

Comparison of Severity of COVID-19 Symptoms Between Vaccinated and Unvaccinated Dental Faculty in Lahore

COVID-19
Symptoms
Between
Vaccinated and
Unvaccinated

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ABSTRACT

Objective: This study aimed to find the differences in severity of COVID-19 symptoms among vaccinated and unvaccinated dental faculty members serving different dental colleges in Lahore.

Study Design: Retrospective Exploratory Cohort study

Place and Duration of Study: This study was conducted at the Avicenna Dental College, Lahore for a period of 2 months from August, 2021 to September, 2021.

Materials and Methods: This study identified 207 COVID-19 affected dental faculty/dentists in Lahore and retrospectively observed the severity of symptoms that included Fever, Cough, Fatigue, shortness of breath. The study divided the participants in two strata namely vaccinated and unvaccinated and statistically ran bivariate analysis on severity of COVID-19 symptoms.

Results: Mean duration among 40 vaccinated dentists between completion of 2 doses and contraction of COVID-19 was 58 days (SD ± 6.3). Bivariate analysis between severity of symptoms among vaccinated and unvaccinated dentists showed that the mild and severe cough were significantly ($p=0.04$) reduced among vaccinated participants. Episodes of dyspnea were significantly ($p=0.01$) less observed among vaccinated dentists.

Conclusion: Even with the emergence of COVID-19 vaccine breakthrough, vaccine turns out to be protective against severity of symptoms and hence, hospitalization is reduced.

Key Words: COVID-19, COVID-19 Vaccine, Symptoms of COVID-19, Dyspnea in COVID-19, Cough in COVID-19

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INTRODUCTION

Covid-19 Pandemic started off from Capital city of Hubei Province of China, Wuhan. It is caused by a species of virus named "severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2)". This disease spread swiftly through airborne transmission and spread swiftly internationally.

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In response to COVID-19 outbreak spreading across all regions of earth, WHO announced Global Health Emergency and advised preventive measures to be taken against Viral transmission. Subsequently, development of COVID-19 started and leading pharmaceutical companies began production of vaccine by August, 2020¹. Another possibility to develop protection against COVID-19 in the population was through herd immunity, which is a natural immunity in a population to resist the transmission of infection². However, this herd immunity failed to give protection to the population in Sweden where 60% of the population was infected with COVID-19. Mortality rate in Sweden was recorded to be 5 times to that of Germany, with devastating disease burden³. Hence, achievement of herd immunity was crucially linked to development of vaccine. Mass vaccination programs in the world started with multiple types of vaccine developed with specific pharmaceutical manufacturers including Pfizer and BioNTech and Moderna⁴. Pakistan began its COVID-19 vaccination program in February 2021 with first phase targeted for vaccination of health care workers working as front-liners in battling the pandemic⁵. High acceptance level for COVID-19

vaccine was observed among health care workers in Pakistan. Dentists and dental faculty members working in various dental institutes in Pakistan got vaccinated in early phases of vaccination. With passage of time vaccine breakthrough cases started emerging among dentists⁶. The next possible protective factor of COVID-19 vaccines might be less severity of symptoms⁷. Although studies have shown that vaccine breakthrough in COVID-19 is linked to mutation and emergence of variation in SARS-CoV-2 virus⁸, the efficacy of vaccine in protection against hospitalization in COVID-19 infected individuals is also observed⁹. The severity of symptoms of COVID-19 is also stratified into mild, moderate, severe and critical¹⁰. This study aimed to draw a comparison in severity of symptoms among vaccinated and unvaccinated dental faculty members in Lahore.

