Prevalence and Determinants of Distress in Young Adult Patients with Cancer in a Private Tertiary Hospital in the Philippines: A Cross-Sectional Study

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ABSTRACT

Background/Importance of the Study: At present, there is not much data on the prevalence of cancer in the young adult population in the local setting, in addition to prevalence and determinants of distress in this population. The findings of this study may help to understand the current situation of this young population, and it may also provide a reference for further improving outcomes among these patients who have a distinct set of needs compared to the older counterparts, in addition to a long life expectancy ahead of them.

Study Design: This study employed an observational cross-sectional design that included young adult cancer patients, aged 19 to 39 years old, seen at the hospital outpatient clinics and Cancer Center from October 2023 to December 2023. Demographic and clinical data were collected. The participants were also asked to fill out the National Comprehensive Cancer Network (NCCN) Distress Thermometer (DT) Screening Tool and Problem List after signing the written informed consent. Data were collated and analyzed per clinical variable.

Results/Analysis: The mean age of the participants was 34.55 years (SD=3.97), with most of them being 36 to 39 years old (51.67%). Comparative analyses of different demographic and clinical characteristics indicated that none of the characteristics were significantly different between those without and with significant distress levels (*p*>0.05). The mean distress score was 4.11 (SD=2.60) and categorizing these scores using the established cut-off score showed that 58.33% (95% CI = 44.88% to 70.93%) had distress. Time from cancer diagnosis significantly predicted distress development, specifically between 6 and 12 months from cancer diagnosis (aOR = 0.03, *p* = 0.042). Factors significantly contributing to distress are concerns on changes in eating, loss or change of physical abilities, worry or anxiety, sadness or depression, loss of interest or enjoyment, loneliness, changes in appearance, feelings of worthlessness or being a burden, relationship with friends, ability to have children, taking care of oneself, finances, access to medicine, issues on sense of meaning or purpose, and on death, dying and afterlife (p<0.05).

Conclusion: Significant distress is present in more than 50% of young adult cancer patients seen in a private tertiary institution in the Philippines. The time from cancer diagnosis significantly predicted distress development. Emotional and practical concerns significantly contributed to distress in this population.

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INTRODUCTION

In 2006, the National Cancer Institute (NCI) Progress Review Group defined the adolescent and young adult (AYA) oncology patient as an individual aged 15 to 39 years at the time of initial cancer diagnosis.[1]

Cancer is predominantly a disease occurring in older adults and the elderly, with merely 4.72% incidence in the adolescent and young adult population in the United Stated in 2015.[2] The group of young adult cancer patients has been recognized to have distinct specific needs and concerns compared to the older population since the 1990s.[3] In a study published by Bleyer, et.al. in 2017, it was estimated that the incidence of cancer in young adults was over one million globally.[4] There is also observation of increasing incidence of cancer in the younger adult population since 2008, attributed to increases in thyroid, kidney, uterine and colon cancers.[5] The years of life lost and saved with current available therapies for cancer have much greater clinical impact despite the small proportion of this population.

The burden of cancer for this age group is greater compared to older or younger counterparts mainly because of their high survival rates and long life expectancy.[6] The needs of young adult cancer patients and survivors appear to be distinct from both older adult and pediatric patients such that some data suggest poorer outcomes in this population despite much progress through the years, which may be related to factors such as tumor biology, genomic risks, tumor histopathology and chemotherapy compliance and sensitivity.[7] Poorer outcomes may also be attributed to delayed diagnosis due to absence of general screening recommendations in this young population. Additional factors include unique psychosocial and economic issues.

Significance of the Study

At present, there is not much data on the prevalence of cancer in the young adult population in the local setting, in addition to prevalence and determinants of distress in this population. This study was conducted to determine the prevalence and determinants of distress among young adult cancer patients in a private tertiary hospital in the Philippines. The findings of this study offer valuable insights into the current challenges faced by this young population, highlighting their distinct needs compared to older counterparts. These results may serve as a foundation for developing targeted interventions, guiding policy-making and enhancing clinical practices, particularly in providing comprehensive general and mental health support for young cancer patients in the future.

Objectives

This study aims to determine the prevalence and determinants of distress among young adult cancer patients in a private tertiary hospital in the Philippines using the NCCN-DT Screening Tool and Problem List.

Specifically, this study intends to identify the possible determinants of distress in young adult cancer patients using demographic and clinical data (age at diagnosis, gender, cancer diagnosis, stage of cancer, treatment status, treatment/s received, working status, monthly income, civil status, plans for future pregnancy for females, number of children, living conditions, exercise intensity and frequency, time from diagnosis, comorbid conditions, medical insurance coverage and psychiatric family history).

Review of Related Literature

Cancer is most prevalent in the older and elderly population, but has been increasing in the young adult population during recent years. The young adult population's survival is also improving through the years due to parallel improvements in cancer treatment, and probably because of their relatively good baseline characteristics including low comorbidities. However, survival rates of this cancer population have not improved as much as in childhood and older adult population.[8] Variations between the older and young adult population in terms of cancer type has been documented in literature, as well as geographical differences. Global differences in healthcare systems as well as cultural and social issues lead to significant disparities in terms of care involving the young adult population affected by cancer,[9] hence the perceived need to collect data in the local setting.

A study published in 2016 by Kaul, et al., determined that young adult cancer patients have been found to have high levels of distress at diagnosis, during treatment and for many years after treatment.[10] The Adolescent and Young Adult (AYA) Oncology Psychosocial Care Manual was developed in 2011 in response to the unmet need for an age-appropriate tool for psychosocial screening, assessment and care planning for this population.[11] Later, the NCCN-DT and Problem List was validated and preferred for the AYA age range, with modification for this subgroup of patients.[6]

The NCCN defined distress as a multifactorial unpleasant experience of a psychological, social, spiritual and/or physical nature that may interfere with one's ability to cope effectively with cancer, its physical symptoms and treatment.[12] The NCCN distress management panel developed a screening tool that identifies psychosocial distress through a questionnaire.[13] The NCCN-DT measures distress on a scale from 0 to 10 with increasing distress severity with higher number, and a problem checklist for specific distress signals which includes physical, emotional, social, practical, religious or spiritual concerns.[12] A Chinese study validated use of the NCCN-DT with other screening tools in Asian patients.[14] A cross-sectional descriptive study was conducted by Pizzaro, et al., in 2022 to determine the diagnostic accuracy of the NCCN-DT in agreement with the Patient Health Questionnaire-8 (PHQ-8) for screening psychosocial distress among Filipino cancer patients.[13] The Receiving Operating Characteristic (ROC) analysis showed an Area under the ROC curve score of 0.98 for the NCCN-DT against the PHQ-8, with a cutoff score of 7 or higher showing a sensitivity of 100% and specificity of 89.3%. The NCCN-DT is also available in the Filipino version.[15]

Several factors contribute to cancer-related distress, which includes the increased awareness of uncertainties in life, worry about recurrence which translates into hypervigilance of symptoms, concerns about finances and managing health-related needs, changes in perceptions of the patients' self, body image and feelings of vulnerability.[16] McDonnell, et al., published a study in 2018 which determined that worry about future health was the most prevalent concern among AYA survivors.[17]

Distress among young adult cancer patients worldwide also vary depending on geographical and cultural factors, as stated earlier. In 2017, a study conducted by Chan, et al., in Singapore found out that half of young adult cancer patients included in their study experienced clinically significant distress early in their cancer journey, with 43% presenting with distress at the time of diagnosis. Worry, financial issues, treatment decisions, work/school issues, nervousness and sadness were the principal factors relating to distress.[18] Currently, there are no available data on distress in the young adult population in the local setting.

