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Posttraumatic growth, depression and anxiety in head and neck cancer patients: examining their patterns and correlations in a prospective study

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Abstract

***Background*: Positive and negative psychological reactions have been described in head and neck cancer patients. Nevertheless, the relationships between these responses across time need to be studied to understand the patients' strengths and vulnerabilities.**

***Objectives*: The aim of this study is to determine the changes in posttraumatic growth (PTG), depression and anxiety longitudinally and the correlations between PTG and depression and anxiety in head and neck cancer patients.**

***Methods*: A prospective study was conducted on 60 head and neck cancer patients within a year of diagnosis recruited from an oncology referral centre in Malaysia with 50 patients completing the study. The PTG Inventory–Short Form (PTGI-SF) and Hospital Anxiety and Depression Scale (HADS) were used at baseline and at 6 months follow-up.**

***Results*: There were significant reductions in the scores of PTGI-SF (mean difference = −5.5, $p = 0.014$), HADS (Depression) (mean difference = −2.0, $p < 0.05$) and HADS (Anxiety) (mean difference = −2.0, $p < 0.05$) from baseline to follow-up. However, their correlations were not significant. HADS (Depression) score at baseline showed weak inverse correlation with PTGI-SF score (rho = −0.147, $p = 0.309$), whereas PTGI-SF score had weak positive correlations with HADS (Anxiety) at baseline (rho = 0.261, $p = 0.067$), HADS (Depression) at follow-up (rho = 0.083, $p = 0.566$) and HADS (Anxiety) at follow-up (rho = 0.111, $p = 0.445$). HADS scores also did not predict total PTGI-SF score longitudinally.**

***Conclusion*: There were reductions in PTG, depression and anxiety within a year of cancer diagnosis and 6 months later with no significant correlations between PTG with depression and anxiety.**

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Introduction

Head and neck cancer refers to malignant tumours that develop over head and neck regions including oral cavity, pharyngeal and laryngeal cancer. In head and neck cancer, facial disfigurement is a complication that could increase one's psychological vulnerability; particularly depression [1,2].

In contrast, various studies had demonstrated positive psychological outcome following diagnosis of cancer, known as posttraumatic growth (PTG).Tedeschi and Calhoun defined PTG as the experience of positive change, resulting from struggle with highly challenging life crises. It consists of five components, that is, spiritual development, new possibilities in life, better appreciation of life, greater sense of personal strength and improved relationships with others [3]. Several factors associated with increased PTG in cancer patients include younger age, highly educated patients [4–6], recurrence, severity of cancer [7] and coping styles such as problem solving, adaptive coping, meaning making and benefit finding [8]. PTG is also reported amongst Malaysian cancer patients [9].

Conversely, a study on Malaysian nasopharyngeal carcinoma (NPC) patients found that both depression and anxiety scores are higher in NPC patients as compared with cancer-free controls [10]. Moreover, a review by Robson and Scrutton reported the incidence of completed suicide ranged from standardized mortality ratio of 1 to 11 amongst cancer patients [11].

The relationship between psychiatry and medical comorbidities is rather complex. The association between medical disorders and psychiatric disorders is well established [12] and are linked via various mechanisms.

On the contrary, one study reported that PTG is not significantly associated with comorbid medical illness in cancer patients [13].

To date, studies conducted prospectively reported conflicting relationships between depression and anxiety with PTG [14–16]. A cross-sectional study amongst breast cancer patients showed only the PTG domain of 'new possibilities' correlates with depression but not with other domains [14]. However, prospective studies in gastrointestinal cancer patients by Nordin and Glimelius [15] and amongst cancer survivors by Munoz and Gracia [16] reported a reduction in depression and a slight increase in PTG, respectively. To the authors' knowledge, this is the first study that aims to investigate the correlations between PTG with depression and anxiety in a head and neck cancer population.

