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Mental Health Issues and the Mediating Role of Anxiety Between the Contact History and Precautionary Measures among Medical Students Dealing with Contagious Diseases

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ABSTRACT

Contagious diseases like COVID-19 have caused substantial morbidity, mortality, and detrimental psychological effects. Medical workers and students are in the front line to deal any kind of diseases that are contagious. They are not only affected physically; their mental health was also affected (McAlonan, et al., 2007). Therefore, the present study was to explore the impact of contagious disease on mental health of medical students. Correctional and cross-sectional research design was used for the present study. For collection of data 522 participants based on online survey-based questionnaire were asked about the precaution measures they were using while dealing patients with contagious diseases. Further, mental health issues were assessed through DASS questionnaire. we have found that 18% sample had normal anxiety, 16% mild, 21% moderate and 31% severe respectively. The sample was having. 05%, 4%, 53%, 16.5%, and 27% extremely sever, severe, moderate, mild and normal depression. 63% sample was having normal stress, 28% mild, 7.5% moderate, 1% severe and 0.5% was having extremely severe stress. The Pearson correlation analysis has shown that contact history and precautionary measures were correlated with mental health issues of medical students. While performing the mediation analysis, it has been found that contact history predict anxiety in medical students and anxiety also appear strong predictor of precautionary measures. Further, the indirect effect has indicated that anxiety partially mediated the relationship between contact history and precautionary measures. According to the study, mental health problems have become common among medical students. Consequently, it is advised that steps be done to reduce their stress, anxiety, and sadness as these conditions may have detrimental effects in a variety of ways.

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Introduction

Contagious diseases are continuously attacking humans. Fortunately, humans have evolved a sophisticated mechanism, the immune system, that support in battling and eliminating infection (O'Neill LA, 2008). A communicable disease that can spread rapidly from person to person through direct contact (touching an infected person), indirect contact (touching a contaminated object), or droplet contact (inhaling droplets made when an infected person coughs, sneezes, or talks) is the definition of a contagious disease (NIH, 2023).

A Contagious disease is any illness that transmit between humans or animals. These diseases are sometime referred as “infectious” or “transmissible” diseases. When the pathogens enter in the body, it started to replicate and the human or animal experience symptoms (Kandola, 2023). when the immune system invokes by a contagious pathogen it may develop clinical or psychological symptoms, based upon the particular type and response degree (Müller, 2014). The pathogens or virus of contagious diseases often attacks the lungs systems, CNS, circulatory system, lymphatic system, genitourinary system, joints, bones and also the skin (Craighead, 2009). The most prevalent contagious diseases according to WHO’s recent report are athlete's foot, parasites, rhinoviruses, Lyme disease, coronaviruses, HIV, tuberculosis, salmonella and Escherichia coli, and ringworm, in which there is serious prevalent professional infections that need to take precaution measures in health area (WHO, 2022).

Approximately, 1 in 10 professionals from health care around the world got sharp illness or injury every year. Because health care workers deal patients in situations that are at high-risk situations. There life, well-being and safety are in threat due to their professional risk for example biological, physical, chemical, danger in environmental conditions and psychological mental health (Mossburg et al. 2019). If medical or health workers ignore to pay attention in precaution measures while doing diagnosis, surgery or nursing and treatment, they are more danger to effected by physical or psychological diseases (Shi et al. 2020).

Basically, medical workers and students are in the front line to deal any kind or diseases either that is contagious diseases or communicable diseases. They are not only affected by physically but also, they through psychological. Currently the relationship between doctor and patient has got a high level of stress in different countries (Makhado et al. 2022). Medical workers face high not only level of anxiety and depression but also stress after treating the patients with respiratory diseases. They experienced fatigue, insomnia, worried about health, anxious about the social interaction, despite their use of precaution measures for contagious disease like COVID-19. Further post-traumatic stress disorder explored as a mediator between high level of depression, anxiety and stress (McAlonan et al. 2007). Due to injuries medical care workers and students have exposure to infected blood and they are at highest risk for infections from the patients of hepatitis A, B & C, HBV and immunodeficiency pathogens (Doebbeling et al. 2003).

