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ORIGINAL CONTRIBUTION

Pandemic Related Perceived Stress and Vaccine Hesitancy in Pakistani Adults Aged 18-59 Years

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Abstract— The current study aimed to examine the pandemic related perceived stress and vaccine hesitancy in Pakistani adults aged 18-59 years. A sample of 452 adults of Punjab, Pakistan, completed an online questionnaire using Google Forms which contained two scales, including the Oxford COVID-19 Vaccine Hesitancy Scale and Pandemic-Related Perceived Stress Scale of COVID-19. The current study aimed to predict vaccine hesitancy from perceived stress and to find demographic associations with both perceived stress and vaccine hesitancy in Pakistani adults. The results showed that the perceived stress significantly predicted vaccine hesitancy in Pakistani adults. There were found significant gender differences in both perceived stress and vaccine hesitancy. Women were found to have more perceived stress and vaccine hesitancy than men. Age had no impact on both perceived stress and vaccine hesitancy, whereas education was found to have a significant impact on perceived stress. The adults with low education were found to have more perceived stress than adults having higher education levels. It is concluded and recommended that even if an effective vaccine is prepared in the event of a pandemic, it must be properly explained to people in order to create acceptance for a vaccine. An education program that increases people's health literacy can also effectively reduce public hesitation about vaccination and improve acceptance. However, for people with high stress, other health programs should be developed to increase the positive response to the COVID-19 vaccine.

Index Terms— COVID-19, Pakistani Adults, Perceived Stress, Vaccine Hesitancy

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Introduction

The Health Care Workers (HCWs) have an important role to play in informing the general public about the source of the vaccine and its effects in the coming years citewinter2010pertussis. In Pakistan, HCWs are preferred for the early Chinese COVID-19 vaccination program (Bai et al., 2021; Falagas & Zarkadoulia, 2008; Wang et al., 2020). This is done within the West, giving preference to high-risk groups, and HCWs are recognized as such. For this reason, it is important to consider the relationship between HCWs and the COVID-19 vaccine, as this will lead to better dissemination of knowledge among the general public.

Vaccination hesitation remains an important problem for Pakistan against the background of various conspiracy theories. It is mostly connected to these theories that polio has not been eradicated across the country. Some claims that have impeded the country's polio campaign include complaints of poor vaccine quality, the questioning of dosage recommendations, religious bans (infidel immunization)

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and suspicions about the presence of an active virus in vaccines (M. Ali et al., 2019; Khan et al., 2020). Unfortunately, the COVID-19 conspiracy narrative is already growing throughout Pakistan. The virus was recently stated by an illusion of Islamic nations by a well-known Pakistani political analyst and columnist to enable Jews in the globe to reign and introduce Nanochips integrated into human bodies to achieve control by means of 5G towers. The former Foreign Minister of Pakistan accused the US of developing the virus in Great Britain and then transferring it to China for global propagation (I. Ali, 2020; Staff, 2020). In Pakistani society, these theories are active in social networks. In a country where vaccination hesitation is a major barrier to preventing vaccine-preventable diseases, such conspiracies could sow the seeds of resistance to COVID-19 vaccination programs.

Perceived Stress

Stress is a mental phenomenon that is usually caused by demands and failures that are very familiar to our lives. One person's assessment is that the demands of the environment outweigh their sources and thus endanger people's well-being. Stress is difficult to determine because everyone's response to stress is different. A stressful situation for one person cannot be accepted by another person. The response to stress affects a person's mind, body, and behaviour. It can interfere with a person's normal development and activity. Stress, if not managed properly, can lead to negative emotions such as depression and anxiety.

Negative Impact of Perceived Stress

Stress causes a number of psychological problems, and the effects of stress vary from person to person. Long-term stress among adults is associated with many chronic psychological and physiological disorders, such as smoking, drug use, and high-risk sexual behaviour (Mohd & Yakin, 2018; Sawatzky et al., 2012). Adults simply suffer from depression when faced with daily stress. Prolonged depression without treatment not only has a serious impact on adults' academic performance but also leads to chronic psychological disorders (Aldwin et al., 2010; Chavan et al., 2021; Kwok et al., 2021; Palgi et al., 2021).

Vaccine Hesitancy

The heterogeneity of vaccine resistance indicates reluctance and rejection of the vaccine to varying degrees in the population. Although it is estimated that only a small proportion of individuals have strong anti-vaccine beliefs that result in complete rejection of the vaccine, more and more people are known to be hesitant to be vaccinated (Larson et al., 2014). Leask et al. (2012) estimated that less than 2 percent of parents decline all vaccinations for their children, but it is believed that 20 to 30% of parents are hesitant to get vaccinated, indicating that they have major worries about vaccinating their children (Leask et al., 2012). Recent research has focused on identifying vaccine-related characteristics among individuals who are unwilling or undecided, who may delay vaccination, or who may only accept certain vaccines while they refuse others (Dror et al., 2020; Troiano & Nardi, 2021; Larson et al., 2014).

