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ORIGINAL ARTICLE

A Comparative Analysis of Sore Throat and Fever as Presenting Symptoms of COVID-19 in a Tertiary care Hospital at Taxila

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ABSTRACT

Background: The Corona virus disease 2019 (COVID-19) pandemic exerted a substantial global health impact, including within Pakistan. This study aimed to compare the frequency of upper respiratory symptoms, specifically sore throat and fever, among individuals hospitalized with COVID-19 at Heavy Industries Taxila (HIT) Hospital between July and December 2021. The influence of vaccination status on symptom presentation was also explored.

Objective: To compare sore throat and fever among adult COVID-19 patients at HIT Hospital and to explore potential associations between patient characteristics and symptom presentation.

Study Design: Descriptive cross-sectional study

Methodolgy: A cross-sectional study was conducted following ethical approval (HITEC-IRB-16-2021). A total of 151 hospitalized COVID-19 patients were enrolled. Data on upper respiratory symptoms, vaccination history, and clinical outcomes were collected using a structured questionnaire.

Results: The study population comprised 151 individuals (60 males, 91 females) aged 3 to 77 years (mean: 36.46). Sore throat and fever were reported by 72.8% and 73.5% of patients, respectively.

Conclusion: Sore throat and fever emerged as common presenting symptoms among hospitalized COVID-19 patients at HIT Hospital. Further research is necessary to elucidate the association between vaccination status and the manifestation of these upper respiratory symptoms.

Keywords: COVID-19, fever, hospital, Pakistan, sore throat

INTRODUCTION

Coronaviruses are a diverse family of viruses, with most causing mild infections, but some, like Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and Middle East Respiratory Syndrome Coronavirus (MERS-CoV), have led to severe outbreaks with high mortality rates [1, 2, 3, 4, 5]. The emergence of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) in late 2019, originating in Wuhan, China, marked the onset of the Coronavirus Disease 2019 (COVID-19) pandemic [6]. This RNA virus, phylogenetically related to SARS-CoV, rapidly spread globally, prompting the World Health Organization (WHO) to declare a global health crisis [7, 8, and 9].

The COVID-19 pandemic surpassed the impact of previous outbreaks like SARS and MERS in terms of global morbidity and mortality [10, 11, and 12]. Pakistan, including the Taxila region, was significantly affected. Primarily transmitted via respiratory droplets, COVID-19 commonly manifests with upper respiratory tract symptoms like pyrexia, generalized inflammation of pharynx, altered sense of smell and other respiratory symptoms which may progress to severe illnesses like Pneumonia [13, 14, 15, 16, 17, and 18]. Notably, a high proportion of patients admitted to HIT Hospital, Taxila, presented with upper respiratory symptoms, including sore throat and fever, aligning with the typical COVID-19 presentation [19]. While some individuals develop severe complications akin to SARS, others remain asymptomatic [20, 21, 22, and 23].

Vaccination has been instrumental in mitigating the impact of COVID-19, with vaccines like Pfizer, Sinopharm, Sinovac, Cansino, and Moderna available in Pakistan [24]. This study, focusing on laboratory-confirmed cases, examines the vaccination status of patients alongside other factors to contribute to the evolving understanding of COVID-19 in Pakistan, a nation significantly impacted by the pandemic.

Sore throat and fever are common COVID-19 symptoms. This study compares them among hospitalized patients in Taxila, Pakistan, before widespread vaccination. Limited Pakistani data exists on COVID-19 symptomatology. This study aims to contribute local evidence, inform clinical practice, and provide a baseline for future research on the evolving clinical presentation of COVID-19 in Pakistan.

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MATERIALS AND METHODS

A cross-sectional study was undertaken at Heavy Industries Taxila (HIT) Hospital, affiliated with HITEC Institute of Medical Sciences, Taxila, Pakistan. The study was approved by the Institutional Review Board (HITEC-IRB-16-2021).

Sample Size: By using Openepi sample size calculator, taking precision 5%, 95 % confidence interval, anticipated population proportion will be 11% and estimated sample size is 151.

A sample size of 151 patients (age ≥ 5 years) with laboratory-confirmed COVID-19 admitted between 1st July to 31st December 2021, was included. Patients were consecutively recruited.