Patients and methods

Participants

This prospective study was conducted over 2 years from 2011 to 2013 in Universiti Kebangsaan Malaysia Medical Centre, a referral centre for oncology treatment in Malaysia. The inclusion criteria were patients were diagnosed within 1 year with head and neck cancer as confirmed by histopathological report; between stage I to IV at diagnosis without distant metastases, where staging was performed according to the International Union Against Cancer; either married or have lived in a relationship longer than 6 months at the time of diagnosis; able to understand Malay or English; and aged 18 years and older (Figure 1). This study was approved by the Ethics Committee of Universiti Kebangsaan Malaysia Medical Centre. All patients who fulfilled the selection criteria were approached consecutively by the researcher who explained the study. Patients who consented to participate were then enrolled in the study. Marital status was controlled in the study as it is a significant confounder that could affect PTG in cancer patients. Studies found that marital status and having a partner were related to higher PTG in cancer patients [14,17].

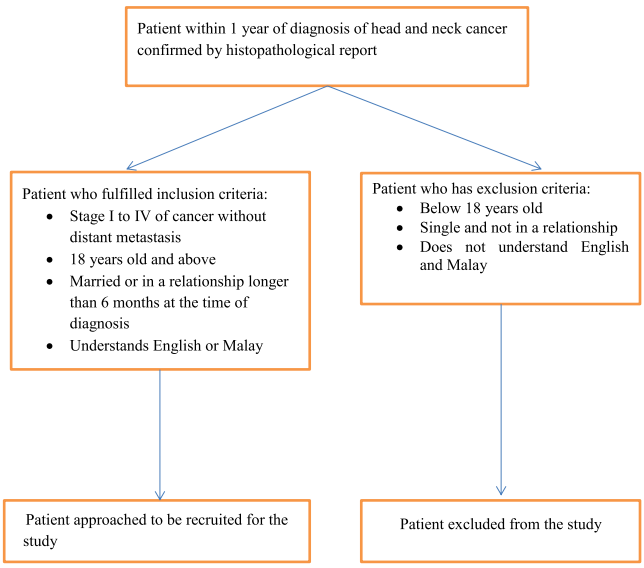

Figure 1. Flowchart of patient recruitment for the study

Participants completed the sociodemographic (gender, age, race, monthly income, education level and marital status), clinical data questionnaires (diagnosis, duration of diagnosis and mode of treatment and stage of cancer), PTG Inventory–Short Form (PTGI-SF) and Hospital Anxiety and Depression Scale (HADS). At 6 months follow-up, the patients were reassessed using questionnaires on mode of treatment, PTGI-SF and HADS. The English versions of all the questionnaires were used for English speaking patients, whereas the Malay versions used for non-English speaking patients. At baseline, 70 patients met study criteria, but only 60 patients consented to participate. However, only 50 patients completed the study at follow-up because 10 patients defaulted, yielding an 86% response rate.

Questionnaires

Posttraumatic Growth Inventory–Short Form

The PTGI-SF was used to assess the experience of positive change resulting from traumatic events experienced [18]. The scale consists of five factors, that is, personal strength, spiritual change, new possibilities in life, appreciation of life and relating to others. Each item is scored from 0 (I did not experience this change) to 5 (I experienced this change to a great degree). The PTGI-SF Malay version was translated and back translated independently by two professional translators. Internal consistencies (Cronbach's alpha) of each factor in the questionnaire were appreciation of life = 0.826, relating to others = 0.77, new possibilities = 0.79, personal strength = 0.815 and spiritual change = 0.80. However, the PTGI-SF Malay version has not been fully validated for Malaysian cancer patients. Nine patients (18%) who could not understand the questions in PTGI-SF where given help by researchers who were proficient in English, Malay and Chinese languages where each question was explained to the patients by the researchers before they were answered by the former. Forty-one of the 50 patients (82%) who completed the study could read, write and understand either Malay or English.