METHODOLOGY

This study employed an observational cross-sectional design that includes young adult cancer patients aged 19 to 39 years old seen at the hospital outpatient clinics and Cancer Center from October 2023 to December 2023.

Study Population

Young adult cancer patients aged 19 to 39 years were included in this study. They were newly diagnosed, or on treatment, or cancer survivors who are on surveillance seen from October 2023 to December 2023. Patients with both solid organ and blood malignancies were eligible to participate in the study.

Cancer patients who were younger than 19 years or older than 39 years were excluded in this study. Admitted patients and those in the emergency room were excluded in this study as well.

Study Procedure

A research proposal was submitted to Institutional Review Board (IRB) to seek approval for the research topic. Upon approval by the IRB, the researcher gathered subjects, through referral by their oncologists from the Makati Medical Center out-patient clinics and Cancer Center. Demographic and clinical data were collected (age at diagnosis, gender, cancer diagnosis, stage of cancer, treatment status, treatment/s received, working status, monthly income, civil status, plans for future pregnancy for females, number of children, living conditions, exercise intensity and frequency, time from diagnosis, comorbid conditions, medical insurance coverage and psychiatric family history). The participants were also asked to fill out the NCCN–DT Screening Tool and Problem List after signing the written informed consent. The researcher approached the study participant, introduced herself and asked the participant if he/she would be willing to participate in the study. The researcher invited the participant to the Cancer Center consultation room and further explained the purpose of the study, informed consent and procedure. The participants were able to go through the informed consent before agreeing to take part in the study. The questionnaires and informed consent provided were in English and Filipino, which were handed to the patient for self-administered responses, while the researcher was within sight for any questions or clarifications. All questionnaires were completed anonymously by participants without any interference. The participants were given 45 minutes to 1 hour to complete the survey.

The DT was adapted from the NCCN to assess the level of distress on a scale ranging from zero (no distress) to ten (extreme distress) for this study. In addition, the problem checklist included in the NCCN questionnaire together with the DT, was administered to identify the sources of distress, including physical, emotional, social, practical and spiritual/religious concerns. There were no perceived risks in answering the survey. The patient's benefit was perceived through free assessment of distress and recommendation for referral to a psychiatrist recommended by the private attending physician or to the hospital service program Psychiatry Department in cases where distress was identified. Psychosocial support was provided by the researcher through active listening, offering emotional support, providing information regarding asking for expert psychiatrist's help and being empathetic during the study procedure.

Data were collated and analyzed per clinical variable.

Sampling Design

The study employed a purposive sampling method.

Statistical Considerations

Statistical analyses were performed using STATA MP Parallel Edition Statistical Software, Version 18, College Station, TX: StataCorp LP. A p-value ≤ 0.05 was considered statistically significant. Descriptive statistics included mean and standard deviation for normally distributed, continuous variables; median and interquartile range for ordinal and non-normal, continuous variables; and, frequency and percentage for categorical variables. The prevalence of distress among participants was estimated using the Chi-Square Test Exact Binomial approach alongside its 95% confidence interval.[19] Between-group comparisons of different demographic and clinical characteristics according to the level of distress (without vs. with distress) were performed using the Chi-Square Test of Homogeneity or Fisher's Exact Test, if the assumption of at least five observations per cell was not met, for categorical variables; Mann-Whitney U Test for ordinal and non-normal, continuous variables; and, independent t-test for normally-distributed, continuous variables.[19] The association of different demographic and clinical characteristics with distress level was determined using binary logistic regression analyses and presented using odds ratio (OR).[19] Univariate analyses were initially performed to analyze the independent association of different demographic and clinical characteristics with distress level and were reported as crude odds ratios (cOR). Predictors with computed p-values ≤ 0.25 at univariate analyses were retained and included in the multivariate analyses. Afterwards, multivariate binary logistic regression using a stepwise forward selection approach was conducted and associations were indicated as adjusted odds ratios (aOR).[20]

RESULTS

Demographic Characteristics

Table 1 presents the demographic characteristics of participants. It can be noted that the mean age of participants was 34.55 years old (SD=3.97), with most of them being 36 to 39 years old (51.67%). It can also be noted that most of the participants were females (75.00%), single (52.54%), completed tertiary level education (73.33%), were employed (73.33%), had a monthly household income between PHP 31,000 to PHP 60,000 (31.82%) and lived with their family or parents (68.33%). Results also showed that among females, 44.44% had plans for future pregnancy and the median number of children among participants was one child (IQR = 0 – 2). Comparative analyses of different demographic characteristics indicated that none of the characteristics were significantly different between those without and with significant distress levels ($p>0.05$).

Table 1. Demographic characteristics of the participants according to distress level (N = 60)

