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COVID-19 RELATED HEALTH LITERACY, CONSCIOUSNESS AND PREVENTIVE BEHAVIOURS IN PUBLIC: FEAR OF COVID-19 AS MEDIATOR

Original Article

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ABSTRACT

Background: The COVID-19 pandemic created an unprecedented global health emergency, exposing vulnerabilities in healthcare systems and the public's preparedness to respond effectively. Beyond clinical interventions, the crisis emphasized the critical role of health literacy in managing public fear, guiding health decisions, and promoting protective behaviours. Insufficient health literacy contributes to misinformation, heightened fear, and psychological distress, while adequate literacy strengthens individual resilience and fosters adherence to recommended preventive practices. Understanding these associations is vital for shaping effective public health strategies.

Objective: The study aimed to examine the relationship between COVID-19-related health literacy, health consciousness, and preventive behaviours, with a particular focus on the mediating role of fear of COVID-19 among the general population.

Methods: A cross-sectional study was conducted from April to June 2021 among residents of Rawalpindi and Islamabad, Pakistan. A total of 384 individuals participated, recruited through convenience sampling. Data collection was carried out using online Google Forms and physical questionnaires. Standardized scales were employed: European Health Literacy Survey Questionnaire (22 items; α=0.903), Fear of COVID-19 Scale (7 items; α=0.863), Health Consciousness Scale (9 items; α=0.736), and Preventive Coronavirus Infection Behaviour Scale (5 items; α=0.853). Data were analysed using IBM SPSS version 23. Descriptive statistics summarized demographics, while correlation and regression analyses, including the Preacher and Hayes mediation method, tested the hypothesized relationships at a 95% confidence interval.

Results: The sample comprised 76.8% females and 61.7% participants aged 15–24 years. Correlation analysis indicated significant negative association between COVID-19-related health literacy and fear of COVID-19 (r=-0.169; p<0.01). Fear was positively correlated with health consciousness (r=0.257; p<0.01) but not with preventive behaviours (r=0.055; ns). Regression results confirmed that health literacy significantly predicted fear (p=0.0004), health consciousness (p<0.01), and preventive behaviours (p=0.0008). Mediation analysis revealed fear partially and negatively mediated the relationships of health literacy with health consciousness and preventive behaviours.

Conclusion: COVID-19-related health literacy was shown to be a protective factor that reduced fear and enhanced both health consciousness and preventive behaviours. These findings highlight the importance of promoting health literacy as a frontline strategy to improve pandemic preparedness, mitigate fear-driven psychological distress, and strengthen the public's capacity for healthy decision-making in future health crises.

Keywords: COVID-19, Fear of COVID-19, Health consciousness, Health literacy, Pandemic fear, Preventive behaviours, Psychological resilience.

INTRODUCTION

SARS-CoV-2, the causative agent of COVID-19, emerged in December 2019 in Wuhan, China, and rapidly evolved into a global pandemic, reaching Pakistan on February 26, 2020, with the first reported case in Karachi (1,2). The pandemic significantly disrupted economies worldwide, including Pakistan's, leading to reduced job opportunities and income losses due to lockdown measures. Beyond its health implications, the crisis created extensive social and psychological challenges, intensified by the simultaneous rise of an "infodemic," a phenomenon characterized by the rapid spread of both accurate and misleading information through digital platforms (3,4). This infodemic fueled confusion, mistrust, and fear among the public, contributing to stress, anxiety, delayed healthcare access, and even extreme consequences such as suicidal behavior in some cases (5,6). The World Health Organization has highlighted this information overload as a public health threat, stressing its impact on social cohesion, political stability, and collective health behavior (7). Within this context, health literacy (HL) emerges as a critical determinant of resilience. Health literacy equips individuals with the skills to access, interpret, and apply credible health information, thereby enabling informed decisions and fostering protective behaviors during pandemics (6,8). While some studies have shown that higher HL can protect medical students from fear and its adverse consequences (9), there is a scarcity of evidence addressing this relationship within the general population.