MATERIALS AND METHODS

Primary data collection from COVID-19 infected dentists (n=207) from Lahore began with the aim to assess the symptoms of loss of smell and taste. However, it was observed that a considerable number of dentists were already fully vaccinated before contraction of COVID-19. This development led to the conception of this research and the dentists including dental faculty members involved in teaching and dental practice, were contacted with inclusion of a series of new questions about other COVID-19 symptoms in this retrospective study. This study only included the affected patients with confirmed PCR reports of COVID-19 from reliable laboratories of Pakistan. Over a period of one month, data was collected from 207 participants working in different recognized dental institutes in Lahore. We looked into the chronological contraction of COVID-19 with vaccination and its correlation with severity of symptoms among the participants. They were first inquired about the nature of the first appearing symptom. Assessment of severity of symptoms was carried out using different criteria, for example, severity of fever was assessed by low grade fever, high grade fever and/or being asymptomatic. Cough was assessed by categorizing it into mild, moderate and severe. The oxygen saturation monitoring was also inquired for its episodes of going below 94%, remaining constantly above 94%. Other frequent symptoms of COVID-19 including dyspnea and fatigue were investigated among vaccinated and unvaccinated patients retrospectively. The investigators also looked into the comparison of chest radiographs of the patients who at some point of infection, got them done.

Data Analysis: To analyze the obtained data, we used standard descriptive statistics. Continuous variables (Age at the contraction of COVID-19) were statistically expressed in mean while categorical variables were statistically expressed in proportions or percentages. The comparisons of symptoms in two groups i.e.

vaccinated and non-vaccinated, were statistically analyzed using Pearson's Chi-Squared test and P value of less than 0.05 was considered to be of standard significance.

RESULTS

From August, 2021 to September, 2021, the data on severity of symptoms was collected from 207 dentists/dental faculty members from various colleges of Lahore who recovered from COVID-19. Collection of data was done by two methods i.e. Face-to-face questionnaire and via phone. Of 207 dentists, 119 (57.48%) were female and 88 (42.51%) were male. From the survey of individuals taking part, it was observed that mean age at which participants contracted COVID-19 infection was a little above 36 years (SD ± 2.1). By categorizing the age into 5 categories of 20-30 years, 31-40 years, 41-50 Years, 51-60 years, 61 and Above, this research observed that most the dentists falling in the category of 31-40 years contracted the virus (n=98) while 61 years and Above age category showed only 1 dentist working as General Dental Practitioner.

Table No.1: Patients' Demographics

Patients' Demographics (N=207)		
Gender (N=207)		
	Male	88 (52.51%)
	Female	119 (57.48%)
Age (N=207)		
	Mean Age at the Contraction of Covid-19	36.2 Years (SD ± 2.1)
	20-30 Years	58 (28%)
	31-40 Years	98 (47.34%)
	41-50 Years	39 (18.84%)
	51-60 Years	11 (5.31%)
	61 Years & Above	1 (0.5%)
Time Passed Since Contraction of COVID-19 (N=207)		
	3 Months	34 (16.42%)
	4-6 Months	25 (12%)
	7-9 Months	59 (28.50%)
	10 Months & Above	89 (42.99%)
Average Duration between Full Vaccination and Contraction of COVID-19 (N=40)		
	58 Days (SD ± 6.3)	

The researchers obtained the data on time duration between completion of 2 doses of vaccine and contraction of COVID-19. The mean duration among 40 vaccinated dentists was recorded to be 58 days (SD ± 6.3). Bivariate analysis of severity of symptoms between vaccinated and non-vaccinated dentists was carried out and results are shown in table 2. Major and significant difference in appearance of 1st symptom was observed in Loss of smell and taste (p value=0.02). Mild and Severe Cough were observed to be significant

differences among vaccinated and non-vaccinated dental faculty members.

Table No.2: Bivariate analysis of Covariates (Severity of Symptoms of COVID-19) among Vaccinated and Non Vaccinated Dentists: Total Number: 207

