

Epidemiological determinants of COVID-19 in the police personnel: A cross-sectional study

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ABSTRACT

Background: Police are the frontline warriors who themselves are at risk of getting corona infection. This research with considerable sample size is the first of its kind to assess the epidemiological determinants of coronavirus disease 2019 (COVID-19) infection in the police personnel. **Material and Methods:** The Institutional Ethics Committee (IEC) approval and permission from police authorities were taken. The cross-sectional, descriptive study was planned on randomly selected 375 police personnel in the month of September-November 2020. Police detected with COVID-19 were included and those who were critically ill were excluded from the study. The written informed consent was taken and data was collected by pretested questionnaire. The data were entered and analyzed using SPSS version 21. **Results:** The mean age of study subjects was 34.25 ± 9.1 years with 84% being males. There was no significant difference in age and sex distribution of study subjects. The most commonly affected police personnel were police constables (222 out of 375) followed by police nayak (42 out of 375). Around 88.2% were symptomatic. Symptoms were fever (64%), weakness (54.4%), cough (38.4%), loss of smell sensation (35.2%), cold (32.3%), shortness of breath (13.9%), diarrhea (11.7%), and pain in the abdomen (6.4%). "Cold" symptom was significantly higher in the younger age group as compared with the older age group. Shortness of breath was significantly higher in males as compared with females (P value < 0.05). The perceived probable sources of infection were from a colleague (33.9%), family member (4.5%), residential society member (2.4%) while performing duty (23.2%), and while traveling in public transport (4%). Regarding preventive measures, almost 99%, 94%, and 87%, followed hand hygiene, mask-wearing, and physical distancing, respectively, prior to getting corona infection. AYUSH self-care practices such as daily drinking of turmeric milk, warm water, and breathing exercises were practiced by 66.9%, 85.9%, and 54.1% of the police personnel, respectively. **Conclusions:** There is male preponderance for corona infection among police personnel. Breathlessness is common in males as compared with female police. The cold symptom is mostly observed in young police personnel. Police personnel needs to judiciously follow physical distancing and practice general measures recommended by AYUSH.

Keywords: COVID-19, epidemiological determinants, police personnel

Introduction

Coronavirus disease 2019 (COVID-19) is the disease caused by a new coronavirus referred to as severe acute respiratory

syndrome coronavirus 2 (SARS-CoV-2). The World Health Organization (WHO) first learned about this new virus on December 31, 2019, following a report of a cluster of cases of "viral pneumonia" in Wuhan, People's Republic of China.^[1] The first case of COVID-19 in India was reported on Jan 30, 2020.^[2] India had the largest confirmed cases in Asia. Six cities viz. Mumbai, Delhi, Ahmedabad, Chennai, Pune, and Kolkata had accounted for around half of all reported cases in the country.

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Received: 28-03-2021

Revised: 04-07-2021

Accepted: 15-07-2021

Published: 31-01-2022

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_592_21

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How to cite this article: Sabale R, Velhal G, Tripathi V, Tripathi S. Epidemiological determinants of COVID-19 in the police personnel: A cross-sectional study. J Family Med Prim Care 2022;11:102-7.

In March 2020, the Prime Minister ordered a nationwide lockdown for 21 days which was extended for next till May 3, 2020, and once more extended. This lockdown restriction was important for containing the spread of coronavirus. Since the outbreak was declared an epidemic, provisions of the “Epidemic Diseases Act, 1897” were invoked.^[3]

Maharashtra was a hotspot that accounted for nearly one-third of the total cases in India. Mumbai was the worst-affected city in India. More than two-thirds of the cases in the state had emerged from the Mumbai metropolitan region.^[4] In April, Mumbai was the first Indian city to make wearing facemasks in public place compulsory.

