The prevalence of COVID 19 among PHCC workers and its relation to place of works and medical comorbidities

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Abstract

Background: COVID 19 disease has a wide spectrum of severity. This has made the study of the risk factors affecting the severity, open for research, beginning from blood grouping to obesity and other comorbidities. The infectious nature of the disease made it important to take very strict measures in infection control through all the medical facilities. Maintaining the wellbeing of health care workers is a priority during this pandemic

Aim: This study aims to find out the prevalence of COVID - 19 among PHCC staff during the period of March to end of September 2020 and to correlate between the place of work and position of the staff and to determine the risk factors associated with COVID-19 infection (age, gender, pre- existing Co-morbidities, and workplace).

Methods: A cross-sectional descriptive study design without any staff identifiers, data for all PHCC staff attending primary health care and their characteristics: Sociodemographic data: Age, Gender, Nationality, Weight, Height, BMI, Job title, PCR test results, Medical history, Place of Work (health care center), blood group captured through medical electronic system (CERNER).

Results: A total 5,062 staff were included, 1,541 (30.4 %) were males, 3,521 (69.6%) were females. Overall positive COVID19 cases were 489 representing 9.7% of the sample and the total negative cases were 4,573 representing 90.3% of the sample.

348 (71.2%) positive cases were females and 141 (28.8%) positive cases were males.

Of the total sample, medical staff were 4,061 and the non-medical sample were 1,001.

Among medical staff the positive cases were 349 (8.6%) and 140 positive cases were non-medical staff, 14 % of 1001 total cases.

Conclusion: Although PHCC also adopted a staff protection policy which included the waiver of attendance registration, the use of (masks, gloves, PPE), hand hygiene, isolation rooms for swabbing and the proper management of medical waste that resulted from dealing with COVID -19 patients, the prevalence of Covid 19 infection among PHCC staff during the period from march first till 30 September found to be 9.7 %, but neither the position at work or comorbidities were found to be statistically significant with COVID 19 infection.

Pharmacists were the most exposed medical staff category to COVID19 infection due to direct contact with all patients visiting PHCC, while dentists were second because they dealt with open mouth patients. Of non-medical staff, cashiers and billing staff were the highest category because the deal with all visitors and are exposed to probably infected material (redit cards , currency) in addition to lack of awareness and training.

No statistical significant results were found among comorbidities cases, reflecting the fact that their exposure is not affected by exposure at work rather than their community exposure.

Key words: COVID 19, Prevalence, Comorbidity, PHCC

Introduction

By August 9, 2020 more than 19 million confirmed cases were reported, half of them in the Americas with the East Mediterranean region reporting more than 1 million confirmed cases (3).

In the absence of effective treatments, the best way to deal with the SARS-CoV2 epidemic is to control the sources of infection. Strategies include early diagnoses, reporting, isolation, and supportive treatments; timely release of epidemic information; and maintenance of social orders. For individuals, protective measures, including improving personal hygiene, wearing medical masks, adequate rest, and keeping rooms well ventilated, can effectively prevent SARS-CoV-2 infection (13).

In Qatar, PHCC adopted an emergency service policy by assigning four health centers as COVID -19 test and hold health centers. These centers test and evaluate both patients with suspected COVID -19 who visit the health centers as walk in patients and suspected or confirmed patients referred from other health centers. Then the asymptomatic or mild cases are sent to quarantine centers and moderate or severe cases are sent to secondary care.

The staff working in the COVID - 19 centers are higher risk exposures for COVID -19 infections followed by healthcare workers working in the triage area in the other health centers, and also staff involved in swabbing, while the staff working in the specialized clinics are less exposed to infection.

PHCC also adopted a staff protection policy which included the waiver of attendance registration, the use of (masks, gloves, PPE), hand hygiene, isolation rooms for swabbing and the proper management of medical waste that resulted from dealing with COVID -19 patients.

Our study aims to find out the prevalence of COVID - 19 among PHCC staff during the period of March to end of September 2020 and to correlate between the place of work and position of the staff.

During the Epidemic high spread of Covid 19 infection, health care authorities concentrated their efforts to reduce spread in the population and to protect health care providers to avoid catastrophic situations which can lead to shortage of personnel and clinics available to front the evolving epidemic, so to evaluate the rate of infection among PHCC staff shows the success and efficacy of those efforts, also understanding the relation between frontline exposure and the mode of transmission via direct or close contacts of infected patients, or coworkers.
Correlating the severity of disease and recovery time varies depending on age, pre-existing comorbidity and the severity of the disease. According to WHO it is around two weeks for mild cases and three to six weeks for severe cases.