This gap is particularly concerning given that low health literacy may exacerbate misinformation-driven fear, resulting in maladaptive responses and worsening public health crises. Fear of COVID-19 itself has become a central factor shaping health consciousness and preventive behaviors. Theoretical frameworks such as Social Cognitive Theory, which emphasizes the interaction between knowledge, environment, and behavior (10,11), and Stimulus Response Theory, which explains conditioned responses to fear stimuli (12), provide a basis for understanding these dynamics. Building on these perspectives, this study investigates the role of health literacy in shaping health consciousness and preventive behaviors, while exploring the mediating influence of fear of COVID-19. The objective of this study is to determine whether COVID-19-related health literacy reduces fear of the disease and how this relationship, in turn, influences health consciousness and preventive behaviors in the general population. This research addresses a critical gap in understanding the psychological and behavioral mechanisms linking health literacy to adaptive public health responses during a pandemic.

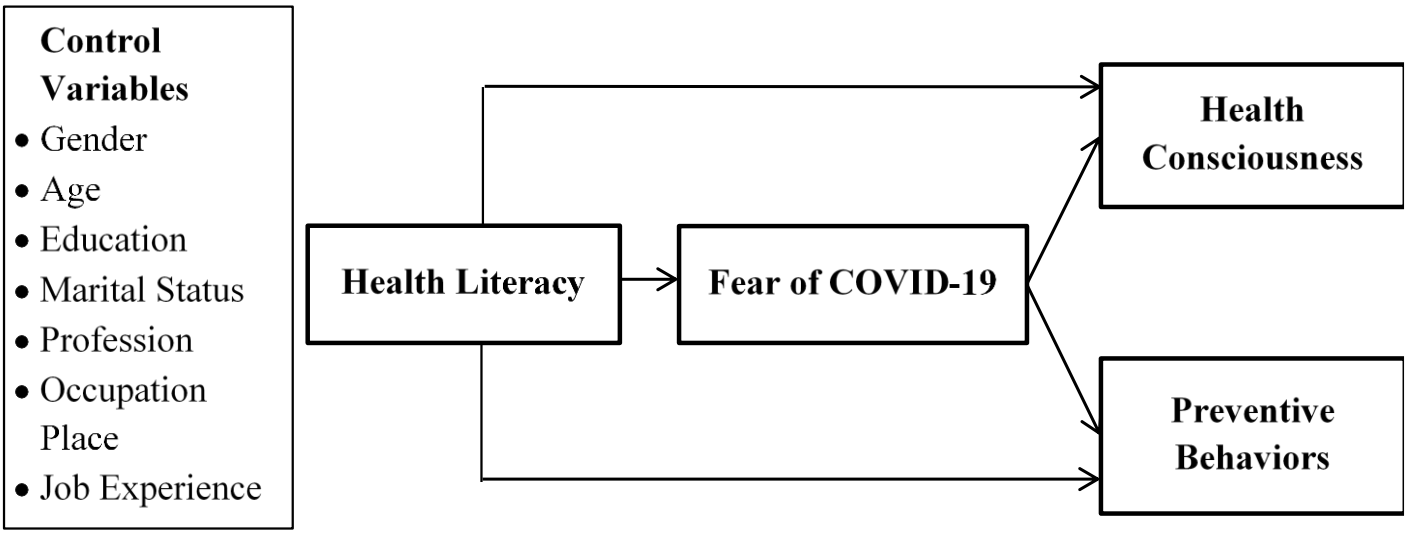
METHODS

The present study was designed as a cross-sectional survey conducted in a natural community setting to examine the impact of COVID-19-related health literacy on health consciousness and preventive behaviors, with fear of COVID-19 conceptualized as a mediating variable. Data were collected over a three-month period, from April 2021 to June 2021, using a convenience sampling technique. The general public residing in the twin cities of Punjab province, Rawalpindi and Islamabad, were approached both virtually and physically. Online data collection was facilitated through digital platforms including email, Instagram, Facebook, WhatsApp, Twitter, and SMS, where potential participants received a link to the Google Forms questionnaire. Additionally, respondents were physically contacted in public spaces and invited to complete the survey. Prior to participation, individuals were provided with a clear explanation of the study purpose, procedures, and voluntary nature of participation. They were also informed of their right to request a copy of their submitted responses, ensuring transparency and respect for participant autonomy. A total of 400 individuals were invited to participate, of whom 384 completed the survey, yielding a high response rate of 96%. The inclusion criteria specified adults residing in Rawalpindi and Islamabad, with access to the internet and the ability to read and respond to the questionnaire in English. Exclusion criteria were individuals below 18 years of age, those with cognitive limitations impairing comprehension, and incomplete responses. Ethical approval for the study was obtained from the relevant Institutional Review Board (IRB). Informed consent was obtained electronically prior to filling out the questionnaire, and confidentiality of all responses was assured.