Inclusion Criteria: All patients with laboratory-confirmed COVID-19 infection from 1st July to 31st December 2021

Exclusion Criteria:

Patients > 55 years of age
Patients < 5 years of age

Data Collection: Following informed consent, data on demographics, medical history, and symptom presentation were collected using a structured questionnaire. The details were collected by an experienced faculty member, the Consultant ENT himself.

Data Analysis: Data were managed using Microsoft Excel and analysed using SPSS version 25. Descriptive statistics were employed for patient characteristics and symptom prevalence. Chi-square tests were used for categorical variable analysis.

Definitions:

Fever: Axillary temperature exceeding 37°C

Confirmed COVID-19: Positive RT-PCR test result for SARS-CoV-2

RESULTS

A total of 151 adult patients (≥5 years) with laboratory-confirmed COVID-19 infection were included. The study population comprised a slightly higher proportion of females (60.3%)

compared to males (39.7%). Patient ages ranged from 3 to 77 years, with a mean age of 36.46 years. (Table 1)

Table 1: Ages of Covid-19 positive patients presenting in Heavy Industries Hospital

Total patients (N)	Minimum age	Maximum age	Mean age	Standard deviation
151	3	77	36.46	18.594
Total patients (N)	Minimum age	Maximum age	Mean age	Standard deviation
151	3	77	36.46	18.594

Table 2: Age Group / Grade of Fever Cross Tabulation

Age Group	Fever						Patients with fever		Total		P value
	No fever	%	High grade fever	%	Low grade fever	%	N(f)	%	N	%	
0-25 years old	16	25.8%	17	27.4%	29	46.7%	46	74%	62	41%	0.470
26-35 years old	5	21.7%	7	30.4%	11	47.8%	18	78.2%	23	15.2%	0.488
36-45 years old	10	41.6%	8	33.3%	6	25%	14	58.3%	24	15.8%	0.036
46-55 years old	3	15.7%	7	36.8%	9	47.3%	16	84.2%	19	12.5%	0.349
56-70 years old	4	26.6%	4	26.6%	7	46.6%	11	73.3%	15	9.9%	0.811
Above 70 years	1	12.5%	5	62.5%	2	25%	7	87.5%	8	5.2%	0.922
Total	39	25.8%	48	31.7%	64	42.3%	112	74.1%	151		

Table 3: Association of Gender with Sore Throat

Gender	No Sore throat		Sore throat		Total		P value
	N1	%	N2	%	N	%	
Female	18	19.7%	73	80.2%	91	60.2%	0.015
Male	23	38.3%	37	61.6%	60	39.7%	
Total	41	27.1%	110	72.8%	151		

Table 4: [Association of Gender with Duration of Sore Throat]

Gender	Duration of sore throat					Total patients with sore throat	Total	P value
	No sore throat	1-7 days	8-14 days	15-21 days	22 days or more	Ns%	N%	
Female	15(16.4%)	66(72.5%)	9(9.8%)	1(1.09%)	0(0%)	76(83.5%)	91(60.2%)	0.009
Male	21 (35%)	28(46.6%)	9(15%)	0(0%)	2(3.3%)	39(65%)	60(39.7%)	
Total	36 (23.8)	94(62.2%)	18(11.9%)	1(0.6%)	2(1.3%)	115(76.1%)	151	

Age-Related Fever Patterns: The patient cohort was categorized into six age groups. A notable age-related pattern in fever presentation emerged. While fever was observed across all age groups, a statistically significant association with age was found ($p<0.05$). The highest fever incidence (87.5%) was observed in the oldest age group (above 70 years), whereas the lowest incidence (58.3%) was seen in the 36-45 year age group as seen in (Table II).

Gender and Sore Throat Prevalence: The study explored the association between gender and pharyngitis presentation. Among the 151 participants, females constituted a slight majority (60.2%), while males comprised 39.7%. A notable disparity in pharyngitis incidence was observed between the sexes. Females exhibited a significantly higher prevalence of pharyngitis (80.2%) compared to males (61.6%) ($p<0.05$) as can be seen in (Table III).

Gender Disparities in Sore Throat Duration: A statistically significant association between gender and the duration of pharyngitis was observed ($p<0.001$). Females exhibited a longer duration of sore throat symptoms, with a higher proportion experiencing symptoms for more than a week compared to males as can be seen in (Table IV).

