# Posttraumatic stress symptoms, depression, family functioning and children's pain in families of children with cancer: a cross-sectional study in south China

Yiling Yang<sup>1</sup>, Xiangyi Tan<sup>1</sup>, Ruiqing Cai<sup>2</sup>, Ping Zhang<sup>3</sup>, Yanqun Hu<sup>4</sup>, Jiangnan Meng<sup>3</sup>, Jinlu Chen<sup>5</sup>, and lei shi<sup>1</sup>

<sup>1</sup>Southern Medical University <sup>2</sup>Sun Yet-Sen University Cancer Center <sup>3</sup>Southern Medical University Nanfang Hospital <sup>4</sup>Zhujiang Hospital <sup>5</sup>Guangzhou Women and Children's Medical Center

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### Abstract

Objective: This study aimed to compare posttraumatic stress symptoms (PTSS), depression and family functioning between families of children with cancer and families of healthy children, examine the relationships among children's PTSS, parents' PTSS and depression, and family functioning, and explore the effect of disease experience on PTSS and the association between pain and PTSS in children with cancer. Methods: Participants were children with cancer (n=91) and their parents (n=91), and healthy children (n=114) and their parents (n=96). The children were asked to self-report PTSS and self-rate their pain degree, and the parents completed self-reported measures of PTSS, depression, and general family functioning. Results: The prevalence of severe PTSS in parents of children with cancer (21.98%) was significantly higher than that in parents of healthy children (1.04%). No significant difference was found in the total PTSS scores between children with cancer and healthy children. The children's PTSS was positively correlated with their parents' PTSS and depression in cancer group but not in the control group. Family functioning affected children's PTSS in both families of children with cancer and healthy families. In children with cancer, PTSS was positively correlated with pain during cancer treatment but not correlated with disease experience. Conclusions: Children with cancer perceive the fear of pain during cancer treatment, whilst their parents experience more psychological trauma. Apart from cancer treatment, attention should also be given to pain management in children with cancer and the mental health of the entire family.

# **KEYWORDS**

Cancer, Pain, Parents, Pediatrics, Prevalence, Psychological Trauma

# BACKGROUND

Pediatric cancer is a potentially life-threatening disease that severely affects the functioning of the entire family system<sup>1</sup>. Invasive procedures and painful adverse effects of the treatment increase the risk of psychological distress in children with cancer. The parents providing care for the children also feel both physically and mentally stressed, which reduces their capability to cope with new stress and may persist in their later lives<sup>2</sup>. Children depend on their parents for both physical and emotional needs, and impaired mental health of their parents can have a negative impact on their psychological growth and physical recovery<sup>2</sup>. Currently studies remain scarce that examine the psychological distress in families of children with cancer in China.

A previous study showed that posttraumatic stress symptoms (PTSS) were common among the parents participating in the caring of children with ongoing treatment for cancer<sup>4</sup>. A theoretical model demonstrated that PTSS of parents could affect PTSS levels in their children with cancer<sup>5</sup>. During cancer treatment, some families experience lasting damages of daily function, strained relationships and demands on family resources, which result in frequently disrupted family functioning<sup>6</sup>. Positive family functioning can protect children with cancer from developing PTSS<sup>7</sup>. About half of the individuals with posttraumatic stress disorder (PTSD) have concurrent major depressive disorder<sup>8</sup>. So far consistent findings have not been available regarding the prevalence of PTSD and depression in children with cancer and their parents. While some studies suggested that PTSD and depression occurred in around 30% in children with cancer and their parents<sup>7,9,10</sup>, other studies reported no elevated PTSD rates or PTSS levels in either the pediatric cancer patients<sup>11-16</sup> or their parents<sup>17,18</sup> compared to healthy controls.

Understanding the impact of disease experience on PTSS in children with cancer may help in high risk screening for psychological stress. In children and adolescents with chronic physical illness, the association of the level of PTSS with the disease severity, duration of treatment and disease course remains elusive<sup>19,20</sup> and needs to be defined. In addition to the psychological distress, pain is also one of the common symptoms of childhood cancer<sup>21,22</sup>, but currently how the fear of cancer pain contributes to the development of psychological trauma has not been fully explored.

The purpose of this study was to analyze the correlations among PTSS, depression and family functioning in families of children with cancer in comparison with healthy families, and explore the impact of disease experience on PTSS and the association between pain and PTSS in children with cancer. We hypothesized that (i) both parents and children in families of children with cancer had higher levels of psychological trauma than those in healthy families; (ii) the parents' PTSS and depression and family functioning were closely related to PTSS in the children; and (iii) disease experience could affect PTSS, and pain intensity was positively correlated with PTSS in children with cancer.

