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The Research Progress on Post-Traumatic Growth in Family Caregivers of Patients with Malignant Bone Tumors

Yunchao Fan[1,a], Yao Zhang[2,b,*], Dandan Lu[1,c,*], Wanting Hao[2,d], Yuting Wu[1,e], Jinfeng Li[1,f]

[1]The School of Nursing, Shaanxi University of Chinese Medicine, Xianyang, China, 712046
[2]Military Medical Center, Xijing Hospital, Fourth Military Medical University, Xi'an, China, 710032
[a]2308073766@qq.com, [b]12409858@qq.com, [c]240330122@qq.com, [d]934412731@qq.com,
[e]484290293@qq.com, [f]1557067431@qq.com
**Corresponding author*

Abstract: *Post-traumatic growth refers to the positive psychological and behavioral changes that occur after an individual experiences a traumatic event. Enhancing post-traumatic growth in family caregivers of patients with malignant bone tumors not only improves their own mental health status, but also positively influences patients' psychological well-being and recovery outcomes. This article reviews the current status, influencing factors, and intervention strategies for post-traumatic growth among family caregivers of patients with malignant bone tumors. It aims to enhance healthcare professionals' attention to caregivers psychological well-being and to provide a reference for the subsequent development of related clinical research.*

Keywords: *Malignant Bone Tumors; Family Caregivers; Post-Traumatic Growth; Review*

1. Introduction

Bone tumors are a rare and heterogeneous group of neoplasms originating from bone and their appendant tissues, which are classified into benign and malignant types[1]. Malignant bone tumors account for approximately 0.2% of all bone neoplasms, and exhibit a bimodal age distribution, with peak incidence occurring in adolescence and older adulthood[2]. Due to their rapid progression, aggressive tissue destruction, and easy metastatic recurrence, these tumors result in high rates of disability and mortality, posing a severe threat to patients' lives and health[3]. The diagnosis and treatment of malignant bone tumors not only bring significant suffering to patients, but also inflict great psychological trauma on family caregivers. Family caregivers are individuals who provide long-term, unpaid care for patients, typically including intimate family members such as spouses, parents, or children. In the disease management of patients with malignant bone tumors, these caregivers assume multiple roles, including daily life care, emotional support, medical care, and playing a crucial role in the patient's recovery process. However, they often face multidimensional pressures, including physical, psychological, financial and caregiving burdens. These stressors not only exacerbate caregivers' negative emotions, but also further aggravate the degree of psychological trauma, while simultaneously negatively affecting patients' treatment adherence and rehabilitation outcomes[4]. Nevertheless, research indicates that individuals often experience negative emotions when facing traumatic events, but they may also undergo positive self-transformation—a phenomenon termed post-traumatic growth (PTG) by Tedeschi[5]. Facilitating PTG among family caregivers not only helps alleviate their negative emotions and enhance their personal strength, but also improves patients' quality of life. Therefore, this review examines malignant bone tumor patients' family caregivers from a positive psychology perspective, synthesizing the current status of post-traumatic growth, influencing factors and intervention strategies. The aims are to provide a reference for the subsequent more in-depth exploration of caregivers' positive psychology and to offer practical guidance for the development of scientific and personalized intervention programs.

2. Conceptual of Post-traumatic Growth

The term post-traumatic growth (PTG) was first coined by scholars Tedeschi and Calhoun in 1995 to describe psychological growth achieved through positive self-adjustment after an individual experiences stressful or traumatic events[6]. This concept is based on the theory of positive psychology, which emphasizes that individuals may not only recover to their original psychological state, but may also achieve a higher level of psychological development following trauma. PTG manifests in five core dimensions: new possibilities, relationships, personal strength, appreciation of life, and spiritual change[7]. Although traumatic events are often accompanied by painful experiences, they may also catalyze the reconstruction of self-perceptions and stimulate positive psychological changes through self-reflection and cognitive restructuring, thereby facilitating PTG[8]. For family caregivers, PTG specifically refers to the positive cognitive and behavioral transformations that occur during the caregiving process after the illness of a family member, achieving psychological growth and demonstrating resilience and self-renewal capabilities [9]. However, scholars such as Szcześniak M have argued that not all individuals exposed to trauma exhibit PTG[10]. Therefore, more attention should be paid to individual differences during research and clinical practice.

3. Assessment tools for posttraumatic growth

Current assessment methods for post-traumatic growth primarily include qualitative interviews and scale assessments. The former uses semi-structured questions to explore the psychological responses and growth experiences of participants after experiencing traumatic events. Scale assessments use validated instruments to evaluate personal growth. Commonly used PTG assessment scales include Post-Traumatic Growth Inventory (PTGI), Stress-Related Growth Scale (SRGS), Illness Cognition Questionnaire (ICQ), Perceived Benefit Scale (PBS), Benefit Finding Scale (BFS), and Revised Posttraumatic Growth Inventory for Children (PTGI-CR). Of these, the Chinese version of the PTGI, which was culturally adapted and revised by Wang et al[11] , has demonstrated good reliability and is the most widely used in China. However, existing instruments lack specificity for assessing post-traumatic growth in cancer caregivers. Future research should develop specific scales for assessing post-traumatic growth of cancer caregivers, incorporating China’s cultural context to meet the needs of further studies.