Methodology

The study is a cross-sectional descriptive study without any staff identifiers. The study used the data for all PHCC staff attending any primary health care centers and their information (Sociodemographic data: Age, Gender, Nationality, Weight, Height, BMI, Job title, PCR test results, Medical history, Place of Work (health care center), Sick leave taken for infection and blood group) that were captured through the medical electronic system (CERNER).

Inclusion criteria was all PHCC staff whose data is available in CERNER with valid PCR test results. This included all front-line staff and all PHCC care providers, personnel attending duties during that periods.

Exclusion criteria: PHCC staff who were not present at study period

This is a population-based study including all staff (physicians, nurses, pharmacists, lab technicians, radiologist technicians and receptionist) working in PHCC who attended any of the 27 health centers in Qatar during the period of March 2020 to the end of September 2020 with valid information of PCR- test results.

The primary outcome of interest was the prevalence of COVID - 19 among PHCC staff during the period of March to end of September 2020 and to correlate between the place of work and position of the staff.

Statistical Methods:
Descriptive statistics in the form of mean and standard deviation of the age and frequency with percentages were calculated for all the categorical variables in the study. Chi-square tests with Yates correction factors were used to see association between COVID 19 positive vs COVID 19 negative for all the categorical variables such as gender, DM, CVD, position of staff and others. Distribution of cases was presented in the form of a histogram. P value 0.05 (two tailed) was used to see statistically significant level. SPSS 26.0 statistical package was used for the analysis.

Results

A total 5,062 staff were included, 1,541 (30.4 %) were males, and 3,521 (69.6%) were females.

Overall positive COVID19 cases were 489 representing 9.7% of the sample and the total negative were 4,573 representing 90.3% of the sample. Please see Table 1.
348 (71.2%) positive cases were females representing 9.9% of all females and 141 (28.8%) positive cases were males representing 9.1% of all males. Please see Table 2.

Of the total sample, medical staff was 4,061and non-medical sample were 1,001.

Among medical staff the positive cases were 349 (8.6%) and 140 positive cases were non-medical staff, 14 % of 1,001 total cases. Please see Tables 3 and 4.

Among non-medical staff the highest infected category was the receptionists 553 total number with 86 positive cases (15.6) followed by cashier and billing staff, 71 total with 10 positive cases (14.1%) and security staff 65 total with 9 positive cases (13.8) respectively.

Of the medical staff the highest infected category was the pharmacists, 388 total staff with 47 (12.1%) of positive cases, dentists, 192 total with 18 (9.4%) positive cases, nurses 1,902 total staff with 175 (9.2%) positive cases , physicians, total 791 total staff with 53 (7.4 %) positive cases followed by lab technicians, total 269 staff with 19 (7.1%) positive cases, physiotherapists total 44 staff with 3 (6.8%) positive cases, radiology technicians total 172 staff with 10 (5.8%) positive cases and dentist assistants 174 total staff with 8 (4.6%) positive cases . Please see Table 5.

Regarding the place of work, the PHCC health centers are divided into 3 regions, the Northern region, the central and the western region. Of the total 5,062 cases 1,676 (33.1%) work in the Northern region, 1,567 (31.0%) work in the Central region and 1,819 (35.9%) works in the Western region. The positive cases were distributed as follows 143 (29.2%) in the Northern region, 153 (31.3%) in the Central region and 193 (39.5%) in the Western region. Please see Tables 6 and 7.

Of the 5,062 people 777 were diagnosed with DM (15.3% of the sample), 80 of them were positive representing (10.3%) of DM patients and 16.4 % of all positive cases.
832 people had hypertension (16.4%), of whom 76 were positive representing (9.1 %) of HTN patients and 15.5 % of all positive cases.

99 people had coronary vascular disease (2.0%), 10 of whom were positive representing 10.1% of coronary vascular disease cases and 2.0% of all positive cases.
1,053 people had dyslipidemia (20.8%), of whom 104 were positive representing 9.9 of dyslipidemia patients and 21.3 of all positive cases.

937 had Bronchial Asthma or Chronic Obstructive Pulmonary Disease; of whom 93 were positive representing 9.9 % of Bronchial Asthma or Chronic Obstructive Pulmonary Disease patients and 19.0% of all positive cases.
18 people had cerebrovascular disease (0.4%), 2 of whom were positive representing 11.1 of patients with cerebrovascular disease and 0.4 % of all positive cases.
70 people had cancer (1.4 %), 4 of whom were positive representing 5.7 % of cancer cases and 0.8 % of all positive cases.

39 cases had chronic kidney disease (0.8%),1 was positive representing (2.6 %) of chronic kidney disease patients and 0.2 % of all positive cases.

