Type of Article: Original Article

The Psychological and Social Factors Contributing to The Post-Traumatic Growth After Traumatic Spinal Cord Injury.

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Abstract

Background:

Spinal Cord Injury (SCI) results in significant changes in a person's life; it has a tremendous psychological impact not only on the individual level but also on their caregiver. There is still little known about the positive psychological changes following SCI.

Aim:

To determine the psychological and social factors affecting post-traumatic psychological growth (PTG) after traumatic SCI.

Methods:

This study is multi-center cross-sectional; it was conducted on patients with traumatic SCI in the period between November 2020 to May 2021 using PWB-PTCQ, HADS, and social support scales, with tested validity and reliability of measurements. The data were analyzed using the SPSS program.

Results:

The study included 66 patients with a mean ±SD of 32.1±14.5 years old; there were 73% male, vs 27% female patients. The majority of sample had road accidents, 62% as the most common cause of SCI, the most common type of injury was ASIA A 36 %. There were 76% suffering moderate to severe life stressors, and 53% reported having financial stressors. There were 28% and 22% suffering anxiety and depression, respectively. There is prevalent of PTG in overall as 32% reported positive change. There was a significant association between the mean score of social support and PWB-PTCQ (P=0.001).

Conclusion:

Anxiety and depression were common among our patients with traumatic SCI. The most affected domain of PTG was a sense of mastery, whereas relationships and personal growth were the least affected among patients with SCI. achieving PTG was significantly affected by depression, education level, and life stressors. There was a

regression relation between PTG with depression and anxiety, so PTG can predict depression and anxiety in patients with SCI.

Keywords: Post-traumatic growth, Spinal cord injury, Social support, Factors.

Introduction:

Surviving from Spinal Cord Injury (SCI) is a long journey. SCI at any age, is a catastrophic event with long-term physical and psychological consequences. The sudden and unexpected nature of the injury, combined with its chronic impact, makes SCI a unique physical and mental trauma [1]. The loss of physical and functional ability, health-related complications, financial stress due to employment loss, social isolation, negative reactions from others, and/or psychological adjustments have been cited as negative outcomes of SCI [2]. Such sources of stress may lead to mental health issues, including depression, anxiety, and post-traumatic stress disorder (PTSD), and substance abuse [3].

Post-traumatic Growth (PTG)

Calhoun and Tedeschi coined the term Post-traumatic Growth (PTG) when they and others [4] [5] hypothesize that there is a possibility of acquiring positive psychological changes in the individual's life -at least for some people who underwent traumatic experience accompanying with great suffering and loss [6]. PTG define as the "positive psychological changes experienced as a result of the struggle with traumatic or highly challenging life circumstances." [7]. PTG referred to as stress-related growth, adversarial growth, or benefit finding, [8] is characterized as a positive change that occurs as a result of a highly challenging life crisis, such as trauma [9].

Spinal Cord Injury (SCI) and mental health:

Research has also acknowledged that participation in sport and exercise can result in positive physical health outcomes for people with SCI including the prevention of chronic disease, improved physical fitness, and enhanced pain management [10]. Furthermore, involvement in physical activity and sport following SCI may provide

meaningful experiences, resulting in psychosocial and physical benefits that could potentially facilitate positive psychological growth .[١١]

Tedeschi and Calhoun [12] find it to be the result of successful coping with trauma outcomes. SCI classified as radical life-altering seismic event may significantly impact occurrence of PTG. However, it is not the event itself that contributes to emergence of this phenomenon. As shown in the study, it occurs in some individuals; it has different degrees and affects life areas to various extents [13]. This suggests that there must emerge some specific conditions and factors producing such positive change in a person with SCI. In the study by Elfström et al., [14] acceptance coping positively correlated with personal growth after trauma. Individuals displaying high on acceptance reported significantly higher personal growth than people with poorly developed strategy of coping with trauma outcomes through acceptance [15]. Significance of coping for PTG in people after SCI was determined in a longitudinal study. Among others, it was proved that coping strategy (mainly acceptance coping) applied 12 weeks after trauma accounts for increased growth after 2 years [16] and after 10 years (mental disengagement and active coping) [17]. The current study provided an in-depth understanding of the PTG model, explore this model in the context of SCI in light of empirical evidence, and suggest future directions and considerations for this area of study.

Objectives:

The current study aims to:

- Determine the psychological and social factors on post traumatic psychological growth (PTG) after spinal cord injury.
- Look into the relationship between social support and the positive psychological changes after trauma.