### METHODS

### Study design

This multi-centered cross-sectional study was approved by the Medical Ethics Committee of Nanfang Hospital, Southern Medical University. All the participants provided written informed consent, were fully informed of the purpose and protocol of the study, and participated in the study on a voluntary and anonymous basis. All the data collected from the participants were kept confidential to protect their privacy.

# **Participants**

The children receiving active treatment for different types of cancer and their parents were recruited from the Department of Pediatrics of 4 general hospitals in Guangzhou, namely Pediatric Malignant Tumor Medical Centers in South China (the First Affiliated Hospital of Sun Yat-sen University), Sun Yat-sen University Cancer Center, Nanfang Hospital (Affiliated to Southern Medical University, Guangzhou, China) and Zhujiang Hospital (Affiliated to Southern Medical University). The eligible participants were between 6 and 18 years of age, had a diagnosis of cancer at least 1 month prior to the enrollment (including both newly diagnosed and recurrent cases), and had no significant cognitive or sensory deficits. Children who reported domestic violence or sexual abuse or were in a critical condition were excluded. One of the parents (father or mother) of a recruited child was invited to participate in the study, and was excluded if they had records of domestic violence or sexual abuse or had ongoing treatment for depression.

The control group consists of healthy children and their parents recruited from a public primary school in Tianhe District of Guangzhou. Specifically, one class was randomly selected from each of the fourth, fifth and sixth grades using the method of pure random numbers, and all the students in the selected class were investigated. The students who reported domestic violence or sexual abuse or had a history of serious illness were excluded. The parents of the students were selected based on the same inclusion and exclusion criteria for parents of children with cancer.

### Procedure

The investigation was conducted on a voluntary, confidential, and anonymous basis, and the participants could withdraw at any time during the study. In each of the 4 hospitals, two specially trained nurses were appointed to conduct face-to-face investigations of the participants. The questionnaires were completed by the participants in a quiet and private room. For children with difficulties in reading or comprehension, the investigators assisted them to complete the questionnaire on the basis that they fully understood the content and made their own decisions for each item. Before collection of the questionnaires, the participants were asked to re-check for omissions.

# Assessment of PTSS, pain, depression and family functioning

We assessed the Children's PTSS using the Chinese version of the 22-item self-report University of California at Los Angeles PTSD Reaction Index for DSM-IV (PTSDI)<sup>23</sup>, which is designed to assess PTSS in children and adolescents aged 6-18 years. The children rated their response to the medical treatment they had received in the last month on a 5-point scale from 0 (never before) to 4 (most of the time). The total score ranges from 0 to 88, with a higher total score indicating a greater symptom severity. A value of 38 or above on the full scale suggests a high sensitivity and specificity of PTSD diagnosis. In this study, Cronbach's  $\alpha$  was 0.892 for the overall scale.

Cancer pain in the children was assessed using the Visual Analog Scale (VAS). The child marked a point on a 10-cm-long line with the two ends representing "no pain" and "unbearable pain" according to the pain severity he or she felt at that time. The length of the straight line from the starting point to the mark was measured to represent the pain severity. Study has shown that VAS is reliable and reproducible for assessing pain in children<sup>24</sup>.

We measured PTSS in the enrolled parents using the Chinese version of the 17-item self-report Post-Traumatic Stress Checklist-Civilian Version (PCL-C)<sup>25</sup>. For each item, a 5-point scale from 1 (not at all) to 5 (extremely) was rated by the parents based on how much they endorsed PTSS when experiencing and witnessing their children's illness and treatment in the last month. The total score ranges from 17 to 85, with a score of 38-49 suggesting mild to moderate PTSS, a score above 50 indicating severe PTSS and possible diagnosis of PTSD. In this study, Cronbach's  $\alpha$  was 0.932 for the total scale.

The depression symptoms of the parents were evaluated using the Patient Health Questionnaire Depression Scale (PHQ-9), which is a 9-item scale for simple and effective depression screening and diagnosis<sup>26</sup>. According to how they felt in the past week, the parents rated on a 4-point scale from 0 (not true at all) to 3 (almost every day). The total score ranges from 0 to 27, and a higher score suggesting greater severity of depression. In this study, Cronbach's  $\alpha$  of the total scale was 0.908.

The family functioning was assessed using the 12-item General Functioning Sub-scale of McMaster Family Assessment Device (GF-FAD), which is a simplified version of FAD<sup>27</sup>. A 4-point scale from 1 (strongly agree) to 4 (strongly disagree) was used to rate how well each statement matched the circumstances of the family. The total score ranges from 12 to 48, with a higher score indicating a poorer family functioning. In this study, Cronbach's  $\alpha$  of the total scale was 0.70.

