RESEARCH ARTICLE

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Predictors of Post-traumatic Stress Symptoms (PTSS), Depression, and Anxiety among Caregivers of Children with Acute Lymphoblastic Leukaemia (ALL)

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Abstract

Objective: The caregivers of children diagnosed with acute lymphoblastic leukaemia (ALL) are believed to experience post-traumatic stress symptoms (PTSS), depression and anxiety. This present study endeavoured to explore the prevalence and predictors of PTSS, depression, and anxiety among the caregivers of children with ALL. **Methods:** Purposive sampling was used to select the 73 caregivers of children with ALL who participated in this cross-sectional study. The Post-traumatic Stress Disorder Checklist for DSM-5 (PCL-5), Beck Depression Inventory (BDI), and Beck Anxiety Inventory (BAI) were used to measure psychological distress. **Result:** There was a low prevalence (11%) of post-traumatic stress disorder (PTSD) among the participants. Although all the criteria for PTSD were not met, a few post-traumatic symptoms remained, suggesting that PTSS was likely present. Most of the participants reported minimal symptoms of depression (79.5%) and anxiety (65.8%). Anxiety, depression, and ethnicity predicted the PTSS scores (R^2 = .77, p =.000). Subsequently, depression predicted the PTSS scores (R^2 = 0.42, p =0.000). Participants of 'Other' or 'Indigenous' ethnicity had lower PTSS scores and higher anxiety scores (R^2 = 0.75, p =0.000) than participants of Malay ethnicity. **Conclusion:** The caregivers of children with ALL experience post-traumatic stress symptoms (PTSS), depression, and anxiety. These variables co-exist and may have different trajectories in different ethnic groups. Therefore, healthcare providers should take ethnicity and psychological distress into consideration when providing paediatric oncology treatment and care.

Keywords: Caregiver- cancer- stress- depression- anxiety

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Introduction

Due to their duties as caregivers and illness-related stressors, caregivers are vulnerable to financial, physical, and psychosocial concerns throughout the course of a cancer diagnosis (Koch and Jones, 2018). There is growing evidence that the caregivers of children with cancer experience post-traumatic stress symptoms (PTSS); which is a sub-threshold of post-traumatic stress disorder (PTSD) (Carmassi et al., 2020; Carmassi et al., 2020). The symptoms of post-traumatic stress include intrusive memories of the child's diagnosis or treatment, intense physiological reactions to illness-related reminders, and avoiding thoughts about cancer and its treatment (Tremolada et al., 2016). Although PTSS can be triggered at any point throughout the course of an illness, the caregivers of children with cancer experience higher levels of PTSS in the initial stages of the diagnosis (Katz et al., 2018).

Depression is also common among the caregivers of children with chronic illnesses. There is an increasing trend of depression among caregivers (Yamazaki et al., 2005). This may be attributed to negative representations of the illness, where the negative perceptions that the caregivers have of the illness as well as the pressures of managing their child's illness result in higher levels of depressive symptoms (Bozo et al., 2010). Age is also an important factor as depression is significantly more prevalent among younger caregivers (Lutfi and Al Lami, 2019).

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Caregivers also have relatively higher levels of anxiety than their children with cancer (Peterson et al., 2020). Caregivers experience higher levels of anxiety due to the challenges, suffering, expectations, and uncertainty over the treatment outcomes of a disease (Kazak et al., 2004). Regardless of the reality, the threat that the caregiver perceives to their child's mortality is extremely stressful and accompanied by high levels of anxiety (Alves et al., 2013). Another study has also reported a similar trend of psychological distress; especially with regard to PTSS; depression and anxiety among caregivers (Katz et al., 2018).

