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Relationship Between Anxiety and Severity of Symptoms with Post Traumatic Growth in COVID-19 Recovered Patients

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ABSTRACT

Traumatic events, such as the COVID-19 pandemic, are not merely perceived as threats or losses; they also present opportunities for growth and positive transformation. This study was conducted on 201 COVID-19 survivors in Malayer, Iran from 2019 to 2022, with participants having been in recovery for at least six months. Data were collected using questionnaires related to demographic information, COVID-19 symptom severity, anxiety, social support, and post-traumatic growth, available on the Porsline platform. Statistical analyses were performed using SPSS version 25 software. The mean post-traumatic growth (PTG) score was 60.12, surpassing the median value of the scale. COVID-19 symptom severity and anxiety were positively correlated with PTG (P<0.001). Addressing the factors influencing PTG and efforts to mitigate their effects can facilitate constructive progress in managing PTG among COVID-19 survivors.

Keywords: COVID-19; Anxiety; Symptom severity; Post-traumatic growth

Introduction

Epidemics are consistently recognized as significant contributors to psychological distress and mental health disorders [1]. In recent centuries, pandemics such as Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS) have affected diverse populations worldwide, with psychological consequences associated with their mortality rates exacerbating global health concerns [2, 3]. By March 2022, the coronavirus disease (COVID-19) had catastrophically impacted the world, resulting in over six million deaths globally, making it the most severe global health crisis since the 1918 influenza pandemic [4]. To date, 146,340 individuals in Iran have succumbed to this disease [5]. COVID-19 symptoms range from mild to severe, with the most common clinical manifestations including fever, dry cough, fatigue, sputum production, dyspnea, myalgia (muscle pain), arthralgia (joint pain), sore throat, and headaches. Nausea or vomiting was reported in a small percentage of patients (5%). In mild cases, patients may experience nonspecific symptoms such as loss of appetite, weakness, muscle pain, sore throat, shortness of breath, nasal congestion, and headache, affecting other organs of the body, including the skin, eyes, brain, heart, lungs, kidneys, and gastrointestinal system [6].

In addition to physical harm, COVID-19 poses a threat to the mental health of individuals across all age groups, particularly children, adolescents, and youth. Anxiety is a psychological consequence of COVID-19 [7].

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The unpredictable nature and uncertainty of disease epidemiology and effective treatment methods predispose individuals to stressful situations. As COVID-19 progresses, the clinical symptoms and psychological difficulties of patients intensify, with most experiencing degrees of anxiety and depressive disorders, even after physical recovery and hospital discharge [8]. However, positive psychological growth and transformation can occur following stressful events, particularly in the context of diseases [7]. Some COVID-19 survivors have reported experiencing positive life changes after recovery, referred to as "post-traumatic growth" (PTG). PTG signifies positive transformations that occur after serious traumatic events, leading to life changes [9]. Such growth arises from the meaning-making process following trauma, leading to the re-evaluation of objectives and priorities, reinvestment in interpersonal relationships, and a greater appreciation for life [10]. Tedeschi and Calhoun introduced "PTG" as a relatively new psychological concept. PTG, which contrasts with post-traumatic stress disorder (PTSD), has garnered considerable attention over the past two decades. PTG represents the personal growth that occurs following significant challenges [11].

An individual experiencing trauma or traumatic events may show three psychological responses: succumbing to stressors (PTSD), resilience/recovery, and PTG within resilience. During resilience and recovery, individuals return to their pre-trauma functional baseline, obtaining a state comparable to their pre-adversity condition. However, PTG enables individuals to transcend their prior functioning levels and grow [12].

This phenomenon typically arises from challenges with severe life crises, representing positive transformations and perspectives following traumatic events [11]. Yan et al. argued that only patients grouped by residential location exhibited significant differences in PTG, with rural dwellers showing higher PTG scores than urban dwellers. The PTG of discharged COVID-19 patients was positively correlated with self-esteem, PTSD, coping style tendency, and social support but was negatively associated with the duration from symptom onset to diagnosis [13]. Shirvani et al. claimed that a sense of meaning in life and coherence significantly predicted PTG among married people who recovered from COVID-19 in Ilam [14]. Furthermore, Xiao et al. assessed COVID-19 survivors six months after recovery and reported that post-discharge and psychosocial factors showed stronger associations with depression, anxiety, and PTG than pre-admission and in-hospital survivors. They asserted that enhancing social support may be an effective strategy for improving the mental health of COVID-19 survivors [15].