Characteristics	**Distress Level (N = 60)**			**Test Statistic a**	***p*-value (Two-Tailed)**
	Total (N = 60)	**Without Significant Distress (n=25; 41.67%)**	**With Significant Distress (n=35; 58.33%)**		
Current Age (Years; $\bar{x}$, SD)	34.55 (3.97)	34.88 (3.76)	34.31 (4.16)	0.54	0.591
Current Age Group (*f*, %)				0.37	0.938
21 to 25 Years Old	2 (3.33%)	1 (4.00%)	1 (2.860%)		
26 to 30 Years Old	9 (15.0%)	3 (12.00%)	6 (17.14%)		
31 to 35 Years Old	18 (30.00%)	8 (32.00%)	10 (28.57%)		
36 to 39 Years Old	31 (51.67%)	13 (52.00%)	18 (51.43%)		
Sex (*f*, %)				0.02	0.880
Male	15 (25.00%)	6 (24.00%)	9 (25.71%)		
Female	45 (75.00%)	19 (76.00%)	26 (74.29%)		
Marital Status (*f*, %)				0.86	0.882
Single	31 (52.54%)	14 (56.00%)	17 (50.00%)		
Married	27 (45.76%)	11 (44.00%)	16 (47.06%)		
Separated	1 (1.69%)	0 (0.00%)	1 (2.94%)		
Educational Attainment (*f*, %)				3.92	0.163
Primary Education	0 (0.00%)	0 (0.00%)	0 (0.00%)		
Secondary Education	3 (5.00%)	2 (8.00%)	1 (2.86%)		
Tertiary Education	44 (73.33%)	15 (60.00%)	29 (82.86%)		
Post-Graduate Education	13 (21.67%)	8 (32.00%)	5 (14.29%)		
Employment Status (*f*, %)				1.91	0.167
Unemployed	16 (26.67%)	9 (36.00%)	7 (20.00%)		
Employed	44 (73.33%)	16 (64.00%)	28 (80.00%)		
Monthly Household Income (*f*, %)				4.92	0.484
Below PHP 10,000	5 (11.36%)	3 (17.65%)	2 (7.41%)		
PHP 10,000 to PHP 20,000	1 (2.27%)	0 (0.00%)	1 (3.70%)		
PHP 21,000 to PHP 30,0000	9 (20.45%)	2 (11.76%)	7 (25.93%)		
PHP 31,000 to PHP 60,000	14 (31.82%)	5 (29.41%)	9 (33.33%)		
PHP 61,000 to PHP 200,000	11 (25.00%)	4 (23.53%)	7 (25.93%)		
Above PHP 200,000	4 (9.09%)	3 (17.56%)	1 (3.70%)		
Living Arrangement (*f*, %)				3.65	0.252
Lives Alone	2 (3.33%)	1 (4.00%)	1 (2.86%)		
Lives with Parents or Family	41 (68.33%)	19 (76.00%)	22 (62.86%)		
Lives with Partner	16 (26.67%)	4 (16.00%)	12 (34.29%)		
Lives with Friends or Housemates	1 (1.67%)	1 (4.00%)	0 (0.00%)		
Plans of Future Pregnancy (*f*, %; N=45)	20 (44.44%)	8 (42.11%)	12 (46.15%)	0.07	0.787
Number of Children (Md, IQR)	1 (0 – 2)	1 (0 – 2)	1 (0 – 2)	0.21	0.835

Md: Median; IQR: Interquartile Range

[a] Note: Test statistics used are either independent t-test for continuous, normally-distributed data; Mann-Whitney U Test for continuous, non-normal and ordinal data; or, Chi-Square Test of Homogeneity or Fisher's Exact Test for categorical data.

[*] Significant at 0.05

[†] Significant at 0.01

Clinical Characteristics

The clinical characteristics of participants are depicted in Table 2. Results showed that the mean age of participants at diagnosis of their oncologic condition was 32.90 years old (SD=5.40). It can also be noted that the most prevalent comorbidity was thyroid disease (8.33%). Majority of the participants had light exercise (65.00%) and have exercised <3 times a week (63.33%). Among the participants, the most common cancer diagnoses were breast cancer (55.00%), lymphoma (11.67%) and colorectal cancer (6.67%), and the most prevalent cancer stage was stage 2 (38.89%). It can also be noted that most of the participants were diagnosed with cancer 1 to 3 years (30.00%) prior. More than three-quarters of participants were actively receiving treatment (76.67%) and the most received treatment was chemotherapy (75.00%). More than half of the participants had medical insurance (55.00%) and only 3.33% had a family history of psychiatric conditions. Between-group comparisons of different clinical characteristics between those without and with significant distress showed no statistically significant results (p>0.05).

Descriptive Statistics of Distress Score and Levels and Sources of Distress

Table 3 illustrates descriptive statistics of the distress score and levels as well as the different problem

Table 2. Clinical characteristics of the participants according to the distress level (N = 60)

Characteristics	Distress Level (N = 60)			Test Statistic [a]	*p*-value (Two-Tailed)
	Total (N = 60)	Without Significant Distress (n = 25)	With Significant Distress (n = 35)		
Age at Diagnosis (Years; $\bar{x}$, SD)	32.90 (5.40)	34.00 (3.92)	32.11 (6.18)	1.34	0.184
Comorbidities (*f*, %)					
Hypertension	3 (5.00%)	1 (4.00%)	2 (5.71%)	0.09	1.000
Diabetes Mellitus	3 (5.00%)	0 (0.00%)	3 (8.57%)	2.26	0.258
Thyroid Disorders	5 (8.33%)	3 (12.00%)	2 (5.71%)	0.75	0.640
Tuberculosis	1 (1.67%)	1 (4.00%)	0 (0.00%)	1.42	0.417
Exercise Intensity (*f*, %)				5.68	0.127
No Exercise	11 (18.33%)	2 (8.00%)	9 (25.71%)		
Light Exercise	39 (65.00%)	18 (72.00%)	21 (60.00%)		
Moderate Exercise	8 (13.33%)	3 (12.00%)	5 (14.29%)		
Vigorous Exercise	2 (3.33%)	2 (8.00%)	0 (0.00%)		
Exercise Frequency (*f*, %)				0.99	0.319
<3 Times a Week	38 (63.33%)	14 (56.00%)	24 (68.57%)		
≥3 Times a Week	22 (36.67%)	11 (44.00%)	11 (31.43%)		
Cancer Diagnosis (*f*, %)					
Breast Cancer	33 (55.00%)	14 (56.00%)	19 (54.29%)	0.02	0.895
Cervical Cancer	3 (5.00%)	1 (4.00%)	2 (5.71%)	0.09	1.000
Colorectal Cancer	4 (6.67%)	3 (12.00%)	1 (2.86%)	1.96	0.298
Gastric Cancer	1 (1.67%)	1 (4.00%)	0 (0.00%)	1.42	0.417
Hepatocellular Cancer	1 (1.67%)	0 (0.00%)	1 (2.86%)	0.73	1.000
High-Grade Astrocytoma	1 (1.67%)	1 (4.00%)	0 (0.00%)	1.42	0.417
Leukemia	2 (3.33%)	0 (0.00%)	2 (5.71%)	1.48	0.506
Lung Cancer	2 (3.33%)	1 (4.00%)	1 (2.86%)	0.06	1.000
Lymphoma	7 (11.67%)	2 (8.00%)	5 (14.29%)	0.56	0.688
Multiple Myeloma	1 (1.67%)	0 (0.00%)	1 (2.86%)	0.73	1.000

(continue)

Table 2. Clinical characteristics of the participants according to the distress level (N = 60) (continued)