Factors such as socio-economic status, marital status, duration of care, education level, and religion significantly affect the psychological distress that the caregivers of children with leukaemia or chronic diseases experience (Cresswell et al., 2014; Granek et al., 2014; Kim et al., 2018; Gardner et al., 2017; Böell et al., 2016). As caregivers play a primary role in every aspect of their child's treatment, it is critical to address their psychological distress; especially because the psychological strain that they experience may affect the patient's outcomes in the long term (Northouse et al., 2001). According to Kazak et al. (2004), PTSS may compromise the ability of caregivers to adhere to medical guidelines. Furthermore, PTSS and symptoms of depression may prevent caregivers from communicating effective with their child's healthcare providers (Kazak et al., 2004; Fagnano et al., 2012). Psychological distress also affects how caregivers respond to their child, especially when the child is in pain, which in turn affects the child's own experiences with pain (Simons et al., 2016). Maternal depression has also been found to significantly affect a child's adherence to a treatment plan (Haverman et al., 2016).

As these factors significantly affect treatment outcomes, it is important to explore the prevalence and predictors of PTSS, anxiety, and depression among Malaysian caregivers of children with ALL. The findings of this present study may provide a better understanding of the psychological distress that caregivers experience, which will in turn provide a better understanding of the treatment outcomes, disease management methodologies, and future psychosocial interventions that are required to develop a more holistic treatment plan for paediatric oncology.

Materials and Methods

Design and participants

A cross-sectional research design and purposive sampling was used to recruit 73 caregivers of children aged zero to 18 years who had been diagnosed with acute lymphoblastic leukaemia (ALL) at least six months prior to recruitment. The caregivers of children who were in hospice care were excluded from this present study to minimise potentially confounding factors as patients in hospice care often have more unpleasant experiences and caregivers often experience a sense of fear and helplessness (Weathers et al., 2013). G*Power 3.0 with priori assumptions at a significance level of a = 0.05, power level of 0.80, and effect size of d = 0.92 was used to determine the sample size (Ljungman et al., 2018). The effect size of 0.1746 was obtained from an extant study (Cohen, 1988), resulting in a total of 56 participants. The final sample size was 70 participants when a dropout rate of 20% was included (Wood et al., 2004; Sakpal, 2010).

Instruments

The Post-traumatic Stress Disorder Checklist for DSM-5 (PCL-5; Weather et al., 2013) is a 20-item self-reporting questionnaire (SRQ) that uses a 5-point Likert scale to assess PTSD symptoms. The probability of PTSD is indicated by a recommended cut-off score of 31 to 33 (Orovou et al., 2021). The PCL-5 has an excellent internal consistency (0.94), test-retest reliability (0.82), convergent validity with other PTSD assessments (0.74 to 0.85), and discriminant validity (0.31 to 0.60) as well as moderately correlates to related constructs, such as depression, and poorly correlates to unrelated constructs, such as mania (Blevis et al., 2015). The Malay language version of the PCL-5 (MPCL-5) has good internal consistency (0.89), inter-rater reliability (0.81), and convergent validity (0.67) with the Clinician-Administered PTSD Scale for DSM-5 (CAPS-5) (Bahari et al., 2019).

The Beck Depression Inventory (BDI; Beck and Steer, 1986) is a 21-item SRQ that uses a 4-point Likert scale to assess the severity of depressive symptoms. The total score ranges between 0 to 63 and includes classifications of minimal (0-9), mild (10-15), moderate (16-23), or severe (24-63) depressive symptoms. It has good internal consistency, with an alpha (α) mean of 0.87 (Beck et al., 1988). Its convergent validity coefficient ranges between 0.58 to 0.79 with other SRQ instruments while its discriminant validity is poor and ranges between 0.59 to 0.99 with the State Trait Anxiety Inventory (STAI), which could be due to the overlap between the symptoms of depression and anxiety (Richter et al., 1998). The Malay language version of the BDI (BDI-Malay) is acceptable and has a Cronbach's alpha coefficient (α) that ranges between 0.71 to 0.91. It also has good concurrent validity (0.84) with the Dysfunctional Attitude Scale (DAS-Malay) and good discriminant validity with clinical and non-clinical cases (Muhktar and Oei, 2008).