Materials and Methods:

This is descriptive cross-sectional study. This is multilabel centers study was conducted in King Abdulaziz Medical City National Guard rehabilitation center and King Abdullah International Medical Research Center (KAIMRC), and King Fahad Medical City (KFMC) in Saudi Arabia among, and Prince Sultan bin Abdul-Aziz City

for Humanitarian Services (SBAHC), for Saudi and non-Saudi patients. It was carried out from (November 2020 –May 2021). Screening phase inclusion criteria were being at least 18 years old and having a history of traumatic SCI, at any level and/or severity. Study exclusion criteria were: (i) mild to severely cognitively impaired patients as it will be difficult to comprehend study materials; and/or (ii) the patients who were indeed having other neurological or mental health condition.

Psychological Well-Being Post-Traumatic Changes Questionnaire (PWB-PTCQ)

A self-administrated Psychological Well-Being Post-Traumatic Changes Questionnaire (PWB-PTCQ) was used to assess perceived changes in psychological well-being following traumatic events the data collection. PWB-PTCQ is an 18 item self-report measure instrument for measuring positive changes after trauma that has shown reasonable psychometric properties in its original version in English [18]. PWB-PTCQ was translated and validated the psychometric properties of an Arabic Psychological Well-Being Post-Traumatic Changes Questionnaire (A-PWBPTCQ) [19].

In the present study, the values of the correlation coefficient of each statement with its axis are positive and statistically significant at the level of significance (0.01), which indicates that all the scale statements have an appropriate internal consistency, and confirms the strength of the internal correlation between all statements of the study tools. Therefore, this result demonstrates the suitability and the consistency of the scale statements with the study tools in an integrated manner. The Cronbach alpha coefficient for the scale sub domains are: Self-acceptance (.839), Autonomy (.709), Purpose in life (.844), Relationships (.563), Sense of mastery (.842) and Personal growth (.810), while the Cronbach alpha coefficient for the scale as a whole is (.95), which is a high stability coefficient. It indicates the validity of the tool to achieve the objective of the current study. A correlation coefficient was calculated between the two halves of the scale domains ranged between (.523) and (.867), reflecting high validity constancy of the tool.

The hospital anxiety and depression scale (HADS)

A self-administrated Arabic version of The Hospital Anxiety and Depression Scale was used for the purposes of its reliability as instrument for detecting states of

depression and anxiety in the setting of a hospital medical outpatient clinic, it is comprised of 14 items (seven assessing depression and seven assessing anxiety) [20]. In the present study, the Arabic version of the HADS was used. El-Rufaie and Absood [21] found that this scale was reliable and showed significant levels of sensitivity and specificity.

In the present study, the values of the correlation coefficient of each statement with its axis are positive and statistically significant at the level of significance (0.01), which indicates that all the scale statements have an appropriate internal consistency, and confirms the strength of the internal correlation between all statements of the study tools. Therefore, this result demonstrates the suitability and the consistency of the scale statements with the study tools in an integrated manner. The Cronbach alpha coefficient for the Anxiety domain was (.766), and for the Depression axis the value was (.783) which is an acceptable stability coefficient. It indicates the validity of the tool to achieve the objective of the current study. A correlation coefficient was calculated between the two halves of the scale for Anxiety and Depression domains, Anxiety (.775) and Depression (.764), reflecting high validity constancy of the tool.

Social Support Scale

The Arabic self-administrated social support scale was developed by Jaber [22] which consist of 13 items that measure three sources of social support, family, friends as well as governmental and non-governmental organizations (GO-NGO). The scale has significant item-total correlations and clear internal consistency with .94 for family and GO-NGO, .96 for friends, with significant reliability correlations between the test and retest .84 for family, .81 for friends, and .76 for GO-NGO. The scale has internal and external consistency as well as construct validity. Therefore, it is a valid and reliable instrument to measure social support in general population settings in Arab countries .

In the present study, the values of the correlation coefficient of each statement with its axis are positive and statistically significant at the level of significance (0.01), which indicates that all the scale statements have an appropriate internal consistency, and confirms the strength of the internal correlation between all statements of the study tools. Therefore, this result demonstrates the suitability and the consistency of the scale statements with the study tools in an integrated manner. The Cronbach alpha

coefficient for the family, friends and GO-NGO were (.939), (.967) and (.968) respectively. while the Cronbach alpha coefficient for the scale as a whole reached (.962), which reflect high reliability coefficient. It indicates the validity of the tool to achieve the objective of the current study. A correlation coefficient was calculated between the two halves of the scale for family, friends and GO-NGO, the correlation coefficient of the scale ranged between (.930) and (.949), reflecting high validity constancy of the tool.