Characteristics	**Distress Level (N = 60)**			**Test Statistic [a]**	***p*-value (Two-Tailed)**
	Total (N = 60)	**Without Significant Distress (n = 25)**	**With Significant Distress (n = 35)**		
Ovarian Cancer	3 (5.00%)	1 (4.00%)	2 (5.71%)	0.09	1.000
Pancreatic Cancer	1 (1.67%)	1 (4.00%)	0 (0.00%)	1.42	0.417
Pheochromocytoma	1 (1.67%)	0 (0.00%)	1 (2.86%)	0.73	1.000
Cancer Stage (*f*, %)				3.25	0.407
Stage 1	5 (9.26%)	2 (8.33%)	3 (10.00%)		
Stage 2	21 (38.89%)	8 (33.33%)	13 (43.33%)		
Stage 3	10 (18.52%)	3 (12.50%)	7 (23.33%)		
Stage 4	18 (33.33%)	11 (45.83%)	7 (23.33%)		
Time from Cancer Diagnosis (*f*, %)				4.71	0.319
Less than 3 Months	16 (26.67%)	4 (16.00%)	12 (34.29%)		
Between 3 to 6 Months	12 (20.00%)	7 (28.00%)	5 (14.29%)		
Between 6 to 12 Months	9 (15.00%)	4 (16.00%)	5 (14.29%)		
Between 1 to 3 Years	18 (30.00%)	9 (36.00%)	9 (25.71%)		
More than 3 Years	5 (8.33%)	1 (4.00%)	4 (11.43%)		
Treatment Status (*f*, %)				3.08	0.272
No Treatment Yet	5 (8.33%)	1 (4.00%)	4 (11.43%)		
Ongoing Treatment	46 (76.67%)	22 (88.00%)	24 (68.57%)		
Post Treatment	9 (15.00%)	2 (8.00%)	7 (20.00%)		
Treatments Received (*f*, %)					
Chemotherapy	56 (75.00%)	19 (76.00%)	26 (74.29%)	0.02	1.000
Targeted Systemic Therapy	22 (36.67%)	10 (40.00%)	12 (34.29%)	0.21	0.787
Radiation Therapy	22 (36.67%)	9 (36.00%)	13 (37.14%)	0.01	1.000
Surgery	33 (55.00%)	15 (60.00%)	18 (51.43%)	0.43	0.602
Medical Insurance (*f*, %)	33 (55.00%)	15 (60.00%)	18 (51.43%)	0.43	0.602
Family History of Psychiatric Conditions (*f*, %)	2 (3.33%)	0 (0.00%)	2 (5.71%)	1.48	0.506

[a] Note: Test statistics used are either independent t-test for continuous, normally-distributed data; Mann-Whitney U Test for continuous, non-normal and ordinal data; or, Chi-Square Test of Homogeneity or Fisher's Exact Test for categorical data.

[*] Significant at 0.05

[†] Significant at 0.01

list or sources of distress. Results showed that the mean distress score was 4.11 (SD=2.60) and categorizing these scores using the established cut-off score showed that 58.33% (95% CI = 44.88% to 70.93%) had significant distress. Among the different sources of distress under physical concerns, the most prevalent was sleep (41.67%), pain (36.67%) and fatigue (36.67%). For emotional concerns, the most common issues were worry and anxiety (71.67%), fear (45.00%) and sadness or depression (28.33%), while the ability to have children (25.00%), relationship with spouse or partner (16.67%) and relationship with family members (16.67%) were the top three social concerns. Focusing on practical concerns, the most common problems were finances (48.33%), work (41.67%) and taking care of others (35.00%). On the other hand, the prevalent spiritual or religious concerns were on death, dying and afterlife (33.33%) and sense of meaning or purpose (21.67%).

Table 3. Descriptive statistics of distress score and levels and the sources of distress (N = 60)

Characteristics	Summary Statistic	Characteristics	Summary Statistic
Distress Scores ($\bar{x}$, SD)	4.11 (2.60)	**Problem List or Sources of Distress (*f*, %)**	
Distress Level (*f*, %)		*Social Concerns*	
Without Distress to Mild Distress (Scores <4)	25 (41.67%)	Relationship with Spouse or Partner	10 (16.67%)
Moderate to Extreme Distress (Scores ≥4)	35 (58.33%)	Relationship with Children	5 (8.33%)
Problem List or Sources of Distress (*f*, %)		Relationship with Family Members	10 (16.67%)
Physical Concerns		Relationship with Friends	8 (13.33%)
Pain	22 (36.67%)	Communication with Healthcare Team	0 (0.00%)
Sleep	25 (41.67%)	Ability to Have Children	15 (25.00%)
Fatigue	22 (36.67%)	*Practical Concerns*	
Tobacco Use	0 (0.00%)	Taking Care of Myself	17 (28.33%)
Substance Use	0 (0.00%)	Taking Care of Others	21 (35.00%)
Memory or Concentration	17 (28.33%)	Work	25 (41.67%)
Sexual Health	3 (5.00%)	School	0 (0.00%)
Changes in Eating	12 (20.00%)	Housing	0 (0.00%)
Loss or Change of Physical Abilities	18 (30.00%)	Finances	29 (48.33%)
Emotional Concerns		Insurance	9 (15.00%)
Worry or Anxiety	43 (71.67%)	Transportation	3 (5.00%)
Sadness or Depression	17 (28.33%)	Childcare	8 (13.33%)
Loss of Interest or Enjoyment	8 (13.33%)	Having Enough Food	2 (3.33%)
Grief or Loss	4 (6.67%)	Access to Medicine	10 (16.67%)
Fear	27 (45.00%)	Treatment Decisions	15 (25.00%)
Loneliness	12 (20.00%)	*Spiritual or Religious Concerns*	
Anger	9 (15.00%)	Sense of Meaning or Purpose	13 (21.67%)
Changes in Appearance	16 (26.67%)	Changes in Faith or Beliefs	1 (1.67%)
Feelings of Worthlessness or Being a Burden	14 (23.33%)	Death, Dying, or Afterlife	20 (33.33%)
		Conflict Between Beliefs and Cancer Treatments	2 (3.33%)
		Relationship with the Sacred	2 (3.33%)
		Ritual or Dietary Needs	3 (5.00%)

Association of Distress with the Sources of Distress

The associations of different sources of stress with distress level are presented in Table 4. Among the different physical concerns, results showed that changes in eating and loss or change of physical activities were significantly associated with distress. In particular, the proportions of participants with changes in eating (31.43% vs. 4.00%, $\chi^2 = 6.86$, p=0.009) and loss or change of physical abilities (40.00% vs. 16.00%, $\chi^2 = 4.00$, p=0.046) were significantly higher among those with significant distress than those without significant distress. In a similar vein, it can be noted that the proportions of participants with emotional concerns, specifically worry or anxiety (88.57% vs. 48.00%, $\chi^2 = 11.82$, p=0.001); sadness or depression (40.00% vs. 12.00%, $\chi^2 = 5.63$, p=0.018), loss of interest or enjoyment (22.86% vs. 0.00%, $\chi^2 = 6.59$, p=0.016); fear (65.71% vs. 16.00%, $\chi^2 = 14.56$, p=0.001); loneliness (31.43% vs. 4.00%, $\chi^2 = 6.86$, p=0.009); changes in appearance (40.00% vs. 8.00%, $\chi^2 = 7.64$, p=0.006); and feelings of worthlessness or being a burden (34.29% vs. 8.00%, $\chi^2 = 5.63$, p=0.018) were significantly higher among those with significant distress. For different social concerns, only the relationship with friends and ability to have children were significantly associated with distress