With this lockdown situation and amendment of the Epidemic Diseases Act, Police have played a major role. The COVID-19 pandemic has created a range of unforeseen and unprecedented challenges for police departments. The challenges can be to maintain police-community relations when both are in fear of COVID-19.^[5] Police are the frontline warriors managing the restriction of movement of people during lockdown to prevent the spread of coronavirus. However, they were themselves at high risk of getting corona infection due to their job-work profile. As of September 2020, there were 19,756 cases of COVID-19 in the Maharashtra police force, out of which 15,830 policemen had recovered.^[6]

The COVID-19 pandemic created social upheaval and altered norms for all but its effects on police have been particularly profound. The principal roles of the police are to maintain the law and order in their area. Their responsibilities are to protect the law, prevent crimes, respond to emergencies, and provide support service. In the COVID-19 era, they have been expected to coordinate local shutdowns, encourage social distancing, and enforce stay-at-home mandates all while completing the responsibilities of protecting the law, preventing, and investigating the crime for which they are already understaffed.^[7]

Work-related transmission is considerable in early COVID-19 outbreaks, and the elevated risk of infection is not limited to the healthcare workers.^[8] As per our review of literature, there is a paucity of research on nonhealthcare workers such as police personnel. This quantitative research with a considerable sample size is the first of its kind to understand the epidemiological determinants of COVID-19 infection in the police personnel. The findings of this research can be a guiding tool for the policymakers, police authorities, general physicians, and health departments to strengthen preventive measures for COVID-19 infection or other emerging infectious diseases specific to the police personnel.

Material and Methods

The Institutional Ethics Committee’s approval and permission from police authorities were taken. It was a cross-sectional, descriptive study. Around 1,500 Mumbai police personnel

were infected till June 2020. We intended to include at least 25% of COVID-19-positive police personnel considering our feasibility to conduct the study. Thus, the sample size was 375 police personnel. The study was conducted from September to November 2020. The inclusion criterion was all the police personnel who were detected as COVID-19. The exclusion criteria were those who were critically ill COVID-19-positive police personnel and who are not willing to participate. For the data collection, assistance was sought from the police authorities. Police once detected with COVID-19, were admitted to the designated COVID-19 care center. All those who were admitted from July to August 2020 were included in the sampling frame. From this sampling frame, study subjects were selected by the random selection method. The written informed consents of the selected police were taken and the interviews were conducted by pretested questionnaire, which included questions about their job/work, symptoms of COVID-19, the perceived source of infection, presence of any comorbidity, and preventive measures undertaken before getting infected with the coronavirus. During the data entry, the questionnaire forms were first numbered. Data entry was done in the coded form in a Microsoft Excel file. The file was password protected and the password was shared among investigators only.

Data were analyzed using SPSS version 21. Results were expressed in proportion and the Chi-square test was used to study association, and the significance level was considered at 5% level of significance ($P < 0.05$).

Results

The mean age of study subjects was 34.25 ± 9.1 years. The minimum and maximum age were 20 and 58 years, respectively; 10% were above 50 years of age and 84% were males. There was no significant difference in age and sex distribution of study subjects. Furthermore, 83.2% (312 out of 375) had family sizes ranging from 2 to 5. Most commonly affected were police constables (222 out of 375) followed by police nayak (42 out of 375). Symptoms were seen in 88.2% of the police. There was no statistically significant association of age and sex with the presence of symptoms (P value > 0.05). Table 1 shows the proportion of study subjects with symptoms and comorbidities. The common symptom was fever (64%) followed by weakness (54.4%). There was a statistically significant association of age with “cold” as one of the symptoms (P value < 0.05). The cold was commonly seen in the younger age group as compared with the older age group. Shortness of breath was significantly associated with sex (P value < 0.05). It was common in males (35 out of 52) as compared with females (17 out of 52). Most study subjects had three symptoms (20.5%). Common comorbidities were hypertension (5.6%) and diabetes mellitus (4.3%). The proportion of study subjects with at least one comorbidity was 11.2%. There was a statistically significant association of the presence of morbidity with age (P value < 0.05). Around 45.9% of the morbidities were observed in the age group of 50 to 59. Morbidity was not associated with the sex of the study subject.

