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Prevalence of hopelessness and suicidal ideation and their associated factors among pediatric patients with leukemia

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Abstract

Background With the increasing survival rate of pediatric patients with leukemia, improving their quality of life (QoL) is the new challenge. Psychiatric disorders are among the significant confounding factors of the aforementioned patients' QoL. Ninety-seven pediatric patients with leukemia were evaluated based on the Beck Hopelessness and SI scale while considering associated factors. We assessed the prevalence of suicidal ideation (SI) and hopelessness, as two of the most prevalent psychiatric symptoms of pediatrics with malignancy while assessing some of the associated factors to provide a plenary insight.

Results Prevalence of SI and hopelessness were 7.2% and 87.6% respectively. Gender, education, the abode of living, time from onset of disease, and parents' education level and income states of many were significantly related to the prevalence of the two studied psychiatric disorders. Multiple logistic regression determined a significant confounding role of abode of living, parent's education, onset, and type of leukemia in hopelessness. As for SI, the result of the latter test determined more confounding factors such as age and patients' education.

Conclusion Both SI and hopelessness are noticeable disorders among children with leukemia with multiple manageable associated factors; hence, it is advisable to recommend psychiatric assessment of leukemic children.

Keywords Suicidal ideation, Hopelessness, Leukemia, Children

Introduction

According to World Health Organization (WHO), the prevalence of malignancy is 50–200 million per year among children. Leukemia accounts for nearly one-third of pediatric malignancies of which acute lymphoblastic

leukemia (ALL) and acute myeloblastic leukemia (AML) make up 95% of leukemia types [1, 2]. Fortunately, along with the increase in malignancy rate, the survival rate of leukemic children has increased over the years. Later accomplishment is associated with increased drug and psychiatric-related morbidities as a result of intense and continuous treatments, highlighting the importance of assessing these patients' quality of life (QoL) in the early phases [3]. Both physical and psychosocial aspect of their lives is affected following treatment, and usually, it is the psychological aspect that receives suboptimal consideration [4, 5]. These psychological disorders that could seriously disturb patients' QoL vary from simple anxiety disorders to poor social functions and suicidal attempts [6]. Previous studies suggest that suicidal idea and tendency increases in the first six months of treatment

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initiation, but they could persist for years after primary diagnosis, since nearly 75% of patients with leukemia face relapse within the first 5 years. Also, hopelessness is known as an essential pre-condition for suicidal ideation (SI) [7]. Numerous factors such as socioeconomic status, the severity of the malignancy, and patients' demographic characteristics are associated with the incidence of SI and hopelessness among children with malignancy [8].

The study provided a focused investigators on two of important psychiatric symptoms, hopelessness, and SI, among leukemic pediatric patients as these 2 symptoms are highly associated with most important psychiatric disorders.

In order to specify an overview for the involved caregivers to help them improve these patients' mental health status subsequently QoL, many relevant associated factors with aforementioned symptoms were investigated as well. The aim of this study was to provide a plenary data that could help with better assessment of psychiatric status of these patients.

Method

In this cross-sectional study, 97 pediatric patients with confirmed leukemia who were registered at Amir Oncology Hospital, affiliated with Shiraz University of Medical Sciences were enrolled from February 2021 to December 2022. All the pediatric patients older than 10 years old with confirmed diagnosed leukemia through bone marrow aspiration and cytology with a history of at least 6 months of treatment were included. Later criteria were determined by our psychiatrist with focus on enough exposure to the environment and relative emotional maturity to assess studied symptoms more accurate. Those with a history of psychiatric disorders, history of previous malignancy, and consumption of psychiatric drugs were excluded. Proper treatment and chemotherapy regimen was determined by a single pediatric oncologist. After explaining the study objectives, a written informed consent form was obtained from each participant's legal guardian.

Chemotherapy regimen

Based on the leukemia type and each individual's condition, one of the high or standard-risk protocols was used. The high-risk protocol consists of induced remission (1 month), consolidation (9 weeks), interim maintenance 1 (7 weeks), delayed intensification 1 (8 weeks), re-consolidation (4 weeks), and maintenance (20–32 months). Standard risk protocol includes induction of remission (1 month), consolidation (1 month), interim maintenance (1 month), delayed intensification (2 months), and maintenance (20–32 months). As for AML, the regimen was as follows: the protocol consists of induced remission

(1 month), consolidation (6 weeks), interim maintenance 1 (7 weeks), delayed intensification 1 (8 weeks), re-consolidation (4 weeks), and maintenance (12 months) [9].