The blood group of 1,766 patients (34.9 %) was recorded, 136 of them were positive representing

(27.8 %) of all positive cases and was distributed as follows 2.2% A negative , 24.1% A positive, 0.4% AB negative, 3.9% AB positive, B negative 0.4%, B positive 13.5%, 2.5% O negative and O positive 25.2 %. Please see Table 17.

Of the 5,062 cases the majority were Filipinos (995), Indians (962) and Qatari (850) in nationality representing 13.1%, 19.0% and 26.0% of all positive cases respectively. Please see Table 18.

The BMI OF 3,830 cases from the total of 5,062 was recorded ,1502 (39.2%) had pre-obesity 9.3% of whom were positive cases , 959 (25.0%) had normal weight 9.7 % of whom were positive cases , 907 (23.7%) had obesity I 11.0% of whom were positive cases ,296 (7.7%) had obesity II 12.8 % of whom were positive cases ,142 (3.7%) had obesity III 11.3 % of whom were positive cases and underweight were 24 cases (0.6%) none of whom were positive cases. Please see Table 19.

These ranges of BMI are used to describe levels of risk:
Overweight (not obese), if BMI is 25.0 to 29.9.
Class 1 (low-risk) obesity, if BMI is 30.0 to 34.9.
Class 2 (moderate-risk) obesity, if BMI is 35.0 to 39.9.
Class 3 (high-risk) obesity, if BMI is equal to or greater than 40.0.

Table1

COVID_19_positive_negative

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Negative	4573	90.3	90.3	90.3
	Positive	489	9.7	9.7	100.0
	Total	5062	100.0	100.0	

Table 2

			COVID-19 positive-negative		
			Negative	Positive	Total
Gender	Female	Count	3173	348	3521
		% within Gender	90.1%	9.9%	100.0%
		% within COVID-19- positive-negative	69.4%	71.2%	69.6%
	Male	Count	1400	141	1541
		% within Gender	90.9%	9.1%	100.0%
		% within COVID-19- positive-negative	30.6%	28.8%	30.4%
Total		Count	4573	489	5062
		% within Gender	90.3%	9.7%	100.0%
		% within COVID-19--positive-negative	100.0%	100.0%	100.0%

Table 3

			COVID-19 positive-negative	
			Negative	Positive
Medical staff	Non-Medical Staff	Count	861	140
		% within Medical staff	86.0%	14.0%
		% within COVID_19_positive negative	18.8%	28.6%
	Medical Staff	Count	3712	349
		% within Medical-staff	91.4%	8.6%
		% within COVID-19 positive-negative	81.2%	71.4%
Total		Count	4573	489
		% within Medical staff	90.3%	9.7%
		% within COVID-19- positive-negative	100.0%	100.0%

Table 4

			Total
Medical staff	Non-Medical Staff	Count	1001
		% within Medical-staff	100.0%
		% within COVID-19-positive-negative	19.8%
	Medical Staff	Count	4061
		% within Medical staff	100.0%
		% within COVID-19-positive-negative	80.2%
Total		Count	5062
		% within Medical staff	100.0%
		% within COVID-19-positive-negative	100.0%

Table 5

| | | | COVID-19-positive-negative | | |
			Negative	Positive	Total
Staff position	Administrative Staff	Count	130	18	148
		% within Staff position	87.8%	12.2%	100.0%
		% within COVID-19-positive-negative	2.8%	3.7%	2.9%
	Allied Health Staff	Count	172	15	187
		% within Staff position	92.0%	8.0%	100.0%
		% within COVID-19-positive-negative	3.8%	3.1%	3.7%
	Cashier & Billing Staff	Count	61	10	71
		% within Staff position	85.9%	14.1%	100.0%
		% within COVID-19-positive-negative	1.3%	2.0%	1.4%
	Customer Service	Count	67	9	76
		% within Staff position	88.2%	11.8%	100.0%
		% within COVID-19-positive-negative	1.5%	1.8%	1.5%
	Dental Assistant	Count	166	8	174
		% within Staff position	95.4%	4.6%	100.0%
		% within COVID-19-positive-negative	3.6%	1.6%	3.4%
	Dentist	Count	174	18	192
		% within Staff position	90.6%	9.4%	100.0%
		% within COVID-19-positive-negative	3.8%	3.7%	3.8%
	Driver/Transport Staff	Count	13	1	14
		% within Staff position	92.9%	7.1%	100.0%
		% within COVID-19-positive-negative	0.3%	0.2%	0.3%
	Lab Technician	Count	250	19	269
		% within Staff position	92.9%	7.1%	100.0%
		% within COVID-19-positive-negative	5.5%	3.9%	5.3%
	Nurse	Count	1727	175	1902
		% within Staff position	90.8%	9.2%	100.0%
		% within COVID-19-positive-negative	37.8%	35.8%	37.6%
	Pharmacist	Count	341	47	388
		% within Staff position	87.9%	12.1%	100.0%