In another study, Stallard et al. examined child caregivers in Portugal and the UK and identified significant differences in PTG scores between subjects reporting no positive alterations and those showing positive growth [16]. According to Fazeli et al., resilient individuals apply extensive coping styles to control their COVID-19 anxiety [17].

Others have emphasized the necessity for counselors and psychologists to focus on PTG for its enhancement among COVID-19 survivors and develop counseling, care, and psychological sessions to improve their mental health and promote PTG among this population [18].

Based on some studies, the COVID-19 pandemic has created new life challenges like other physical ailments. Beyond its mortality rate, COVID-19 has generated diverse emotional and psychological obstacles such as fear, anxiety, depression, and suicidal ideation. However, some COVID-19 survivors have reported positive post-recovery transformations called PTG.

Given that PTG, as a positive transformative change, derives from coping with highly challenging life crises, and considering the existing research gap regarding the relationship between PTG and COVID-19, this study aimed to investigate the association of COVID-19 anxiety and symptom severity with PTG among survivors.

Materials and Methods

This study was conducted on 201 COVID-19 survivors in Malayer since the onset of the pandemic. Cui et al. reported the Pearson correlation coefficient between anxiety and PTG to be 0.413 [19]. Considering the correlation coefficient, a type one error rate of 1% (α=0.01), power of 99% (β=0.01), and the following formula, the final sample size was estimated to be 201 patients. The participants were selected using a simple random sampling method from the list of COVID-19 patients in the Malaysian Communications and Multimedia Commission (MCMC) registry at the Deputy of Treatment, Lorestan University of Medical Sciences in Malayer. To this end, a complete list of COVID-19 patients was extracted from the MCMC registry, followed by the identification of eligible individuals (N=520). Subsequently, 201 patients were randomly selected from the list using SPSS version 25 software, expressing their willingness to participate in the study.

Instruments:

Corona Disease Anxiety Scale (CDAS)

Alipour et al. validated the CDAS in a study of COVID-19 anxiety in Iran. The final version of the CDAS contains 18 items and two factors, where the first nine items measure psychological manifestations, while the remaining items address somatic symptoms. The instrument employs a four-point Likert scale, with higher scores indicating greater anxiety levels among the participants. Based on the standardized T-score ranges, the questionnaire factors and total anxiety scores were categorized into three levels: no/mild (T<39), moderate (40>T< 60), and severe (T>61) anxiety. The instrument's reliability was analyzed using Cronbach's alpha, yielding different values (Factor 1: α=0.879, λ-2=0.882; Factor 2: α=0.861, λ-2=0.864; Total: α=0.919, λ-2=0.922). Cronbach's alpha reliability was calculated to be 0.81, remaining applicable even six months after infection [20].

COVID-19 Symptom Severity Scale (CSSS)

Spinato et al. validated a questionnaire to evaluate COVID-19 symptoms. The questionnaire contains six main sections: weakness/fatigue (5-item), gastrointestinal manifestations (8-item), olfactory and auditory disturbances (5-item), respiratory complications (6-item), throat-related symptoms (4-item), and myalgia with taste dysfunction [21]. To assess the validity, a fluent English speaker translated the original questionnaire into Persian. The questionnaire was then back translated into English by another bilingual expert. In the next step, an internal medicine specialist compared the original version, Persian translation, and back-translated English version, confirming its validity. To assess reliability, the questionnaire was administered twice to 20 patients at a ten-day interval. Finally, the correlation coefficient was calculated, yielding excellent reliability (α=0.91).

PTG Inventory (PTGI)

Tedeschi et al. developed this 21-item self-report scale [9] to examine five domains of PTG, including life appreciation/values, new possibilities, personal strength, interpersonal relationships, and spiritual change utilizing a six-point Likert scale. The total score ranges from to 0-105, with higher scores representing higher levels of PTG. In addition, Tedeschi et al. investigated the validity and reliability of this scale (α=0.90), with a Cronbach's α ranging 0.67-0.85. Further, Mohiuddin et al. validated the PTGI, confirming high reliability (α=0.92) (22). Furthermore, Heidarzadeh et al. focused on cancer patients, declaring that the scale exhibited appropriate model fit, significant inter-dimensional correlations (r=0.64-0.75), as well as total score (r=0.75), subscale (r=0.57-0.77), and test-retest (r=0.75) reliability over 30 days among 18 patients [23].

