



Original Research

Clinical severity spectrum of re-infected cov-19 patients in Khyber Pakhtunkhuwa (KPK)

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Abstract

Background: Re-infection is infection likely to occurred second time. Recently due to increase in the pandemic of SARS COV-2 there were increased in cases of re-infection but the clinically severity spectrum of re-infection is unknown. This study is design to determine clinical severity of re-infected COV-19 patients. **Material and methodology:** This comparative cross-sectional study was conducted in pathology department of Rehman Medical Institute Peshawar Pakistan and Leady Reading Hospital Peshawar within duration of 6 months (February-July 2021). **Inclusion criteria:** Patients who were re-infected by SARS COV-2 and having duration between primary infection and re-infection are > 30 days were included. **Exclusion criteria:** Unwilling patient to give data and patients having duration between primary infection and re-infection is<30 days were excluded from the study. **Sample size:** Total 32 samples were collected by designing proper Questionnaire according to the criteria of (World Health Organization). The collected data will be analyzed through SPSS version 22. The frequencies, mean, standard deviation of data was performed by descriptive statistics in SPSS. **Result:** Out of 32 primary SARS COV-2 infected individuals, 20 have mild infection while in same 32 re-infected SARS COV-2 individuals 19 individuals have severe symptoms in its secondary infection with mean age (32years) of individuals. **Conclusion:** In current study by comparing primary symptoms of SARS COV-2 infected individuals with symptoms of Re-infected individuals, symptoms are mild and severe respectively. Hence, re-infection cause by SARS COV-2 is more severe than primary infection.

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Introduction: Severe acute respiratory syndrome virus (SARS COV-2) emerged as novel human pathogen worldwide and first time detected in Wuhan city of China in the end of 2019 [1,2] and changed the whole scenario of World become pandemic. Before 2003, HCoV-OC43 and HCoV-229E are only 2 known human coronaviruses that cause mild infections [3,4,5]. These viruses contain spike like projection of glycoproteins on their surface which have appearance like crown under electron microscope due to this reason these viruses were named as coronaviruses. SARS COV-2 is single-stranded RNA virus. Enveloped viruses responsible for causing a wide variety infection in avian and mammalian species [6,7] and transmitted through respiratory droplet, air born and body contact [8]. The receptor for SARS COV-2 are present at epithelial cell of nasal cavity and lungs called ACE2 receptors, after attachment with these receptors virus start replicating when it inhaled [9,10]. The incubation period for SARS-COV-19 is about 4 to 5 days, while 97.5% have symptoms appear within 11.5 days after infection [6]. The host show symptoms such as fever, cough, shortness of breath, headache and lose of smell and taste for three days and the confirmatory test for this virus is RT-PCR [11]. According to the recent report of WHO June 2021 worldwide there are 172,242,495 confirmed cases of SARS COV-2 and 3,709,397 deaths occur, while in Pakistan January 2021 there are 928,588 confirmed cases of SARS COV-2 and 21,105 deaths happened [12]. In KP total confirmed cases are 134,072 among which active cases are 4,580 and fatal cases are 4,135 [13]. In first-wave of covid-19 infection millions of people were infected and many of them are also suffered from second wave of covid-19 virus infection [14]. According to Jan Van Elslande et, al a case study was conducted on re-infected SARS COV-2 patient and he observed symptoms similar to the primary infection [15] but according to a case study conducted by Avani Jain et, al on re-infected SARS COV-2 patient, he observed more severe symptoms in reinfection [16].

Primary objective: In order to reduce the controversy and ambiguity between clinical severity pattern of primary SARS COV-2 infection and reinfection of SARS COV-2, this study will be conducted to determine the clinical severity pattern of primary SARS COV-2 infection and reinfection.

Material and methods: This comparative cross-sectional study was conducted in pathology department of Rehman Medical Institute Peshawar Pakistan and Lady Reading Hospital Peshawar within duration of 6 months (February 2021-July 2021).

Inclusion criteria: Patients who were re-infected by SARS COV-2 having duration between primary infection and re-infection is > 30 days were included.

Exclusion criteria: Unwilling patient to give data and patients having duration between primary infection and re-infection is >30 days were excluded from the study.

Sample size: Total 32 samples were collected by designing proper Questionnaire according to the criteria of (World Health Organization) to know about the clinical severity spectrum of SARS COV-2 symptoms. The collected data will be analyzed through SPSS version 22. The frequencies mean standard deviation of data was perform by descriptive statistics in SPSS.