Table 4. Associations of distress with the sources of distress among participants (N = 60)

Sources of Distress	Distress Level (N = 60)		χ^2 -Value	*p*-value (Two-Tailed)
	Without Significant Distress (n = 25)	With Significant Distress (n = 35)		
Physical Concerns				
Pain	7 (28.00%)	15 (42.86%)	1.39	0.239
Sleep	7 (28.00%)	18 (51.43%)	3.29	0.070
Fatigue	8 (32.00%)	14 (40.00%)	0.45	0.526
Tobacco Use	0 (0.00%)	0 (0.00%)	–	–
Substance Use	0 (0.00%)	0 (0.00%)	–	–
Memory or Concentration	5 (20.00%)	12 (34.29%)	1.47	0.226
Sexual Health	0 (0.00%)	3 (8.57%)	2.26	0.258
Changes in Eating	1 (4.00%)	11 (31.43%)	6.86[†]	0.009
Loss or Change of Physical Abilities	4 (16.00%)	14 (40.00%)	4.00[*]	0.046
Emotional Concerns				
Worry or Anxiety	12 (48.00%)	31 (88.57%)	11.82[†]	0.001
Sadness or Depression	3 (12.00%)	14 (40.00%)	5.63[*]	0.018
Loss of Interest or Enjoyment	0 (0.00%)	8 (22.86%)	6.59[*]	0.016
Grief or Loss	0 (0.00%)	4 (11.43%)	3.06	0.133
Fear	4 (16.00%)	23 (65.71%)	14.56[†]	0.001
Loneliness	1 (4.00%)	11 (31.43%)	6.86[†]	0.009
Anger	2 (8.00%)	7 (20.00%)	1.65	0.281
Changes in Appearance	2 (8.00%)	14 (40.00%)	7.64[†]	0.006
Feelings of Worthlessness or being a Burden	2 (8.00%)	12 (34.29%)	5.63[*]	0.018
Social Concerns				
Relationship with Spouse or Partner	2 (8.00%)	8 (22.86%)	2.32	0.171
Relationship with Children	1 (4.00%)	4 (11.43%)	1.05	0.390
Relationship with Family Members	2 (8.00%)	8 (22.86%)	2.32	0.171
Relationship with Friends	0 (0.00%)	8 (22.86%)	6.59[*]	0.016
Communication with Healthcare Team	0 (0.00%)	0 (0.00%)	–	–
Ability to Have Children	3 (12.00%)	12 (34.29%)	3.86[*]	0.049
Practical Concerns				
Taking Care of Myself	3 (12.00%)	14 (40.00%)	5.63[*]	0.018
Taking Care of Others	6 (24.00%)	15 (42.86%)	2.28	0.131
Work	7 (28.00%)	18 (51.43%)	3.29	0.070
School	0 (0.00%)	0 (0.00%)	–	–
Housing	0 (0.00%)	0 (0.00%)	–	–
Finances	7 (28.00%)	22 (62.86%)	7.10[†]	0.008
Insurance	1 (4.00%)	8 (22.86%)	4.07	0.067
Transportation	0 (0.00%)	3 (8.57%)	2.26	0.258
Childcare	1 (4.00%)	7 (20.00%)	3.23	0.123
Having Enough Food	0 (0.00%)	2 (5.71%)	1.48	0.506
Access to Medicine	0 (0.00%)	10 (28.57%)	8.57[†]	0.003
Treatment Decisions	4 (16.00%)	11 (31.43%)	1.85	0.174
Spiritual or Religious Concerns				
Sense of Meaning or Purpose	2 (8.00%)	11 (31.43%)	4.72[*]	0.030

(continue)

Table 4. Associations of distress with the sources of distress among participants (N = 60) (continued)

Sources of Distress	Distress Level (N = 60)		χ^2 -Value	p-value (Two-Tailed)
	Without Significant Distress (n = 25)	With Significant Distress (n = 35)		
Changes in Faith or Beliefs	0 (0.00%)	1 (2.86%)	0.73	1.000
Death, Dying, or Afterlife	3 (12.00%)	17 (48.57%)	8.78 †	0.003
Conflict Between Beliefs and Cancer Treatments	0 (0.00%)	2 (5.71%)	1.48	0.506
Relationship with the Sacred	1 (4.00%)	1 (2.86%)	0.06	1.000
Ritual or Dietary Needs	0 (0.00%)	3 (8.57%)	2.26	0.258

* Significant at 0.05
† Significant at 0.01

levels. In particular, the proportions of participants with concerns on their relationship with friends (22.86% vs. 0.00%, χ^2 = 6.59, p=0.016) and ability to have children (34.29% vs. 12.00%, χ^2 = 3.86, p=0.049) were significantly higher among those with significant distress than those without. In terms of practical concerns, three sources of distress were significantly associated, and these were taking care of oneself, finances and access to medicine. Analyses have shown that proportions of participants with practical concerns on taking care of themselves (40.00% vs. 12.00%, χ^2 = 5.63, p=0.018), with finances (62.86% vs. 28.00%, χ^2 = 7.10, p=0.008) and with access to medicine (28.57% vs. 0.00%, χ^2 = 8.57, p=0.003) were significantly higher among those with significant distress. Finally, analyses of spiritual or religious concerns have shown that those with issues on their sense of meaning or purpose (31.43% vs. 8.00, χ^2 = 4.72, p=0.030) and on death, dying and afterlife (48.57 vs. 12.00%, χ^2 = 8.78, p=0.003) were significantly higher among those with significant distress than those without significant distress.

Predictors of Distress

The univariate and multivariate binary logistic regression analyses of the associations of different demographic and clinical predictors with distress are presented in Table 5. On univariate analyses, results showed that none of the demographic and clinical characteristics significantly predicted the development of distress among participants (p>0.05). Although not statistically significant, it can also be noted that computed p values of age at diagnosis (p=0.189), employment status (p=0.172), monthly household income, exercise intensity, colorectal cancer (p=0.196) and time from cancer diagnosis were less than 0.25, thus they were included in the final multivariate analyses. Multivariate binary logistic regression analyses showed that age at diagnosis, employment status, monthly household income, exercise intensity and colorectal cancer did not significantly predict the likelihood of developing distress among participants. However, one category of the time from cancer diagnosis significantly predicted distress development, specifically between 6 to 12 months from cancer diagnosis (aOR=0.03, p=0.042). This result indicates that the time from cancer diagnosis of 6 to 12 months decreased the likelihood of developing distress by 33.33% compared to those who were diagnosed less than three months prior.