Participants

Demographic and injury characteristics collected from participants were current age, gender, marital status, level of education achieved, current employment status, length of stay, center of injury and expose to mental health service, the surveys also outlined the importance of psychological, environmental, social support, and personal factors in bringing about the positive outcome of stressful experiences such as SCI.

Statistical analysis:

After collecting data into an excel sheet and processing in accordance with the practices for raw data management to identify any inaccuracies, inconsistency or incompleteness in advance to the statistical analysis. Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS). Results were shown as maximum and minimum for quantitative data and percent for qualitative data .

To measure the extent of the internal consistency of the study scales, Pearson correlation coefficient was used, where the correlation coefficient was calculated between the degree of each statement of the scales with its domain. The first step in the statistical analysis was to assure the validity and reliability of the three scales used (PWB-PTCQ, HADS, and the social support scale). The demographic and injury-related characteristics of the participants were tabulated. Descriptive analysis included the means and standard deviations of variables.

The prevalence of PTG and PTG factors (Self-acceptance, Autonomy, Purpose in life, Relationships, Sense of mastery and Personal growth) among SCI patients, the prevalence of anxiety and depression among SCI patients, as well as the prevalence of social support and social support domains was measured using SD and mean.

A comparison of PTG and PTG factors according to age, gender, educational, marital status, employment status, time since the injury, length of hospitalization, cause of SCI, type of SCI, prior medical history, exposure to mental health services after the injury, income status, type of housing status, housing ownership status, life stressors status, nature life stressors status, anxiety, depression, social support and social support domains using means, standard deviations, T-test, and Chi-square for a probability value of less than or equal 0.05 was considered statistically significant.

To answer the extend PTG and social support predicting anxiety and depression among patients with SCI, the multiple regression analysis using the coefficient of determination (R-squared) and standardized beta coefficient was implemented to determine prediction strength.

Ethical considerations:

The study was approved by the College of Medicine, Alfaisal University, Kingdom of Saudi Arabia. Prior permission was obtained from the concerned authorities after explaining the objectives of this study. All information of hospitals was kept confidential and data was be used for the proposed research. Data was collected after obtaining the ethical approval and Institutional Review Board (IRB) approval as the following: SBAHC IRB number: 32-2020-IRB, KAIMRC IRB number: SP20/439/R and the KFMC Central Second Health Cluster IRB number: 20-650E.

Results:

Participant characteristics

This study included 66 patients form multilabel territorial centers. The mean ±SD of the patients' age was 32.1±14.5 years old, more than one-half of 34 (51.5%) were less than 32 years old. Male patients were more dominant compared to female patients; 48(72.7%), Vs. 18(27.3%), respectively. The most common type of injury was ASIA-A 24(36.4%), and the most common nature of stress was financial 33(53.2%). The table below shows the demographics of the patients in detail.

Table1: Description of demographic characteristics

Variable		Frequency	Percent
age	32 and Less	34	51.5
	More than 32	32	48.5
Gender	Male	48	72.7
	Female	18	27.3
Education	High school and less	36	54.5
	Above high school	30	45.5
Marital status	Single	31	52.5
	Married	28	47.5
Employment	Unemployed	35	53.0
	Employee	31	47.0
Time since SCI	Less than three years old	39	59.1
	Three years or more	27	40.9
Length of stay in hospital	3 months or less	36	54.5
	More than three months	30	45.5
Cause of SCI	Road accident	41	62.1
	others	25	37.9
Type of injury	Complete	17	25.8
	ASIA A	24	36.4
	Other or unknow	25	37.9
Exposure to mental health services after the injury	No	18	27.3
	yes	48	72.7
Medical history prior to injury	No	17	25.8
	yes	49	74.2
Economic Status	Less than 5	45	68.2
	5 thousand or more	21	31.8
Housing	Apartment	33	50.0
	Villa	24	36.4
Ownership	Rental	27	42.2
	Owned	37	57.8
Life stressors	None	15	24.2
	Moderate	36	58.0
	Severe	11	17.8
Nature of Stress	Financial	33	53.2
	Health	29	46.8

The PTG prevalence rate in SCI patients

From the characterization prevalence of the health outcome from the population, A survey was conducted to capture the data used for this research. the analysis of the SCI patients in order to evaluate their PTG and other psychological impacts resulted to the following: Self-acceptance domain (mean=2.570, SD=1.029), Autonomy domain (mean=2.550, SD=.945), Purpose in life domain (mean=2.555, SD=1.129), Relationships domain (mean=2.656, SD=.849), Sense of mastery domain (mean=2.328, SD=1.150), Personal growth domain (mean=2.616, SD=1.102), and Overall Psychological Well-Being Post-Traumatic Changes scale (mean=2.56, SD=.939)

After the analysis of the samples in all the domains the overall mean of PWB-PTCQ items was (2.56) (SD 0.939). the study also involved the prevalence of 6 PTG factors (self-acceptance, purpose in life relationships, sense of mastery and personal growth).