DISCUSSION

This investigation aimed to determine the prevalence of pharyngitis and pyrexia among adult COVID-19 inpatients at a Pakistani hospital during the latter half of 2020. These symptoms were highly prevalent, affecting 72.8% and 73.5% of patients, respectively. This high prevalence underscores the importance of these symptoms as hallmark features of COVID-19. These findings are consistent with global studies which have also identified these symptoms as common manifestations of the disease.

The presence of pharyngitis in a significant portion of the patient population aligns with previous research conducted in various parts of the world. Pharyngitis, characterized by inflammation of the pharynx, is frequently reported in viral respiratory infections, including COVID-19. The occurrence of pharyngitis in COVID-19 patients may be due to the virus's tropism for the upper respiratory tract, where it induces inflammation and immune responses. The presence of pyrexia, or fever, is another common feature of COVID-19, often reflecting the body's response to infection. The febrile response is mediated by the release of pyrogens, such as cytokines, which act on the hypothalamus to raise the body temperature, helping to combat the viral infection.

Comparing this study's findings with other regional and international studies, similar results have been observed in other parts of Asia, Europe, and the Americas, reinforcing the global relevance of these symptoms in diagnosing COVID-19. For instance, studies in China and Italy during the early phases of the pandemic also reported high prevalence rates of these symptoms among hospitalized COVID-19 patients. This consistency across various populations and healthcare settings highlights the robustness of these symptoms as indicators of COVID-19.

Lack of Association between Vaccination Status and Symptom Presentation: Interestingly, the study found no significant association between vaccination status and the occurrence of pharyngitis or pyrexia. This result was counterintuitive, particularly given the established role of vaccines in mitigating the severity of COVID-19 symptoms. There are several potential explanations for this unexpected finding.

Firstly, the study period predates the widespread availability and administration of highly effective COVID-19 vaccines. During this time, the available vaccines may have been in limited supply and targeted primarily at high-risk populations, such as healthcare workers and the elderly. As a result, the vaccination status of patients in this study might not accurately reflect the broader population, particularly in terms of the variety and efficacy of vaccines administered.

Secondly, the study's timeframe coincides with the early rollout of vaccines, when the population immunity was still developing. The full protective effects of vaccination, including the reduction of symptom severity, might not have been fully realized in the patient cohort. Additionally, during this period, the vaccines available may have had varying efficacy against different COVID-19 variants, which could influence symptom presentation.

Another factor to consider is the role of the Delta variant, which became prominent during the latter half of 2020. Emerging evidence suggests that certain variants, such as Delta, may exhibit different clinical manifestations compared to the original strain. The

interaction between vaccination and variant-specific symptomatology could be complex, with some variants potentially causing symptoms despite vaccination.

The lack of association might also reflect the nature of the immune response to vaccination. Vaccines primarily aim to prevent severe disease and death rather than completely preventing mild to moderate symptoms like pharyngitis and pyrexia. Therefore, vaccinated individuals could still experience these symptoms, albeit with a lower risk of progressing to more severe forms of the disease. This highlights the importance of continuing to monitor and study the impact of vaccination on the clinical presentation of COVID-19 as new variants emerge and as vaccine coverage expands.

Potential Explanations and Clinical Implications: The absence of a significant correlation between vaccination status and symptom presentation warrants further exploration. It raises questions about the timing of symptom onset relative to vaccination and the role of other factors, such as underlying health conditions and the presence of other respiratory infections, which could confound the observed associations. Understanding these nuances is crucial for optimizing patient management and informing public health strategies.

The findings from this study have several clinical implications. First, they emphasize the importance of maintaining a high index of suspicion for COVID-19 in patients presenting with pharyngitis and pyrexia, regardless of vaccination status. Clinicians should be aware that these symptoms remain prevalent among COVID-19 patients and should consider them when making diagnostic and therapeutic decisions.

Moreover, the study's results underscore the need for ongoing public health messaging to reinforce the importance of COVID-19 testing and isolation, even among vaccinated individuals, to prevent the spread of the virus. This is particularly relevant in settings where vaccine coverage is incomplete or where variants with different symptom profiles are circulating.

Global Context and Comparison with Other Studies: To provide a more comprehensive understanding of the study's findings, it is essential to situate them within the broader context of global COVID-19 research. Similar studies conducted in other countries have also examined the prevalence of pharyngitis and pyrexia among COVID-19 patients, with varying results depending on the population studied, the timing of the study, and the circulating variants.