The risk of professional experience to contagious diseases among health care workers, mainly students in health careers, is a chief community health matter (Cheng et al. 2012). Medical students are unprotected to professional health risks in hospitals while their duration of academic

and internship years due to their insufficient knowledge about precaution measures about contagious diseases. Hazard to medical professional works, plus medical students, remains a considerable issue in the medical care occupation of numerous countries and it caused to highest risk in getting infections such as HIV, COVID or other infectious diseases (Memish et al. 2013). In hospitals medical students are exposed to risk in acquiring and transmission for infections. These infections in medical students are frequently caused by pathogens or viruses they are spread through contact to suffering patients, infection surfaces, transmission of airborne through atomizers and by water or food. It is identified that medical students are frequently exposed hazard to face infectious or contagious diseases (Ojulong et al. 2013).

When emerging contagious diseases such as COVID-19 and pandemic outbreaks of other diseases generally have a serious mental health impact on healthcare professionals, medical students and general public. During outbreak of any diseases or pandemics situation lead to increase in precaution behavior such as washing hands, impaired functioning due to increased anxiety and mental health symptoms that cause maladaptive in coping mechanism (Rubin et al., 2009).

Similarly in China, when there was a serious HIV (contagious diseases) epidemic blowout problems have stimulated particularly in young medical students. Which has produced mental health issues such as work pressure, work overload, long working hours in HIV healthcare works. Moreover, these medical works experience anxiety symptom over safety practices due to the professional exposure to HIV (Sanchez et al. 2014). Further medical workers of HIV experienced serious somatic symptoms, insomnia, problems in interpersonal relations, maladaptive coping styles, often experience burnout and low level of job satisfaction as compared to other medical care workers (Qiao et al. 2016).

Therefore, the aim of current study is to explore that contact history with contagious diseases caused precaution behaviors and anxiety, depression and stress in medical students. Further is to explore the mediating role of Anxiety between the relationship of contact history and precautionary measures among medical students dealing with contagious diseases. while investigating these aspects, it potentially uncovers insights into the mental health challenges faced by medical students in the context of contagious diseases and the role that anxiety may play in shaping their behaviors and decisions regarding precautions.

MATERIAL AND METHODS

Research design

The present study was based on correlational and cross-sectional research design. It was online investigation-based sample from medical students.

Sample

Snowball technique of sampling to recruit sample was used. Study participants was selected from medical colleges. The sample size was 522 including both male and female medical students. Sample size was estimated through G* power.

Inclusion and exclusion criteria

The study Included participants currently enrolled in medical colleges. Only those participants were included in study whom have directly treat or contact with patients who were diagnosed with contagious diseases.

MEASURES

The following measures was used in current study:

a) **Demographic information Sheet:** Demographic information sheet including participant's gender, age, level of education and year of education was used to collect demographic information about sample. Answers were coded for categorical data analysis.
b) **Depression, Anxiety and Stress Scale:** For measuring medical student's mental health issues, DASS 21 was used. The three emotional states of stress, anxiety, and depression can be simultaneously assessed using this short version of 21 items scale is appropriate for use across many age groups, both in clinical and non-clinical contexts (Lovibond & Lovibond, 1995). The overall ordinal alpha for the DASS-21 scale was 0.74. The DASS-21 subscales evaluating depression, anxiety, and stress had Cronbach's alpha values of 0.83, 0.74 and 0.87 respectively (Moya et al., 2022).
c) **Precautions Measures:** Precautionary measures involved using a face mask, cleaning hands frequently, using antiseptics, focusing more closely on personal hygiene, remaining at home and skipping social gatherings, maintaining a balanced diet, cleaning cell phone, staying away from public transportation and dining outside, getting enough sleep and drinking enough water, keeping an eye on my physical health, and convincing others to take the necessary precautions. Frequently, always, infrequently, sometimes, and never were among the participants' answers.
d) **Contact History:** To determine a person's risk of infection and to find possible routes of transmission, contact histories are gathered. Medical student provided contacting the contagious disease and take necessary preventive action by learning who and where the patient has been in contact with.