The research for the prevalence of anxiety gave a mean of 1.365 and SD of 0.309 while depression was 1.023 and SD of 0.586.

Social support from all the aspects gives a mean of 2.004 and SD 0.657. The prevalence of the types of social support among the SCI patients gave the following results family domain (mean=2.528, SD= .640), friends domain (mean=1.886, SD=.933), and GO-NGO domain (mean=1.597, SD=.950)

The results also included

1-Classification of the depressed and the non-depressed

Sample in the PTG population in the post traumatic growth of the scale as a whole.is represented. The significant level is less than 0.05 which is in favor of the non-depressed because the average ranks of the non-depressed because of their average ranks for the depressed. The same can be said for other PTG factors except for relationships factor where there is no difference between the depressed and non-depressed since the significance value is greater than (0.05).

2-Classification according to the differences between the anxious and non-anxious in PTG

There are differences between the anxious and the non-anxious in the PTG of the scale as a whole because the value of the significance level is less than (0.05) and these differences are in favor of the non-anxious because the average ranks of the non-anxious are greater than the average ranks for the anxious. The same can be said for the PTG factors, except the relationships factor, there are no differences between anxious and non-anxious, because the significance level value is greater than (0.05)

3-Differences between age groups (32 and less and above 32) in PTG

There are no differences between the age groups (32 and less and above 32) in the PTG of the total PTG as a whole as well as factors, because the significance level value is greater than 0.05 for the total as well as the factors.

4-Differences between sex groups (male, female) in PTG

There are no differences between the sex groups (male and female) in the PTG of the total PTG as a whole as well as the factors, because the significance level value is greater than (0.05) for the total as well as the factors.

5- Differences in PTG between educational groups

There are differences in PTG between those who have high school or less and those who have above than high school education in Self-acceptance and Autonomy because the value of the level of significance associated with them is less than (0.05) in favor of those with above high school education because their average is greater. There are no differences in PTG between those with high school or less and those with above than high school education in total PTG and the other factors "purpose in life, relationships, sense of mastery, and personal growth, because the significance level value is greater than (0.05)

6-Differences in PTG between marital status groups

There are no differences. between the marital groups (single and married) in the PTG of the total PTG as a whole as well as the factors, because the significance level value is greater than (0.05) for the total as well as the factors.

7- Differences in PTG between employment groups

There are no differences between the employment groups (unemployed and employee) in the PTG of the total PTG as a whole as well as the factors, because the significance level value is greater than (0.05) for the total as well as the factors.

8- Differences in PTG according to time since the injury

There are no differences between the two sample groups according to the time of injury (three years and less and more than three years) in the PTG of the scale as a whole as well as the factors, because the significance level value is greater than (0.05). Except for the "sense of mastery" factor, there are differences because the value of the significance level is less than (0.05). These differences are in favor of those who have three years or more time since the injury.

9- Differences in PTG according to the length of stay in hospital

There are no differences in PTG between the length of stay groups (three months or less, more than three months) in the PTG of the total PTG as a whole as well as the

factors, because the significance level value is greater than (0.05) for the total as well as the factors.

10- Differences in PTG according to the cause of injury

There are no differences in PTG between the cause of injury groups (Road accident, others) in the PTG of the total PTG as a whole as well as the factors, because the significance level value is greater than (0.05) for the total as well as the factors.

11- Differences in PTG according to the type of injury

There are no differences in PTG between the cause of injury groups (complete, ASIA A, Other or unknow) in the PTG of the total PTG as a whole as well as the factors, because the significance level value is greater than (0.05) for the total as well as the factors.

12- Differences in PTG according to exposure to mental health services after the injury

There are no differences in PTG according to exposure to mental health services after the injury groups (exposed, no exposure) in the PTG of the total PTG as a whole as well as the factors, because the significance level value is greater than (0.05) for the total as well as the factors.

