (SBUMS).

Materials and Methods

This is a multi-center cross-sectional descriptive study conducted among Healthcare workers (HCW) in Non-COVID pediatrics department of Loghman Hakim (it is located in southwest of Tehran), and Imam Hossein (it is located in east of Tehran), Shohadaye Tajrish Hospital (it is located in north of Tehran), Shahid Beheshti University of Medical Sciences, Tehran, Iran in February 20th, 2020toJanuary19th, 2021. The ethics committee of Shahid Beheshti University of Medical Sciences (IR.SBMU.RETECH.REC.1399.673) approved the study. HCWs including pediatric residents, faculty members, nurses, environmental services staff and secretaries in Non-COVID pediatrics departments of SBUMS. HCWs with fixed shifts in Non-COVID pediatrics departments of SBMU. Interns, medical students, pediatrics department HCWs and residents who have shifts in department of COVID-19. Corresponding author designed the standardized questionnaire. It consists 3 main section; 1-Demographics information (sex, age, weight, BMI, Blood group and RH, past

medical, occupation type and education), 2-Coronavirus disease (COVID-19) history in HCW and their closed family (infection, date), 3-Using and access to Personal Protective Equipment (PPE). The questionnaire was completed by HCWs. The analysis was performed using statistical package for social sciences (SPSS) software version 21 using chi square test to evaluate the differences of qualitative variables and T-test / Mann Whitney U test to test quantitative variables.

Results

There were 110 HCWs who were in Non-COVID pediatrics departments of SBMU. According the inclusion and exclusion criteria, 82 of them were entered into this study,67(81.7%) were female. The mean age was 37.6 ± 10.3 years old (rang 24 to 62) and the mean BMI was 24.1 ± 3.3 kg/m². Forty four (53.5%) were nurses, 14(17 %) paediatrics residents, 13 (16%) pediatrics faculty members,8(9.8%) environmental services staff and 3(3.7%) secretaries. 27.8% were older than 45 years old and 72.2% were 24-45 years old. 76.8% were married. 12 (14.6%) have underlying medical diseases. Hypothyroidism (7cases), splenectomy after accident (1case), rheumatoid arthritis (1case), renal disorder (1case) and diabetes mellitus (1case). 90.2% of them follow protective health protocol and use PPE (table-1). Overall, 80% of HCWs believed non-COVID-19 pediatric departments follows protective protocol and guidelines. In addition, 60% suggested if they did not adhere protective protocol and using PPE; head department (28%), head nurse (25%), their colleagues (8%) and hospital supervisor (5%) reminded and gave them feedback.

PPE	Percent% COVID-19 positive (n=35)	Percent% COVID-19 negative (n=47)
Surgical Mask	91.4	95
Filter Respirator (N95)	23	19
Face Shield	7.3	8.5
Goggles	20	10.5
Gown -Aprons	5.7	6.5
Gloves	65.7	70
PPE using	90.2	93.5

Table 1: PPE using in COVID-19 and non- COVID-19 cases (P>0.05).

Blood types in the ABO/Rh are mentioned in table 2.

Blood group	Percent COVID-19 positive (n=35)	Percent COVID-19 negative (n=47)
A+	29.5	10
B+	23.5	30
AB+	11.5	6.5
O+	23.5	40
A-	0	10
B-	12	0
O-	0	3.5

Table2: blood types system in COVID-19 and non- COVID-19 cases (P>0.05).

COVID-19 positive group:

In 11-month period of COVID-19 pandemic in this study, 35(43%) confirmed COVID-19. In this group 28(80%) were female. The mean age was 38.3 ±10.5 years old. Mean BMI was 24.6±3.4 kg/m². In COVID-19 positive group 18(51.4%) were nurses, 5 (14.5%) pediatrics residents, 6 (17%) faculty members, 4(11.5%) environmental services staff and 2(5.6 %) secretaries. 80.3% of them follow protective health protocol. COVID-19 cases were infected more on July 2020 (25.7%), November 2020 (17.1%) and August 2020 (14.2%) (Diagram-1).