Perceived Social Support Questionnaire

Procidano and Heller developed this 20-item questionnaire with Yes/No/Do not know responses, where "Do not know" responses are consistently coded as 0, negative ones ("No") obtain +1 point for items 2, 6, 7, 15, 18, and 20, and positive ones ("Yes") are awarded +1 point. The total score ranges from to 0-20, with higher scores representing stronger familial support. Scores indicated

different levels of familial support, including low (0–5), moderate (6–10), and high (>10). Procidano et al. reported excellent internal consistency (α=0.90). Validity-based data were extracted from the original 20-item scale before differentiating for familial support. Further, Procidano et al. reported high concurrent validity for this questionnaire (α=0.84-0.90). The instrument scores were positively correlated with psychological distress and social efficacy, as well as the California Personality Inventory (CPI) and Interpersonal Dependency Inventory (IDI) ($p<0.05$) [24].

After protocol approval and acquisition of the required permits, COVID-19 patient data were accessed using the MCMC registry at the Deputy of Treatment, Lorestan University of Medical Sciences, Malayer. Simple random sampling was performed using the list of eligible individuals in the MCMC registry from disease onset to July 2023. Data were collected using questionnaires available on the Porsline platform. Subsequently, the subjects' names and contact information were extracted from the system to initiate telephone contact. During the calls, the researcher explained the objectives to the participants and obtained their informed consent. In the next step, the subjects received the necessary explanations regarding questionnaire completion procedures, voluntary participation, confidential, anonymous data collection, and their right to obtain the results upon request. In the following procedure, the questionnaire link developed on the Porsline online platform was sent to the subjects through SMS.

Statistical Analysis

Data were collected and entered into SPSS version 25 software. Descriptive statistics (central tendency and dispersion measures for quantitative variables, and frequency/percentage for qualitative variables) were used to describe the data. In addition, the normality of data distribution was verified using the Kolmogorov-Smirnov test. Independent t-tests, one-way analysis of variance (ANOVA), Pearson's correlation, and simple/multiple linear regression were used due to the normality of the data distribution, with a significance level of $p<0.05$.

Ethical Considerations

The present study obtained ethical code IR.LUMS.REC.1402.187 from the Ethics Committee of Lorestan University of Medical Sciences.

Results

As indicated in Table 1, most subjects are aged 30–50, employed, and married. The subjects predominantly hold academic degrees, and 98% live in urban areas.

Based on the results, 4% of the COVID-19 survivors endured pulmonary disease, with 1% reporting prior hospitalization due to COVID-19 (Table 2).

The results represented the mean (SD) scores for COVID-19 anxiety, symptom severity, social support, and PTG as 16.57 (10.90), 20.52 (12.76), 10.86 (2.68), and 60.12 (17.75), respectively. The mean scores for COVID-19 symptom severity, anxiety, and social support fell below the median, with PTG scores surpassing the median.

Tables 3-9 represent the associations between demographic variables.

Table 3 presents the correlation of age with COVID-19 symptom severity, anxiety, social support, and PTG. No positive associations are observed between age and the aforementioned variables.

Education level was not significantly associated with COVID-19 symptom severity, anxiety, social support, and PTG (Table 4).

As indicated in Table 5, marital status is positively correlated with PTG ($p=0.035$). However, marital status was not significantly associated with COVID-19 symptom severity, anxiety, and social support.

Residential location was not positively correlated with COVID-19 symptom severity, anxiety, social support, and PTG (Table 6). In addition, occupational status exhibited no

significant association with the above-mentioned variables.As shown in Table 7, a positive correlation is identified between pulmonary disease history and COVID-19 symptom severity (p=0.008). However, pulmonary disease history was not significantly associated with COVID-19 anxiety, social support, and PTG. Further, prior COVID-19-related hospitalization was not positively correlated with COVID-19 symptom severity, anxiety, and social support.

Based on the results, COVID-19 symptom severity and anxiety demonstrated a significant association with PTG among the recovered patients (Table 8).

Table 9 represents the multivariate regression analysis of factors influencing PTG. As presented, COVID-19 anxiety and social support are positively correlated with PTG. Accordingly, each one-unit increase in COVID-19 anxiety score led to a 0.333-point rise in PTG score (P=0.01). In addition, each one-unit increase in social support led to a 1.868-point rise in PTG score (P<0.001). However, COVID-19 symptom severity was not positively associated with educational attainment, marital status, residential location, occupational status, pre-existing medical conditions, and prior COVID-19-related hospitalization.