Psychiatric assessment

Two questionnaire forms were designed by our center's psychiatrist based on the Beck Hopelessness and SI scale, which were filled through a direct interview with the patients [10]. All the patients who filled out the forms had gone through at least 6 months of both out-patient and in-patient chemotherapy. Based on the scoring system of the questionnaires, patients' scores of 0–3 points were considered as patients with no suicidal ideas, those with 4–11 points were considered a low-risk group and those with 12–38 points were considered a high-risk group. As for scaling hopelessness scaling, 8 points were considered as cut off and those with more than 8 points were considered as hopeless patients [10]. Participants' demographic data, such as age, gender, onset, abode of living, parents' education level, and salary were obtained from patient's electronic files.

Statistical analysis

In the descriptive analysis, the available data for the quantitative variables were expressed as the mean (\pm standard deviation), and the qualitative variables were expressed as frequency and percentage.

The relation between two categorical variables was determined, using the chi-square test or Fisher's exact test. Shapiro–Wilk test was performed for quantitative variables and the result showed that hopelessness and SI are not normally distributed. Hence, Mann–Whitney *U* test and Kruskal–Wallis *H* test were used to show the significant difference in the laboratory test between the two groups. After that, all associations with *P* value < 0.2 were included in multiple logistic regression.

All statistical analysis was performed using SPSS software, version 25 (SPSS Inc. Chicago, IL.). A *P* value less than 0.05 was considered to be statistically significant.

Result

The mean age of 97 patients with leukemia in this cross-sectional was 13.21 ± 2.93 of whom 44.3% were females. Table 1 represents the general characteristics of the participants. Almost 96% of the participants were suffering from acute lymphoblastic leukemia (ALL). Regarding the socioeconomic status of their parents, the educational status was as follows: 21.6% under a high school diploma, 32% high school diploma, and 46.4% had higher education. Two-thirds of patients were from the middle class. Prevalence of suicidal ideas was as follows: no SI (92.8%), mild risk (7.2%) and none had a high risk for SI. As for hopelessness, only 12.4% of the participants did

Table 1 General characteristics of 97 leukemic pediatric patients

Variables		Number	Percent (%)
Gender	female	43	44.3
	male	54	55.7
Abode	urban	28	32.2
	rural	59	67.8
Education	Elementary	18	31.6
	Middle school	13	22.8
	High school	26	45.6
Parents' education	Under diploma	21	21.6
	Diploma	31	32.0
	Academic education	45	46.4
Income	Less than 10 million Rial (\$250)	11	11.3
	Between 10 to 20 million Rial (\$250–500)	59	60.8
	More than 20 million Rial (> \$500)	27	27.8
Type of leukemia	Acute lymphoblastic leukemia (ALL)	93	95.9
	Acute myeloblastic leukemia (AML)	4	4.1
Onset (month)	6 to 12 months	29	29.9
	12–24 months	25	25.8
	> 24 months	43	44.3
Severity	Standard	30	30.9
	High risk	67	69.1

not experience hopelessness and the rest were suffering from the latter disorder. Based on recommended chemotherapy protocol, the severity was classified as standard and high risk (69.1%). Considering the potential contributing factors, such as gender, education, the abode of living, time from onset of disease, and parents' education level and income states of many were significantly related to the prevalence of the two studied psychiatric disorders (Tables 2 and 3).

Both patients and their parents' education were significantly related to the prevalence of hopelessness, ($P=0.031$, $P=0.008$, respectively) as well as family income ($P=0.0$). As for SI, the location was statistically related to its prevalence amongst those who lived in urban areas (0.001). Similar to hopelessness, the type of leukemia, and parents' socio-economic states significantly correlated. All the variables that had a P value >0.2 in univariate analysis were entered in the multiple regression analysis test. Regression analysis test for SI revealed city ($P=0.012$), 95% confidence interval (CI) (0.21–1.68), patients and parents' education ($P=0.001$, CI: -3.07 to 0.82 , $P=0.022$, CI: 0.15 to 1.88, respectively) and leukemia type ($P= <0.001$, CI 2.6 to 5.9) were considered as significant contributing factors (Table 3).