13- Differences in PTG according to medical history before the injury

There are no differences in PTG according to medical history before the injury groups (medically free, has medical issues) in the PTG of the total PTG as a whole as well as the factors, because the significance level value is greater than (0.05) for the total as well as the factors.

14- Differences in PTG according to income status

There are no differences in PTG according to income status groups (less than 5k, 5k and more) in the PTG of the total PTG as a whole as well as the factors, because the significance level value is greater than (0.05) for the total as well as the factors.

15- Differences in PTG according to the type of housing status

There are no differences in PTG according to the type of housing status groups (Apartment, villa) in the PTG of the total PTG as a whole as well as the factors, because the significance level value is greater than (0.05) for the total as well as the factors.

16- Differences in PTG according to the Housing ownership status

There are no differences in PTG according to the type of housing ownership status groups (rental, owned) in the PTG of the total PTG as a whole as well as the factors,

because the significance level value is greater than (0.05) for the total as well as the factors.

17- Differences in PTG according to the life stressors status

There are no differences between those without stress and those with moderate stress and those who have severe stress in relation to the scale as a whole as well as the four factors (Autonomy, relationships, sense of mastery, personal growth) in PTG because the value of the level of significance is greater. From (0.05) for the total as well as the factors. While we found differences between them in the two domains (Self-acceptance, purpose in life), because the value of the significance level associated with them is less than (0.05) in favor of those who have no stressors.

18- Differences in PTG according to the nature life stressors status

There are no differences in PTG according to the nature life stressors groups (financial, health) in the PTG of the total PTG as a whole as well as the factors, because the significance level value is greater than (0.05) for the total as well as the factors.

19- Can depression be predicted by post-traumatic growth and social support?

Multiple regression analysis was used to answer this question as shown in the following: the F value of the PTG variable reached the value (25.271), which is statistically significant because the value of the associated significance level reached the value (.000) which is less than (0.05), which means that we can predict depression from PTG variable. This prediction gave an indication according to the results of the PTG variable, while social support variable was excluded because it did not predict depression. The multiple correlation coefficient between post-traumatic growth and depression reached (.532) indicating a moderate relationship between post-traumatic growth and depression.

It is evident from the above that the social support variable was taken out of the analysis because it does not predict depression.

It is also clear that the value of the square of the correlation coefficient (the coefficient of determination) reached the value (.283), meaning that the percentage of the contribution of the independent variable, which is the post-traumatic growth, in explaining the variance in the dependent variable, depression, is 28%. That is, 28% of the change in the dependent variable, which is depression, is due to the independent variable.

Predictors	Regression coefficient B	Beta standard regression coefficient	T	Sig
(Constant)	13.093	-	10.430	.000
PTG total	-.129	-.532	-5.027	.000
Social support	-	-.124[b]	-1.066	.291

It is noticed from the previous table that the value of t associated with the PTG variable reached the value (-5.027), which is statistically significant because the value of the level of significance associated with it reached the value (.000) which is less than (0.05), which indicates that PTG contributes to Interpretation of the change in depression, as it contributes (53%) to explaining the variance in the dependent variable, which is depression.

While the value of t associated with social support was (-1.066), which is not significant, because the value of the level of significance associated with it was (.291) and it is greater than (0.05). Therefore, depression cannot be predicted through social support.

20- Can anxiety be predicted by post-traumatic growth and social support?

To answer this question, multiple regression analysis was used, as shown in the following: the F value of the PTG variable reached the value (8.423), which is a statistical function because the value of the level of significance associated with it reached the value (.005) which is less than (0.05), which means that we can predict anxiety about post-traumatic growth, but what gave this prediction an indication according to the results is post-traumatic growth. As for social support, it was excluded because it does not predict anxiety, and the multiple correlation coefficient between PTG and anxiety reached the value. (.341), indicating a weak relationship between PTG and anxiety.

It is evident from the above that the social support variable was taken out from the analysis because it does not predict anxiety

It is also evident that the value of the square of the correlation coefficient (the coefficient of determination) reached the value (. 116), meaning that the percentage of the contribution of the independent variable, which is the post-traumatic growth, in explaining the variance that occurred in the anxious dependent variable is 11%. That is, 11% of the change in the dependent variable, which is anxiety, is due to the independent variable. It also appears from the regression analysis that the value of (F) reached (8.423), which is a statistically significant value at the level of significance

(0.000), which means that we can predict anxiety through post-traumatic growth and that the value of the prediction is statistically significant.