Table 1: Proportion of study subjects with symptoms and comorbidities (n=375)

	Frequency	Percentage
Symptoms		
Present	325	86.7%
Absent	50	13.3%
Type of symptoms		
Fever	240	64.0%
Weakness	204	54.4%
Cough	144	38.4%
Loss of smell sensation	132	35.2%
Cold	121	32.3%
Shortness of breath	52	13.9%
Diarrhoea	44	11.7%
Pain in the abdomen	24	6.4%
Number of symptoms		
One	75	20%
Two	77	20.5%
Three	60	16%
Four	54	14.4%
Five	35	9.3%
Six	11	2.9%
Seven	13	3.5%
Comorbidities		
Present	52	13.9%
Absent	323	86.1%
Type of comorbidities		
Hypertension	21	5.6%
Diabetes mellitus	16	4.3%
Asthma	5	1.3%
Myocardial infarction	2	0.5%
Renal failure	2	0.5%
Tuberculosis	2	0.5%
Number of comorbidities		
One	42	11.2%
Two	7	1.9%
Three	2	0.5%
Four	1	0.3%

Table 2 shows the sociodemographic and occupational-related variables among study subjects. The majority of the police personnel were posted at different places (32%) followed by nakabandi (30.9%). Almost 50% of the police personnel had to do 12 h per day duty. Almost half of them got once a week off. A total of 48.8% of the police personnel were posted at the containment zone. One-fourth of them had to use public transport to commute to their duty station. The perceived probable sources of infection in the police personnel were from colleagues (33.9%), family members (4.5%), residential society members (2.4%) while performing duty (23.2%), and while traveling in public transport (4%). Almost 32% could not find any perceived source of infection. A total of 41.9% always felt that they are in close contact with any suspected COVID-19-positive person. In 15.2% and 17.3% of the police personnel, their family members and colleagues got infected, respectively, because of them. The median number of family members and colleagues infected with coronavirus because of close contact with the study subject was 3 and 4, respectively.

Table 3 shows the measures undertaken by the police personnel for prevention against COVID-19 infection. Almost all were regularly cleaning hands, and 94%, 35%, and 40% regularly wore masks, goggles, and face shields, respectively. Moreover, 87% followed physical distancing, and 35%, 54%, 67%, and 86% followed AYUSH immunity-boosting respiratory health measures viz. practicing meditation, doing breathing exercises, drinking turmeric milk, and drinking warm water, respectively. In addition, 24% and 60% consumed vitamin D and vitamin C tablets, respectively.

Discussion

The COVID-19 pandemic has brought changes in the way humans interact. Everyone is at risk of getting infected with coronavirus but the high-risk groups include healthcare workers, frontline workers, old age, and those with comorbidities. In context to COVID-19, the frontline workers include personnel from state and central police organizations, armed forces, home guards, and civil defense volunteers including disaster management volunteers and municipal workers (excluding healthcare workers), prison staff, and revenue officials engaged in containment and surveillance activities, etc.

Prior to the COVID-19 pandemic, not all police forces were seen interacting with the community. But due to lockdown and enforcement measures, they are in the frontline interacting with the people to ensure that citizens follow the norms as advised by the government. Their work involves unavoidable contact with the public, and these kinds of circumstances naturally put officers at greater risk of the virus simply via their attendance.^[9]

Since 2020, various researches are going on to understand the epidemiology, clinical features, management of COVID-19. There are many studies on COVID-19 in healthcare workers including systematic reviews and meta-analysis.^[10-12] However, to our knowledge, there is a paucity of research describing the epidemiological determinants of COVID-19 in police personnel. In the era of the COVID-19 pandemic, when scientists all over the world are gathering evidence to understand the epidemiology of COVID-19, it is also of utmost importance to know about COVID-19 in the frontline workers also, especially police since they constitute a major workforce. In Mumbai itself, there are lakhs of the police force.^[13] Moreover, police personnel similar to the general public, seek care from a general family physician for their illness. Thus, this paper can guide the family care physicians to understand COVID-19 epidemiology in the police, so that they can provide care based on the evidence generated.