Meanwhile, the Beck Anxiety Inventory (BAI; Beck et al., 1988) is a 21-item SRQ that uses a 4-point Likert scale to assess common symptoms of anxiety. The total score ranges between 0 to 63 and includes classifications of minimal (0-7), mild (8-15), moderate (16-25), or severe (26-63) anxiety. It has excellent internal consistency (0.92) (Beck et al., 1988) and its convergent validity (0.54) with the Anxiety Diary is higher than that of the Depression Diary, which reflects the discriminant validity of the measurement instrument (Fydrich et al., 1992). The Malay language version of the BAI is acceptable and has an α of 0.66 to 0.89 with an overall α of 0.91 and a concurrent validity that ranges between 0.22 to 0.67 with related measurement instruments; such as the Depression Anxiety Stress Scale (DASS-21) (Firdaus and Shereen, 2011).

Data collection

All the participants were recruited from the Universiti Kebangsaan Malaysia Medical Centre during their

child's follow-up appointment. Prior to recruitment, the caregivers were briefed on the nature, purpose, and requirements of the study. Upon obtaining their written informed consent, the participants were provided a set of forms to complete, which included a demographic information sheet, PCL-5, BDI, and BAI.

Data analysis

IBM® Statistical Package for the Social Sciences (SPSS) version 26.0 was used to analyse the data. The demographic characteristics and level of psychological distress that the participants experienced were presented using descriptive statistics. A bivariate correlation was used to explore the relationship between the multiple variables in this present study, producing r. The significant variables (two-tailed, $p<0.005$) that correlated with PTSS, depression, and anxiety were then subjected to a multiple linear regression, forward stepwise selection to determine the model of good fit for the predictors of the psychological outcomes, producing R2. At each step, the variables were chosen based on their p-values, where a threshold of 0.1 was used to limit the total number of variables that would be included in the final model.

Ethical considerations

This present study was conducted in accordance with the Helsinki Declaration of Principles and was approved by the ethics committee of the university (JEP-2019-447).

Results

The 73 participants had a mean age of 40.32 ± 7.81 SD years. Most of the participants were women (69.9%), Malay (86.3%), Muslim (89.0%), married (90.4%), had graduated secondary school (56.2%), and came from low-income households (75.3%). Table 1 provides a comprehensive overview of the sociodemographic characteristics of the participants.

Bivariate correlation was used to assess the relationship between the demographic characteristics, PTSS, depression, and anxiety. The primary findings indicated a significantly positive correlation between PTSS and depression [$r(71) = 0.65$, $p<0.01$], PTSS and anxiety [$r(71) = 0.85$, $p<.01$], religion and PTSS [$r(71) = 0.44$, $p<0.01$], religion and anxiety [$r(71) = 0.39$, $p<0.01$], ethnicity and PTSS [$r(71) = 0.38$, $p<0.01$], ethnicity and anxiety [$r(71) = 0.41$, $p<0.01$]. Table 2 provides more comprehensive information.

PTSS

Of the 73 participants, eight (11%) reported PTSD symptoms while the remaining 65 (89%) reported PTSS symptoms that did not indicate PTSD. Meanwhile, a combination of three variables; anxiety, depression, and ethnicity; explained 77% of the variance in the PTSS score [$R^2 = 0.77$, $p =0.000$]. Higher levels of depression and anxiety correlated with higher PTSS scores while individuals of 'Other' or 'Indigenous' ethnicity had lower PTSS scores than those of Malay ethnicity; the largest ethnic group in Malaysia.