Cronbach's alpha overall for the PTGI-SF Malay version were 0.87 and 0.96 at baseline and follow-up, respectively, and for the English version were 0.82 at baseline and 0.92 at follow-up. These internal consistencies were obtained from 25 patients (50%) who answered the Malay version and another 25 patients (50%) who answered the English version of PTGI-SF. Mann–Whitney test was

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performed to compare the total PTGI-SF scores between subjects who answered the Malay version with those who answered the English version at baseline and follow-up. However, no significant differences between the scores were found (at baseline: $Z = -1.001$, $p = 0.317$; at follow-up: $Z = -1.079$, $p = 0.281$).

Hospital Anxiety and Depression Scale

Hospital Anxiety and Depression Scale is a self-rated questionnaire that assesses patients' level of anxiety and depression using seven items for depression and seven for anxiety. Each item scores from 0 to 3, and the range for both depressive and anxiety items is from 0 to 21 [19]. The Malay version of HADS has appropriate psychometric properties to be used in this sample [20].

Statistical methods

Statistical analysis was done using SPSS version 19 (IBM Corporation, Armonk, New York, USA) [21]. The Wilcoxon test was applied to compare the total PTGI-SF, PTGI-SF factors and HADS scores at baseline and follow-up because these variables were not normally distributed. Similarly, the relationship between total PTGI-SF with HADS scores at baseline and follow-up were examined using Spearman's rank correlation coefficient. Multiple regression analyses were performed to examine the relationships between sociodemographic factors, clinical factors and HADS scores with total PTGI-SF scores.

Results

Sample description

The sociodemographic characteristics and clinical data of patients are summarized in Table 1. The mean age of the patients was 49.76 (+/−11.56) years. Two thirds of the subjects were male ($n = 33$, 66%). Half of the subjects had secondary education ($n = 28$, 56%) followed by primary ($n = 13$, 26%) and tertiary education ($n = 9$, 18%). At baseline, 40% of patients were new cancer cases ($n = 20$) who had not received any treatment, but during follow-up, 96% of patients had received at least one form of treatment, with the largest group receiving a combination of radiotherapy and chemotherapy ($n = 17$, 34%).

Table 1. Sociodemographic and clinical characteristics of study participants

Variables	Number of patients (*n*)	Percentage (%)
Age (years; mean) (SD)	49.76	11.56
Gender		
Male	33	66
Female	17	34
Race		
Chinese	27	54
Malays	19	38
Indians	3	6
Others	1	2
Monthly income		
<RM1000	27	54
RM1000–RM3000	16	38
RM3000–RM5000	7	14
Education		
Primary education	13	26
Secondary education	28	56
Tertiary education	9	18
Marital status		
Married	45	90
Unmarried	5	10
Diagnosis		
Nasopharyngeal carcinoma	20	40
Squamous cell carcinoma	27	54
Spindle cell carcinoma	1	2
Mucoepidermal carcinoma	2	4
Duration of Diagnosis		
New case	20	40
<3 months	9	18
3–6 months	10	20
6–12 months	11	22
Stage of disease		
Stage 1	11	22
Stage 2	14	28
Stage 3	12	24
Stage 4	13	26
Treatment (at baseline)		
No treatment	20	40
Surgery only	8	16
Chemotherapy only	3	6
Radiotherapy only	4	8
Surgery and chemotherapy	1	2
Surgery and radiotherapy	2	4
Chemotherapy and radiotherapy	8	16
Surgery, chemotherapy and radiotherapy	4	8
Treatment (at follow-up)		
No treatment	2	4
Surgery only	3	6
Chemotherapy only	0	0
Radiotherapy only	3	6
Surgery and chemotherapy	1	2
Surgery and radiotherapy	11	22
Chemotherapy and radiotherapy	17	34
Surgery, chemotherapy and radiotherapy	13	26

SD, standard deviation.