Table 5 (continued)

Radiology Technician	Count		162	10	172
	% within Staff position		94.2%	5.8%	100.0%
	% within COVID-19-positive-negative		3.5%	2.0%	3.4%
Receptionists	Count		467	86	553
	% within Staff position		84.4%	15.6%	100.0%
	% within COVID-19-positive-negative		10.2%	17.6%	10.9%
Security	Count		56	9	65
	% within Staff position		86.2%	13.8%	100.0%
	% within COVID-19-positive-negative		1.2%	1.8%	1.3%
Wellness Staff	Count		80	8	88
	% within Staff position		90.9%	9.1%	100.0%
	% within COVID-19-positive-negative		1.7%	1.6%	1.7%
Total	Count		4573	489	5062
	% within Staff position		90.3%	9.7%	100.0%
	% within COVID-19-positive-negative		100.0%	100.0%	100.0%

Table 6

			COVID-19-positive - negative
Place of Work (as per HR Work Location)	Northern Region	Count	1533
		% within Place of Work (As per HR Work Location)	91.5%
		% within COVID19_positive-negative	33.5%
	Central Region	Count	1414
		% within Place of Work (As per HR Work Location)	90.2%
		% within COVID-19-positive-negative	30.9%
	Western Region	Count	1626
		% within Place of Work (As per HR Work Location)	89.4%
		% within COVID-19 positive-negative	35.6%
Total		Count	4573
		% within Place of Work (As per HR Work Location)	90.3%
		% within COVID-19 positive-negative	100.0%

Table 7

			COVID-19 positive-negative	Total
Place of Work (as per HR Work Location)	Northern Region	Count	143	1676
		% within Place of Work (as per HR Work Location)	8.5%	100.0%
		% within COVID-19 positive-negative	29.2%	33.1%
	Central Region	Count	153	1567
		% within Place of Work (as per HR Work Location)	9.8%	100.0%
		% within COVID19 positive-negative	31.3%	31.0%
	Western Region	Count	193	1819
		% within Place of Work (as per HR Work Location)	10.6%	100.0%
		% within COVID-19 positive-negative	39.5%	35.9%
Total		Count	489	5062
		% within Place of Work (as per HR Work Location)	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%

Table 8

			COVID-19 positive-negative		Total
			Negative	Positive	
DM	No	Count	3876	409	4285
		% within DM	90.5%	9.5%	100.0%
		% within COVID19 positive-negative	84.8%	83.6%	84.7%
	Yes	Count	697	80	777
		% within DM	89.7%	10.3%	100.0%
		% within COVID-19 positive-negative	15.2%	16.4%	15.3%
Total		Count	4573	489	5062
		% within DM	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 9

| | | | COVID-19 positive-negative | | |
			Negative	Positive	Total
HTN	No	Count	3817	413	4230
		% within HTN	90.2%	9.8%	100.0%
		% within COVID19 positive-negative	83.5%	84.5%	83.6%
	Yes	Count	756	76	832
		% within HTN	90.9%	9.1%	100.0%
		% within COVID-19 positive-negative	16.5%	15.5%	16.4%
Total		Count	4573	489	5062
		% within HTN	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 10

| | | | COVID-19 positive-negative | | |
			Negative	Positive	Total
CVD	No	Count	4484	479	4963
		% within CVD	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	98.1%	98.0%	98.0%
	Yes	Count	89	10	99
		% within CVD	89.9%	10.1%	100.0%
		% within COVID-19 positive-negative	1.9%	2.0%	2.0%
Total		Count	4573	489	5062
		% within CVD	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 11

			COVID-19 positive-negative		
			Negative	Positive	Total
DYSLIPIDEMIA	No	Count	3624	385	4009
		% within DYSLIPIDEMIA	90.4%	9.6%	100.0%
		% within COVID-19 positive-negative	79.2%	78.7%	79.2%
	Yes	Count	949	104	1053
		% within DYSLIPIDEMIA	90.1%	9.9%	100.0%
		% within COVID-19 positive-negative	20.8%	21.3%	20.8%
Total		Count	4573	489	5062
		% within DYSLIPIDEMIA	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 12

			COVID-19 positive-negative		
			Negative	Positive	Total
ASTHMA or COPD	No	Count	3729	396	4125
		% within ASTHMA or COPD	90.4%	9.6%	100.0%
		% within COVID-19 positive-negative	81.5%	81.0%	81.5%
	Yes	Count	844	93	937
		% within ASTHMA or COPD	90.1%	9.9%	100.0%
		% within COVID-19 positive-negative	18.5%	19.0%	18.5%
Total		Count	4573	489	5062
		% within ASTHMA or COPD	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 13