#### Data analysis

After completion of the investigation, the integrity and authenticity of the data were checked on the spot, the unqualified questionnaire (missing items, answers appeared in a certain pattern, two or more options were selected) was screened, and 50% of the collected questionnaires were randomly selected to verify the authenticity of the indicators. Data is checked and entered by two people on two machines. SPSS for Windows (Ver.20.0 IBM, New York, USA) were used to analyze the data. The demographic and clinical data of the parents and the children were presented as means with standard deviations (SDs), frequency or composition ratio. T test and chi-square test were performed to examine the differences between gender and among different age groups. Pearson's Chi-square test was used to compare the prevalence of PTSS in parents and children. Independent-sample t test was used to compare the total score of PCL-C, PTSDI, depression, and family functioning. Pearson correlation coefficient was calculated to measure the correlations among the total PCL-C score, depression, family functioning, PTSDI score and VAS score. Independent-sample t test and one-way analysis of variance (ANOVA) were used to examine differences in PTSDI scores among children with cancer with different disease experiences. A P value less than 0.05 was considered to indicate a statistical significance.

# RESULTS

### Participant characteristics

A total of 120 cancer child-parent questionnaires and 120 healthy child-parent questionnaires were issued. The number of valid questionnaires recovered in cancer group is 91 (75.8%), and 96 (80%) for parents and 114 (95%) for children in control group. Some participants did not complete the questionnaire due to changes of the children's condition, limited time, scheduling difficulties, or no interest about the research. Participants who failed to provide complete data were also excluded from the analysis. Table 1 displays the medical and demographic information for the cancer and healthy control groups. There was no significant difference in parents' ( $\chi 2=1.08$ , P=0.337;t=-0.69, P=0.49) and children's ( $\chi 2=3.274$ , P=0.07; t=0.169, P=0.866) gender or age between the two groups.

# Comparison of psychological status between families of children with cancer and healthy children

The prevalence of PTSS in children with cancer was 8.79%, significantly higher than that in healthy children  $(0.88\%; \chi^2 = 7.55, P < 0.01)$ . But there was no significant difference in the total score of PTSDI between children with cancer and healthy children (t = 1.13, P = 0.259).

The prevalence of severe PTSS was significantly higher among parents of children with cancer than those of healthy children (21.98% vs1.04%;  $\chi^2 = 44.04$ , P < 0.001). Figure 1 shows the distribution of PTSS severity in the two groups. As shown in Table 2, the scores of PCL-C, depression, and general family function were significantly higher in parents of children with cancer than those of healthy children (t = 8.96, P < 0.001).

### Correlations between parents' PTSS, depression, family function and children's PTSS

Table 3 shows that more severe PTSS and depression of the parents and a poorer general family function were associated with a higher likelihood of PTSS in the children with cancer (r = 0.317, P < 0.01; r = 0.504, P < 0.01; and r = 0.207, P < 0.05, respectively). Among the parents, the severity of PTSS was positively correlated with depression (r = 0.786, P < 0.01) and family functioning (r = 0.266, P < 0.05).

In the control group, in contrast to the cancer group, parental PTSS (r = 0.152, P > 0.05) or depression (r = 0.170, P > 0.05) was not found to significantly correlate with PTSS in the children. But similar to the cancer group, the general family function score was positively correlated with PTSS in children (r = 0.303, P < 0.01), and parental PTSS was positively correlated with depression (r = 0.636, P < 0.01) and general family function (r = 0.233, P < 0.05).

# Effects of disease experience on PTSS and correlations between pain and PTSS in children with cancer

We compared PTSDI scores between children with cancer who reported a history of serious illness, critical conditions, ICU admission, infections, blood transfusion, and other diseases with those who had no such history, and found no significant differences between the two groups (P > 0.05). We also compared PTSDI scores among children with different lengths of time after cancer diagnosis (<6 months, 6-12 months, and >12 months), and found no significant difference among the 3 groups (P > 0.05). The PTSDI scores did not differ significantly between patients with disease relapse and the newly diagnosed patients (P > 0.05). The VAS score in children with cancer ( $3.45\pm2.66$ ) was positively correlated with their PTSDI score (r = 0.424, P < 0.001).

### DISCUSSION

As consistent with previous studies<sup>11-13</sup>, we found that the parents of children with cancer endorsed PTSS more than the parents of healthy children. In the parents of children with cancer, the prevalence of severe PTSS (21.98%) in this study is comparable with that of PTSD (22%) at 4 months after the children's diagnosis<sup>28</sup>, but higher than that of PTSD (17%) at 12 months or later after the diagnoses using the same scales with the same cutoff score of  $50^{29}$ . This discrepancy may arise from the different lengths of time after cancer diagnosis, as the parents are particularly at risk for PTSS in the first year of their children's cancer diagnosis<sup>29</sup>. We noted that the parents of children with cancer reported more severe depression and poorer general family functioning than those of healthy children, which is consistent with previous findings<sup>31,32</sup>. A previous study found that more than 90% of families of children with cancer reported unhealthy functioning in all dimensions of FAD, with the general family function rated as the unhealthiest<sup>33</sup>. Caring for a child with cancer may trigger depression in the parents, which leads to ill family functioning.