Normality testing of Posttraumatic Growth Inventory (Short Form) and Hospital Anxiety and Depression Scale scores at baseline and follow-up

At baseline, Shapiro–Wilk test showed that the total PTGI-SF score was not normally distributed ($W = 0.805$, $p < 0.05$, skewness = −1.835); whereas at follow-up, the total PTGI-SF score was normally distributed ($W = 0.981$, $p = 0.588$, skewness = 0.270). HADS (Anxiety) at baseline was normally distributed ($W = 0.976$, $p = 0.414$, skewness = 0.308), whereas HADS (Depression) at baseline was not normally distributed ($W = 0.926$, $p = 0.004$, skewness = 0.920). At follow-up, both HADS (Anxiety) ($W = 0.928$, $p = 0.004$,

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skewness = 0.855) and HADS (Depression) (W = 0.887, $p < 0.05$, skewness = 0.934) were not normally distributed.

Comparison of total Posttraumatic Growth Inventory (Short Form) and Hospital Anxiety and Depression Scale scores at baseline and follow-up

Total PTGI-SF scores were significantly reduced, median 37.5 at baseline and 30.0 at follow-up [mean difference = −5.5, 95% confidence interval (CI) = −7.54–0.22, Z = −2.465, $p = 0.014$]. Significant reductions were also noted between HADS (Depression) median scores from 5.0 at baseline to 2.5 at follow-up (mean difference = −2.0, 95% CI = −2.8 to −0.9, Z = −3.952, $p < 0.05$) and HADS (Anxiety) median scores from 7.5 at baseline to 4.5 at follow-up (mean difference = −2.0, 95% CI = −3.5 to −1.4, Z = −4.119, $p < 0.05$).

Comparing PTGI-SF factors at baseline with follow-up, 'relating to others', 'new possibilities' and 'growth of personal strength' were found to decrease significantly (relating to others: median difference = −1, $Z = -2.668$, $p = 0.007$; new possibilities: median difference = −1, $Z = -2.004$, $p = 0.044$; personal strength: median difference = −1.5, $Z = -2.255$, $p = 0.023$). However, 'spiritual change' and 'appreciation of life' changes at baseline and follow-up were not significant (spiritual change: median difference = 0, $Z = -1.353$, $p = 0.179$; appreciation of life: median difference = 0, $Z = -1.223$, $p = 0.227$).

Correlations between total Posttraumatic Growth Inventory (Short Form) scores and Hospital Anxiety and Depression Scale scores at baseline and follow-up

Bivariate analysis found a weak negative correlation between total PTGI-SF and HADS (Depression) at baseline (rho = −0.154, 95% CI = −0.417 to 0.177, $p = 0.286$). However, the correlations between total PTGI-SF scores with HADS (Anxiety) at baseline (rho = 0.261, 95% CI = −0.059 to 0.523, $p = 0.067$), HADS (Depression) (rho = 0.074, 95% CI = −0.217 to 0.425, $p = 0.61$) and HADS (Anxiety) (rho = 0.084, 95% CI = −0.231 to 0.485, $p = 0.563$) at follow-up were found to be weak positive correlations. All the correlations were not statistically significant.

Multiple regression was performed with total PTGI-SF score (baseline) as a dependent variable and sociodemographic, clinical data and HADS scores as independent variables. ($R^2 = 0.363$; $p = 0.037$) (Table 2). The findings demonstrate that both HADS (Anxiety) and (Depression) scores made significant contributions to total PTGI-SF score (baseline) with (Depression) making the greatest contribution [HADS (Anxiety): $B = 0.590$, $p = 0.001$ and HADS (Depression): $B = -0.635$, $p < 0.001$].

Multiple regression was repeated with total PTGI-SF score (follow-up) as dependent variable and sociodemographic, clinical data, HADS scores and total PTGI-SF score (baseline) as independent variables ($R^2 = 0.260$; $p = 0.399$). The results were summarized in Table 2. The independent variables were statistically insignificant including HADS scores at baseline [HADS (Anxiety): $B = -0.141$, $p = 0.127$; HADS (Depression): $B = 0.118$, $p = 0.613$]. Both HADS (Anxiety) and (Depression) scores at baseline did not predict the total PTGI-SF score at follow-up after accounting for sociodemographic factors, clinical factors and total PTGI-SF(baseline) score.