Table 1. Frequency distribution of demographic characteristics among disease survivors

Variable		*Number*	*Percentage (%)*
Age (years)	18-30	*50*	*24.9*
	31-50	*139*	*69.2*
	51-70	*12*	*6.0*
Educational attainment	No formal education	*2*	*1.0*
	Incomplete secondary education	*8*	*4.0*
	High school diploma	*26*	*12.9*
	Higher education	*165*	*82.1*
Residential location	City	*197*	*98.0*
	Village	*4*	*2.0*
Job	Employed	*169*	*84.1*
	Unemployed	*32*	*15.9*
Marital status	Married	*154*	*76.6*
	Single	*47*	*23.4*

Table 2. Frequency distribution of medical history among disease survivors

Variable		Number	Percentage (%)
Pulmonary disease history	Yes	8	4.0
	No	193	96.0
COVID-19 hospitalization history	Yes	2	1.0
	No	199	99.0

Table 3. Association of age with COVID-19 symptom severity, anxiety, social support, and PTG

Variable	Age groups	Number	Mean (SD)	P value
COVID-19 symptom severity	18-30	50	21.58 (14.03)	0.611
	31-50	139	20.40 (12.63)	
	51-70	12	17.58 (8.11)	
COVID-19 anxiety	18-30	50	15.96 (9.80)	0.646
	31-50	139	16.55 (10.96)	
	51-70	12	19.25 (14.70)	
Social support	18-30	50	10.28 (2.92)	0.188
	31-50	139	11.08 (2.61)	
	51-70	12	10.58 (2.19)	
PTG	18-30	50	55.73 (17.43)	0.092
	31-50	139	61.23 (17.53)	
	51-70	12	66.09 (19.53)	

Table 4. Association of educational attainment with COVID-19 symptom severity, anxiety, social support, and PTG

Variable	Educational attainment	Number	Mean (SD)	P value
COVID-19 symptom severity	No formal education	2	18.00 (1.41)	0.987
	Incomplete secondary education	8	21.62 (10.76)	
	High school diploma	26	20.50 (13.54)	
	Higher education	165	20.50 (12.86)	
COVID-19 anxiety	No formal education	2	14.50 (13.43)	0.642
	Incomplete secondary education	8	12.12 (7.54)	
	High school diploma	26	15.84 (8.36)	
	Higher education	165	16.92 (11.38)	
Social support	No formal education	2	12.00 (00)	0.901
	Incomplete secondary education	8	10.75 (2.43)	
	High school diploma	26	11.07 (2.43)	
	Higher education	165	10.81 (2.76)	
PTG	No formal education	2	47.00 (8.48)	0.661
	Incomplete secondary education	8	62.71 (13.73)	
	High school diploma	26	62.16 (17.11)	
	Higher education	165	59.85 (18.09)	

Table 5. Association of marital status with COVID-19 symptom severity, anxiety, social support, and PTG

Variable	Marital status	Number	Mean (SD)	P value
Symptom severity	Married	154	20.28 (12.48)	0.885
	Single	47	21.39 (13.25)	
Anxiety	Married	154	17.39 (11.14)	0.128
	Single	47	13.51 (8.88)	
Social support	Married	154	11.02 (2.72)	0.277
	Single	47	10.32 (2.59)	
PTG	Married	154	61.43 (17.60)	0.035
	Single	47	55.55 (16.22)	

Table 6. Association of residential location and occupational status with COVID-19 symptom severity, anxiety, social support, and PTG

Variable	Residential location	N	Mean (SD)	P value	Occupational status	N	Mean (SD)	P value
Symptom severity	**City**	197	20.45 (12.80)	0.584	**Employed**	169	20.28 (12.67)	0.546
	Village	4	24.00 (11.48)		**Unemployed**	32	21.78 (13.37)	
Anxiety	**City**	197	16.66 (10.93)	0.373	**Employed**	169	16.35 (11.25)	0.528
	Village	4	11.75 (8.99)		**Unemployed**	32	17.68 (8.89)	
Social support	**City**	197	10.88 (2.67)	0.405	**Employed**	169	10.90 (2.74)	0.579
	Village	4	9.75 (3.59)		**Unemployed**	32	10.61 (2.37)	
PTG	**City**	197	60.30 (17.47)	0.342	**Employed**	169	59.81 (18.20)	0.575
	Village	4	51.75 (30.65)		**Unemployed**	32	61.80 (15.22)	

Table 7. Association of pulmonary disease and hospitalization history with COVID-19 symptom severity, anxiety, social support, and PTG