The term "vaccine hesitation" emerged to better describe the heterogeneous nature of vaccine resistance and continued until hesitant individuals completely abandoned vaccines (World Health Organization, 2014; MacDonald et al., 2012). This persistence reflects previous findings that have identified several types of reactions, including resistance to vaccination programs, passive acceptance, and active demand. Hesitation is characterized as a certain state of indecision that can lead to vaccination rejection if individuals are not effectively involved in the decision-making process and are not accepted to address specific concerns about vaccination (Larson et al., 2014).

Risk Perception and Vaccination

As demonstrated in the above-mentioned argument about the vaccine, an important aspect of vaccine resistance is the general impression of the risk and subsequent safety issues (Kata, 2012). In addition, the low perceived risk of vaccine-preventable diseases in many wealthy countries has resulted in comfort difficulties (MacDonald et al., 2015). To develop successful communication techniques to encourage vaccination, it is vital to better understand the relationship between adherence to the vaccination programmes by the public and their perception of individual health risks.

Interest in the perception of social risk arose primarily in response to public debate about the use of technology stemming from risk-benefit sharing, which was inconsistent with expert predictions and explanations. Unlike expert risk assessment which is experimentally tested and based on evidence, the perception of public risk is considered to be based on the likelihood of no harm if no preventive measures are implemented. Experts measure risk, in particular, based on the quantitative likelihood of results and consider "uncertainty" immeasurable (Gigerenzer, 2002). In contrast, the idea of social risk is mostly based on personal injury and uncertainty when estimating the likelihood of a result (Gifford, 1986). The literature reported differences between professionals and social risk perception, indicating a higher perceived risk among the public than among professionals (Krewski et al., 2012).

Rationale

Given the novelty of the coronavirus pandemic, it is still unclear how factors related to COVID-19 are related to perceived stress and vaccine hesitancy in adults. Earlier studies had evaluated vaccine hesitancy from a conspiracy theories perspective (Demuyakor, 2020; Khan et al., 2020), the acceptance of vaccine in the Pakistani population (Qamar et al., 2021), and vaccine hesitancy from social inequality perspective (Perveen et al., 2021). No study reported the association of perceived stress and vaccine hesitancy in Pakistani adults and the role of demographics in such association. The present study was conducted to fill this gap.

Objectives

The objective of this study is, therefore, to predict vaccine hesitancy from perceived stress and to measure the demographic differences (gender, age, and education) in vaccine hesitancy and pandemic related perceived stress in Pakistani adults.

Hypotheses of the Study

H_1: Perceived stress leads to vaccine hesitancy.
H_2: Females have more vaccine hesitancy and perceived stress than males.
H_3: There are age-wise differences in perceived stress and vaccine hesitancy.
H_4: The people with higher education have more perceived stress and vaccine hesitancy than people with lower education.

Methodology

Research Design & Participants

The cross-sectional survey method was used in this study to collect data. A total sample of 452 participants was included in the study. The data were collected from different cities of Punjab province in Pakistan. The sample was calculated using Raosoft online sample size calculator with 95% confidence interval and 5% margin of error. The purposive sampling technique was used to collect data.

Measures

Demographic Information Form

This sheet comprises the respondent's name (optional), gender, age and educational level.

Pandemic-Related Perceived Stress Scale of COVID-19

The COVID-19 pandemic-related Stress Scale contains 10 questions developed by Campo-Arias et al. (2020) to measure an individual's assessment of stressful life events (Cohen et al., 1983). The scale was designed to reveal that the respondents' lives had been unpredictable, unmanageable and extremely difficult in the past month. PSS-10 is a five-point Likert scale that varies between (0 = never 4 = very often). There are four positively written opposite items (items 4, 5, 7 and 8). Total scores range from 0 to 40, indicating higher perceived stress. The internal consistency of the original scale varies from 0.75 to 0.86. In this study, PSS-10 had an internal consistency of $\alpha = 0.71$.

Oxford COVID-19 Vaccine Hesitancy Scale

The Oxford COVID-19 Vaccine Hesitancy Scale was developed by Freeman et al. (2020). It is a measure of seven items obtained from a study of Pakistani adults selected according to the population by age, gender, ethnicity, income and region. Special response options of coded items 1 to 5 are used. The "I don't know" option is also provided. Higher scores indicate higher vaccine hesitation. Oxford COVID-19 Vaccine Scale scores are associated with the Vaccine Suspension Scale (Shapiro et al., 2018), $r = 0.47$, $p < 0.001$. The Cronbach alpha is 0.97.