Our results suggested that children with cancer had no elevated levels of PTSS relative to healthy children of a similar age, in contrast with the result of a previous study that reported psychological trauma resulting from childhood cancer<sup>7</sup>. But our results are supported by other studies that have included healthy controls<sup>11-16</sup>, suggesting that posttraumatic stress is less applicable in the context of psychological responses of children with ongoing cancer treatment, and being diagnosed with pediatric cancer might be considered more as a difficult but manageable stressor than a major traumatic event<sup>34</sup>. Children are too young to feel the psychological stress of cancer, while their parents may experience more psychological trauma and are at higher risks of developing severe PTSS.

In pediatric cancer families, parents' PTSS and depression were correlated with children's PTSS, which is supported by findings in pediatric oncology population<sup>5,35</sup>. However, this correlation does not exist in healthy families, possibly due to the fact that cancer families share the same stressful experience following a cancer diagnosis and during the treatment. The long and painful process of cancer treatment binds the entire family emotionally. We also found that PTSS in the parents of children with cancer was related to their depression and general family functioning, which is consistent with previous studies<sup>29,36</sup>. Poor family functioning often produces an adverse impact on the parents' psychology, and PTSS is associated with an increased risk of depression in the parents. The children's PTSS is correlated with family functioning, which underlines the importance of supporting the whole family system in the event of pediatric cancer diagnosis.

We did not find significant correlation between PTSS and disease experience in the children with cancer. Currently no relevant studies that examine the variables of disease experience have been available, and the impact of disease experience on PTSS in children with cancer still awaits further investigation by studies with larger sample sizes. In children with cancer, the severity of PTSS is reported to be independent of the treatment responses or the length of time after diagnosis<sup>19</sup>. PTSS is associated more with such personality factors and traits as adaptive style, rather than the history of health conditions<sup>14</sup>. Presumably, the disease experience increases the vulnerability of the children to life challenges instead of directly leading to PTSS.

Pain reported by children with cancer is related to PTSS<sup>37</sup>, but the nature of this relationship remains unclear. Children normally do not fully understand the significance of a cancer diagnosis, but the pain caused by cancer treatment has an intuitive psychological impact. Children are more sensitive to the feeling of pain than to the disease experience of cancer, suggesting the importance of effective pain management in order to alleviate the traumatic experiences. Patient-controlled analgesia or authorized agent-controlled analgesia is safe, timely, and acceptable to children, which can achieve the best balance between effective pain management and adverse reactions<sup>38</sup>.

### Study limitations

Some limitations to this study should be noted. First, this cross-sectional study does not support a conclusion of causality, which shall be explored by future studies of a longitudinal design at the family system level; nor is it impossible to determine the directionality of the relationship among children's PTSS, parents' PTSS and depression, and family functioning. Second, only self-reported screening tools were used in this study to measure PTSS. Nevertheless, the purpose of this study is to screen PTSS and determine the severity of PTSS,

and the measurement tools have good reliability and validity. Finally, less than 80% of valid questionnaires were recovered in cancer group, indicating that families of children with cancer did not have time to care for anything other than the treatment of the child, and that this group urgently needed adequate psychosocial support.

### Clinical implications

Pain caused by treatment is closely related to psychological trauma of children with cancer. Effective pain management and relieving the physical and psychological symptoms will help to improve children's quality of life. The mental health of the parents directly affects the children's mental health and the general family functioning. Early detection of the psychological trauma of the parents and timely interventions can have a far-reaching positive impact on the prognosis of the children. Application of the techniques from the cognitive-behavioral theoretical framework is recommended for the family members of children with cancer<sup>39</sup>. For parents of children with ongoing cancer treatment, intervention with Internet-based guided self-help following the principles of cognitive behavior therapy has shown promising effects for relieving PTSS and related symptoms<sup>40</sup>.

### Conclusions

The parents of children with cancer have more severe PTSS and depression than the parents of healthy children, but the children with cancer and healthy children have comparable PTSS level. Disease experience of the children with cancer does not obviously affect the development of PTSS, while pain experienced during cancer treatment may trigger PTSS. The parents' PTSS and depression, family functioning and children's PTSS are closely related in families of children with cancer. Supportive psychological intervention is strongly recommended for families of children with cancer.

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# CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

# DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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children with cancer and parents of healthy children