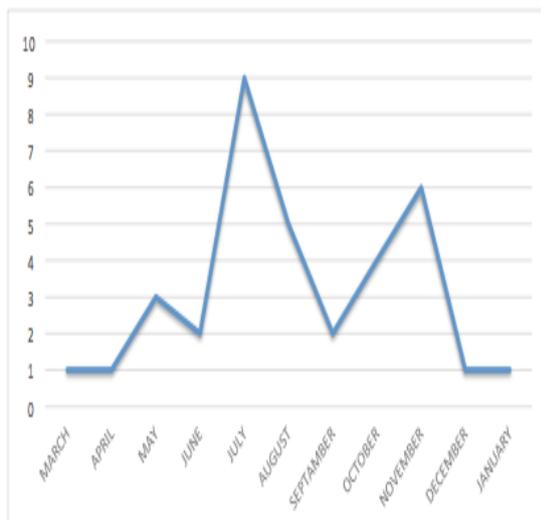


Diagram-1: Date of COVID-19 detection in HCWs.

COVID-19 in their closed family reported in 44% of them also one half of them suffered COVID-19 in the same time. The vast majority of them (76%) reported hospital environment and occupational source is one of the main causes of COVID-19. Three (8.5%) cases of COVID-19 have underlying medical diseases (Splenectomy, rheumatoid arthritis, diabetes mellitus). 34 (97.2%) of HCWs in this group were recovered but 1(2.8%) was died. Unfortunately, one of faculty members was died during this period. She was 62 years old and she worked in NICU as a neonatologist. She had fatigue, myalgia history and died at home. Aortic dissection and COVID-19 have been recorded in her autopsy. Characteristics features of HCWs with COVID-19 versus non-COVID-19 are mentioned in Table 3.

Characteristic	Percent N=82	COVID-19 Positive(n=35)	Non-COVID-19 (n=47)	P value in COVID-19 and non-COVID-19 group
Age(year) (Mean±SD)	37.6±10.3	38.3± 10.5	37±10.2	
Age Group(year)				
=>45	27.8	28	25.5	0.7
<45	72.2	72	74.5	
Sex				
Men	18.3	20.6	17	0.7
Female	81.7	79.4	83	
BMI (Mean±SD)	24.2±3.4	24.6±3.4	23.8±3.4	
BMI Group				
<=25	64	41	67	0.6
>25	36	59	33	
PMH				
No	85.5	91.5	81	0.16
Yes	14.5	8.5	19	
Job category				
>Specialist	16	17	15	0.8
Resident	17	14.5	19	
Nurse	53.5	51.5	55	
environmental services staff	9.8	11.5	9	
secretaries	3.7	5.5	2	
Education				
<Diploma	12.2	9	15	0.7
License	53.3	57.6	51	
=>Specialist	34.1	33.4	34	
COVID-19				
No	57	0	100	
Yes	43	100	0	

Table3: Characteristics features of HCWs in COVID-19 versus non-COVID-19

Secretaries and environmental services staff are the most vulnerable cases if each job category considers individually (Table 4).

Job category	Total number (N=82)	COVID-19 Positive (N=35)	Percent %
Secretaries	3	2	66.5
Environmental Services Staff	8	4	50
Faculty Members	13	6	46
Nurse	44	18	41
Pediatric Residents	14	5	35.5

Table 4: COVID-19 in each job category individually.

Discussion

Healthcare workers are at the front-line of fighting against COVID-19 pandemic worldwide. The large studies about COVID-19 infections noted that health-care workers from March to April 2020 had at least 3 to 4 fold increased risk compared with the general community (1, 6). Jia-Te Wei et al reported that attack rate (AR) of HCWs reach up to 11.9% in Wuhan/China and 20% in Italy (6). Additionally, it is increasing over time as an evidence; Taleb pour m. reported that one third of HCWs in Sina hospital were infected till August 2021 (7). Our study showed that 42.7% of healthcare workers in 3 Non- COVID-19 pediatrics wards of Shahid Beheshti University of Medical Sciences were infected. Moreover infection was more common in nurses (51.4%). Our study declared that median age in COVID-19 group was 38.3 ±10.5 years. Close to our results, Golnar Sabetian et al