Result: In this current study, data were collected from private and public sector hospitals including Lady Reading Hospital Peshawar, Pakistan, and Rehman Medical Institute Peshawar. Data were collected from those patients who were re-infected by SARS COV-2 virus and the duration between their primary covid-19 infection and re-infection is > 30 days, and data were not collected from those patients who were unwilling to give data and duration between their primary infection and re-infection < 30 days. Proper questioners were designed (according to WHO criteria) to know about the patient's severity spectrum of SARS COV-2 symptoms. The mean age of patients was taken 32 years with SD 12.07 (Range 66, Max 88-Min 22). Among 32 individuals 24 (75%) were male patient and 8 (25%) were female patients. The frequency of duration between primary infection and re-infection in 15 Individuals is (30-80 days), in 8 individuals (80-160 days), in 7 individuals (160-260 days), 2 individuals (260-365 days). Among 32 individuals, 27 (84%) individuals have their RT-PCR positive report of primary infection, 5 (15%) individuals have their antibodies positive report of primary infection, and all the 32 (100%) individuals have RT-PCR positive report of their re-infection as shown in Figure and Table no 1. By comparing the clinical severity pattern of primary infection and re-infection of SARS COV-2 in (n=32) individuals. The symptoms of SARS COV-2 re-infected individuals were more severe as compared to primary SARS COV-2 infected individuals. Of 32 individuals, 19 (59.4%) individuals have severe symptoms in its secondary infection while 20 (60%) individuals have mild symptoms in its primary SARS COV-2 infection as shown in Table and Figure no 2.

Discussion: Due to increase in cases of SARS COV-2 virus in KP Pakistan there is also appearance of re-infected cases of that virus. Reinfection in SARS COV-2 virus is second episode of infection cause by that virus. However, the clinical severity spectrum of SARS COV-2 symptoms virus is unknown that the symptoms cause by SARS COV-2 is severe in primary infection or re-infection.

Human body show adaptive or innate immunity to that specific virus. Primarily IgM antibodies are produced in response to SARS COV-2 virus, but their level remain same after several weeks while the level of IgG antibodies increases and can persist for 1-2 years. In case of SARS COV-2 virus, similarly IgM and IgG antibodies are produced but still patients are re-infected by SARS COV-2 virus after having primary infection. The reason is that SARS COV-2 virus is highly adaptable and highly mutagenic which change their strain but the symptoms severity cause by that virus in secondary infection is still not clarified.

In current study 32 samples, were collected from those tested positives by RT-PCR in its re-infection in private and public sector hospitals of KP Peshawar. Information from these individuals about their re-infection was collected by designing proper questioner. The majority of re-infected individuals were male and mean of their age were 32 years. By comparing their symptoms of primary infection and re-infection, the symptoms caused by SARS COV-2 virus in primary infection is mild and moderate, but the symptoms caused by that virus in re-infection is

more severe than the symptoms in primary infection. Among 32 individuals, 20 individuals have mild symptoms in its primary infection, the remaining 12 individuals have moderate and severe symptoms while among these 32 re-infected individuals 19 individuals have more severe symptoms and remaining 13 individuals have mild and moderate symptoms. The reason of severity of symptoms in re-infection is may be due to enhanced immunity or infection cause by more pathogenic strain of coronavirus-2.

According to (Avani Jain et, al) a re-infected case study was done on 21-year-old young female without any comorbid having duration between their primary SARS COV-2 infection and re-infection from July to September (60 days). She was tested positive for SARS COV-2 by RT-PCR in its re-infection. On clinical history of the symptoms cause by primary infection was mild while the symptoms cause by re-infection is more severe as compared to its primary infection that mainly includes insomnia and last for 2 weeks.

A case study conducted by (Jan Van Elslande et, al) on 51year old female who experienced mild clinical sign symptoms of SARS COV-2 in its first episode of infection. After discharge of his primary infection, she suffered from second episode of SARS COV-2 infection with the 3 months (90 days) duration between primary infection and re-infection. The re-infection is confirmed by RT-PCR having positive result. She has no travel history. She experienced similar mild symptoms in his second episode which she experienced in his first episode of infection. By sequencing the genome of SARS COV-2 in primary infection and re-infection 2 different strain were detected. But in our study the symptoms experienced by individuals in second episode of infection more severe as compared to primary infection.

According to (Vivek Gupta et, al) two re-infected health care workers were tested positive for SARS COV-2 by RT-PCR after his primary infection with the duration of 3 months (90 days) between primary infection and re-infection. Both of them were asymptomatic in his first episode of covid-19 infection with lower viral load. After surveying these two health care workers they experienced no symptoms in his second episode of infection and were similarly asymptomatic to his primary infection. They concluded that symptom caused by SARS COV-2 in primary infection is similar to the symptoms of re-infection. In current study by surveying multiples re-infected SARS COV-2 individuals it was concluded that symptoms in second episode were more severe than primary infection.