The study instrument consisted of two sections: demographic data and standardized scales measuring the study variables. Demographic items included age, gender, education level, job status, and professional experience. Health literacy specific to COVID-19 was assessed using the European Health Literacy Survey Questionnaire (HLS-EU-Q) (22 items; α=0.903) (13), measured on a four-point Likert scale ranging from "1 = Very Difficult" to "4 = Very Easy." Fear of COVID-19 was assessed using the Fear of COVID-19 Scale (FCV-19S) (7 items; α=0.863) (14), rated on a five-point scale from "1 = Strongly Disagree" to "5 = Strongly Agree." Health consciousness was measured with the Health Consciousness Scale (HCS) (9 items; α=0.736) (15), also on a five-point Likert scale. Preventive behaviors were assessed through the Preventive Coronavirus Infection Behavior Scale (PCIBS) (5 items; α=0.853) (16), rated on a scale from "1 = Almost Never" to "5 = Almost Always." The reliability analysis confirmed internal consistency for all scales, with Cronbach's alpha values exceeding the acceptable threshold of 0.7. An additional review of the items revealed that none required reverse coding. Data

were entered and analyzed using IBM SPSS version 23. Descriptive statistics were applied to summarize demographic characteristics. Reliability analysis was performed to establish the internal consistency of the scales. Analysis of variance (ANOVA) was conducted to control for the influence of demographic variables. Correlation and regression analyses were performed to assess the relationships between independent and dependent variables. Mediation analysis was conducted using the Preacher and Hayes bootstrapping method to test the mediating role of fear of COVID-19 in the relationship between health literacy, health consciousness, and preventive behaviors. A 95% confidence level and 5% margin of error ($p \leq 0.05$) were adopted as the criteria for statistical significance.

Research Model



RESULTS

The demographic characteristics of the study population demonstrated that the majority of participants were females (76.8%), predominantly young individuals aged 15–24 years (61.7%), followed by those aged 25–44 years (33.9%). A large proportion were unmarried (72.9%) and most were working in healthcare setups (61.7%). In terms of educational attainment, 39.6% had a bachelor's degree and 32.0% had a master's degree, while only 3.6% had doctoral qualifications. Regarding professional distribution, the largest group was categorized as "others" (65.6%), followed by paramedical staff (18.0%), doctors (11.7%), and nurses (4.7%). Job experience data revealed that more than half (51.6%) had less than one year of experience, while 24.5% reported one to three years, and 24.0% reported more than three years. Analysis of variance indicated a statistically significant effect of nearly all demographic variables on health consciousness and preventive behaviors ($p<0.05$), with the exceptions of marital status and occupation place on health consciousness, and gender on preventive behaviors, which were non-significant. Correlation analysis showed that COVID-19-related health literacy was significantly and negatively associated with fear of COVID-19 ($r = -0.169$, $p<0.01$), supporting the first hypothesis. Fear of COVID-19 demonstrated a significant positive correlation with health consciousness ($r = 0.257$, $p<0.01$), supporting the second hypothesis. No significant correlation was observed between fear of COVID-19 and preventive behaviors ($r = 0.055$, ns), which was contrary to the fourth hypothesis. However, health literacy related to COVID-19 correlated positively with both preventive behaviors ($r = 0.525$, $p<0.01$) and health consciousness ($r = 0.245$, $p<0.01$).

Regression and mediation analyses revealed that health literacy related to COVID-19 had a strong negative effect on fear of COVID-19 (95% CI = -0.524 to -0.1368, $p<0.01$). Fear of COVID-19 was positively associated with health consciousness (95% CI = 0.1586 to 0.2985, $p<0.01$) and with preventive behaviors (95% CI = 0.0516 to 0.1943, $p<0.01$). Health literacy demonstrated a significant positive direct effect on health consciousness (95% CI = 0.2950 to 0.5685, $p<0.01$), while fear of COVID-19 acted as a significant partial and negative mediator in this relationship (95% CI = -0.1333 to -0.0214, $p<0.01$). Similarly, health literacy had a strong positive direct effect on preventive behaviors (95% CI = 0.758 to 1.0338, $p<0.01$), with fear of COVID-19 partially mediating this relationship in a negative