Table 1. The Demographic Characteristics of the Caregivers of Children with ALL Referred to Universiti Kebangsaan Malaysia Medical Centre, Malaysia between 2021 to 2022

Age in years, Mean ± SD	40.32 ± 7.81
Gender: Male, N (%)	22 (30.1)
Gender: Female, N (%)	51 (69.9)
Ethnicity: Malay, N (%)	63 (86.3)
Ethnicity: Chinese, N (%)	1 (1.4)
Ethnicity: Indian, N (%)	8 (11.0)
Ethnicity: Others, N (%)	1 (1.4)
Religion: Muslim, N (%)	65 (89.0)
Religion: Buddhist, N (%)	1 (1.4)
Religion: Hindu, N (%)	7 (9.6)
Marital status: Married, N (%)	66 (90.4)
Marital status: Separated, N (%)	3 (4.1)
Marital status: Divorced, N (%)	2 (2.7)
Marital status: Widowed, N (%)	2 (2.7)
Education level: Primary, N (%)	2 (2.7)
Education level: Secondary, N (%)	41 (56.2)
Education level: Tertiary, N (%)	26 (35.6)
Education level: Others, N (%)	4 (5.5)
Income level: B40, N (%)	55 (75.3)
Income level: M40, N (%)	15 (20.5)
Income level: T20, N (%)	3 (4.1)
Duration of care in months, Mean ± SD	45.25 ± 34.14
Child's gender: Male, N (%)	43 (58.9)
Child's gender: Female, N (%)	30 (41.1)
Age at diagnosis in months, N (%)	69.67 (41.16)
Living arrangement: Nuclear, N (%)	67 (91.8)
Living arrangement: Extended, N (%)	6 (8.2)

†B40, Low-income group; M40, Middle income group; T20, High income group according to the Household Income and Basic Amenities Survey Report 2019, Department of Statistics Malaysia

Depression

Most of the participants [n=58 (79.5%)] reported minimal levels of depression, followed by nine participants (12.3%) who reported mild levels, four (5.5%) who reported moderate levels, and two (2.7%) who reported severe levels. None of the demographic variables predicted depression. Only the PTSS score accounted for 42% of the variance in the depression score [$R^2 = 0.42$, $p =0.000$], where a higher PTSS score correlated with higher levels of depression.

Anxiety

Most of the participants [n=48 (65.8%)] reported minimal levels of anxiety, followed by 14 participants (19.2%) who reported mild levels, eight participants (11.0%) who reported moderate levels, and three participants (4.1%) who reported severe levels. Two variables; namely, PTSS and ethnicity; explained 75% of the variance in the anxiety score [$R^2 = 0.75$, $p =0.000$]. Compared to the Malay reference group, a higher PTSS score in the indigenous group was predictive of a higher

Table 2: The Correlation Matrix of the Demographic Variables of the Caregivers of Children with ALL Referred to Universiti Kebangsaan Malaysia Medical Centre, Malaysia between 2021 to 2022