Procedure

After choosing the research topic, permission was taken from the author of the questionnaire to use the questionnaire in research. The 2 scales and demographic information forms were appended together. The complete questionnaire was distributed through social media platforms such as WhatsApp and Facebook. The questionnaire also contained explicit informed consent. Each participant was required

to read and respond in yes to informed consent before taking part in the study. The results were analyzed through Statistical Package for Social Sciences (SPSS 25.0). The linear regression, independent sample t-test, and analysis of variance were used to test hypotheses. The anonymity of the participants was maintained.

Table I
Frequency Distribution of Demographic Variables (n = 452)

Variables	Frequency(%)
Gender	
Male	194 (42.9%)
Female	258 (57.1%)
Age	(years)
18-40	238 (52.7%)
41-50	114 (25.2%)
51-59	76 (16.8%)
60+	24 (5.3%)
Education	
Matric	80 (17.7%)
Inter	93 (20.6%)
Graduation	166 (36.7%)
Masters+	113 (25.0%)

Table I gives the frequency distribution of demographic variables included in the study. There are around 43% males, and 57% are female participants. The majority of the participants (53%) are from the 18-40 years age group, followed by around 25% who are from 41-50 years age group, whereas only 22% of participants are from other age groups. 37% of the participants have graduation education, followed by 25% who have masters or higher education. Around 38% have inter or less education.

Table II
Linear Regression Analysis Perceived Stress Leads to Vaccine Hesitancy

Variable	R^2	F	df	B	SE	β	t	Sig.
Perceived Stress	.04	23.06	1,450	.20	.04	.22	4.80	.000

DV=Vaccine Hesitancy

Table II gives the results of linear regression analysis run to predict vaccine hesitancy from perceived stress. The results are statistically significant. It means that perceived stress significantly predicted vaccine hesitancy ($F(1, 450) = 23.06$, $p < .05$).

Table III
Result of t-test (n = 452) for Gender Differences in Perceived Stress and Vaccine Hesitancy

Gender	Female		Male		Independent Sample t-test		
	M	SD	M	SD	t	df	$p.$
Perceived Stress	26.96	5.32	24.95	6.35	3.65	44.66	.000
Vaccine Hesitancy	12.64	6.40	11.02	4.82	2.95	345.60	.003

Table III shows the results of the independent sample t-test computed to find out gender differences in perceived stress and vaccine hesitancy. The results of the t-test are statistically significant for both perceived stress and vaccine hesitancy. The females have more perceived stress (M = 26.96 vs M = 24.95) and vaccine hesitancy (M = 12.64 vs M = 11.02) than males.

Table IV
Analysis of Variance (n=452)

Variables	18-40 years		41-50 years		51-59 years		60+ years		ANOVA Result	
	M	SD	M	SD	M	SD	M	SD	F-value	Sig.
Perceived Stress	26.08	5.90	25.25	6.13	25.22	6.25	27.68	5.72	1.43	.23
Vaccine Hesitancy	12.02	5.82	11.60	5.13	11.06	5.40	11.45	6.50	.60	.61

Table IV describes the results of ANOVA computed to find age-wise differences in perceived stress and vaccine hesitancy. The results of ANOVA are not statistically significant for both perceived stress and vaccine hesitancy. There are no significant age differences in perceived stress and vaccine hesitancy.

Table V
Analysis of Variance (n = 452)

Variables	Matriculation		Intermediate		Graduation		Masters		ANOVA Result	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*-value	Sig.
Perceived Stress	27.81	5.39	26.76	5.83	25.24	5.61	24.46	6.69	6.33	.000
Vaccine Hesitancy	12.11	5.82	12.17	5.62	11.95	5.78	10.71	5.10	1.64	.17

Table V describes the results of ANOVA computed to find education-wise differences in perceived stress and vaccine hesitancy. The results of ANOVA are statistically significant for perceived stress only. The people with lower education, such as matriculation (M = 27.81), have more perceived stress than people with higher education levels such as graduation and masters, respectively (M = 25.24, M = 24.46).

Discussion

The current study aimed to examine the pandemic related perceived stress and vaccine hesitancy in Pakistani adults aged 18-59 years. The linear regression indicated that perceived stress significantly predicted vaccine hesitancy in Pakistani adults. The most common reason for the perceived stress was a belief in conspiracy theories which led people to develop vaccine hesitancy. The best solution is to battle disinformation and to offer correct information in a powerful manner by 'packing' or vaccination (Linden et al., 2017; Wong, 2015).