direction (95% CI = -0.0791 to -0.0095, p<0.01). These findings provided statistical support for all proposed hypotheses, confirming that health literacy directly enhances health consciousness and preventive behaviors, while fear of COVID-19 plays a significant, though partially negative, mediating role. To provide a more comprehensive understanding of the data, descriptive statistics of the study's main variables were calculated, including mean scores and standard deviations. The findings revealed that the mean score for COVID-19-related health literacy was 2.89 ± 0.64 on a four-point scale, indicating a moderate level of perceived ease in accessing and understanding COVID-19-related information. The mean score for fear of COVID-19 was 3.12 ± 0.71 on a five-point scale, reflecting a moderate-to-high level of fear in the studied population. Health consciousness demonstrated a mean score of 3.46 ± 0.68, suggesting that participants were moderately health-conscious during the pandemic. Preventive behaviors were reported at a mean of 3.85 ± 0.73 on a five-point scale, indicating a relatively high adherence to protective practices. These descriptive results highlight that, despite moderate levels of fear, the population demonstrated strong engagement in preventive behaviors, and their health literacy levels were sufficient to support informed health-related decisions.

Table 1: Demographics of study participants (n=384)

Demographic Variable	Categories	n (%)
Gender	Male	89 (23.2)
	Female	295 (76.8)
Age (years)	<15	4 (1.0)
	15-24	237 (61.7)
	25-44	130 (33.9)
	>44	13 (3.4)
Marital Status	Unmarried	280 (72.9)
	Married	97 (25.3)
	Others	7 (1.8)
Education Level	Intermediate or equivalent	95 (24.7)
	Bachelor's or equivalent	152 (39.6)
	Master's or equivalent	123 (32.0)
	PhD or equivalent	14 (3.6)
Occupation Place	Healthcare Sector	237 (61.7)
	Others	147 (38.3)
Job Status	Doctor	45 (11.7)
	Nurse	18 (4.7)
	Paramedical Staff	69 (18.0)
	Others	252 (65.6)
Job Experience (years)	<1	198 (51.6)
	1-3	94 (24.5)
	>3	92 (24.0)

Table 2: One-way ANOVA statistics for confounding variables (n=384)

Control Variables	F-Statistics (HC)	Sig. (p-value) for (HC)	F-Statistics (PB)	Sig. (p-value) for (PB)
Gender	4.010	0.046*	2.019	0.156 (ns)
Marital Status	1.127	0.325 (ns)	3.455	0.033*
Age	17.129	<0.001**	8.904	<0.001**
Education	4.912	0.002**	3.289	0.021*
Profession	4.884	0.002**	5.722	0.001**
Occupation Place	1.622	0.204 (ns)	19.083	<0.001**
Experience	6.748	0.001**	10.991	<0.001**

*p ≤ 0.05; **p ≤ 0.01; HC = Health Consciousness; PB = Preventive Behaviors; ns = non-significant

Table 3: Correlation between study variables (n=384)

	COVID-19 Related HL	Fear of COVID-19	Preventive Behaviors	Health Consciousness
COVID-19 Related HL	(0.903)			
Fear of COVID-19	- 0.169**	(0.863)		
Preventive Behaviors	0.525**	0.55 (ns)	(0.853)	
Health Consciousness	0.245**	0.257**	0.466**	(0.736)

** = Correlation is significant at the $p \leq 0.01$ level; alpha reliabilities are given in parenthesis.
n = 384; HL = Health Literacy; ns = non-significant

Table 4: Mediating role of FCV in the relationship of COVID-19 related HL with HC and PB (n=384)

Effect of HL Related To COVID-19 on FCV

Variable	Coeff	Se	T	P	LLCI	ULCI
HL	- 0.3507	0.0988	- 3.5500	0.0004	- 0.5449	- 0.1564