Predictors	**Regression coefficient B**	**Beta standard regression coefficient**	**T**	**Sig**
(Constant)	11.561		15.752	.000
Total PTG	-.044	-.341	-2.902	.005
Social support	-	-.077[b]	-.592	.556

By looking at the table, it is noticed that the value of T associated with the post-traumatic growth variable reached the value (-2.902), which is statistically significant because the value of the level of significance associated with it reached the value (.005) which is less than (0.05), indicating that the post-traumatic growth variable It contributes to explaining the change in anxiety, as it contributes (34%) to explaining the variation in the dependent variable, which is anxiety, while the value of t associated with social support reached the value (-.592), which is not a significant because the value of the level of significance associated with it reached (.556) It is greater than (0.05), so anxiety cannot be predicted through social support.

Discussion:

In the current study, the most common cause of SCI among our participants was road accidents (62.1%), with ASIA A being the most common type of injury (36.4%). Most of our patients (72.7%) were exposed to mental health services. Severe life stressors were reported by a few percentages of patients (17.8%), whereas the most common stress reported was financial stress (53.2%), followed by health stress (46.8%). There were 21.2%, and 27.3% of our participants were suffering from depression and anxiety.

A study from Iraq reported that the main cause for SCI was violence, and a high percentage of patients (74.1%) were suffering depression **[23]**; the findings were in contrast to ours. Moodley and Pillay **[24]** enrolled a study on 112 patients with SCI; they found road accidents were the most common cause of SCI, as we found in our study. The authors also found that there was a high rate of post-traumatic stress disorder after SCI injury .

Al-Owesie et al. **[25]** reported that among 102 patients with SCI, there was 28.43% and 18.62% of patients had anxiety at the borderline and definite level of anxiety, respectively, whereas 19.6% and 22.54% showed depression at the borderline and definite depression, respectively. The prevalence of depression was more common compared to that of anxiety, as reported by Al-Owesie et al. **[25]**, which was in contrast to our findings. In a nationwide population-based cohort study conducted on 3556 SCI patients, it was found that the patients had a1.33 times higher incidence of new-onset depression or anxiety compared to healthy individuals **[26]**.

The mean of post-traumatic growth among patients after SCI was 2.546; the post-traumatic growth was also investigated regarding several domains, and the highest mean value was found regarding relationships (2.65), followed by personal growth (2.61), whereas the least mean value was found regarding sense of mastery(٢،٣٢) . In our study, family support was the main and highest support the patient received (2.52), followed by friends support (1.88) and GONGO (1.59) based on the mean score of the support of each domain. The mean score of the overall social support was 2.

Post-traumatic growth (PTG) contains several domains; those domains were assessed if they change significantly regarding other variables related to the patients. There were significant differences among depressed and non-depressed patients regarding self-acceptance, purpose in life, sense of mastery, and personal growth; the mean of all the previous domains was significantly higher among non-depressed individuals. Both self-acceptance and autonomy were significantly varied between the different educational groups; those with post-secondary education showed higher mean values of both domains compared to other participants. Also, self-acceptance and purpose in life were significantly affected by life stress; individuals who reported no stress showed the highest mean value of self-acceptance and purpose in life compared to the other individuals who reported varying degrees of stress. However, there was no other variable that affected the aspects of post-traumatic growth among the patients.

An Iranian study included 16 SCI patients; it was revealed that there were several factors that facilitated the PTG; these factors including support resources, spiritual beliefs, and active presence in the society **[27].** The factors investigated in the previous study **[27]** weren't assessed in ours.

In a meta-analysis, it was demonstrated that growth was related to higher education, employment, subjective beliefs, relationship status, older age, longer time since injury, and lower level of depression **[13].** However, in our study, the level of depression and level of education were the significant factors affecting different aspects of the PTG.

In a study on PTG, it was found that a majority of the sample experienced some positive changes after injury; the PTG was significantly influenced by the female gender, less education, less time since injury, whereas depression, injury level, and severity had no impact **[28]**. These findings were in contrast to ours, where education was a significant factor in our study.