Procedure

After receiving official approval from the department, participants were contacted in medical colleges and university via email. Data was gathered via an online survey-based scales from a sample of medical college/university students. The participants were informed that their participating in this study was voluntary. Confidentiality was guaranteed, and informed consent was also taken. The online survey was made using Google Forms. Each academic year's class representatives took part in directly sending the questionnaire link to students. Approximately 750 medical students were contacted and approximately, 650 participants send back questionnaire after filling. For data evaluation SPSS was used once the data collection process is over. While, when the data was entered, few questionnaires were discarded because of inclusion/exclusion criteria, and few questionnaires were discarded because of incomplete information. Data from 522 medical students was used for analysis.

Statistical analysis:

SPSS was used to examine the data. Standard deviation (SD), mean, frequency, and percentage were utilized in descriptive statistics. The association between the variables was investigated using the method of Pearson product-moment correlation. Mediation analysis was conducted using Hay's Process.

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Results

The study included 522 participants, the majority of whom were male (88%). The respondents' ages ranged from 15 to 30 years old. The age range of 63.5 percent of participants was between 15 and 20 years old, while 36.5% of participants were between 21 and 30 years old. The highest percentage of students (78%) expressed fear of interacting with those who were exhibiting symptoms. Major preventive strategies mentioned by the students were avoiding handshakes (85%), washing hands (98%), using hand sanitizers (69%), wearing face masks (95%), restricting use of public transportation (97%), and avoiding shopping malls (94%).

Table I

Descriptive Statistics and Psychometric Properties of Study Variables (N=522)

					Range		
Variables	*K*	*M*	*SD*	*α*	Potential	Actual	*Skew*
Contact History	03	3.67	1.04	.75	3-6	3-6	1.05
Precautionary Measures	07	29.22	4.29	.68	7-35	7-35	-1.60
Anxiety	07	6.72	3.01	.89	0-21	0-18	-.079
Stress	07	6.35	2.74	.88	0-21	0-17	.096
Depression	07	6.45	2.73	.89	0-21	0-15	-.073

Note. k= Number of Items, M= Mean, SD= Standard Deviation.

The mean and standard deviation of the study's variables are displayed in Table 1. It also shows the Cronbach's alpha, and internal consistency, for each scale used to determine the research variables. The results showed that all scales of the present study are internally consistent. Normality distribution of the data was checked by examining the skewness coefficients. Skewness values between -1 and +1 indicate a normal distribution (Hair et al., 2014). The skewness values of the data were found to be normally distributed (between -1 and +1 values). Thus, parametric tests such as Pearson correlation, regression, and mediation were justified.

Table II

Person product correlation of study anxiety, contact history and precautionary measures among medical students (n=522)

	Variables	1	2	3	4	5
1	Anxiety	-	.55**	.55**	.18*	.42**
2	Depression		-	.72**	.01	.17*
3	Stress			-	-.02	.18*
4	Contact History				-	.17*

5	Precautionary Measures	-

Note: *p<.05,**p<.01,

Table II showed person product correlation among anxiety, contact history and precautionary measures among medical students. It depicts that medical student's anxiety is significantly correlated with contact history (r=.18, p<.05) and Precautionary Measures (r=.42, p<.01). Further scores on depression are significantly correlated with anxiety, stress and precautionary measures. Similarly scores on stress was also correlated with anxiety, depression and precautionary measures.