			COVID- 19 positive-negative	
			Negative	Positive
CEREBROVASCULAR	No	Count	4557	487
		% within CEREBROVASCULAR	90.3%	9.7%
		% within COVID-19 positive-negative	99.7%	99.6%
	Yes	Count	16	2
		% within CEREBROVASCULAR	88.9%	11.1%
		% within COVID-19 positive-negative	0.3%	0.4%
Total		Count	4573	489
		% within CEREBROVASCULAR	90.3%	9.7%
		% within COVID-19 positive-negative	100.0%	100.0%

\Table 14

			Total
CEREBROVASCULAR	No	Count	5044
		% within CEREBROVASCULAR	100.0%
		% within COVID-19 positive-negative	99.6%
	Yes	Count	18
		% within CEREBRO VASCULAR	100.0%
		% within COVID-19 positive-negative	0.4%
Total		Count	5062
		% within CEREBROVASCULAR	100.0%
		% within COVID-19 positive-negative	100.0%

Table 15

			COVID-19 positive-negative		
			Negative	Positive	Total
CANCER	No	Count	4507	485	4992
		% within CANCER	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	98.6%	99.2%	98.6%
	Yes	Count	66	4	70
		% within CANCER	94.3%	5.7%	100.0%
		% within COVID-19 positive-negative	1.4%	0.8%	1.4%
Total		Count	4573	489	5062
		% within CANCER	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 16

			COVID-19 positive-negative		
			Negative	Positive	Total
CKD	No	Count	4535	488	5023
		% within CKD	90.3%	9.7%	100.0%
		% within COVID19 positive-negative	99.2%	99.8%	99.2%
	Yes	Count	38	1	39
		% within CKD	97.4%	2.6%	100.0%
		% within COVID-19 positive-negative	0.8%	0.2%	0.8%
Total		Count	4573	489	5062
		% within CKD	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 17

| | | COVID-19 positive-negative | | |
		Negative	Positive	Total
Blood-Group	Count	1630	136	1766
	% within Blood-Group	92.3%	7.7%	100.0%
	% within COVID-19 positive-negative	35.6%	27.8%	34.9%
A Negative	Count	69	11	80
	% within Blood-Group	86.3%	13.8%	100.0%
	% within COVID-19 positive-negative	1.5%	2.2%	1.6%
A Positive	Count	882	118	1000
	% within Blood-Group	88.2%	11.8%	100.0%
	% within COVID-19 positive-negative	19.3%	24.1%	19.8%
AB Negative	Count	6	2	8
	% within Blood-Group	75.0%	25.0%	100.0%
	% within COVID-19 positive-negative	0.1%	0.4%	0.2%
AB Positive	Count	158	19	177
	% within Blood-Group	89.3%	10.7%	100.0%
	% within COVID-19 positive-negative	3.5%	3.9%	3.5%
B Negative	Count	34	2	36
	% within Blood-Group	94.4%	5.6%	100.0%
	% within COVID-19 positive-negative	0.7%	0.4%	0.7%
B Positive	Count	568	66	634
	% within Blood-Group	89.6%	10.4%	100.0%
	% within COVID-19 positive-negative	12.4%	13.5%	12.5%
O Negative	Count	68	12	80
	% within Blood-Group	85.0%	15.0%	100.0%
	% within COVID-19 positive-negative	1.5%	2.5%	1.6%
O Positive	Count	1158	123	1281
	% within Blood-Group	90.4%	9.6%	100.0%
	% within COVID-19 positive-negative	25.3%	25.2%	25.3%
Total	Count	4573	489	5062
	% within Blood-Group	90.3%	9.7%	100.0%
	% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 18

| | | | COVID-19 positive-negative | | |
			Negative	Positive	Total
Nationality	Algerian	Count	4	1	5
		% within Nationality	80.0%	20.0%	100.0%
		% within COVID-19 positive-negative	0.1%	0.2%	0.1%
	American	Count	13	1	14
		% within Nationality	92.9%	7.1%	100.0%
		% within COVID-19 positive-negative	0.3%	0.2%	0.3%
	Armenian	Count	1	0	1
		% within Nationality	100.0%	0.0%	100.0%
		% within COVID-19 positive-negative	0.0%	0.0%	0.0%
	Australian	Count	9	1	10
		% within Nationality	90.0%	10.0%	100.0%
		% within COVID-19 positive-negative	0.2%	0.2%	0.2%
	Bahraini	Count	3	0	3
		% within Nationality	100.0%	0.0%	100.0%
		% within COVID-19 positive-negative	0.1%	0.0%	0.1%
	Bangladeshi	Count	3	1	4
		% within Nationality	75.0%	25.0%	100.0%
		% within COVID-19 positive-negative	0.1%	0.2%	0.1%
	Bosnian	Count	1	0	1
		% within Nationality	100.0%	0.0%	100.0%
		% within COVID19 positive-negative	0.0%	0.0%	0.0%
	British	Count	251	10	261
		% within Nationality	96.2%	3.8%	100.0%
		% within COVID-19 positive-negative	5.5%	2.0%	5.2%
	Bulgarian	Count	1	0	1
		% within Nationality	100.0%	0.0%	100.0%
		% within COVID-19 positive-negative	0.0%	0.0%	0.0%
	Canadian	Count	12	0	12
		% within Nationality	100.0%	0.0%	100.0%
		% within COVID-19 positive-negative	0.3%	0.0%	0.2%