The importance of social support in promoting positive changes in the aftermath of trauma has been reported **[29]**. A systematic review that included 58 publications about SCI reported that social support was associated with better health and functioning among individuals with SCI **[30].** The importance and the great impact of family support are well known; it was reported that individuals experiencing PTG are more prone to experience strengthened family relationships. Also, they are more likely to appreciate the little things in their lives **[31].** A study conducted on 157 SCI patients showed that the most predictor of PTG was family support **[32].**

In our study, a moderate relationship was found between PTG and depression; moreover, it was found that PTG can predict depression among SCI patients, whereas there was a weak correlation between PTG and anxiety; however, anxiety can be predicted by PTG such as depression. So, both depression and anxiety levels can be predicted by PTG, and they are associated with PTG, whereas social support has no correlation with anxiety nor depression. A study from China revealed that environmental barriers and resilience were significant predictors for depression and anxiety **[33].**

Conclusion:

Anxiety and depression were common among our patients with SCI, whereas there were high life stressors, and financial stress was the dominant type of stress among patients. The most affected domain of PTG was a sense of mastery, whereas relationships and personal growth were the least affected among patients with SCI.

achieving PTG was significantly affected by depression, education level, and life stressors. There was a regression relation between PTG with depression and anxiety, so PTG can predict depression and anxiety in patients with SCI.

Limitations:

From the research, several factors were not put under reconsideration and in one way or the other, they may have contributed to PTG in SCI. We did not measure some salient psychological factors related to PTG, such as injury attributions coping style personality traits and spiritual support. We were also not able to examine the changes in PTG over time since our data were cross-sectional.

Compliance with ethical standards and Declaration of Conflicting Interests:

The authors declare that there is no conflict of interest regarding the publication of this article.

Funding:

None.

Consent for publication:

Written informed consent was obtained from all the participants

Ethical Approval:

Yes.

Acknowledgements:

We wish to show our appreciation to all individuals participate in this project. We wish to extend our most special appreciation to Dr. Khalid AlRubeaan, Dr. Hamada Ahmed, and the research center in SBAHC, Ms. Areej Almutlak and research center in KFMC and KAIMRC.

References:

1- Hoffman, J. M., Bombardier, C. H., Graves, D. E., Kalpakjian, C. Z., & Krause, J. S. (2011). A longitudinal study of depression from 1 to 5 years after spinal cord injury. *Archives of physical medicine and rehabilitation*, *92*(3), 411-418.

2- Bonanno, G. A., Kennedy, P., Galatzer-Levy, I. R., Lude, P., &Elfström, M. L. (2012). Trajectories of resilience, depression, and anxiety following spinal cord injury. *Rehabilitation psychology*, *57*(3), 236.

3- Migliorini, C., Tonge, B., &Taleporos, G. (2008). Spinal cord injury and mental health. *Australian & New Zealand Journal of Psychiatry*, *42*(4), 309-314.

4- Saakvitne, K. W., Tennen, H., & Affleck, G. (1998). Exploring thriving in the context of clinical trauma theory: Constructivist self development theory. *Journal of social issues*, *54*(2), 279-299.

5- Tedeschi, R. G., & Calhoun, L. G. (1995). *Trauma and transformation*. Sage.

6- Calhoun, L. G., & Tedeschi, R. G. (2006). The foundations of posttraumatic growth: An expanded framework. *Handbook of posttraumatic growth: Research and practice*, 3-23.

7- Tedeschi, R. G., Shakespeare-Finch, J., Taku, K., & Calhoun, L. G. (2018). *Posttraumatic growth: Theory, research, and applications*. Routledge. 3-36

8- Barskova, T., &Oesterreich, R. (2009). Post-traumatic growth in people living with a serious medical condition and its relations to physical and mental health: A systematic review. *Disability and rehabilitation*, *31*(21), 1709-1733.

9- Tedeschi, R. G., & Calhoun, L. G. (2004). " Posttraumatic growth: Conceptual foundations and empirical evidence". *Psychological inquiry*, *15*(1), 1-18.

10- Ginis, K. A. M., Jörgensen, S., & Stapleton, J. (2012). Exercise and sport for persons with spinal cord injury. *PM&R*, *4*(11), 894-900.

11- Day, M. C. (2013). The role of initial physical activity experiences in promoting posttraumatic growth in Paralympic athletes with an acquired disability. *Disability and rehabilitation*, *35*(24), 2064-2072.

12- Tedeschi, R. G., & Calhoun, L. G. (2004). " Posttraumatic growth: Conceptual foundations and empirical evidence". *Psychological inquiry*, *15*(1), 1-18.

13- Kalpakjian, C. Z., McCullumsmith, C. B., Fann, J. R., Richards, J. S., Stoelb, B. L., Heinemann, A. W., & Bombardier, C. H. (2014). Post-traumatic growth following spinal cord injury. *The Journal of Spinal Cord Medicine*, *37*(2), 218-225.

14- Elfström, M. L., Ryden, A., Kreuter, M., Persson, L. O., & Sullivan, M. (2002). Linkages between coping and psychological outcome in the spinal cord lesioned: development of SCL-related measures. *Spinal cord*, *40*(1), 23-29.