Most of the police affected were below 50 years of age. The maximum age was 58 years. This finding is due to the preventive measures taken by the administration for police personnel over 55 years of age to stay at home and not assist in coronavirus-related duties.^[14] In the study conducted by Kokane

Table 2: Sociodemographic and occupational-related variables among study subjects

	Frequency	Percentage
Posting of police		
Nakabandi	116	30.9%
Police station	60	16%
Other	120	32%
Office	79	21.1%
Duration of duty hours per day		
3-9 h	69	18.4%
12 h	213	56.8%
14-18 h	33	8.8%
24 h	60	16%
Whether received duty off from work		
Never got an off	96	25.6%
Once a month	14	3.7%
Once a week	187	49.9%
Once in 15 days	17	4.5%
Any other	61	16.3%
Duty assigned in containment zone area		
Yes	183	48.8%
No	192	51.2%
Means for commuting to duty place		
Public transport	95	25.3%
Police van	63	16.8%
Walking	10	2.7%
Private vehicle	51	13.6%
Own vehicle	116	30.9%

Table 3: Measures undertaken by the police personnel for prevention against COVID-19 infection

	Frequency	Percentage
Wear mask regularly	352	93.9%
Wear Goggle regularly	133	35.5%
Wear face shield regularly	151	40.3%
Clean hands regularly	371	98.9%
Follow physical distancing regularly	326	86.9%
Took hydroxychloroquine prophylaxis	125	33.3%
Daily practice meditation	133	35.5%
Daily do breathing exercises/Pranayam	203	54.1%
Daily drink turmeric milk	251	66.9%
Daily drink warm water	322	85.9%
Consume vitamin D tablet	92	24.5%
Daily consume vitamin C tablet	224	59.7%

et al.,^[15] proportion of male police was (83.33%) and from the age group of less than 35 years (61.76%). This is inconsistent with our study findings. In our study, fever was the most common symptom. A similar finding was observed in the study by Gupta *et al.*^[16] In the study conducted by Tambe *et al.*,^[17] 18.7% of patients had two comorbidities and 3.0% of patients reported three comorbidities. This is in contrast to our findings. We got a lesser proportion may be due to the difference in the mean age in their study and our study.

It was observed in our study that, breathlessness was more common in males as compared with females. The reason for

this should be explored. As a precautionary measure, oxygen saturation by pulse oximetry should be frequently done among police who are involved in corona duty, especially for males.

In our study, on average three family members were infected due to close contact with police family members. A police officer's job work has a direct impact on his/her family members' health and safety. In the COVID-19 pandemic, there is a fear among police officers of bringing home the virus to their families. In turn, it is likely that family members simultaneously worry about their police officer family member.^[18] Cheng *et al.*^[19] concluded that most transmissions of COVID-19 occurred at the very early stage of the disease or even before the onset of symptoms, and the secondary clinical attack rate among contacts decreased over time as symptoms developed and progressed. To reduce fear among police and their family members of contracting COVID infection, initiatives have been undertaken by the Maharashtra Police. Separate quarantine or isolation facilities, dedicated hospitals have been earmarked for police at various places. Along with a COVID helpline, healthcare aid is being given through the Maharashtra Police Family Insurance scheme. At some high-risk areas, hotels and lodges have been allotted to them for quarantine purposes or while performing COVID duty. Pune police have issued a pictorial SOP to minimize the risk for the family of personnel once they go home.^[20] Even though police officers are doing much more to protect themselves, there are many instances where regardless of their protective equipment use or other measures, they are exposed to the virus.^[21] Moreover, with more police getting infected, it is taxing on police service, as the remaining police officers have to maintain the same level of service, putting them, in turn, at high risk of contracting the infection. In a study conducted by Hawkins, the protection against COVID-19 should include personal protective equipment, paid sick leave, and worker's compensation for those who contract the disease in the course of their work.^[22] In our study, it is observed that at the individual level, police have been following COVID-19 appropriate behavior, but there may be some loopholes in practicing these measures, thus getting infected by coronavirus. Around 10% of them could not follow physical distancing. This may be due to their job work profile such as while detaining individuals who are accused of breaking the law, not following traffic laws or while patrolling areas where crime has occurred it will be practically not possible to follow physical distancing. Moreover, sometimes mask is not used correctly leading to the risk of infection.