4. Status of post-traumatic growth among family caregivers of patients with malignant bone tumors

The experience of caring for family members with malignant bone tumors, such as confronting the diagnosis, involvement in treatment decisions, and providing daily care, can be physically and emotionally traumatizing for family caregivers, while simultaneously promoting self-growth. Research indicates that posttraumatic growth among family caregivers of malignant bone tumor patients is generally at a moderate level[12]. A study revealed that osteosarcoma patient caregivers had an average post-traumatic growth score of 62.92±16.46, with the lowest score on the dimension of “new possibilities”[13]. The same result was found in a study by Du.[12]. This may be because caregivers devote a great deal of time and energy to patient care, which may limit their own lives and recreational activities, thereby reducing motivation to pursue new things. Vaarwerk conducted interviews with parents of children with Ewing's sarcoma and rhabdomyosarcoma, and found that these parents demonstrated a certain degree of post-traumatic growth, which was reflected in improved caregiving ability, increased personal strength, positive reflections on life meaning, and enhanced interpersonal relationships[14].

However, substantial individual differences exist in cognitive appraisal and coping strategies when facing similar negative events, with a considerable proportion of caregivers whose physical and psychological conditions is not optimistic. Studies have shown that parents of pediatric and adolescent osteosarcoma patients exhibit significantly lower levels of post-traumatic growth compared to the patients, while concurrently displaying more severe posttraumatic stress disorder symptoms[15].Family caregivers of patients with malignant bone tumors experience multifaceted stressors that adversely affect their physical and mental health. These adverse effects include sleep disorders, fatigue, increased negative emotional distress, social withdrawal, and diminished quality of life[16]. Patients with malignant bone tumors require caregivers to provide both daily and medical care support, as well as emotional care. Importantly, caregivers' mental health status can significantly influence patients' outcomes. Therefore, paying attention to the development of post-traumatic growth of these caregivers not only improves their physical and mental health outcomes, but also enhances their ability to provide emotional support to patients, which is of great significance to patients’ therapeutic effects and recovery process.

5. Factors influencing post-traumatic growth among family caregivers of patients with malignant bone tumors

The PTG of family caregivers for patients with malignant bone tumors is mainly influenced by two factor categories: caregiver-related factors and patient-related factors.

5.1 Caregiver-related factors

5.1.1 Demographic factors

The PTG of family caregivers is influenced by factors such as gender, economic income, educational level, marital status and personality traits. Lu Jingjing [17] found that female caregivers account for approximately 47% to 80% of the caregiving population, and face significantly higher caregiving difficulties than male caregivers. They are also more susceptible to negative emotions, which can hinder the realization of PTG. A cross-sectional study by Ying Xiao [18] showed that caregivers with higher educational levels usually have relatively stable incomes, experience lower financial burdens from medical expenses, and possess stronger problem-solving skills and psychological resilience, making it easier for them to achieve positive psychological and behavioral changes. Marital status is another key factor. Moore et al. [19] believe that a stable marital status can promote PTG, likely due to spousal support, higher household well-being, and adequate intra-familial support, all of which help to reduce the caregiver's stress and create favorable conditions for the acquisition of PTG. In addition, personality traits are independent influences on PTG. Study indicates [13] that caregivers with open personalities tend to engage in positive reflection, change their thoughts to adapt to the environment, and analyze problems from multiple perspectives. Therefore, they are able to adjust their mindset more quickly and experience greater positive growth.

5.1.2 Rumination

Rumination is a cognitive processing mechanism triggered by traumatic events, comprising intrusive rumination and purposeful rumination. The former is the individual's negative and avoidant thinking about traumatic events, whereas the latter refers to an actively and purposefully revisiting events[20]. According to the post-traumatic growth theoretical model, purposeful rumination serves as a key factor in facilitating personal growth[21]. Studies have demonstrated that caregivers' purposeful rumination is closely related to PTG. When caregivers engage in purposeful rumination, they actively reflect on the traumatic event of their family member's cancer, change their cognitive appraisals, and actively seek personal benefits from the experience. This rumination enables them to derive positive meaning from the trauma and adjust their psychological states, thereby facilitating PTG [22].