The following groups have been identified as more likely to be uncertain in comparisons between subgroups: people who do not work in the health sector, rural and urban communities, prefer information from unattended sources (such as national newspapers and television channels) or parents of children under age 18. The advantages and dangers of vaccines are more likely to be realistic in the healthcare field and are more likely to be less overestimated (e.g., assumption that natural immunity is better), and vaccination risks are hesitant. In addition, parents tend to feel more responsible for their children than they do, and therefore perceptions of vaccine risk, reflecting previous findings, appear to be increasing (Crescitelli et al., 2020; Ebrahimi et al., 2021; Napolitano et al., 2018). Rural residents are more likely to be reluctant to be vaccinated, which coincides with findings showing greater vaccine resistance among people living in suburban areas than in cities (Murphy et al., 2021). This is a theoretical concern that is less likely to have access to public information as a related factor (Alabdulla et al., 2021; Netfa et al., 2020). The second hypothesis of this research was that "females have more vaccine hesitancy and perceived stress than males". The results of the t-test were statistically significant for both perceived stress and vaccine hesitancy. Women were found to be more stressed and hesitant to vaccinate than men. These findings reflect past researches that have shown women had more stress than men (Hogan et al., 2002; Tamres et al., 2002; Ng & Jeffery, 2003) observed men being more susceptible to stress, but Tamres et al. (2002) reported an important difference in stress levels.

Nolen-Hoeksema (1990) argument may explain the fact that women face more burdens in their daily lives as a result of their social status and roles than men and that these strains can cause higher stress. Findings on gender and vaccination hesitation revealed that male participants differed significantly from women. These findings are consistent with a recent study by Green et al. (2021) which also found that women had more vaccine hesitancy than men.

The third hypotheses of the research were that "there are age-wise differences in perceived stress and vaccine hesitancy". The results of ANOVA were not statistically significant for both perceived stress and vaccine hesitancy. There were found no significant age differences in perceived stress and vaccination hesitation. The Pakistani public believes that vaccinations are safe, effective and important, but it seems sensible given that a significant portion of the population is very suspicious or refuses a COVID-19 vaccine. The threat is reaching a stage at which vaccines are becoming seriously distrustful, with significant effects on individuals and health services. Socio-demography does not explain vaccination hesitation in any useful way. Doubt is relatively evenly distributed among the population - not limited to certain groups, which may be another indication that the issue remains at one point. Understanding the reasons for vaccination hesitation has never been so easy, especially in Pakistan.

The fourth hypothesis of the research was that "perceived stress and vaccine hesitancy would be different for different education levels". The results of ANOVA are statistically significant for perceived stress and not for vaccine hesitancy. The people with lower education were found to have more perceived stress than people with higher education levels. The results are not consistent with earlier studies Green et al. (2021) which found a significant difference in vaccine hesitancy in people of different education levels.

There are three more basic views on the COVID-19 vaccine: whether the vaccine development rate will affect safety, affectivity and to the extent that the vaccine is physically disagreeable; whether the vaccine recipient may feel tested. If an individual is considering infection, the vaccine will work. All this is connected with the necessity of trust and faith in the literature and decision-making about vaccination.

This component also includes conspiracy beliefs of coronavirus (Freeman et al., 2020). Researchers also observe that the vaccination conspiracy is a common feature of a large minority while a higher proportion is not dependent on the truth or false beliefs of the conspiracy.

Conclusion

The study provides a snapshot of the hesitation of the COVID-19 vaccine among Pakistani adults. Vaccine reluctance has been found to be very common among adults in Pakistan during the COVID-19 pandemic. The probability of infection was reported to be high. The efficacy and safety of the COVID-19 vaccine were noted as barriers to vaccination. Promoting scientific research to demonstrate vaccine safety in the medium to long term should be encouraged by politicians, including the Ministry of Health of Pakistan. Vaccination literacy programs should be tailored to the health, scientific and general literacy of the priority groups. Strategies to reduce vaccine reluctance need to be adapted to address societal misconceptions about vaccination.

Limitations & Future Directions

The present study had certain limitations. The study did not differentiate between the types of vaccine. Future studies could be conducted by taking into account the specific vaccines. For this purpose, the qualitative methodology could be used, which may provide an in-depth understanding of the reasons behind vaccine hesitancy in the masses. The other demographic variables like profession, marital status, number of children, and the geographical region could not be included in the study. The vaccine hesitancy should have been studied along with these demographic variables.

Implications

There are several levels of importance in assessing the types of stress and vaccine hesitation associated with COVID-19. One is to provide appropriate interventions for perceived stress associated with COVID-19 and to provide patients with appropriate strategies to combat COVID-19. For this purpose, community workers may be trained by mental health professionals (Bilal, 2021). In addition, sufficient information from relevant organizations, including health professionals, psychologists, policymakers, and planners, to advise and educate the general population on the prevention and treatment of the physiological and psychological effects of COVID-19. In this way, vaccine hesitancy may be minimized among the masses. Electronic and social media may be useful in this regard.

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