reported a rate of 62.5% (273 out of 4854 cases) infection among HCW in southwest Iran, with a mean age of 35 years and female dominancy (53.5%), in our study 51.4% of infected cases were among nurses that was similar to their study results (8). Unfortunately we lost one of our best neonatologist/female /62year-old from the disease. Pediatrics nurses were the most common infected HCWs in our study, it may be related to factors like long work shifts, more close contact, difficult and stressful work. Soham Bandyopadhyay et al in a large worldwide systematic review in 152 888 infections and 1413 deaths, reported that infections were mainly in women (71.6%) and nurses (38.6%)but deaths were mainly in men (70.8%) and doctors (51.4%) (9). Furthermore Eghbali M et al showed that in epidemics, health personnel, particularly nurses are at the forefront of the fight against infectious disease (10). During this study period, 25.7% of infected cases were involved on July 2020 followed by November 2020 compatible with second and 3rd disease waves similar to Bandyopadhyay et al study that showed COVID-19 infections and deaths among HCWs follow that of the general population around the world(9). On the other hand Xiaoquan Lai et al in one case series demonstrated that most infections among HCWs occurred during the early stage of pandemic (11). We had not found published documents about pediatrics wards personnel infections but in orthopedic ward in Imam Khomeini Hospital 23% of HCWs were infected that was lower than our results may be because of more asymptotic pediatrics patients (12). Risk factors of this infection are multiple, Li Ran et al. showed that the high-risk department, longer duty hours, and suboptimal hand hygiene were linked to COVID-19 infection(13), Saqib Ali et al suggested that major risk factors for increasingly infection among HCWs include lack of understanding of the disease, inadequate use and availability of PPE, uncertain diagnostic criteria, lack of diagnostic tests ,the exhaustion and stress of personnel and lack of psychological support(14) and Haley Ehrlich et al declared that proper guidelines would significantly reduce transmission rates among HCWs(13, 15). Wee Hoe Ganet et al declared that Care teams must try to reduce the impact of any

inadvertent occupational exposure and Medical student withdrawal from wards. Also occupational exposure was suggested as an important additional item in this study (2, 14). Xiaoquan Lai et al reported that because of the risk and stress of contact with suspected patients, higher work load and insufficient supplies, nurses show worse Infection prevention and control behaviors over time(15, 16). Emanuele Nicastro et al. showed that Intra hospital spread of SARS-CoV2 is a major threat during the pandemic and the use of a strict protocol , adoption of PPE for HCWs, and use of screening of all admitted children and possibly all HCWs are important(2, 17).In this study 76% of participants thought that the source of their infection was from their working hospitals ,similar to Ying-Hui Jin et al that reported that from 103 professional staff with COVID-19 in Wuhan early in the epidemic, 84.5% thought they were infected in hospital-working place and 42% thought their infection was related to inadequate protective equipment(11, 18). Similar to our results In Lai X case series, in Wuhan, China from January 1th to February 9th, 2020, (71.8%) were women, most infections among HCWs occurred during the early stage of outbreak that non-first-line HCWs had a significantly higher compared with first-line HCWs may be because of Insufficient PPE or exposed to patients who were infected with no or very subtle symptoms (16). Jia-Te Wei et al declared that novel corona virus in HCWs are higher in general, ophthalmology, and respiratory departments compared with the infection diseases department that they had strict protective protocol(6). This study showed although most of the HCWs adhered to protective protocol and guideline, 42.7% of them infected. So one of the causes of COVID-19 infections in non-COVID department is that pediatricians might be carrier of SARS-CoV-2 and be asymptomatic (16). One of the most important points of this study is medical staff and environmental services staff are the most vulnerable cases in COVID -19 infections, if each job category considers individually. Health care assistants have more communication with variety of people in departments and touch surfaces more. Therefore they should be aware of using PPE, hand hygiene and obey social distancing.

Malik V.S et al. reported that patients with high BMI (BMI > 25 kg/m²) have moderate to high risk of complications with COVID-19, also in Kamb hampati AK et al study 73% of U.S. health care personnel (HCP) hospitalized with COVID-19 had obesity(19). Whiles there is no statistically significant differences in BMI >25 kg/m² in this study. The relationship between ABO blood groups and incidence of COVID-19 were controversial, but in a meta-analysis reported by Pourali et al showed that individuals with A blood group are at higher risk while those with O blood group are at lower risk for COVID-19 infection. Also Selçuk Yaylac et al showed that the most frequently seen blood type among COVID-19 patients was A Positive (20, 21). Though in this study there is no significant association between COVID-19 and blood group system. Owing to the limited sample size in this study and little prior research and experience in this field, future researches are necessarily recommended.

Most of our cases believed the occupational sources are a crucial item in infection transmission. Although non-COVID pediatrics department do not admit patient who are suspicious to COVID-19, pediatrics

departments HCWs should be adhere protective protocols and follow strict guideline. Nurses had more population in this study and secretaries and environmental services staff are more vulnerable job category. This study might be helpful as a guide for hospital infection control staff and HCWs for early and aggressive use of PPE especially in the beginning and peak of new and unknown contagious infectious diseases.

Conflict of interest

Authors declare no conflict of interest.

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