5.1.3 Social support

Social support has been shown to be one of the important predictors of PTG. Adequate social support serves as both a protective buffer and a psychological resource for caregivers[23]. A study on parents of children with malignant bone tumors found that parents with higher levels of social support were more willing to actively express needs and seek assistance. This enhanced their psychological security and sense of belonging, thereby facilitating positive psychological growth[24]. Nouzari [25] demonstrated that sufficient social support not only effectively alleviates caregivers' negative emotions such as anxiety and depression, but also prompts them to take a new perspective on the problems. These supported caregivers tend to use positive coping strategies and take the initiative to provide assistance to others, thereby promoting the stabilization of family relationships and establishing intimate interpersonal relationships, ultimately generating more post-traumatic growth experiences.

5.1.4 Coping strategy

Coping strategies refer to the cognitive and behavioral approaches individuals adopt when confronting stressful events. Yonemoto [15] investigated parents of children with osteosarcoma and found that adopting positive coping strategies helped them to re-establish a positive view of the disease, enabling parents to face their child's condition realistically while taking the initiative to make self-adjustments, ultimately achieving a positive change in mindset. Luan Beibei [26] demonstrated a positive correlation between caregivers' positive coping strategies and PTG, indicating that caregivers who predominantly employ active coping strategies exhibit higher levels of PTG, increased self-efficacy, and report more positive psychological experiences. Furthermore, in families where spouses serve as primary caregivers, the patient and the spouse interact with each other through dyadic coping. The spouse's coping capacity and emotional state not only affect their own physical and psychological health, but also directly influence the patient's health outcomes and rehabilitation efficacy [27].

5.1.5 Caregiver burden

During a patient's treatment course, caregivers are required to provide comprehensive support including physical, psychological, daily living, and financial aspects. However, this period often presents challenges such as role adaptation difficulties and limited caregiving capacity, which may increase caregiver stress and burden, consequently hindering the development of PTG. Research shows that caregivers assuming multiple roles experience heightened perceived stress and increased caregiving burden, resulting in diminished PTG levels and a serious impact on the quality of life[28]. Mollaei et al.[29] found that caregivers with substantial burden are less psychologically resilient due to chronic high-pressure exposure, coupled with inadequate self-care awareness and capacities, making positive psychological transformation difficult to achieve.

5.2 Patient-related factors

5.2.1 Psychological status

During the cancer diagnosis and treatment phase, patients' psychological changes and emotional states can also significantly influence their caregivers. Japanese researchers[15] found that osteosarcoma patients with high levels of PTG could positively affect the caregivers' emotions through their optimistic attitudes, thereby promoting positive psychological changes in caregivers and enhancing their confidence and motivation to cope with the caregiving challenges. Gianinazzi [30] demonstrated a positive correlation between PTG levels in parents of pediatric cancer patients and the growth levels of their children. This phenomenon may arise from the joint confrontation of the disease by both parents and child, not only mutually supporting each other through suffering, but also sharing growth experiences. These findings suggest that positive interaction patterns between caregivers and patients play a crucial role in enhancing the coping ability and improving the psychological well-being of both parties.

5.2.2 Disease state

The level of PTG in family caregivers is also associated with disease duration and tumor site of patients. Research indicates that the prolongation of patients' disease duration enable caregivers to enhance their trauma coping ability through psychological adaptation and resource integration during the long-term caregiving process[18]. Tu [13] conducted an investigation of osteosarcoma patient caregivers found that lower limb patients, due to poorer self-care compared to upper-limb patients, require caregivers to devote more time and effort to daily living assistance. When confronting various caregiving challenges, caregivers thought more deeply about life meaning and personal value, demonstrated greater personal strength and showed more pronounced PTG than caregivers of upper limbs patients.

6. Interventions for post-traumatic growth in family caregivers of malignant bone tumors patients

6.1 Psychological interventions

The sudden onset of illness in family members, the lengthy treatment process, and prognostic uncertainty often plunge caregivers into negative emotional states such as anxiety, depression and uncertainty, posing significant threats to their psychological well-being. Consequently, psychological support is crucial for family caregivers of malignant bone tumors patients. Kubo [31]and others implemented an 8-week mindfulness intervention for cancer caregivers, demonstrating significant improvements in caregivers' PTG levels, overall well-being and quality of life. Shakiba [32]conducted a cognitive-emotional training for mothers of pediatric cancer patients in three areas: knowledge, emotion, and behavior. This problem-oriented, multidimensional intervention strategy helped mothers to better adapt to the challenges posed by their children's illnesses, fostered positive psychological changes, and effectively alleviated posttraumatic stress disorder symptoms. Additionally, psychologists Jourard [33] developed a psychological intervention model termed self- disclosure intervention, which involves individuals verbally or in writing in expressing the impacts of traumatic events and inner feelings. Self-disclosure has been proven to be an important intervention for maintaining psychological health in post-traumatic populations. Harvey [34]conducted a randomized controlled trial among cancer patients caregivers, demonstrating that participants engaged in written emotional disclosure exhibited significant reductions in stress levels and depressive symptoms. Notably, caregivers with higher levels of depression access more external resources for coping with negative emotions and gained greater benefits from emotional disclosure. Therefore, healthcare professionals should pay particular attention to the mental health of family caregivers for malignant bone tumors patients, and provid personalized psychological interventions in a timely manner according to caregivers' specific circumstances, facilitating positive psychological transformation, enhancing coping capacity, and promoting personal growth.