Table 18 (continued)

Colombian	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Croatian	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Danish	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID--19 positive-negative	0.0%	0.0%	0.0%
Egyptian	Count	474	59	533
	% within Nationality	88.9%	11.1%	100.0%
	% within COVID-19 positive-negative	10.4%	12.1%	10.5%
Emirati	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Eritrean	Count	3	1	4
	% within Nationality	75.0%	25.0%	100.0%
	% within COVID-19 positive-negative	0.1%	0.2%	0.1%
Filipino	Count	931	64	995
	% within Nationality	93.6%	6.4%	100.0%
	% within COVID-19 positive-negative	20.4%	13.1%	19.7%
French	Count	2	0	2
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
German	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Hungarian	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%

Table 18 (continued)

Indian	Count	869	93	962
	% within Nationality	90.3%	9.7%	100.0%
	% within COVID-19 positive-negative	19.0%	19.0%	19.0%
Indonesian	Count	3	0	3
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19-positive-negative	0.1%	0.0%	0.1%
Iranian	Count	22	3	25
	% within Nationality	88.0%	12.0%	100.0%
	% within COVID-19 positive-negative	0.5%	0.6%	0.5%
Iraqi	Count	22	3	25
	% within Nationality	88.0%	12.0%	100.0%
	% within COVID-19 positive-negative	0.5%	0.6%	0.5%
Irish	Count	4	1	5
	% within Nationality	80.0%	20.0%	100.0%
	% within COVID-19 positive-negative	0.1%	0.2%	0.1%
Italian	Count	2	0	2
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Jordanian	Count	352	26	378
	% within Nationality	93.1%	6.9%	100.0%
	% within COVID-19 positive-negative	7.7%	5.3%	7.5%
Kenyan	Count	3	1	4
	% within Nationality	75.0%	25.0%	100.0%
	% within COVID-19 positive-negative	0.1%	0.2%	0.1%
Kuwaiti	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Lebanese	Count	6	2	8
	% within Nationality	75.0%	25.0%	100.0%
	% within COVID-19 positive-negative	0.1%	0.4%	0.2%

Table 18 (continued)

Libyan	Count	5	2	7
	% within Nationality	71.4%	28.6%	100.0%
	% within COVID-19 positive-negative	0.1%	0.4%	0.1%
Malaysian	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Mauritanian	Count	0	1	1
	% within Nationality	0.0%	100.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.2%	0.0%
Moroccan	Count	4	1	5
	% within Nationality	80.0%	20.0%	100.0%
	% within COVID-19 positive-negative	0.1%	0.2%	0.1%
Netherlands	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
New Zealander	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Nigerian	Count	3	0	3
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.1%	0.0%	0.1%
Omani	Count	14	3	17
	% within Nationality	82.4%	17.6%	100.0%
	% within COVID-19 positive-negative	0.3%	0.6%	0.3%
Pakistani	Count	20	5	25
	% within Nationality	80.0%	20.0%	100.0%
	% within COVID-19 positive-negative	0.4%	1.0%	0.5%
Palestinian	Count	128	13	141
	% within Nationality	90.8%	9.2%	100.0%
	% within COVID-19 positive-negative	2.8%	2.7%	2.8%

Table 18 (continued)

Qatari	Count	723	127	850
	% within Nationality	85.1%	14.9%	100.0%
	% within COVID-19 positive-negative	15.8%	26.0%	16.8%
Russian	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Saudi	Count	9	1	10
	% within Nationality	90.0%	10.0%	100.0%
	% within COVID-19 positive-negative	0.2%	0.2%	0.2%
Serbian	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Slovakian	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Somali	Count	12	2	14
	% within Nationality	85.7%	14.3%	100.0%
	% within COVID-19 positive-negative	0.3%	0.4%	0.3%
Spanish	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Sudanese	Count	274	33	307
	% within Nationality	89.3%	10.7%	100.0%
	% within COVID-19 positive-negative	6.0%	6.7%	6.1%
Swedish	Count	2	0	2
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Syrian	Count	81	5	86
	% within Nationality	94.2%	5.8%	100.0%
	% within COVID-19 positive-negative	1.8%	1.0%	1.7%