Variable	Pulmonary disease	N	Mean (SD)	P value	Hospitalization history	N	Mean (SD)	P value
Symptom severity	Yes	8	32.12 (17.18)	0.008	Yes	2	19.50 (9.19)	0.909
	No	193	20.04 (12.37)		No	199	20.53 (12.81)	
Anxiety	Yes	8	21.12 (10.98)	0.229	Yes	2	17.50 (14.84)	0.904
	No	193	16.38 (10.88)		No	199	16.56 (10.90)	
Social support	Yes	8	10.12 (4.61)	0.431	Yes	2	10.50 (0.70)	0.849
	No	193	10.89 (2.59)		No	199	10.86 (2.69)	
PTG	Yes	8	66.25 (10.19)	0.320	Yes	2	69.50 (24.74)	0.454
	No	193	59.86 (17.97)		No	199	60.02 (17.72)	

Table 8. Correlation of COVID-19 symptom severity, anxiety, and social support with PTG

Variable		Symptom severity	Anxiety	Social support
PTG	Correlation coefficient	0.124	0.269	0.253
	P value	<0.001	<0.001	0.086

Table 9. Results of multivariate regression analysis on the association of COVID-19 symptom severity, anxiety, and social support with PTG among disease survivors

Variable	Unstandardized coefficient (B)	Standard error (SE)	Standardized coefficient (B)	t	P Value*
Constant	59.707	33.980	-	1.757	0.081
Symptom severity	0.135	0.110	0.98	1.227	0.221
COVID-19 anxiety	0.333	0.127	0.206	2.621	0.010
Social support	1.868	0.477	0.282	3.918	<0.001
(no formal education)	-27.532	13.487	-0.157	-2.041	0.43
(incomplete secondary education)	0.285	6.886	0.003	0.041	0.967
(high school diploma)	1.052	3.700	0.020	0.284	0.777
Marital status (single)	-3.748	3.623	-0.083	-1.035	0.302
Residential location	-5.031	8.620	-0.040	-0.584	0.560
Job	4.640	4.023	0.093	1.153	0.250
Underlying pulmonary disease	-3.032	6.385	-0.034	-0.475	0.635
ICU hospitalization	-11.447	11.888	-0.065	-0.963	0.337

R^2=0.203

Discussion

Based on these findings, the mean scores for COVID-19 symptom severity and anxiety were below the median, in contrast to the PTG scores, which exceeded this threshold, indicating significant growth within the studied population. Afzali et al. reported that nurses working and residing in Shahriar had a mean PTG score of 61.79. This PTG score was directly correlated with psychological well-being and mindfulness [25], aligning with the results presented here, suggesting that COVID-19 may promote growth among patients and nurses. COVID-19 symptom severity and anxiety levels are positively associated with PTG. Tomaszek et al. examined the mediating role of existential anxiety and life satisfaction in the relationship between PTSD symptoms and PTG among 199 patients, which is consistent with the findings reported here. The aforementioned study confirmed a significant association between symptom severity and PTG, with COVID-19-related anxiety influencing the latter factor [26]. Additionally, Ahmadi et al. investigated the correlation between PTSD and PTG among 172 COVID-19 ICU survivors from selected hospitals in South Khorasan, precisely six months post-recovery. The results indicated that stressful experiences, such as COVID-19, may lead to positive psychological outcomes [27].

Trauma responses can facilitate personal growth following adverse events due to their complexity [28]. The present study identified a positive correlation between social support and PTG among COVID-19 survivors, which is consistent with the findings of Ahmadi et al. [29]. Ahmadi et al. found a significant association between social support and PTG among women in Isfahan (N=300), indicating that social support positively influences PTG [29]. According to some researchers (e.g., Ahmadi et al.; Tedeschi & Calhoun, social support helps manage negative thoughts and alleviates anxiety caused by adversity by reducing emotional tension, fostering deeper bonds with others, enhancing interpersonal relationships, and promoting self-disclosure. It also influences an individual's cognitive evaluations of the world, leading to a more adaptive and positive understanding of the experienced trauma [10].

Conclusion

In conclusion, the mean PTG score exceeded the median of the applied scale, indicating a

high PTG among the studied population. Marital status emerged as a critical demographic factor enhancing PTG. A history of pulmonary disease, COVID-19 symptom severity, and anxiety associated with the infection were positively correlated with PTG. Furthermore, a significant association was found between social support and PTG. Given the impact of social support on PTG, targeted intervention and support programs should be developed for individuals at risk of trauma exposure.

Conflict of Interests

Authors declare that they do not have any conflict interests.

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