Figure 1

Levels of Anxiety, Stress and Depression

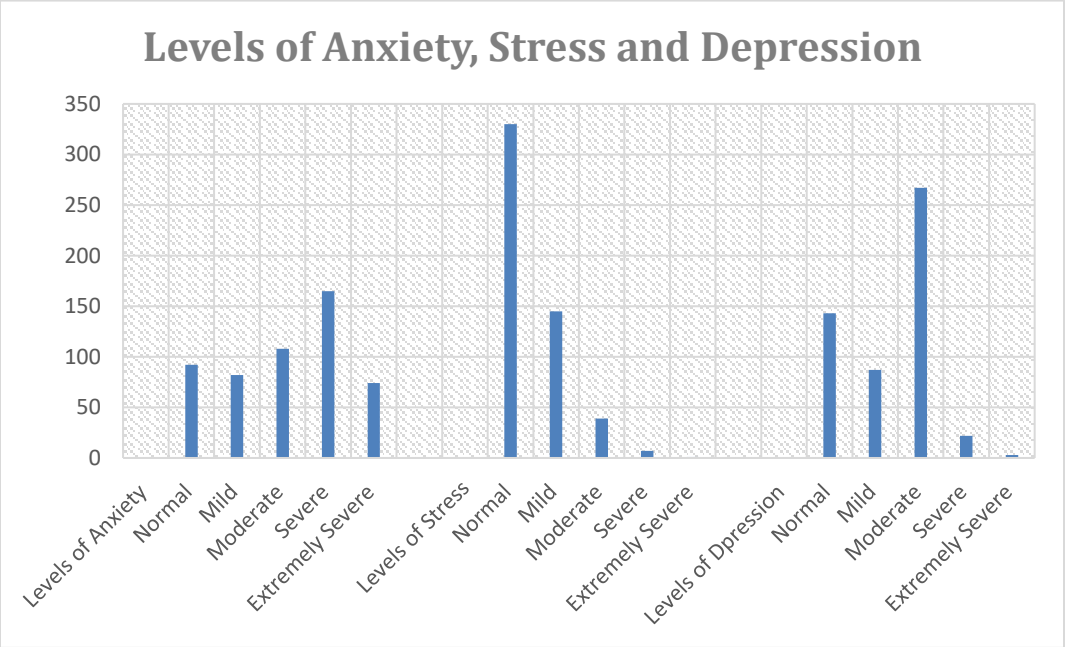

Figure 1 indicates the sample was suffering from mild, moderate, severe, and extremely severe levels of anxiety, stress, and depression. 18% sample had normal anxiety, 16% mild, 21% moderate, 31% severe and 14% sample had extremely severe anxiety. The sample was having 27 %, 16.5%, 53%, 4% and 0.5 % normal, mild, moderate, severe and extremely severe depression. 63% sample was having normal stress, 28% mild, 7.5% moderate, 1%severe and 0.5% was having extremely severe stress.

Mediation Analysis

Mediation analysis using study variables, contact history, anxiety and precautionary measures.

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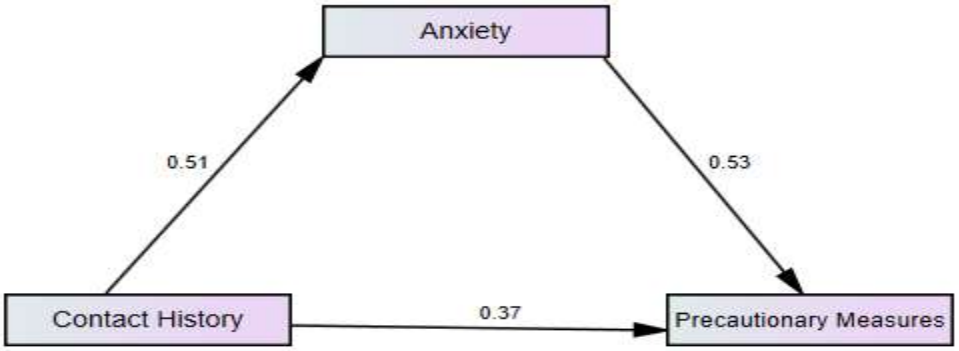
Figure II

Mediating Role of Anxiety between Contact History and Precautionary Measures Through Process by Hayes (N=522)