Power analysis (*post-hoc*) for logistic regression analysis was conducted using G*Power version 3.1.9.4. From the study results, a total of 60 participants were recruited. Analyses indicated that the lowest association among variables with the outcome yielded an odds ratio (OR) of 0.3353 and R^2 value of 0.1116. An alpha or significance level of 5.00% (two-tailed) was used to detect significant results (Daniel & Cross, 2013). With these parameters, a null proportion of 0.20, an odds ratio of 0.3353 and a sample size of 60, an estimated power of 80.38% (0.8038) was estimated. This result indicates that the acquired sample was sufficient and the likelihood of Type II errors (false negative) was minimized to 19.62% as shown in Figure 1.

DISCUSSION

The group of young adult cancer patients has been recognized to have distinct specific needs and

Table 5. Univariate and multivariate binary logistic regression analyses of the predictors of distress among the participants (N = 60)

Predictors	**Distress Level (With Distress)**			
	Unadjusted Model (Univariate)		**Adjusted Model[b] (Multivariate)**	
	Crude OR (cOR)	***p*-value (Two-Tailed)**	**Adjusted OR (aOR)**	***p*-value (Two-Tailed)**
Age at Diagnosis (Years)	0.93	0.189	0.95	0.645
Sex (Female)	0.91	0.880	–	–
Marital Status				
Single	Referent	–	–	–
Married	1.20	0.735	–	–
Separated	1.00	1.000	–	–
Educational Attainment				
Primary Education	Referent	–	–	–
Secondary Education	1.00	1.000	–	–
Tertiary Education	3.87	0.285	–	–
Post-Graduate Education	1.25	0.869	–	–
Employment Status (Employed)	2.25	0.172	1.03	0.994
Monthly Household Income				
Below PHP 10,000	Referent	–	Referent	–
PHP 10,000 to PHP 20,000	1.00	1.000	1.00	1.000
PHP 21,000 to PHP 30,0000	5.25	0.172	1.03	0.994
PHP 31,000 to PHP 60,000	2.70	0.353	1.03	0.994
PHP 61,000 to PHP 200,000	2.63	0.383	1.01	0.994
Above PHP 200,000	0.50	0.638	1.04	0.994
Living Arrangement				
Lives Alone	Referent	–	–	–
Lives with Parents or Family	1.16	0.919	–	–
Lives with Partner	3.00	0.472	–	–
Lives with Friends or Housemates	1.000	1.000	–	–
Comorbidities (*f*, %)				
Hypertension	1.45	0.765	–	–
Diabetes Mellitus	1.00	1.000	–	–
Thyroid Disorders	0.44	0.393	–	–
Tuberculosis	1.00	1.000	–	–
Exercise Intensity				
No Exercise	Referent	–	Referent	–
Light Exercise	0.26	0.110	1.04	0.994
Moderate Exercise	0.37	0.353	1.01	0.995
Vigorous Exercise	1.00	1.000	1.00	1.000
Exercise Frequency (≥3 Times a Week)	0.58	0.321	0.39	0.333
Cancer Diagnosis [a]				
Breast Cancer	0.93	0.895	–	–
Cervical Cancer	1.45	0.765	–	–
Colorectal Cancer	0.22	0.196	0.33	0.462
Lymphoma	1.92	0.460	–	–

(continue)

Table 5. Univariate and multivariate binary logistic regression analyses of the predictors of distress among the participants (N = 60) (continued)

Predictors	**Distress Level (With Distress)**			
	Unadjusted Model (Univariate)		**Adjusted Model[b] (Multivariate)**	
	Crude OR (cOR)	***p*-value (Two-Tailed)**	**Adjusted OR (aOR)**	***p*-value (Two-Tailed)**
Ovarian Cancer	1.45	0.765	–	–
Cancer Stage				
Stage 1	Referent	–	–	–
Stage 2	1.08	0.937	–	–
Stage 3	1.56	0.699	–	–
Stage 4	0.42	0.407	–	–
Time from Cancer Diagnosis				
Less than 3 Months	Referent	–	Referent	–
Between 3 to 6 Months	0.24	0.081	0.15	0.213
Between 6 to 12 Months	0.42	0.323	0.03 *	0.042
Between 1 to 3 Years	0.33	0.140	0.14	0.123
More than 3 Years	1.33	0.819	0.07	0.232
Treatment Status				
No Treatment Yet	Referent	–	–	–
Ongoing Treatment	0.27	0.261	–	–
Post Treatment	0.88	0.923	–	–
Treatments Received				
Chemotherapy	0.91	0.880	–	–
Targeted Systemic Therapy	0.78	0.651	–	–
Radiation Therapy	1.05	0.928	–	–
Surgery	0.71	0.511	–	–
Medical Insurance (With)	0.71	0.511	–	–
Family History of Psychiatric Conditions (With)	1.00	1.000	–	–

a Note: Select cancer diagnoses (eg, gastric cancer, hepatocellular cancer, etc.) were omitted from the analyses due to low number of cases.
b Note: The multivariate analyses included select predictors from univariate analyses with computed *p*-values ≤0.25.
* Significant at 0.05
† Significant at 0.01

concerns compared to the older cancer population, which includes but is not limited to developmental and life-stage challenges in terms of education and career disruption, fertility and family planning, financial burden as younger adults may not yet have established financial independence, psychosocial and relationship concerns, as well as long-term survivorship issues.[21] The burden of cancer is perceived to be greater in the younger population compared to older counterparts due to their higher survival rates and longer life expectancy. At present, there is not much data on the prevalence of cancer in the young adult population in the local setting, as well as prevalence and distress in this population. This study included young adult cancer patients' aged 19-39 years old. This study examines the prevalence and contributing factors to psychological distress among young adult cancer patients in a private tertiary hospital in the Philippines. It addresses a significant gap in literature by focusing on a patient group often overlooked or presumed to share similar experiences with older adults. The authors utilized the NCCN-DT Screening Tool and Problem List to identify key determinants of distress. The methodology is strengthened by the use of this tool, which has been validated and tested for

