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Covid-19 Re-Infection In Health Care Workers Of Dedicated Covid Hospital Government Medical College Aurangabad - A Cross-Sectional Study

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Introduction-
The world right now is in the grip of a highly contagious mystery virus, severe acute respiratory syndrome coronavirus 2 (SARSCoV2), that has led to Coronavirus disease 2019(COVID19). According to the WHO, globally 236,599,025 cases of the disease and 4,831,486 deaths have been confirmed as of October 10, 2021 (WHO, 2021) and this number is still increasing rapidly.
SARS-CoV-2, the virus responsible for COVID-19, has spread in around all regions of the world. The soldiers in this war, standing on the frontline, are the healthcare workers (HCW), who form the backbone of any healthcare system. The existing studies till now on COVID-19 are focused on the epidemiology, its pathology, diagnosis, and clinical aspects of patients with active infections, and little attention is being directed to post-recovery patient and its re-infection. This study aims at estimating the prevalence of COVID-19 re-infections and to study determinants of COVID-19 re-infections.
Methods-
A cross-sectional study was carried out in health care workers of Dedicated covid hospital- Government medical college, Aurangabad During June 2021 to August 2021 and pretested questionnaire, including information about Socio-demographic factors and determinants of covid19 re-infection in health care workers was used. Pearson's chi-square test was used and data was analyzed using SPSS trial version 26
Result And Conclusion-
The Prevalence of covid 19 re-infection were found to be 2.7 %. Total health care workers who suffered from covid 19 were 588, out of that 15 (2.83%) were re-infected and only one HCW suffered thrice (0.17%). Out of re-infected, HCW 73% were in the age group of 24 to 28 yrs. Place of residence was found to be significantly associated with reinfection. SPO2 level at the time of admission and duration of hospital stay was found to be significantly lower in re-infected HCW.
Keywords- *COVID-19, re-infection, health care workers*

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I. Introduction

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been spreading around the globe causing severe disruptions to social and economic activities.[1] It has shaken the world with exponential deaths, crashed the economy, and broken the healthcare system. SARS-CoV-2, the virus responsible for COVID-19, has notably spread to different regions of the world.[2] India, with a population of over 130 crores, has been caught unprepared with a sloppy initial quarantine, giving the virus room to spread. Now, as the virus is spreading like wildfire, our healthcare system is overwhelmed. Healthcare workers are working on the front line of this pandemic and serving the nation. HCW's are the ones who primarily attend to the patients and for the longest possible duration; without them, the entire public healthcare system would come to a halt.[3] Many resident physicians have been affected by COVID-19 through direct infection, quarantine, or redeployment [4]. While the virus affecting the patients with existing comorbidities, newer data indicate that everyone may be susceptible to possible infection and that not all patients will present with typical respiratory symptoms, making it of vital to examine established cases of re-infection in an attempt to further help with developing drugs for treatment, vaccines, and protocols for prevention. [5] As Mahatma Gandhi had said, "The best way to find yourself is to lose yourself in the service of others." This truly describes health care workers commitment

Paul Hunter, Professor at the University of East Anglia in medicine says "Other things being equal, we can expect to see even without this new variant (the UK-identified B117) repeat infections by about now

anyway" There are four types of endemic coronaviruses (229E, NL63, OC43, and HKU1) that regularly seen in humans, causing the majority of respiratory tract infections.[6]

It is commonly accepted that once already infected then cured, an individual is better protected against the infectious agent, yet this might not be true in cases of rapidly mutating viruses such as COVID-19. [7] In some patients with mild symptoms, antibodies can be detected after a longer period, or cannot be found at all. In other types of human coronavirus diseases, the antibody levels decline over time, and reinfection with the same type of coronavirus is possible [8]. There was currently evidence for reactivation of SARS-CoV-2 and there might be no specific clinical characteristics to distinguish them .[9] Even though the new SARS-CoV-2 virus has been known for nearly one year, there are still many unclear points about the disease.[10] The majority of the existing studies on COVID-19 are focused on the epidemiology, diagnosis, and clinical aspects of patients with active infections, and little attention is being directed to post-recovery patient follow-up[11]. In terms of a clinical cure for COVID-19, patients are considered free of the disease 14 days after their last negative diagnostic test. The chances of reinfection in population who are infected and cured are still not well established.