Variables	Non Vaccinated	Vaccinated	P-Value
	N (%)	N (%)	(Pearson's Chi Squared Test)
Total 207	167	40	
Gender			
Male	70 (41.91%)	18 (45%)	0.89 (Non-Significant)
Female	97 (58.08%)	22 (55%)	
1st Symptom			
Fever	95 (56.88%)	15 (37.50%)	0.32 (Non-Significant)
Sore Throat & Cough	39 (23.35%)	25 (62.50%)	0.96 (Non-Significant)
Loss of Smell & Taste	33 (19.76%)	0	0.02 (Significant)
Malaise & Fatigue	0	0	
Shortness of Breath	0	0	
Fever			
Low Grade Fever	95 (56.88%)	33 (82.50%)	0.25 (Non-Significant)
High Grade Fever	72 (43.11%)	7 (17.50%)	0.82 (Non-Significant)
No Fever	0	0	
Cough			
Mild	25 (14.97%)	35(87.50%)	0.04 (Significant)
Moderate	88 (52.69%)	5 (12.50%)	0.77 (Non-Significant)
Severe	54 (32.33%)	0	0.04 (Significant)
Oxygen Saturation			
Going below 94%	45 (26.94%)	4 (10%)	0.70 (Non-Significant)
Constant above 94%	122 (73.05%)	36 (90%)	0.02 (Significant)
Episodes of Dyspnea (Shortness of Breath)			
Yes	23 (13.77%)	1 (2.50%)	0.01 (Significant)
No	144 (86.22%)	39 (97.50%)	0.01 (Significant)
Fatigue during/after COVID-19 infection			
Yes	122 (73.05%)	39 (97.50%)	0.10 (Non-Significant)
No	45 (26.94%)	1 (2.50%)	0.20 (Non-Significant)

Data obtained on episodes of dyspnea (shortness of breath) during COVID-19 infection that appeared to be significant. Among non-vaccinated, 23 (13.77%)

experienced episodes of shortness of breath at least once during infection. However, among vaccinated, only 1 (2.50%) had an experience of shortness of breath. Severity of Fever and experience of fatigue during/after COVID-19 infection were observed to be non-significant in bivariate analysis.

DISCUSSION

COVID-19 is seen as novel disease with extensive ongoing research and investigations to understand the disease. Clinical course of COVID-19 disease is also variable and renders different kind of symptoms with different severity levels¹¹. Clinical progression of severe disease may lead to hospitalization and death eventually. The vaccination of COVID-19 is seen to be protective against the virus transmission. However, efficacy of vaccines available is not 100% leading to emerging cases of COVID-19 infection in vaccinated individuals. Our study too, identified such cases of vaccine breakthrough among COVID -19 patients just like previous studies on vaccine breakthrough¹¹. A study conducted among vaccinated and COVID-19 positive patients showed that viral load was 2-4 times lower than that in unvaccinated individuals¹². Another study done on nasal swabs of vaccinated and unvaccinated COVID-19 positive individuals showed that viral load of SARS-CoV-2 was 1.6-2 times lower on nasal swabs of vaccinated participants than those of unvaccinated individuals¹³. This may explain the significant differences of severity of cough in vaccinated and unvaccinated COVID-19 patients observed in our study. Non-significant statistical difference of gender in vaccinated and unvaccinated patients can also be affirmed by another study conducted by Candelli *et al*¹⁴. Scientific interpretation of differences in episodes of dyspnea among vaccinated and unvaccinated dentists may be explained by the decreased viral load. Three variables relating the most prevalent symptoms of COVID-19 i.e. fever, oxygen saturation and fatigue were not found to be significantly associated with vaccination. The plausible reason behind these non-significance differences may be because of relative young age of vaccinated dental faculty without any comorbidities^{15, 16}. Delay in second dose in vaccinated individuals should be assessed in associated with levels of antibodies against COVID-19 via lab testing and its link to severity of symptoms should be determined as it was observed in some of the individuals with comorbidities¹⁷. Added values and strength of this study was its Cohort nature and comparison of symptoms with a control group (Unvaccinated COVID-19 patients). Limitations of this study included small data size that didn't include old aged individuals and memory bias as participants relied on the memory of past COVID-19 infection. Further work is needed to establish the association of serum levels of antibodies and SARS-CoV-2 viral load with

prospective exploration. However, this study could be replicated on a larger scale among general masses to lead to more promising results on differences in severity of symptoms of COVID-19 among vaccinated and non-vaccinated individuals.

CONCLUSION

Regardless of COVID-19 vaccine breakthrough cases, completion of COVID-19 vaccine is observed to be resulting in less severe symptoms of COVID-19. Assessment and monitoring of serum antibodies against COVID-19 after completion of vaccine doses should be recommended because COVID-19 is novel disease and its vaccines' efficacies in producing adequate protective levels might be affected by multiple variable.

Author's Contribution:

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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