Table 2. Standard multiple regression analyses

Variables	Standardized beta coefficient (*B*)	*p*-value
Dependent variable: total PTGI-SF (baseline)		
Gender	0.140	0.381
Age	−0.117	0.454
Marital status	−0.158	0.766
Race	0.055	0.778
Monthly income	0.094	0.703
Education status	−0.122	0.450
Diagnosis	−0.096	0.484
Stage of cancer	0.103	0.893
Treatment	0.114	0.429
HADS (A)	0.590	0.001*
HADS (D)	−0.635	<0.001*
$R^2 = 0.363$		$p = 0.037$*
Dependent variable: total PTGI-SF (follow-up)		
Gender	−0.28	0.872
Age	0.079	0.648
Marital status	0.204	0.156
Race	0.109	0.501
Monthly income	−0.147	0.400
Education status	0.162	0.367
Diagnosis	−0.118	0.476
Stage of cancer	0.225	0.145
Treatment	0.130	0.551
HADS (A)	−0.141	0.127
HADS (D)	0.118	0.613
Total PTGI (baseline)	0.065	0.719
$R^2 = 0.260$		$p = 0.399$

PTGI-SF, Posttraumatic Growth Inventory–Short Form; HADS (A), Hospital Anxiety and Depression Scale–Anxiety; HADS (D), Hospital Anxiety and Depression Scale–Depression.
*Findings were statistically significant.

Discussion

In this study, the median scores of HADS (Depression) at baseline and follow-up were 5.0 and 2.5, respectively, whereas the HADS (Anxiety) median scores were 7.5 at and 4.5, respectively. In a study of gastrointestinal cancer patients [15], mean HADS (Anxiety) scores are 4.0 (at diagnosis) and 3.6 (6 months later), whereas mean HADS (Depression) scores are 4.4 (at diagnosis) and 4.0 (6 months later). The median scores of PTGI-SF in this study were 37.5 and 30.0 at baseline and follow-up, respectively. By comparison, a study of cancer patients by Munoz and Garcia demonstrated mean PTGI-SF scores ranging from 27.5 to 28.5[16]. Compared with the aforementioned studies, the anxiety level of

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the sample in this study was relatively similar, but the depression level was lower longitudinally. This was unexpected because it is generally accepted that facial disfigurement in head and neck cancer patients increases the risk of depression [1,2]. However, the PTG levels were higher in this study.

This study demonstrated a significant decrease of the total PTGI-SF scores from baseline to follow-up. Cadell has demonstrated that distress because of trauma will promote PTG hence explaining the higher PTG at baseline in almost half of our patients (40%) who were newly diagnosed with cancer and had not received treatment [22]. Interestingly, the assessment at follow-up registered a significant decrease in PTG level. One main clinical characteristic of the patients that changed at follow-up was the treatment type, whereas other factors remained the same (Table 1). At follow-up, it was noted that the proportion of patients who did not receive treatment was reduced to a tenth (4%) from baseline, whereas those who underwent any form of combination therapy increased enormously from 24% at baseline to 82% at follow-up. On the basis of this observation, we infer that the reduction in PTG could be related to the treatment that patient underwent and its association with the quality of life. PTG has been found to be inversely correlated to quality of life in cancer patients in three studies [23–25]. In addition, studies have demonstrated that quality of life in head and neck cancer patients significantly deteriorates during radiotherapy, surgery and chemotherapy but is then followed by gradual recovery and improvement up to 12 months after treatment [4,26,27]. Improved quality of life following treatment possibly contributed to a decrease in PTG at follow-up.

Another finding was that the depression and anxiety scores were also significantly decreased from baseline to follow-up. A study by Hammerlid demonstrated that anxiety and depression levels increase upon diagnosis of head and neck cancer but return to almost pretreatment level in 12 months [28]. This supports our findings, as about 58% of patients in this study were diagnosed with head and neck cancer 3 months or earlier at baseline. This could explain the higher level of depression and anxiety of patients at baseline as the diagnosis of cancer may be traumatizing to the patients initially. Levels of depression and anxiety were reduced when assessment was repeated 6 months later. One explanation for the significant decrease in depression and anxiety scores from baseline to follow-up was probably due to regression of the scores towards the mean during the follow-up assessment (6 months after baseline assessment) following the peak level of anxiety and depression closer to initial diagnosis during baseline assessment.