This study aims to estimate the prevalence of COVID-19 re-infections and to study determinants of COVID-19 re-infections.

II. Material And Methods:

Study design-

A cross-sectional study design was used.

Study duration-

The study was done from June 2021 to August 2021.

Study settings-

Dedicated covid hospital (DCH) Government medical college Aurangabad. The study utilized an online questionnaire delivered to participants in the period between 20th June 2021 to 18th August 2021. The questionnaire was created and pretested on health care workers, the questionnaire consists of demographic details and details regarding infection and re-infection. [12,13]

III. Methods

A cross-sectional study was carried out in health care workers of dedicated covid hospital Government medical college Aurangabad during June 2021 to August 2021 and pretested questionnaire, including information about sociodemographic factors and determinants of covid19 re-infection in Health care workers, was used. Pearson's chi-square test was used and data was analyzed using SPSS trial version 26.

The following case definition of SARS-CoV-2 re-infection was used for inclusion: a patient with two episodes of RT-PCR confirmed infection with SARS-CoV-2 that occurred 90 or more days apart, both episodes were symptomatic, and the patient was symptom-free in the meantime[14]

Sample size-

All health care workers who were affected with covid 19 till date, were included in the study.

Statistical analysis

Data was entered in the master chart by using MS excel. Data were analyzed using SPSS trial version 26 chi-square test was used for qualitative data.

IV. Results

A total of 588 health care workers were infected with COVID-19 to date. Out of 588, 572 (97%) were infected once, 15 (2.83%) were re-infected including 60% females & 40% male HCWs and one HCW was infected thrice. (**Fig. 1)**

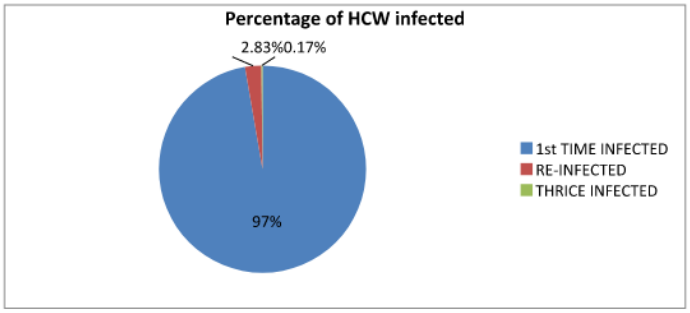

Fig. 1. Distribution of study participants according to a percentage of HCW infected

The prevalence of covid 19 re-infection was found to be 2.7 %. Among re-infected 73% were in the age group of 24 to 28 yrs, 80 % HCW had the co-morbid condition. (Table-1)
Place of residence was found to be significantly associated (p-value-0.014) with re-infection. Among 1st-time infected health care workers 314(55%) & 258 (45%) were residing on campus & outside campus respectively and among re-infected 13(87%) & 2(13%) were residing on campus & outside campus respectively. (Fig 2)