Effect of FCV on HC

Variable	Coeff	Se	T	P	LLCI	ULCI
FCV	0.2107	0.0351	6.0081	0.0000	0.1418	0.2797

Effect of FCV on PB

Variable	Coeff	Se	T	P	LLCI	ULCI
FCV	0.1201	0.0356	3.3737	0.0008	0.0501	0.1901

Direct Effect of HL Related To COVID-19 on HC

Effect	Se	T	P	LLCI	ULCI
0.4826	0.0684	7.0568	0.0000	0.3481	0.6171

Indirect Effect of HL Related To COVID-19 on HC

	Effect	BootSE	BootLLCI	BootULCI
FCV	- 0.0739	0.0266	- 0.1298	- 0.0248

Direct Effect of HL Related To COVID-19 on PB

Effect	Se	T	P	LLCI	ULCI
0.8816	0.0706	12.4805	0.0000	0.7427	1.0205

Indirect Effect of HL Related To COVID-19 on PB

	Effect	BootSE	BootLLCI	BootULCI
FCV	- 0.0421	0.0166	- 0.0786	- 0.0131

n = 384; $p \leq 0.01$; HL= Health Literacy; FCV= Fear of COVID-19; HC= Health Consciousness; PB= Preventive Behaviors; LLCI = Lower Limit Confidence Interval; ULCI = Upper Limit Confidence Interval

Table 5: Descriptive Statistics of Main Study Variables (n = 384)

Variable	Mean ± SD	Scale Range
COVID-19 Related Health Literacy	2.89 ± 0.64	1 – 4
Fear of COVID-19	3.12 ± 0.71	1 – 5
Health Consciousness	3.46 ± 0.68	1 – 5
Preventive Behaviors	3.85 ± 0.73	1 – 5