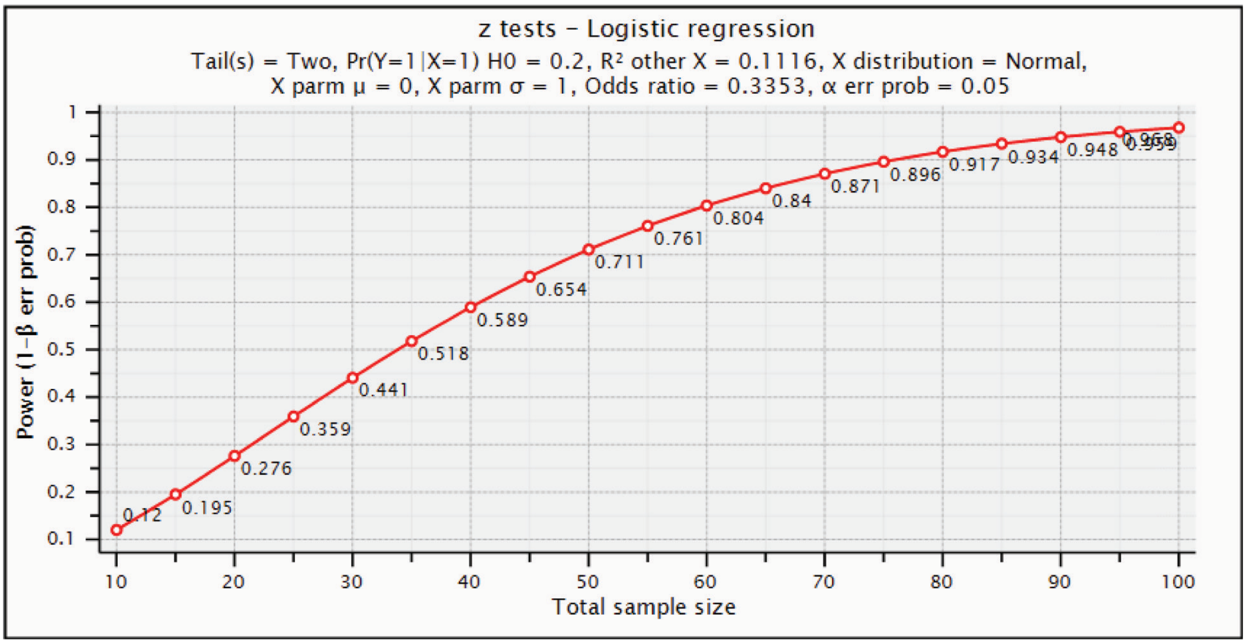

Figure 1. Power analysis for logistic regression analysis

relevance among Asians, including Filipinos, for measuring distress.

The NCCN Distress Management Panel developed the DT, a tool for the initial screening of distress, with scores ranging from 0 to 10 (no distress to extreme distress).[12] Identification of key problems leading to perception of distress is also one of the strengths of the NCCN-DT. The NCCN-DT has been validated by studies that included patients with various cancer types, different settings, languages, cultures and countries, showing good sensitivity and specificity. Ma, et al., conducted a meta-analysis in 2014 to examine the diagnostic role and cutoff score of the DT compared with various reference standards. The study revealed a good balance between pooled sensitivity of the DT to be 81% (95% CI, 0.79–0.82) and pooled specificity to be 72% (95% CI, 0.71–0.72) at a cutoff score of 4. [22] A local study by Pizarro, et al., published in 2022 was able to validate the NCCN-DT among Filipino cancer patients with satisfactory diagnostic accuracy in comparison to reference standards.[13]

In this study that included 60 participants, the prevalence rate of distress among participant young adult cancer patients was 58.33%, with the mean distress score of 4.11. Among different sources of distress based on the Problem List, the most prevalent was related to worry and anxiety at 71.67%, problems related to finances at 48.33%, fear at 45%, physical concerns related to sleep at 41.67% and concerns related to work at 41.67%. Highlighting the demographic characteristics of those with significant distress scores, majority (51.43%) were in the age group of 36 to 39 years old, 74.29% were females, 50% were single, 82.86% finished tertiary education, 80% were employed with a monthly household income in the range of PHP 31,000 to PHP 60,000 (33.33%) and 62.86% living with their parents and family. Clinical characteristics of those with significant distress scores showed that majority (60%) had light physical exercise less than three times a week (68.57%), 54.29% had breast cancer diagnosis diagnosed with stage 2 cancer (43.33%) and whose cancer was diagnosed less than three months from the time of study. Majority (68.57%) were currently receiving treatment for malignancy, with chemotherapy being the most prevalent treatment received (74.29%).

On univariate analyses, results showed that none of the demographic and clinical characteristics significantly predicted development of distress among participants (p>0.05). Although not statistically significant, it can also be noted that computed p values of age at diagnosis (p=0.189), employment status (p=0.172), monthly household income, exercise intensity, colorectal cancer (p=0.196) and time from cancer diagnosis were less than 0.25, thus were included in the final multivariate analyses as shown in the results section Table 5. Multivariate binary logistic regression analyses showed that age at diagnosis, employment status, monthly household income, exercise intensity and colorectal cancer did not significantly predict the likelihood of developing distress among participants. One category of the time from cancer diagnosis significantly predicted distress development, specifically between 6 to 12 months from cancer diagnosis (aOR=0.03, p=0.042). This result indicates that the time from cancer diagnosis of 6 to 12 months decreased the likelihood of developing distress by 33.33% compared to those who were diagnosed less than three months prior. This finding may highlight the need to identify distress earlier in the course of the young adult patient's cancer journey, suggesting early recognition in order to address factors leading to development of distress. This result, however, is not correlated to other factors as was previously discussed. This finding was somewhat similar to results of the study conducted by Chan, et al., published in 2018 that assessed psychological distress among Asian adolescent and young adult cancer patients in Singapore, wherein more than 40% presented with distress on diagnosis or within a month of diagnosis.[18]

The study also found associations between distress level and its different sources based on the NCCN Problem List. Factors significantly contributing to distress are concerns on changes in eating, loss or change of physical abilities, worry or anxiety, sadness or depression, loss of interest or enjoyment, loneliness, changes in appearance, feelings of worthlessness or being a burden, relationship with friends, ability to have children, taking care of oneself, finances, access to medicine, issues on sense of meaning or purpose and on death, dying and afterlife. These concerns contributing to distress should be addressed as soon as recognized through early assessment as these can result in poor treatment adherence that can eventually affect outcomes. Early intervention can also prevent intensification of distress, which may improve outcomes overall.

In this study, most of the factors with significant influence to distress are emotional and practical concerns, similar to the study conducted by Chan, et al., in Asian adolescent and young adult cancer patients.[18] The emotional concerns may be falsely attributed solely as cancer symptoms that are normally observed in patients undergoing treatment. If left unmanaged, it can affect patients' decisions later on, impacting adherence and eventually cancer outcomes, hence the recommendation to identify sources other than the disease process itself utilizing early screening. Practical concerns which include taking care of themselves, finances and access to medicines reported by respondents in this study were probably mainly because work and source of income was a crucial matter in this age group.

The study appropriately addressed the effects of participants' clinico-demographic characteristics; however, the timing of data collection may have influenced their responses. Conducted during the end-of-year months—a unique season for Filipinos—participants' emotions may have been shaped by personal, socio-cultural and economic factors prevalent during this period. To minimize this time-related bias, year-round data collection is recommended.

Another limitation is the study's confinement to a single private tertiary hospital in the Philippines, which limits the generalizability of findings to the broader population of Filipino young adult cancer patients. Future research should include a wider range of institutions, including both government and private facilities to ensure more comprehensive representation.