The direct effect (a) of contact history on anxiety is depicted in the figure. The findings suggested that contact history was a significant predictor of anxiety. The direct effect of the predictor on the mediator was shown by the statistically significant regression coefficient (β=.51, t=4.09, p***=.001) between contact history and anxiety. Additionally, the diagram illustrates how anxiety directly affects precautions measures. Precautionary measures were shown to be strongly predicted by anxiety as well. The direct influence of the mediator on the outcome variable was also statistically significant, as seen by the regression coefficient (β=.53, t=10.04, p*** <.001) between anxiety and precautionary measures. Additionally, the figure shows the direct impact of contact history on precautionary measures which is also statistically significant with *β*=.37 *t*=2.4, *p*** =.01, but less significant than the total effect of contact history on precautionary *β*=.64 *t*=3.93, *p**** =.0001. This indicated that anxiety partially mediated the relationship between contact history and precautionary measures.

Table III

Indirect Effects of Anxiety between Contact History and Precautionary Measures Through Process by Hayes (N=522)

Mediator	*Effect*	*BootSE*	*95%BootCI*	
			BootLL	*BootUL*
Anxiety	.27	.07	.15	.42

Note. Effect = standardized regression coefficient, BootCI = bootstrapped confidence interval, BootLL = bootstrapped lower limit, BootUL = bootstrapped upper limit

The indirect effect was tested using a boost strap estimation approach with 1000 sample. The result indicated a significant indirect effect of contact history on precautionary measures through anxiety *b*= .27, BCaCl [.153,.416]. Anxiety was found to be a significant mediator between contact history and precautionary measures. It implies that the person who have contact history with the patients of COVID 19 can have effect on precautionary measures in the presence of anxiety.

DISCUSSION

For a present study, correlation research design was used in which through online survey data was collect from medical students. This study was based on two premises. First was that contact history and precaution measures would be correlated with depression, stress and anxiety in medical students while dealing patients with contagious diseases. Further contact history with contagious diseases and precaution measures was mediate by anxiety.

The results of DASS test scores have been shown that18% medical students had normal anxiety, 16% mild, 21% moderate, 31% severe and 14% sample had extremely severe anxiety. Further these students having 27%, 16.5%, 53%, 4% and 0.5 % normal, mild, moderate, severe and extremely severe depression. And 63% students having normal stress, 28% mild, 7.5% moderate, 1%severe and 0.5% was having extremely severe stress while treating the patients having contagious disease.

Our finding about correlation has depicted that there is significant correlation between contact history, precaution measures and mental health of medical students. when the medical students have contact with a patient who have contagious disease, they would experience anxiety and that would increase their precaution measure or behaviors. For example, repetitively hand wash, using sanitizer or wearing disposable cloths and vaccination. These finding were corroborated with the longitudinal analysis in medical college students. it was explored that COVID 19 and contagious disease has a negative impact on mental health of medical students as student experienced high level of depression and anxiety when it was compared with before the pandemic of infectious disease (Li et al., 2020a; Huckins et al., 2020).

Moreover, when there is pandemic situation of any diseased for example, COVID- 19, it has undesirable effect upon the society and it could be credited to unexpected hindrance for medical students. For example, in their education, afraid to get infection, worried about future, frustration, news about deficiency of particular precaution measures, quarantine and misleading information and rumors about diseases (Bao et al., 2020; Ferrel & Ryan, 2020). Moffat and their fellows have found that medical students are at greater hazards for emerging psychological disorder while their educational and house-job duration (Moffat et al., 2004). When there is epidemic situation of any contagious disease, medical students face difficulty in coping mechanism, they experience poor quality of sleep, high level of anxiety, stress and depression, that is aggravation of symptoms (Ilango et al., 2020). Similarly, Yazdanpanah also reported increase level of depression, anxiety and stress in medical students during the pandemic of infectious diseases (Yazdanpanah et al., 2021).