	Gen	Rel	Eth	MS	EL	Inc	DC	CGen	AAD	LA	Age	R/ship	PTSS	Dep	Anx
Gen		-0.035	-0.041	-0.004	0.077	-0.242*	-0.035	0.063	0.115	0.151	-0.227	1.000**	0.056	0.043	0.085
Rel	-0.035		0.807**	-0.027	-0.120	-0.078	-0.16	-0.014	-0.013	-0.108	0.072	-0.035	0.440**	0.278*	0.391**
Eth	-0.041	0.807**		0.046	-0.114	-0.001	0.059	-0.009	0.096	-0.060	0.082	-0.041	0.381**	0.234*	0.412**
MS	-0.004	-0.027	0.046		-0.237*	-0.196	0.000	-0.016	-0.161	0.211	-0.029	-0.004	0.105	0.279*	0.189
EL	0.077	-0.12	-0.114	-0.237*		0.420**	-0.071	0.171	-0.167	0.273*	-0.036	0.077	-0.072	-0.027	-0.178
Inc	-0.242*	-0.078	-0.001	-0.196	0.420**		0.064	-0.152	-0.017	0.033	0.272*	-0.242*	-0.250*	-0.19	-0.259*
DC	-0.035	0.160	0.059	0.000	-0.071	0.064		0.100	-0.155	-0.260*	0.315**	-0.035	0.273*	-0.272*	-0.250*
CGen	0.063	-0.014	-0.009	-0.016	0.167	-0.152	0.100		-0.140	-0.005	0.006	0.063	0.011	-0.066	0.006
AAD	0.115	-0.013	0.096	-0.161	-0.169	-0.017	-0.155	-0.140		-0.005	0.442**	0.115	-0.036	-0.017	0.038
LA	0.151	-0.108	-0.06	0.211	0.273*	0.033	-0.260*	-0.005	-0.005		-0.117	0.151	-0.053	0.137	-0.039
Age	-0.227	0.072	0.082	-0.029	-0.036	0.272*	0.315**	0.006	0.442**	-0.117		-0.227	-0.243*	-0.021	-0.209
R/ship	1.000**	-0.035	-0.041	-0.004	0.077	-0.242*	-0.035	0.063	0.115	0.151	-0.227		0.056	0.043	0.085
PTSS	0.056	0.440**	0.381**	0105	-0.072	-0.250*	-0.273*	-0.062	-0.036	-0.053	-0.243*	0.056		0.651**	0.849**
Dep	0.043	0.278*	0.234*	0.279*	-0.027	-0.19	-0.272*	0.011	-0.017	0.137	-0.021	0.043	0.651**		0.587**
Anx	0.085	0.391**	0.412**	0.189	-0.178	-0.259*	-0.250*	-0.066	0.038	-0.039	-0.209	0.085	0.849**	0.587**	

† Gen, Gender; Rel, Religion; Eth, Ethnicity; MS, Marital status; EL, Education level; Inc, Income; DC, Duration of care; CGen, Child's gender; AAD, Age at diagnosis; LA, Living arrangement; Age, Parent's age; R/ship, Relationship between participant and child; PTSS, Total PCL-5 score; Dep, Total BDI score; Anx,Total BAI score; Stepwise regression, *, Correlation is significant at 0.05 (2-tailed); **, Correlation is significant at 0.01 (2-tailed)

Table 3. A Model of the Significant Predictors of PTSS, Depression, and Anxiety among the Caregivers of Children with ALL Referred to Universiti Kebangsaan Malaysia Medical Centre, Malaysia between 2021 to 2022

Dependent Variable	Significant Predictors	Beta	P	R^2
PTSS	Anxiety	0.95	0	0.77
	Depression	0.39	0.004	
	Ethnicity (Others)	-12.08	0.04	
Depression	PTSS	0.36	0	0.42
Anxiety	PTSS	0.66	0	0.75
	Ethnicity (Others)	12.45	0.008	

†PTSS, Post-traumatic stress symptoms measured via total PCL-5 score

anxiety score. Table 3 provides a summary of the findings of the forward stepwise regression.

Discussion

Most of the caregivers reported minimal to mild levels of psychological distress. Less than half of the participants (11%) reported suffering from PTSD. This supports the assumption that a significant number of caregivers experience PTSS; a sub-threshold of PTSD (Carmassi et al., 2020; Carmassi et al., 2020). Therefore, even in the absence of a formal mental health diagnosis, psychological support is necessary as PTSS, which affects the psychological functions of an individual, is more prevalent among caregivers. As most of the participants reported minimal levels of depression (79.5%) and anxiety (65.8%), which contradicts the findings of extant studies (Katz et al., 2018; Kazak et al., 2004), it is possible that these caregivers have developed strategies to cope with such feelings throughout the duration of their child's treatment. It is, however, still important for healthcare providers to explore these areas when interacting with caregivers as a handful of them have reported high levels of depression and anxiety. Another possible explanation for the contradictory findings is that illness-related uncertainties and psychological stressors may be higher among caregivers of children who are newly-diagnosed with cancer (Katz et al., 2018). Comparatively, the children of the participants of this present study had been diagnosed at least six months prior to recruitment, with a mean duration of care of 45.25 months.