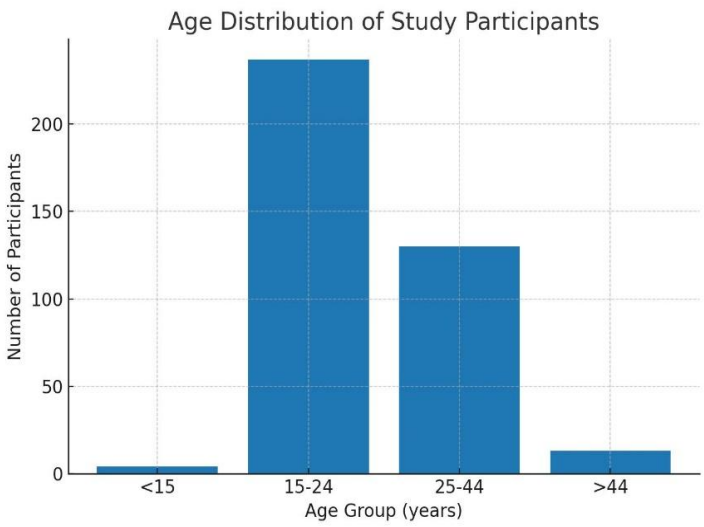


Figure 2 Age Distribution of Study Participants

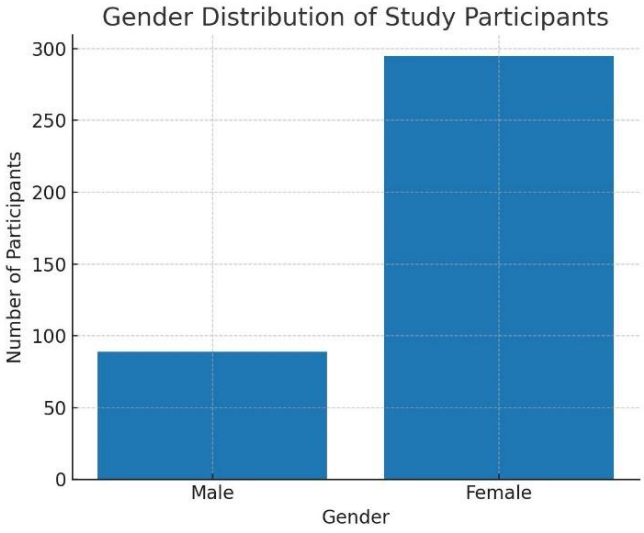


Figure 2 Gender Distribution of Study Participants

DISCUSSION

The findings of this study provide valuable insights into the role of health literacy in shaping public responses during the COVID-19 pandemic. Evidence from earlier research among students indicated that belief in COVID-19-related information, whether authentic or misleading, was directly associated with heightened levels of fear (17). In contrast, the present study hypothesized that improved health literacy would reduce fear of COVID-19, thereby minimizing misinformation-driven anxiety and its adverse consequences. The results demonstrated that while health literacy had a negative association with fear of COVID-19, the effect was weaker than anticipated, suggesting that other psychosocial or environmental factors may influence fear levels during a health crisis. Previous research has consistently supported the role of health literacy in mitigating fear by enhancing awareness of disease transmission, prevention, and management, which subsequently promotes mental stability and healthier decision-making (18). The current findings partially align with this evidence, as health literacy significantly enhanced preventive behaviors and health consciousness. Fear of COVID-19 also emerged as a positive predictor of health consciousness and preventive behaviors, consistent with prior evaluations conducted during the pandemic that showed fear acted as a motivating factor for individuals to remain cautious, adopt protective measures, and restrict unnecessary exposure (19,20). Such findings underscore the dual role of fear as both a motivator of health-promoting behaviors and a potential contributor to psychological distress.

The study also highlighted that excessive fear could negatively mediate the relationship between health literacy and preventive behaviors. This observation is consistent with previous evidence suggesting that heightened fear may compromise logical thinking, lead to maladaptive responses, and exacerbate psychological suffering (21,22). Hence, while moderate levels of fear may trigger protective behaviors, excessive or prolonged fear can be detrimental to mental health, underscoring the importance of balanced public health communication. The current results support the notion that health literacy serves as a crucial tool in reducing misinformation, counteracting fear-driven distress, and fostering resilience against pandemic-related anxiety (23,24). The implications of these findings are multifaceted. Enhancing health literacy not only enables individuals to distinguish between credible and misleading information but also strengthens their ability to adopt preventive practices. Integrating health literacy programs into public health initiatives could therefore reduce misinformation, increase public compliance with preventive guidelines, and limit the psychosocial burden of pandemics. The recognition of fear as both a mediator and a determinant of health behaviors emphasizes the importance of carefully crafted risk communication strategies that inform without generating unnecessary panic.

This study offers several strengths, including the use of validated instruments with strong internal consistency, a high response rate, and the application of robust statistical methods for mediation analysis. These factors enhance the reliability of the findings and their contribution to existing literature. However, the study also presents limitations that must be acknowledged. The cross-sectional design

limits causal inferences, while the use of convenience sampling restricts generalizability beyond the twin cities of Rawalpindi and Islamabad. The reliance on self-reported online surveys introduces the potential for response bias and excludes individuals with limited internet access, potentially underrepresenting marginalized groups. Moreover, the sample size, although adequate for statistical analysis, may not fully capture the diversity of Pakistan's population. Future research should build upon these findings by employing longitudinal or experimental designs to examine causal pathways between health literacy, fear, and health behaviors (25). Larger and more diverse samples across different regions would provide broader generalizability. Additionally, exploring the role of moderating variables such as social support, media exposure, or psychological resilience could provide a more nuanced understanding of the mechanisms at play. Interventions that integrate health literacy education with targeted risk communication strategies may prove particularly effective in managing both behavioral and psychological responses during health crises. In conclusion, the study reinforces the critical role of health literacy as a protective factor against fear-driven maladaptive responses while simultaneously promoting preventive behaviors and health consciousness. The findings suggest that public health systems should prioritize the dissemination of accurate, reliable, and accessible information to reduce misinformation and mitigate unnecessary fear. By strengthening health literacy and managing fear effectively, communities can be better prepared to respond to pandemics in a way that safeguards both physical and psychological well-being.

CONCLUSION

Health literacy related to COVID-19 emerged as a vital frontline tool in preventing the spread of infection and safeguarding public well-being. The study concluded that strengthening health literacy not only enhances preparedness at both individual and systemic levels but also reduces fear-driven psychological consequences while promoting healthier choices and preventive behaviors. By equipping people with the ability to access, understand, and apply reliable health information, health literacy provides a sustainable pathway for managing current and future health crises. Its role as a cornerstone of primordial and primary prevention highlights its practical significance in mitigating misinformation, fostering resilience, and ensuring a more effective and efficient public health response during pandemics and other widespread health threats.

AUTHOR CONTRIBUTION

Author	Contribution
Naseem Azad*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Attiya Najeeb	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Waseem Mushtaq	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Maryam Abbas	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published

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