Further the analysis of direct effect had shown that contact history appeared to be a significant predictor of precautionary measures. The figure also showed the direct effect of anxiety on precautionary measures. Anxiety appeared as the strong the predictor of precautionary measures. A contact history with patients having contagious diseases could be a significant cause of anxiety in medical students, predominantly while their medical rotations or when they are deal to patients with infectious symptoms. There were several factors for example fear of infection, lack of experience, risk to personal health, transmission concern, stigma and discrimination and most importantly mental health issues such as depression and anxiety. There is limited research work on the direct and indirect effect of contact history, precaution measure and mental health of medical

students treating contagious diseases. However, the finds of Zhang et al., which showed that medical students with contact history same communicable diseases (covid-19) were likely to develop psychological problems because while dealing with communicable disease cause medical students to worried about whether they would also infect (Zhang et al., 2021).

Furthermore, the multilinear regression analysis found perceived stress, society support and recent influence of infectious diseases were significant factors which have impact on the mental distress among medical students and medical staff (Tokumasu et al., 2023). Preceding studies suggested that medical students were frequently experience anxiety, depression that was significantly correlated to their level of stress (Moutinho et al., 2017). Their self-interpretation of event which are stressful showed their psychological stress. High level of stress also risks for getting psychological illness (Boals & Banks 2012). Further these stresses also decrease their level of immunity, which cause high risk of psychological illness, infections, increased cancer progression (Cruz-Pereira et al., 2020; Dhabhar et al., 2012).

In the line to our analysis, further we have identified that anxiety partially mediated the relationship between contact history and precautionary measures among medical students. In applied terms, this mean that medical students who have a previously of more wide interaction with potentially contagious situations might experience higher level of anxiety, and this level of anxiety, in turn, impact their preparedness and capability to involve in precautionary measures efficiently. These results are similar to the study which was carried out to determine whether the level of stigma will be impacted by information about COVID-19, attitude, practice, and behavior about preventive measures against COVID-19, as well as fear and anxiety towards the virus. It also evaluated the mediating role that fear, anxiety, and COVID-19 diagnosis have on stigma. The relationship between knowledge and the stigma discriminating scale was partially mediated by anxiety, fear, diagnosis, and having a family member with COVID-19 (Haddad et al., 2021). Additionally, a structural model was employed in a study including 1500 participants to assess the mediating role of prejudice and fear of infection, as well as the impact of mass media exposure and knowledge level on anxiety. It was discovered that being aware of COVID-19 significantly reduces anxiety, prejudice against those who are sick, and fear of infection (Lee et al., 2020).

All things considered, the remark implies that medical students' anxiety levels over possible health risks, their history of contact with infected people, and the precautions they take to safeguard others and themselves are related. There may be other reasons impacting medical students' decision-making process, but anxiety is one reason why they would opt to take particular precautions. The findings provide significance for medical education and public health initiatives that seek to encourage infection control behaviors among healthcare practitioners. Promoting adherence to precautionary measures in medical settings may benefit from addressing mental health issues as such depression, stress and anxiety and offering assistance to students in controlling their emotional reactions to possible health hazards. Nurturing psychological adjustment and mental health has been challenging in any pandemic’s situation. It is important to develop approaches to avoid developing psychological disorder in medical workers, students and general population (Cleary et al. 2018).

Conclusion

The study illustrates how medical students' anxiety, contact history, and preventive measures interact in a complicated way. The significant associations shown between stress, anxiety, depression, and preventive measures emphasize how interrelated these psychological elements are. The sample's different levels of stress, anxiety, and depression are indicative of the substantial psychological load that medical students bear, particularly considering their exposure to possible health risks. Furthermore, the research shows that contact history is a strong predictor of anxiety, which in turn affects the decision to take preventative action. The mediation analysis also indicates that contact history has a direct impact on precautionary behavior, but that this effect is magnified by elevated anxiety levels, suggesting that anxiety partially mediates the association between contact history and precautionary measures. These results emphasize the need for focused interventions to address medical students' mental health issues, especially with regard to anxiety management and how it affects preventive behavior.

Implication

The study advances knowledge of the psychological variables impacting health-related behaviors in medical students, which has ramifications for improving mental health services and encouraging sensible preventative measures in this population.

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