6.2 Digital interventions

With the rapid advancement of digital technology, digital interventions have been widely used in the field of psycho-oncology and have achieved promising outcomes. Matthys [35]conducted a web-based self-management program for advanced cancer patients and their family caregivers. The intervention consisted of four online meetings and interactive exercises. The web-based system automatically assessed participants' needs and problems based on their interactions, subsequently providing personalized educational content alongside information support and psychological counseling. This intervention effectively alleviated caregivers' psychological distress, enhanced their self-efficacy, and promoted a more positive coping attitude. Augmented reality (AR) technology has been applied in family-centered cancer supportive care, enabling healthcare professionals to monitor and evaluate patients' conditions more effectively while strengthening communication between caregivers and healthcare professionals. The real-time feedback function offers timely guidance, improving the accuracy and compliance of caregiving behaviors. Thus, caregivers experience increased confidence, alleviated negative emotions and stress, and improved psychological status during long-term care[36]. Digital interventions play a positive role in improving the mental well-being of both caregivers and patients, receiving high satisfaction and acceptance rates. In addition, their flexibility and accessibility overcome time and geography barriers, expanding intervention coverage while reducing medical costs and alleviating the financial burden on patients' families.

6.3 Social support interventions

Social support therapy refers to interventions aimed at increasing an individual's perceived level of social support or enhancing their social support network, including individual and group-based formats, which have been shown to improve caregivers' social support and facilitate PTG. Xie [37] found that group-based psychological interventions not only foster cooperation and communication among caregivers, expanding their interpersonal relationships, but also effectively elevate their social support and hope levels, help caregivers build confidence in life and reduce negative emotions. Dockham [38]implemented the FOCUS program through the Cancer Support Community (CSC) for cancer patients and their caregivers. This intervention took the form of group sessions on family engagement, optimism cultivation, coping efficacy enhancement, uncertainty reduction, and symptom management. The results demonstrated that the emotional and informational support provided through this intervention significantly increased caregivers' benefit-finding, self-efficacy, and quality-of-life. Social support interventions facilitate mutual assistance and help among caregivers through diverse interactive activities, yielding good psychosocial benefits. However, research has found that cancer patients and their caregivers desire more information and support and healthcare professionals cannot adequately address their psychosocial demands[39]. Therefore, healthcare professionals should establish dedicated support platforms for caregivers of patients with malignant bone tumors to foster peer support among caregivers, as well as to help and guide caregivers to effectively utilize social resources, so as to enhance caregivers' social support networks, reduce adverse emotions, and stimulate more positive attitudes and resilience.

6.4 Comprehensive interventions

Ho et al.[40]developed Family Dignity Intervention (FDI), which is based on dignity therapy and integrated with Asian cancer families' unique understanding of and needs regarding dignity issues. This family-based psychosocial-spiritual intervention aims to build a communication bridge between caregivers and patients, to guide caregivers to look at the problem from the patient's point of view, and to strengthen their family responsibility. The intervention enhances caregivers' self- worth and sense of dignity, thus improving caregiving motivation and confidence, while also creating a harmonious family environment. The study of Li [41]found that implementing FDI alongside routine care stimulated positive emotions in caregivers, including enhanced self-confidence, satisfaction, and well-being. This intervention not only promoted caregivers' PTG but also alleviated their caregiving burden. Furthermore, Chen [42]suggested improving the healthcare consortium model to strengthen cooperation among hospitals, communities and families. They advocated for implementing family-centered continuous care services, arguing that these multi-party collaborative interventions can provide more resources and support for caregivers, which could alleviate their caregiving burden and improve motivation for caregiving.

7. Conclusions

The PTG of family caregivers for patients with malignant bone tumors still has significant room for improvement. Promoting PTG in caregivers not only mitigates negative psychological impacts and improves caregiving ability, but also contributes to improving the quality of patients' survival and facilitates disease recovery, yielding great significance for both caregivers and patients. However, current research in China has paid limited attention to the post-traumatic growth of family caregivers for patients with malignant bone tumors, indicating a need for strengthening the research formats and targeted interventions. Future research can be conducted based on the PTG theory model, employing longitudinal and qualitative studies. This would enrich the research forms and explore more deeply the changes in the level of post-traumatic growth, psychological experiences, and needs of family caregivers of patients with malignant bone tumors at different stages, so that more effective and scientific nursing intervention strategies can be formulated to enhance the psychological health status of caregivers.

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