Table 4 summarizes the results of multiple logistic regression to determine the independent factors associated with hopelessness. The potential determinants included gender, age, abode area, education, income,

leukemia type, and the onset of the disease. Of the aforementioned variables, abode ($P=0.015$, CI -1 to -0.11), parents' education ($P=0.005$, CI 0.3 to 1.58), leukemia type ($P<0.001$, CI 5.91 to 8.21) and the onset of disease ($P=0.003$, CI -0.65 to -0.14) were statistically significant as the contributing factors. Table 5 summarizes the results of multiple logistic regression to determine the independent factors associated with SI which determined the significant role of all the factors entered in the latter test except for parent's income.

Discussion

With respect to the increased survival rate of pediatric leukemic patients, psychiatric disorders, such as hopelessness and SI are prevalent disturbing factors of their QoL, which should be assessed more accurately [11]. Of the nearly 100 pediatric patients with leukemia, the prevalence of hopelessness and SI were 87.6% and 7.2%, respectively. Of the associated factors, age, abode of living, and education of both patients and their parents were significantly related. As for SI, location, parent's education, and the disease onset were relatively correlated.

Hopelessness is considered an essential precondition for SI; therefore, it is a necessity to assess this disorder since we observed an extremely high rate of later disorder amongst our patients [7]. The income and education of their parents were significantly related to the prevalence of hopelessness among our patients.

Table 2 Beck Hopelessness Scale of 97 leukemic patients and associated factors

Variables		Mean ± standard deviation	P value
Gender	Female	10.16 ± 2.48	0.780
	Male	9.98 ± 1.89	
Abode	Urban	9.43 ± 1.83	0.108
	Rural	10.52 ± 2.22	
Education	Elementary	11.14 ± 2.67	0.031*
	Middle school	9.50 ± 1.15	
	High school	9.92 ± 2.36	
Parents' education	Under diploma	11.58 ± 2.55	0.008*
	Diploma	11.14 ± 2.59	
	Academic education	10.58 ± 2	
Income	Less than 10 million Rial (\$250)	9.2 ± 1.7	0.017*
	Between 10 to 20 million Rial (\$250–500)	12.55 ± 2.84	
	More than 20 million Rial (> \$500)	9.78 ± 1.86	
Type of leukemia	Acute lymphoblastic leukemia (ALL)	9.67 ± 1.86	0.001*
	Acute myeloblastic leukemia (AML)	9.85 ± 1.94	
Onset	6 to 12 months	15	0.372*
	12–24 months	9.86 ± 1.03	
	> 24 months	9.6 ± 1.55	
Severity	Standard	9.44 ± 2.08	0.387
	High risk	10.65 ± 2.52	
Variables		10 ± 0.79	
Gender	Female	10.09 ± 2.55	

* Statistically significant

Table 3 Beck Suicidal Ideation Scale of 97 leukemic patients and associated factors

Variables		Mean ± standard deviation	P value
Gender	Female	1.21 ± 2.24	0.780
	Male	0.28 ± 0.6	
Abode	Urban	1.11 ± 1.37	0.108
	Rural	0.69 ± 1.92	
Education	Elementary	0	0.031*
	Middle school	0.17 ± 0.38	
	High school	0.92 ± 1.75	
Parents' education	Under diploma	1.54 ± 2.49	0.008*
	Diploma	1.95 ± 2.71	
	Academic education	0.26 ± 0.68	
Income	Less than 1 million Rial (\$250)	0.4 ± 1.03	0.017*
	Between 1 to 2 million Rial (\$250–500)	2.91 ± 3.27	
	More than 2 million Rial (> \$500)	0.29 ± 0.81	
Type of leukemia	Acute lymphoblastic leukemia (ALL)	0.67 ± 1.27	0.001*
	Acute myeloblastic leukemia (AML)	0.42 ± 0.96	
Onset	6 to 12 months	7	0.372*
	12–24 months	0.93 ± 1.21	
	> 24 months	0.8 ± 1.66	
Severity	Standard	0.44 ± 0.77	0.387
	High risk	0.72 ± 2.05	
Variables		0.4 ± 0.93	
Gender	Female	0.82 ± 1.83	

* Statistically significant

Table 4 Results of multiple logistic regression of associated covariates in hopelessness

	B	Sig	95.0% confidence interval lower to upper bound	
Covariant	-8.70	<0.001 ^a	-12.698	-4.706
Age	0.17	0.077	-.019	.362
Gender	-0.35	0.248	-.965	.256
Abode of living	-0.55	0.015 ^a	-1.000	-.116
Education	0.25	0.471	-.443	.944
Parent's education	0.94	0.005 ^a	.309	1.584
Parent's income	0.02	0.951	-.622	.662
Type of leukemia	7.06	<0.001 ^a	5.917	8.219
Onset	-0.39	0.003 ^a	-.652	-.146