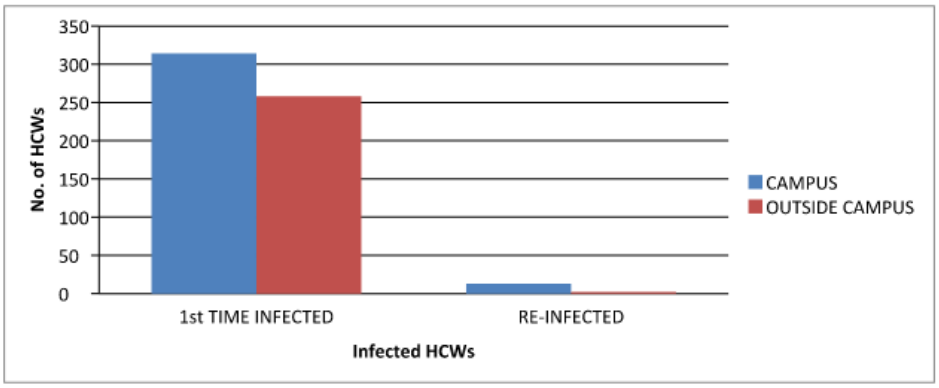

Fig 2.-Distribution of study participants according to the place of residence

Among re-infected, 67 % of HCWs were posted in COVID-related work.SPO2 level at the time of admission and duration of hospital stay was found to be significantly lower in reinfected HCW (Table-1). Cough, sore throat, fever and body pain, headache, anosmia is reported commonly in all infected HCWs. Out of a total of 588 HCWs, 26 (4%) were having mild or no symptoms so got home isolated, 529(90%) HCWs were admitted to the ward with moderate symptoms, and 33(6%) HCWs were admitted to ICU with severe symptoms and deranged covid protocol **(Fig. 3)**.

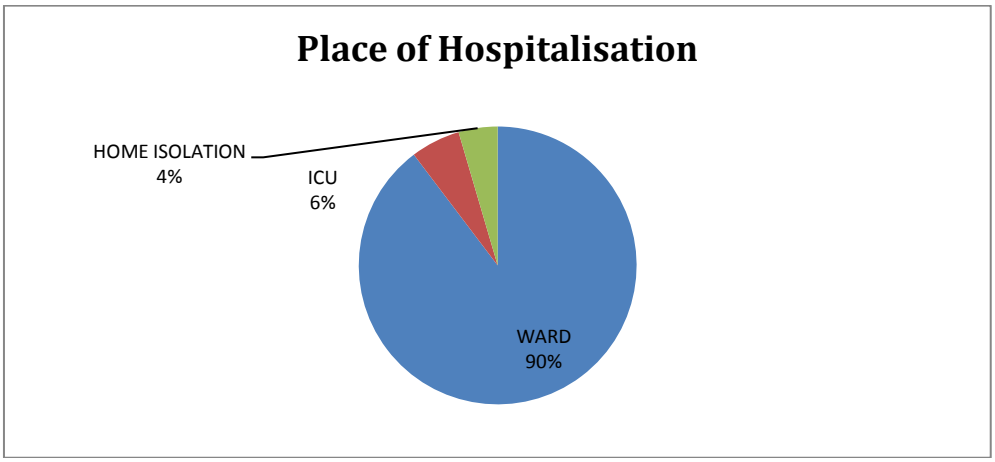

Fig. 3. Distribution of study participants according to Place of hospitalization

Table no. 1.—Distribution of study participants according to sociodemographic determinants of covid 19 re-infection in health care workers

Sociodemographic parameters	Group	1st time infected	Re-infected	Total	p-value
Age groups (years)	19 - 23	44 (8%)	0	44 (7%)	0.50
	24 - 28	244 (43%)	11 (73%)	255 (43%)	
	29 - 33	117 (20%)	3 (20%)	120 (20%)	
	34 - 38	68 (12%)	1 (7%)	69 (12%)	
	39 - 43	33 (6%)	0	33 (6%)	
	44 - 48	27 (5%)	0	27 (5%)	
	49 - 53	18 (3%)	0	18 (3%)	
	54 - 58	17 (2.3%)	0	17 (2.3%)	
	59 - 63	4 (0.7%)	0	4 (0.7%)	
Gender	Male	281 (49%)	6 (40%)	287 (49%)	0.48

	Female	291 (51%)	9 (60%)	300 (51%)	
Place of residence	Campus	314 (55%)	13 (87%)	327 (56%)	0.014
	Outside campus	258 (45%)	2 (13%)	260 (44%)	
Comorbidities	No	389 (68%)	12 (80%)	401 (68%)	0.32
	Yes	183 (32%)	3 (20%)	186(32%)	
Postings before infection	Non-covid	118 (20.62%)	5 (33%)	123 (20%)	0.23
	Covid	454 (79.38%)	10 (67%)	464 (80%)	
BMI	Normal	148 (26%)	3 (20%)	151 (26%)	0.86
	Overweight	273 (48%)	8 (53%)	281 (48%)	
	Obese	151 (26%)	4(27%)	155 (26%)	
SPO2 at time of admission	<90%	160 (28%)	0	160 (27%)	0.016
	>90%	412 (72%)	15 (100%)	427 (73%)	
Place of Admission	Ward	513 (90%)	15 (100%)	528 (90%)	0.42
	Icu	33 (5.7%)	0	33(5.6%)	
	Home isolation	26 (4.3%)	0	26(4.4%)	
Days of hospitalization	Below average	232 (41%)	0	232(39%)	0.02
	Above average	340 (59%)	15 (100%)	355(61%)	

V. Conclusion

Out of 588 health care workers of dedicated covid hospital government medical college, the prevalence of covid-19 re-infections was 2.7%. Place of residence was found to be significantly associated with re-infection and SPO2 level at the time of admission and duration of hospital stay was found to be significantly lower in re-infected health care workers.