Bivariate and multivariate analyses performed in this study demonstrated no significant relationships between HADS (Depression and Anxiety) and PTGI-SF scores. This finding is similar to two prospective studies in hepatocellular carcinoma patients by Moore and colorectal cancer survivors by Salsman that also demonstrated no significant correlations between PTG and depression [29,30] and anxiety [30]. PTG is unrelated to depressive symptoms but interacted with posttraumatic stress symptoms in predicting depressive symptoms by weakening the deleterious effect of posttraumatic stress onto depression as shown by a study on breast cancer patients by Morrill [31]. Therefore, there is no direct relationship between PTG with depression and anxiety in head and neck cancer patients.

Depression has an inverse relationship with positive cognitive processing that in turn is positively correlated to PTG [30,32]. Surprisingly, at follow-up, the HADS scores were nonsignificant in predicting PTG. We inferred that PTG could be an outcome of coping with traumatic events when one utilizes cognitive processing to comprehend the traumatic event and restore their belief that the world surrounding them is comprehensible and sensible [33]. This study also demonstrated that PTGI-SF at baseline was unrelated to PTGI-SF score at follow-up. Motivated illusion is a coping process activated in response to traumatic event such as cancer diagnosis where subjects exhibit distortion of their perception of the past in which the past was viewed as being more negative than their current state. Therefore, they claimed to have experienced an improvement in their personal attributes after a traumatic event, which aim at maintaining a coherent and consistent sense of internal identity and to consolidate self-esteem, meaning of life and self-control [34]. Widows and colleagues found this coping mechanism is related to PTG in bone marrow transplant survivors [35]. We inferred that PTG reported at baseline was possibly motivated illusion that the patients engaged to alleviate distress at the initial phase, hence further indicating PTG as a coping process to cancer.

This study has several limitations. First, the small sample size was incapable of detecting smaller effect size. Second, this study did not account for potential confounders such as quality of life, hope, optimism, active coping, perceived intensity of disease, employment and psychosocial support [17,24,36,37]. Third, this study did not assess the role of caregivers in influencing psychological state of head and neck cancer patients. A cross-sectional study noted cancer patients' level of depression is related to the level of depression of their caregivers [38]. Another study of breast cancer patients demonstrated that increased spousal support would increase PTG of patients [39]. Thus, assessing the interplay of psychological states of patients and caregivers and how they influence each other is vital. Finally, PTGI-SF Malay version was not fully validated. However, we found it has good internal consistencies between the items with no significant differences between the PTGI-SF scores of the Malay and English versions.

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This is the first study to prospectively investigate the course of depression, anxiety and PTG and their correlations in head and neck cancer patients. The findings provided some insight to understand the various psychological responses across time in our effort to deliver a holistic approach of care. This preliminary study identified possible factors associated with PTG in head and neck cancer patients, and these provide a platform for future studies. As head and neck cancer has one of the longer survival rates, we recommend future studies to examine PTG across a longer duration to determine its stability and explore other confounding factors.

Conclusion and clinical implications

Posttraumatic growth, depression and anxiety reduced simultaneously across time in head and neck cancer patients, but no correlations were found between PTG with depression and anxiety. This study explored whether PTG had either a direct relationship or independent effect on depression and anxiety in head and neck cancer. This enhances our understanding of the interplay between positive and negative psychological responses in cancer patients over a period. In clinical practice, clearer understanding of the determinants of PTG will help in the development of psychosocial interventions that targeted on enhancing the predictive factors of PTG to bring about possible benefits to head and neck cancer, for example, better well-being of patients.

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Conflict of interest

The authors have declared no conflicts of interest.

Ethics approval

This study was approved by Ethics Committee of Universiti Kebangsaan Malaysia Medical Centre.

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