Conclusion: In current study by comparing primary symptoms of SARS COV-2 infected individuals with symptoms of re-infected individuals we concluded that

symptoms in Primary infection were mild while symptoms of re-infection were much severe. Hence, re-infection cause by SARS COV-2 is more adverse and dangerous than primary infection, observed symptomatically.

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Table 1. Symptom severity of primary infection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Mild	20	62.5	62.5	62.5
	Moderate	6	18.8	18.8	81.3
	Severe	6	18.8	18.8	100.0
	Total	32	100.0	100.0	

Table 2. Frequency of symptoms severity of re-infection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Mild	7	21.9	21.9	21.9
	Moderate	6	18.8	18.8	40.6
	Severe	19	59.4	59.4	100.0
	Total	32	100.0	100.0	

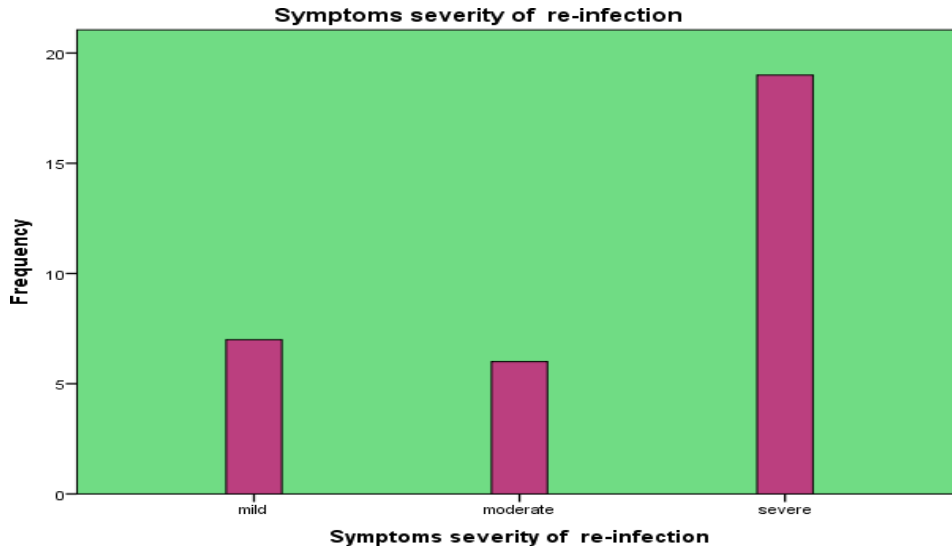


Fig 1. Symptoms severity of Primary Infection

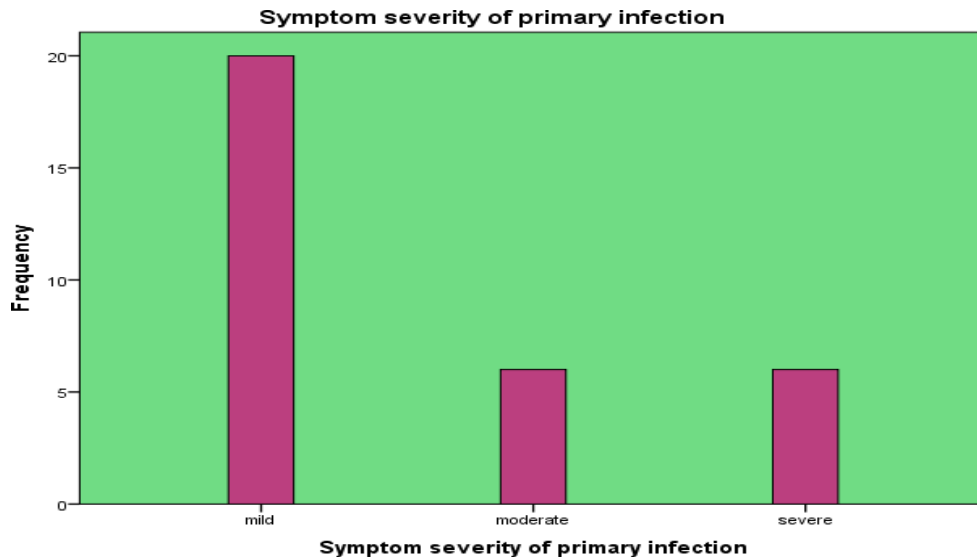


Fig 2. Symptoms severity of Re-infection