An increase in any single variable, be it PTSS, depression, or anxiety, was found to correlate with an increase in another variable. Longstanding evidence does suggest that PTSD correlates with coexisting psychological responses to anxiety and depression (Brady, 1997). There is also increasing evidence that PTSD or PTSS may be determining factors for the onset of anxiety and depression (Carmassi et al., 2020). Therefore, different types of psychological distress can often exist at the same. As such, it is critical to examine related concerns when investigating psychological distress to provide more effective management and care.

All but one demographic characteristic did not yield significant findings on psychological distress. More specifically, individuals of 'Other' or 'Indigenous' ethnicity had lower PTSS scores and higher anxiety scores than those of Malay ethnicity. This contradicts a finding that anxiety is most prevalent among individuals of Malay descent (Hishan et al., 2018). It is noteworthy, however, that very few participants were of 'Other' or 'Indigenous' ethnicity. Therefore, there is no conclusive evidence with which to accurately determine the predictive value of ethnicity. It could, however, be potentially explained by the upbringing of an ethnic group, where individuals with a rural upbringing reported higher levels of anxiety and depression than those with an urban upbringing (Hishan et al., 2018). It is possible that individuals from rural areas experience uncertainty when faced with a rapidly changing lifestyle and developments in the place where their children's treatment hospital is located while simultaneously managing their children's health concerns. The cultural values and belief systems of individuals of 'Other' or 'Indigenous' ethnicity may also affect their perceptions and interpretations of traumatic events, which in turn affects how their child's cancer diagnosis affects them (Appell, 2001). Although mental health is more easily accessible today, individuals with mental health issues are still discriminated in rural communities (Tumin et al., 2022), which may affect how these individuals report their symptoms during mental health assessments. Therefore, apart than SRQs, future studies and healthcare protocols should include behavioural observations and clinical interviews as they provide important insights into an individual's psychological well-being. It would also be interesting for future studies to explore the correlation between ethnicity and psychological distress.

Limitations

The sample size of this present study was small and lacked heterogeneity as most of the participants were female, Muslims, Malays, and from low-income households. As childhood cancer is rare, future studies may consider including the caregivers of children with other types of cancers to better generalise the findings. As the inclusion criteria were caregivers of children with ALL undergoing follow-up at the hospital irrespective of the phase of their illness, future studies may consider limiting the inclusion criteria to the caregivers of children at specific phases of an illness to increase the specificity of the findings as well as overcome the possibility of a floor effect, which is more likely to occur among the caregivers of children in the later phases of their illness.

In conclusion, this present study explored the correlation between demographic characteristics, PTSS, depression, and anxiety. The results indicated that anxiety, depression, and ethnicity could be used to predict PTSS scores. Subsequently, PTSS scores could be used to predict the likelihood of experiencing depression and anxiety. Apart from PTSS score, ethnicity was also found to predict the likelihood of experiencing anxiety. Individuals of 'Other' or 'Indigenous' ethnicity had lower PTSS scores and higher anxiety scores than individuals of Malay ethnicity. Therefore, healthcare providers must take ethnicity and psychological distress into consideration

while providing paediatric oncology treatment and care.

Author Contribution Statement

Conception and design: ACSS, MA, CMHC; Data analysis and interpretation: ACSS; Drafting of the article: ACSS, NBMH; Critical revision of the article for important intellectual content: MA, HA, RIH, AL, CMHC; Final approval of the article: MA, HA, RIH, AL, CMHC; Provision of study materials or patients: HA; Statistical expertise: MA, AL, CMHC; Administrative, technical, or logistical support: RIH; Data collection and assembly: ACSS, NBMH, HA.

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General

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Approval

The data was derived from a doctoral research that had been approved by the ethics committee of the university (JEP-2019-447).

Ethical Declaration

This present study was approved by the ethics committee of the university (JEP-2019-447).

Data Availability

The data of this present study is not publicly available and is only available upon request due to privacy concerns.

Conflict of Interest

The authors declare no conflicts of interest in the publication of this manuscript.

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