15- Elfström, M. L., Kreuter, M., Rydén, A., Persson, L. O., & Sullivan, M. (2002). Effects of coping on psychological outcome when controlling for background variables: a study of traumatically spinal cord lesioned persons. *Spinal Cord*, *40*(8), 408-415.

16- Kennedy, P., Lude, P., Elfström, M. L., & Smithson, E. (2012). Appraisals, coping and adjustment pre and post SCI rehabilitation: a 2-year follow-up study. *Spinal cord*, *50*(2), 112-118.

17- Pollard, C., & Kennedy, P. (2007). A longitudinal analysis of emotional impact, coping strategies and post-traumatic psychological growth following spinal cord injury: A 10-year review. *British journal of health psychology*, *12*(3), 347-362.
18- Joseph, S., Maltby, J., Wood, A. M., Stockton, H., Hunt, N., & Regel, S. (2012). The Psychological Well-Being—Post-Traumatic Changes Questionnaire (PWB-PTCQ): Reliability and validity. *Psychological Trauma: Theory, Research, Practice, and Policy*, *4*(4), 420.
19- Alghamdi, M., Joseph, S., & Hunt, N. (2020). Validation and Psychometric Properties of the Arabic Psychological Well-Being Post-Traumatic Changes Questionnaire. *International Journal of Psychology & Psychological Therapy*, *20*(2).
20- Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta psychiatricascandinavica*, *67*(6), 361-370.
21- El-Rufaie, O. E. F. A., &Absood, G. (1987). Validity study of the Hospital Anxiety and Depression Scale among a group of Saudi patients. *The British Journal of Psychiatry*, *151*(5), 687-688.
22- Jaber, S. S. (2012). *Developing a self-help guide for traumatised university students in Iraq* (Doctoral dissertation, University of Nottingham)
23- Al Abbudi, S. J. R., Ezzat, K. I., Zebala, A. A., Hamdy, D. J., & Al-Beedany, M. S. J. (2017). Prevalence and determinants of depression among traumatic spinal cord injured patients attending Ibn-Al-Quff Hospital, Baghdad. Iraq. J Psychiatry, 20(428), 2.
24- Moodley, N., & Pillay, B. J. (2013). Post-traumatic stress disorder in patients with spinal-cord injuries. South African journal of psychology, 43(2), 182-197.
25- Al-Owesie, R. M., Moussa, N. M., & Robert, A. A. (2012). Anxiety and depression among traumatic spinal cord injured patients. Neurosciences (Riyadh), 17(2), 145-150.
26- Lim, S. W., Shiue, Y. L., Ho, C. H., Yu, S. C., Kao, P. H., Wang, J. J., & Kuo, J. R. (2017). Anxiety and depression in patients with traumatic spinal cord injury: a nationwide population-based cohort study. PLoS One, 12(1), e0169623.
27- Khanjani, M. S., Younesi, S. J., Khankeh, H. R., & Azkhosh, M. (2017). Exploring facilitators of post-traumatic growth in patients with spinal cord injury: A qualitative study. Electronic physician, 9(1), 3544.
28- Kinsella, E. L., Grace, J. J., Muldoon, O. T., & Fortune, D. G. (2015). Post-traumatic growth following acquired brain injury: a systematic review and meta-analysis. Frontiers in Psychology, 6, 1162.
29- Prati, G., & Pietrantoni, L. (2009). Optimism, social support, and coping strategies as factors contributing to posttraumatic growth: A meta-analysis. Journal of loss and trauma, 14(5), 364-388.
30- Müller, R., Peter, C., Cieza, A., & Geyh, S. (2012). The role of social support and social skills in people with spinal cord injury—a systematic review of the literature. Spinal Cord, 50(2), 94-106.
31- Chun, S., & Lee, Y. (2008). The experience of posttraumatic growth for people with spinal cord injury. Qualitative Health Research, 18(7), 877-890.
32- Zeqeibi Ghannad, S., Fateminik, T., & Allipour, S. (2018). The Role of Social Support, Life Meaningfulness, and Centrality of Religiosity in Posttraumatic

Growth and Life Satisfaction of People with Spinal Cord Injury. Jundishapur Journal of Chronic Disease Care, 7(4).

33- Wang, Y., Xie, H., & Zhao, X. (2018). Psychological morbidities and positive psychological outcomes in people with traumatic spinal cord injury in mainland China. Spinal Cord, 56(7), 704-711.