In the study conducted by Frenkel *et al.*,^[23] among all the perceived stress, a major proportion of stress was when police were assigned the task of the corona patrol. In our study, almost 50% were posted in the containment zone which is defined as a geographical area where a significant number of COVID-19 cases are found. In Mumbai, in the early phase of the pandemic, most of these containment zones were in the densely populated slums and chawls. No person was allowed to go out of the containment zone and no outsider was allowed entry. Institutional isolation and quarantine were done of positive and close contacts, respectively. In addition

to usual law enforcement work, in this pandemic, police also carried out a variety of unconventional duties, in isolation or quarantine, assisting the health department in contact tracing activities, helping migrant workers to enter shelters, and helping the needy persons in containment zone to access medical and other essential services.^[24] These additional activities have put police personnel more likely at risk to get affected by COVID-19 compared with the general population. Moreover, it is observed that duty hours of 50% of police was 12 h per day, 25% never got an off and were posted at patrolling at checkpoints.

In our study, public transport was a commonly used means of transport followed by a police van. In a study conducted by Hu *et al.*,^[25] COVID-19 has a high transmission risk among train passengers, but this risk shows significant differences with cotravel time and seat location. In a case-control study, the author concluded that physical distancing is the most effective public health measure to control COVID-19, in police settings.^[26] However, in our study, the proportion regularly following physical distancing was less as compared with washing hands regularly and wearing a mask.

India had approved the use of HCQ for prophylaxis against COVID-19.^[27] The police department had provided HCQ to all police personnel. However, only one-third had taken this preventive medicine. Moreover, only a few had completed the full dose of prophylaxis.

Ministry of AYUSH recommended some general measures for boosting immunity with special reference to respiratory health.^[28] In the present study, only 35% practiced breathing exercises, 85% drank warm water, and 66% drank turmeric milk. Awareness needs to be generated among police personnel regarding these general measures, especially to practice breathing exercises to prevent COVID-19. As concluded by Boovaragasamy *et al.*,^[29] it is the need of the hour to care for the well-being of frontline workers, especially police personnel.

In our study, we aim to assess the epidemiological determinants of COVID-19 in police personnel. It is seen that all of them followed some of the self-care measures to prevent themselves from COVID-19. However, they contracted the disease. This shows that the prevention of COVID-19 needs a multipronged strategy. There are measures which individual needs to take action to maintain his health, practice breathing exercises, follow COVID appropriate behavior, etc., Moreover, when the person steps out of his home for work, and he/she travels there is also need those others i.e. public, colleagues also follow simple measures to prevent corona infection. This is reflected from our study also, as many felt that they got an infection from their colleagues, or while doing duty and while traveling.

We conducted the study when COVID vaccination had not started in our country. So questions pertaining to vaccination or whether they were vaccinated or not were not asked.

Key messages

1. Male police are more affected than female police with breathlessness common in male police
2. Cold symptoms especially in young police should be not be neglected.
3. Many police are not able to follow physical distancing may be due to their occupation.
4. There is a need to strengthen contact tracing among the police workforce
5. Awareness needs to be generated to practice immunity-boosting measures such as breathing exercises.

Conclusions

There is male preponderance for corona infection among police personnel. Breathlessness is common in males as compared with female police. The cold symptom is mostly observed in young police personnel. Police personnel needs to judiciously follow physical distancing to prevent a further rise in cases and practice general measures recommended by AYUSH to boost their immunity. Duty hours of police can be reduced to prevent physical stress. Welfare measures can be provided to police those who are continuously working in the corona-related duty.

Ethical approval

The study was approved by Institutional Ethics Committee. Permission from police authorities was also taken to conduct the study.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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