Table 18 (continued)

Tunisian	Count		247	21	268
	% within Nationality		92.2%	7.8%	100.0%
	% within COVID-19 positive-negative		5.4%	4.3%	5.3%
Turkish	Count		5	1	6
	% within Nationality		83.3%	16.7%	100.0%
	% within COVID-19 positive-negative		0.1%	0.2%	0.1%
Yemeni	Count		41	7	48
	% within Nationality		85.4%	14.6%	100.0%
	% within COVID-19 positive-negative		0.9%	1.4%	0.9%
Total	Count		4573	489	5062
	% within Nationality		90.3%	9.7%	100.0%
	% within COVID-19 positive-negative		100.0%	100.0%	100.0%
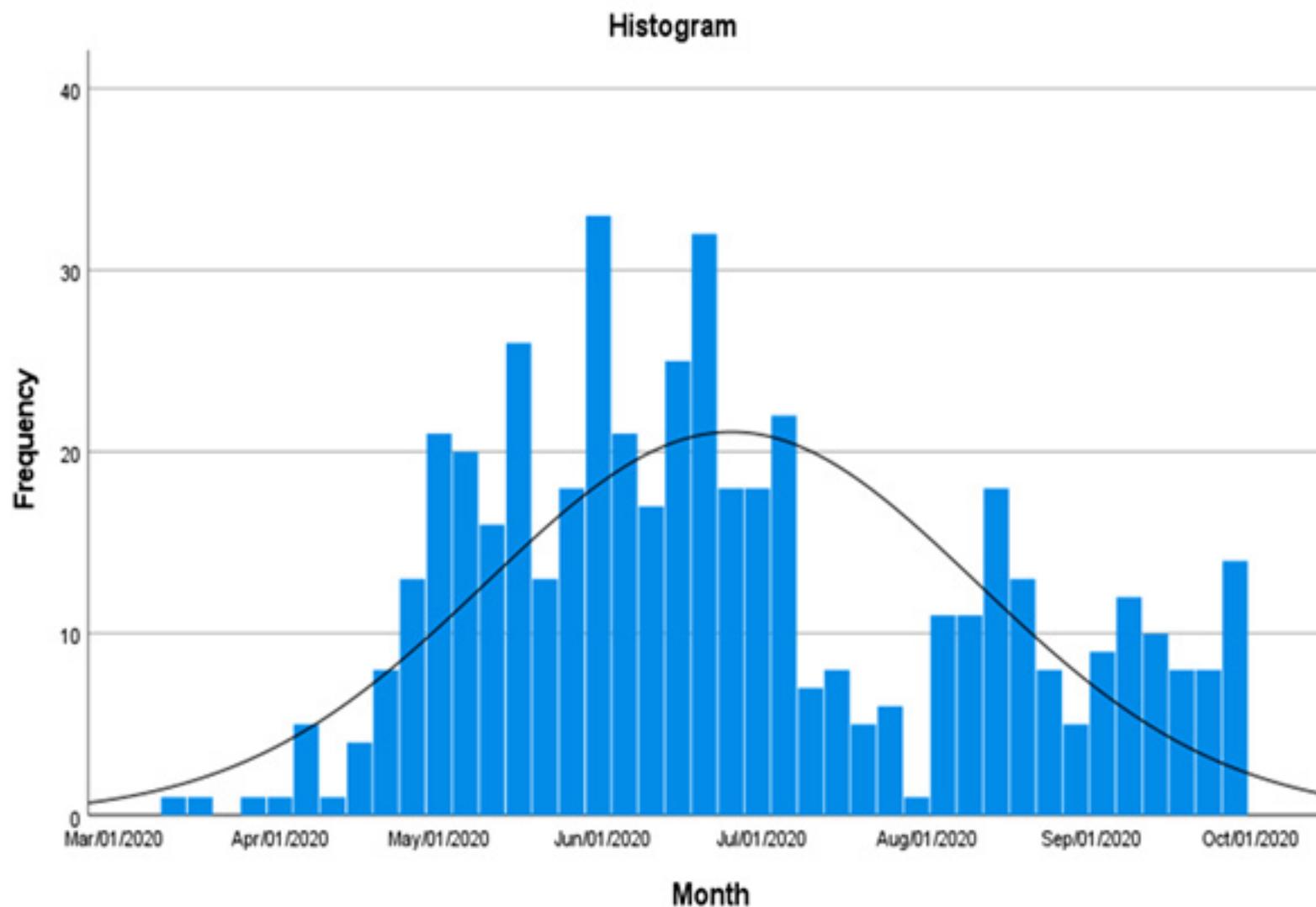
Histogram