CONCLUSION

Significant distress is present in more than 50% of young adult cancer patients seen in a private tertiary institution in the Philippines. Time from cancer diagnosis significantly predicted distress development. Emotional and practical concerns significantly contributed to distress in this population.

Ethical Considerations

Research implementation and data collection were started upon approval from the IRB. The investigators underwent good clinical practice certification. Patient safety and confidentiality were ensured throughout the study. Confidentiality was assured as all gathered data were stored in a password-protected computer and secured in a locked drawer to preserve confidentiality. The researcher was the only one with access to gathered data. The stored data will be deleted from the computer and papers containing gathered data will be shredded as soon as the study is completed. Compliance with the National Ethical Guidelines for Health and Health Related Research (NEGHHRR) 2017 and

Data Privacy Act of 2012 were assured in the conduct of this study. No conflict of interest was involved in this study. Beneficial contribution to scientific knowledge includes establishing prevalence and determinants of distress in young adult cancer patients.

REFERENCES

1. Adolescent and Young Adult Oncology Progress Review Group. Closing the Gap: Research and Care Imperatives for Adolescents and young Adults with Cancer. NIH Pub. No. 06-6067. 2006.
2. U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool [Internet]. Cdc.gov. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2015. Available from: https://www.cdc.gov/cancer/dataviz
3. McDonald FEJ, Patterson P, Kim B, White K. Working beyond the patient and cancer for adolescents and young adults. *Eur J Cancer Care (Engl)* [Internet]. 2018;27(6):e12967. Available from: http://dx.doi.org/10.1111/ecc.12967
4. Bleyer A, Ferrari A, Whelan J, Barr RD. Global assessment of cancer incidence and survival in adolescents and young adults: Bleyer et al. *Pediatr Blood Cancer* [Internet]. 2017;64(9):e26497. Available from: http://dx.doi.org/10.1002/pbc.26497
5. Miller KD, Fidler-Benaoudia M, Keegan TH, Hipp HS, Jemal A, Siegel RL. Cancer statistics for adolescents and young adults, 2020. *CA Cancer J Clin* [Internet]. 2020;70(6):443–59. Available from: http://dx.doi.org/10.3322/caac.21637
6. Palmer S, Patterson P, Thompson K. A national approach to improving adolescent and young adult (AYA) oncology psychosocial care: the development of AYA - specific psychosocial assessment and care tools. *Palliat Support Care*. 2014;12(3):183–8.
7. Blanke CD, Bot BM, Thomas DM, Bleyer A, Kohne C-H, Seymour MT, et al. Impact of young age on treatment efficacy and safety in advanced colorectal cancer: a pooled analysis of patients from nine first-line phase III chemotherapy trials. *J Clin Oncol* [Internet]. 2011;29(20):2781–6. Available from: http://dx.doi.org/10.1200/JCO.2010.33.5281
8. Bray F, Colombet M, Mery L, Piñeros M, Znaor A, Zanetti R, Ferlay J, eds. Cancer Incidence in Five Continents Volume XI. IARC Scientific Publication No. 166 [Internet]. 2021. Available from: https://publications.iarc.fr/Book-And-Report-Series/Iarc-Scientific-Publications/Cancer-Incidence-In-Five-Continents%C2%A0Volume-XI-2021
9. Li CK, Dalvi R, Yonemori K. Care of adolescents and young adults with cancer in Asia: results of an ESMO/SIOPE/SIOP Asia survey. *ESMO Open* [Internet]. 2019;4. Available from: http://dx.doi.org/10.1136/esmoopen-2018-000467
10. Kaul S, Avila JC, Mutambudzi M, Russell H, Kirchhoff AC, Schwartz CL. Mental distress and health care use among survivors of adolescent and young adult cancer: a cross - sectional analysis of the national health interview survey. *Cancer*. 2016;123:869–78.
11. Adolescent and Young Adult Oncology Psychosocial Care Manual (Rev). Sydney, NSW, Australia: Canteen; 2015.
12. Riba MB, Donovan KA, Ahmed K, Andersen B, Braun I, Breitbart WS, et al. NCCN guidelines® insights: distress management, version 2.2023. *J Natl Compr Canc Netw* [Internet]. 2023;21(5):450–7. Available from: http://dx.doi.org/10.6004/jnccn.2023.0026
13. Pizarro DM, Francia MB, Ordinario MV. Diagnostic accuracy of the NCCN Distress Thermometer for the assessment of psychosocial sistress among Filipino patients with cancer. *Acta Medica Philippina*. 2022;56(12):5–11.
14. Tang L-L, Zhang Y-N, Pang Y, Zhang H-W, Song L-L. Validation and reliability of distress thermometer in Chinese cancer patients. *Chin J Cancer Res* [Internet]. 2011;23(1):54–8. Available from: http://dx.doi.org/10.1007/s11670-011-0054-y
15. Riba MB, Donovan KA, Ahmed K, Andersen B, Braun I, Breitbart WS, et al. NCCN guidelines version 2.2022 distress management. *J Natl Compr Canc Netw*. 2022;20(2).
16. Syrjala KL, Yi JC, Langer SL. Psychometric properties of the Cancer and Treatment Distress (CTXD) measure in hematopoietic cell transplantation patients: Cancer and Treatment Distress (CTXD) psychometric properties. *Psychooncology* [Internet]. 2016;25(5):529–35. Available from: http://dx.doi.org/10.1002/pon.3861
17. McDonnell GA, Pope AW, Schuler TA, Ford JS. The relationship between cancer-related worry and posttraumatic growth in adolescent and young adult cancer survivors. *Psychooncology* [Internet]. 2018;27(9):2155–64. Available from: http://dx.doi.org/10.1002/pon.4785
18. Chan A, Poon E, Goh WL, Yanxiang G, Tan CJ, Yeo K, et al. Assessment of psychological distress among Asian adolescents and young adults (AYA) cancer patients using the distress thermometer: a prospective, longitudinal study. Supportive care in cancer. *Nature: Springer*; 2018.
19. Daniel WW, Cross CL. Biostatistics: A foundation for analysis in the health sciences. 10th ed. Nashville, TN: John Wiley & Sons; 2013.
20. Raykov T, Marcoulides G. An introduction to applied multivariate analysis. NJ: Routledge. Taylor & Francis Group; 2008.
21. Rosenberg AR, Wolfe J. Challenges and opportunities in pediatric palliative care research: adolescents and young adults. *Palliative Medicine*. 2013;27(7):586–91.
22. Ma X, Zhang J, Zhong W, Shu C, Wang F, Wen J, et al. The diagnostic role of a short screening tool–the distress thermometer: a meta-analysis. *Support Care Cancer* [Internet]. 2014;22(7):1741–55. Available from: http://dx.doi.org/10.1007/s00520-014-2143-1