Covid 19 re-infection is possible not only in health care workers but also in common peoples too, so it is necessary to maintain social distancing , use of sanitizer and masks in public places to avoid re-infection. It is concluded that personal preventative and public health measures remain the primary preventative methods. Further studies are required to study factors associated with re-infection in detail to reduce transmission.

VI. Discussion

The present study is carried out in health care workers of dedicated covid hospital Government medical college Aurangabad to estimate the prevalence of COVID-19 re-infections and to study determinants of COVID-19 re-infections, from June 2021 to August 2021.In health care workers of dedicated covid hospital government medical college, the prevalence of covid-19 re-infections was 2.7%. Place of residence was found to be significantly associated with re-infection and SPO2 level at the time of admission and duration of hospital stay was found to be significantly lower in re-infected health care workers.

Very few studies were done to study covid 19 re-infection. The case study was done by Paul K.S. Chan et al for Serologic Responses in Healthy Adult with SARS-CoV-2 re-infection in Hong Kong were unusual because the patient had low or undetectable levels of neutralizing and binding antibodies against multiple viral proteins during the primary infection and in stage of asymptomatic reinfection. The patient recovered from primary infection within 3 weeks, and his secondary infection was asymptomatic. These findings indicate that, in the absence of primary neutralizing antibodies, T cells and mucosal immunity might have played a critical role in resolving the infection. [15]

The study was done by M.M. Arons et al for Rapid and widespread transmission of SARS-CoV-2 in the skilled nursing facility. At the time of testing more than half the residents whos were positive were asymptomatic and most likely contributed to transmission. Infection-control strategies focused solely on symptomatic residents were not sufficient to prevent transmission after SARS-CoV-2 introduction into the facility, these findings are similar to the findings from this article in health care workers [16].

A case report done by Dabiao Chen et al in china shows the oropharyngeal swab test for SARS-CoV-2 RNA on 2 February 2020 became positive again after two consecutively negative results on 28 January and 30 January 2020, while respiratory symptoms had already improved and had no fever so in the present study re-infected HCWs were also had improvement in respiratory symptoms but still they got reinfected [17]

A similar study by Ludovic Lafaie et al on three geriatric cases with two episodes of COVID-19 separated by a symptom-free interval of weeks, explained that it may be due to persistence of nonviable RNA of SARS-CoV-2 after the first COVID-19 episode, by SARS-CoV-2 re-infection, or by COVID-19 relapse. The second wave of respiratory disease could have been caused by something other than SARS-CoV-2, but all virological and bacteriological infectious samples were negative, except for COVID-19 [18]

Findings from this article are similar to the study by Vivek Gupta et al, in which healthcare workers from INDIA showed that they had symptoms in 1 or both of the episodes, they report asymptomatic SARS-

CoV-2 reinfection in healthcare workers detected during routine surveillance. The report highlights the possibility of undetected SARS-CoV-2 re-infections and the need for surveillance of SARS-CoV-2 re-infections in healthcare system [19] and similar findings are from Pakistan in a case report by Muhammad hanif et al concluded that it is critical to determine how long antibodies will last after SARS-CoV-2 infection, a case studied indicate a risk of reinfection in COVID-19 after full recovery. Thus, personal preventative and public health measures remain the primary preventative methods [8].

Chris Stokel-Walker a freelance journalist in his article says that "If you've recovered from SARS-CoV-2, it's not an excuse to forget about social distancing and not to wear a mask,we know that you can have it twice and that means you can get it again and pass it on." Paul Hunter, Professor at the University of East Anglia in medicine says "Other things being equal, we can expect to see even without this new variant (the UK-identified B117) repeat infections by about now anyway" [3]

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