Table 19

| | | | COVID-19 positive-negative | | |
			Negative	Positive	Total
BMI category	Under weight	Count	24	0	24
		% within BMI category	100.0%	0.0%	100.0%
		% within COVID-19 positive-negative	0.7%	0.0%	0.6%
	Normal weight	Count	866	93	959
		% within BMI category	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	25.2%	24.0%	25.0%
	Pre-Obesity	Count	1362	140	1502
		% within BMI category	90.7%	9.3%	100.0%
		% within COVID-19 positive-negative	39.6%	36.2%	39.2%
	Obesity I	Count	807	100	907
		% within BMI category	89.0%	11.0%	100.0%
		% within COVID-19 positive-negative	23.4%	25.8%	23.7%
	Obesity II	Count	258	38	296
		% within BMI category	87.2%	12.8%	100.0%
		% within COVID-19 positive-negative	7.5%	9.8%	7.7%
	Obesity III	Count	126	16	142
		% within BMI category	88.7%	11.3%	100.0%
		% within COVID-19 positive-negative	3.7%	4.1%	3.7%
Total		Count	3443	387	3830
		% within BMI category	89.9%	10.1%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Discussion

PHCC adopted a staff protection policy which included the waiver of attendance registration, the use of (masks, gloves, PPE), hand hygiene, isolation rooms for swabbing and the proper management of medical waste resulting from dealing with COVID -19 patients.

The prevalence of COVID 19 infection among PHCC staff during the period from March 1st till 30 September was found to be 9.7 %, but neither the position at work or comorbidities were found to be statistically significant with COVID 19 infection.

Pharmacists were the most exposed medical staff category to COVID 19 infection. This may be due to direct contact with all patients visiting the health centers, while dentists were second because they were dealing with open mouth patients; of non-medical staff receptionists, cashier and billing staff were the highest category because they deal with all visitors and are exposed to probably infected material (health cards, credit cards , currency) in addition to lack of awareness and training.

Although the COVID-19 pandemic evolved quickly, there were clear early warning signs that comorbidities, including diabetes, predisposed patients to adverse outcomes.

Obesity was an independent predictor of serious infection and obese patients were likelier to have diabetes versus other age- and sex-matched COVID-19 patients (20).

Our results showed increased susceptibility to Covid 19 infections for obese cases, (39%) of positive cases had obesity; similar results were found in Misumi et al's study (21),

while for the other comorbidities (DM, HTN, CKD, CVD, Dyslipidemia) our results showed slight insignificant increase of COVID19 infection for these patients; for DM 10.3 %, HTN 9.1%, CVD 10.1%, Dyslipidemia 9.9%, Asthma and COPD 9.9%, Cerebrovascular disease 11.1%, and Cancer 5.7 % .

The total number of Cancer cases was 70 patients who were waived from working in contact   with patients.

Since the beginning of the pandemic many studies were conducted to establish a relation with the blood grouping of COVID 19 infectivity and severity; in our sample a non-significant slightly higher proportion of blood group O individuals was found. This correlates with other studies results like Sunny Dziket et al (22).

Our sample was obtained by a data extraction team using anonymous   method, which did not give the research team opportunity to go through details of each positive patient to track the indication of swabbing, severity and hospitalization.

Also the study was limited with the small number of patients with cancer (70 patients), chronic kidney disease (39 patients) and patients with cerebrovascular disease (18 patients).

Conclusions

Although PHCC also adopted a staff protection policy which included the waiver of attendance registration, the use of (masks, gloves, PPE), hand hygiene, isolation rooms for swabbing and the proper management of medical waste resulting from dealing with COVID -19 patients, the prevalence of Covid 19 infection among PHCC staff during the period from March 1st till 30 September ws found to be 9.7 % , but neither the position at work or comorbidities were found to be statistically significant with Covid 19 infection.

Pharmacists are the most exposed medical staff category to Covid 19 infection due to direct contact with all patients visiting PHCC, while dentists are second because they are dealing with open mouth patients; among non-medical staff cashier and billing staff are the highest category because they deal with all visitors and are exposed to probably infected   material (credit cards, currency); in addition lack of awareness, training and socio-economic conditions played a determinant role in infection spread through non-medical staff.

No statistically significant results were found among comorbidities cases, reflecting the fact that they were not more exposed at work than the entire community's exposure.

Because we used anonymized data we could not get additional details and analysis of the comorbidity cases and evaluate their medical assessment at the moment of their infection.

Only 1,766 cases had their blood group identified in the database used for this study and this limited the analysis.

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