^a Statistically significant**Table 5** Results of multiple logistic regression of associated covariates in suicidal ideation

	B	P value	95.0% confidence interval lower to upper bound	
Covariant	-7.19	0.008*	-12.39	-2
Age	0.98	<0.001*	0.67	1.28
Abode of living	0.95	0.012*	0.21	1.68
Education	-1.95	0.001*	-3.07	-0.82
Parent's education	1.02	0.022*	0.15	1.88
Parent's income	-0.07	0.866	-0.99	0.84
Type of leukemia	4.25	<0.001*	2.60	5.90

* Statistically significant

A recent study on assessing the burden on the parents of children with leukemia revealed a significant correlation between both parents' income and education [12]. The high burden of the disease on parents would definitely affect the psychological status of the patients themselves. Parents' socioeconomic status was related to their abode of living as patients in rural areas had more hopelessness scale in comparison with those living in urban areas. Bernard et al. (2019) highlighted the effect of the socio-economic status of patients with leukemia on their depression; hence, we emphasize on the financial support of these patients and their family in order to achieve better progress and QoL [13].

The fact that SI is prominently related to the overall mortality rate of cancer survivors, highlights the assessment of this psychiatric disorder amongst children with leukemia, the most prevalent pediatric malignancy [14].

In a survey of a significant number of participants, a prevalence of 12.8% was recorded for SI. (9) Another plenary study by Recktilis et al. (2010) determined that survivors of childhood malignancy were at higher risk of SI in comparison with the control group. In their study, they also assessed the associated factors, such as onset, age, gender, and severity, of which none were significantly relevant. We observed the onset and time from diagnosis as confounding factors in SI [15]. Age was counted as a significantly associated factor. As children were getting older, they were more affected by psychiatric conditions and age was significantly related to the incidence of SI. As opposed to our result Reckitis et al. (2010) declared that age was not related to SI incidence [15]. Of course, it should be kept in mind that the study was on all kinds of malignancies. Seltzer et al. (2014) on the other hand, confirmed the correlation between age and prevalence of SI [14]. Another confounding factor was the place of abode. Those who lived in rural areas were more susceptible to SI. The latter point may be affected by the lower socio-economic status of urban citizens. In contrast with our study, Zhong et al. (2017) did not find any significant correlation between their place of residence and SI [16]. As for the education of their parents was correlated as well to the SI.

There have been numerous studies on the assessment of SI amongst survivors of childhood malignancies, but not enough evaluation has been done specifically in pediatric leukemic patients and as we recorded the prevalence of 7.2% SI among leukemia patients, we encourage more investigations regarding this serious psychiatric disorder. Our study is the first study in the Middle East that tried to evaluate the prevalence of SI and hopelessness, specifically among pediatrics with leukemia. Moreover, many associated factors were also considered. Despite the above-mentioned strengths, this study faced some limitations. First, it was not a prospective study. Therefore, we did not have any role in randomizing the patients and interfere with classification of patients. This reinforces the necessity of a multi-center randomized clinical trial to assess the long-term evaluation of the two mentioned psychiatric disorders among pediatrics with leukemia.

Conclusion

In conclusion, both SI and hopelessness are noticeable disorders among children with leukemia; hence, it is advisable to recommend a close psychiatric assessment of children with leukemia. A larger prospective multi-center clinical trial is warranted to assess the long-term evaluation of studied psychiatric disorders in order to provide more comprehensive management.

Abbreviations

QoL	Quality of life
SI	Suicidal ideation
ALL	Acute lymphoblastic leukemia
AML	Acute myeloblastic leukemia
CI	Confidence interval

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Authors' contributions

Omid Reza Zekavat, developed the primary design of the study and framework. Negar Safari, significantly contributed to writing the script and data gathering. Amirabbas Pakniyat participated in designing the study and preparing the script and data analysis. Haleh Bozorgi took significant part in preparing the script and writing and data analysis and had the final review. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations**Ethics approval and consent to participate**

The study was approved by the local Ethics Committee of Shiraz University of Medical Sciences with the code number of 12579-01-01-95.

Consent for publication

Written informed consent was obtained from all subjects and/or their legal guardian(s).

Competing interests

Omid Reza Zekavat, Negar Safari, Amirabbas Pakniyat, and Haleh Bozorgi declare that they have no competing interests.

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