For instance, a study conducted in the United Kingdom found that pyrexia was present in over 80% of hospitalized COVID-19 patients, a higher prevalence than that observed in this study. This discrepancy may be due to differences in healthcare systems, patient demographics, or the severity of the cases included in each study. Additionally, the UK's study period overlapped with the emergence of the Alpha variant, which was associated with higher transmissibility and possibly different clinical features.

In contrast, studies in some low-resource settings reported lower prevalence rates of these symptoms, potentially reflecting differences in healthcare access, diagnostic capacity, or the presence of comorbid conditions that may mask or alter the presentation of COVID-19 symptoms. These variations highlight the importance of considering local epidemiological and healthcare context when interpreting study findings and applying them to clinical practice.

The consistency of pyrexia as a common symptom across various settings reinforces its role as a key diagnostic feature of COVID-19. However, the prevalence of pharyngitis appears to be more variable, which may be influenced by factors such as population age, the presence of other respiratory pathogens, and differences in symptom reporting or healthcare-seeking behaviour.

Future Research Directions: The findings of this study point to several areas for future research. First, there is a need for larger, prospective studies that include a more diverse patient population across different geographic regions. Such studies would help to confirm the prevalence of pharyngitis and pyrexia in different populations and explore potential factors influencing symptom presentation, such as age, sex, comorbidities, and the presence of other respiratory infections.

Future research should also focus on the impact of vaccination on COVID-19 symptomatology, particularly as new vaccines are developed and administered to broader segments of the population. Longitudinal studies that track patients' symptoms before and after vaccination could provide valuable insights into how vaccination influences the clinical course of COVID-19, including the persistence or reduction of common symptoms like pharyngitis and pyrexia.

Additionally, the emergence of new variants of concern necessitates ongoing monitoring and research. Variants such as Delta and Omicron have shown different symptom profiles compared to earlier strains, and it is crucial to understand how these variants interact with vaccination to influence symptom presentation and disease severity. Studies that compare the symptomatology of different variants in vaccinated versus unvaccinated populations would be particularly informative.

Another area of interest is the role of the immune response in symptom development. Research into the immunological mechanisms underlying pharyngitis and pyrexia in COVID-19 patients could shed light on why these symptoms are so prevalent and whether they could be targeted by therapeutic interventions. Understanding the interplay between viral load, immune response, and symptom development could lead to more effective treatment strategies for managing COVID-19 symptoms.

Finally, there is a need for studies that explore the long-term outcomes of COVID-19 patients who experience pharyngitis and pyrexia. While these symptoms are common during the acute phase of the disease, their persistence or recurrence could have implications for patient recovery and long-term health. Research into the long-term effects of these symptoms, including their impact on quality of life and the potential for developing long COVID, would be valuable for guiding patient care and follow-up.

CONCLUSION

Since its emergence in China, COVID-19 has been the subject of extensive research to elucidate its clinical manifestations. Pharyngitis and pyrexia have been consistently identified as cardinal symptoms of the disease. This study aimed to quantify the prevalence of these symptoms among hospitalized COVID-19 patients at a Pakistani hospital during the latter half of 2020.

The findings of this investigation corroborate existing evidence, highlighting the high prevalence of pharyngitis and pyrexia in the study cohort. These results underscore the significance of considering these symptoms as potential indicators of COVID-19 infection in clinical practice.

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Disclaimer: This investigation was subject to certain limitations. The retrospective study design precluded the establishment of definitive causal relationships between variables. Furthermore, the data's geographic and temporal specificity—a single hospital in Taxila, Pakistan, during the latter half of 2020—may restrict the generalizability of findings to other settings.

The evolving nature of COVID-19, characterized by the emergence of new variants, necessitates ongoing research to elucidate evolving clinical manifestations. Prospective studies encompassing larger, more diverse populations are warranted to comprehensively assess factors influencing symptom presentation and the impact of vaccination strategies.

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Recommendations: To mitigate the spread of COVID-19 and curb the development of antimicrobial resistance, individuals presenting with upper respiratory symptoms, such as sore throat and fever, in endemic regions should undergo PCR testing.

Future research should explore deeper into the long-term consequences of COVID-19 infection, particularly in relation to vaccination status. Large-scale prospective studies are essential to ascertain the vaccine's efficacy in preventing severe disease and long-term complications.

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