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Socio-demographics associated with stress and anxiety level among patients diagnosed with proliferative disease of the haematopoietic system

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Summary

Aim. The most common psychiatric disorders in cancer patients are anxiety disorders. These arise from negative experiences and personal traumas of the patient, the fear of developing cancer, the fear of death, and anxiety about painful examinations and procedures. This article aims to determine the occurrence and intensity of stress and anxiety in patients diagnosed with proliferative disease of the haematopoietic system and their socio-demographic correlates.

Material and methods. The study involved 100 patients diagnosed with proliferative disease of the haematopoietic system (acute leukaemia, chronic leukaemia, lymphoma, plasma cell myeloma, erythraemia). Participants completed the Perceived Stress Scale, State-Trait Anxiety Inventory and a questionnaire on socio-demographic variables and disease characteristics. Differences between patient results and tool validation group results were examined using one-sample Student's *t*-tests. Relationships between variables were determined using Spearman's rho and the Kruskal-Wallis test.

Results. Patients with proliferative disease of the haematopoietic system exhibit higher levels of stress compared to the general population. Socio-demographic variables, such as marital status and occupational situations, had significant implications for stress intensity. The participants showed a moderate level of state anxiety and a lower inclination to react with fear compared to the tool normalisation group. As in the case of stress, the presence of loved ones, occupational situations and age significantly influenced the intensity of anxiety. The higher the stress among the participants, the higher their experienced anxiety.

Conclusions. Coping with cancer, i.e. fighting the disease, involves the search for emotional and instrumental support by affected individuals. Supportive environmental conditions

such as stable family and professional situations are crucial for the psychological well-being of the participants.

Key words: anxiety, stress, proliferative diseases of the haematopoietic system

Introduction

Anxiety disorders and chronic stress are among the many psychological challenges faced by patients diagnosed with proliferative diseases of the haematopoietic system. Terms such as 'cancer distress', indicating a specific stress related to cancer [1], have been used for years, emphasising the need for routine assessment of stress intensity and associated anxiety in patients. This is essential to provide adequate support and improve their quality of life [2]. Stress and its intensity play a crucial role in the development, progression and treatment of cancer [1, 3, 4]. Psychological and behavioural factors are suggested to influence the occurrence or progression of cancer through psychosocial effects on immune functions [5]. The diagnosis of a chronic disease with an uncertain prognosis disrupts the patient's current life, both their private and professional spheres [6–8]. The need for hospitalisation, long-term treatment, its burdensome side effects, states of remission and recurrence of the disease, uncertainty of the next day are just some of the few causes of stress in oncological patients [9].

For almost four decades, research in psychoneuroimmunology (PNI) and numerous clinical and epidemiological studies have significantly contributed to understanding the impact of psychological stress on human diseases, particularly cancers associated with suppressed immune responses to tumours and stress. Individuals with immunosuppression due to pharmacological agents or immune deficiency-related conditions have an increased risk of cancer [10, 11]. Furthermore, stress [12] has been linked to the growth, progression and metastasis of tumours, as well as anxiety disorders [13]. Stress-induced changes in the sympathetic nervous system (SNS) lead to significant immunological alterations and persistent behavioural changes resembling anxiety [14–16]. Additionally, these changes can be reversed by blocking sympathetic signalling before exposure to stressors [14]. Epidemiological data regarding the prevalence of psychiatric disorders in patients with malignant oncological diseases usually include comparisons to the entire world population [9]. Anxiety disorders affecting psychological, somatic-vegetative and behavioural aspects, known as illness anxiety, extend beyond physiological reactions, leading to disruption in daily activities [17]. Pharmacotherapy, psychotherapy or a combination of both is often necessary in such cases, estimated to occur in almost half of cancer patients [17].

Anxiety contributes to a worse disease prognosis, less effective treatment, increased individual, societal and medical costs [18]. Generalised anxiety can occur in any chronic disease, cardiovascular disease, cancer, or respiratory system disease. Panic anxiety arises during life-threatening situations or acute pain episodes. Panic attacks can occur when receiving a diagnosis, encountering abnormal test results, or facing the prospect of returning to the hospital. Generalised anxiety persists through-

out the disease, with patients living in constant fear, apprehensive about follow-up examinations and interpreting subtle changes in their bodies as signs of cancer [19, 20]. Research indicates that psychological stress (depressive and anxiety symptoms) is associated with higher cancer-related mortality and poorer cancer survival but not with an increased incidence of cancer [21]. Early detection and effective intervention for anxiety and distress in cancer patients and the general population have clinical and public health significance.

Materials and methods

The study was conducted at the Haematology and Bone Marrow Transplantation Clinic in the Independent Public Clinical Hospital No. 1 in Lublin from December 2021 to March 2022. Before commencing the research, written consent was obtained from the Hospital Director and the Ward Nurse. The study included 106 patients diagnosed with proliferative diseases of the haematopoietic system, namely acute leukaemia, chronic leukaemia, lymphoma, plasma cell myeloma, and erythraemia. The analyses included data from 100 patients who completed the full test battery. All patients were informed that the collected data would be used for research purposes. Participation in the study was voluntary and anonymous.

The research utilised the following tools: (1) an author-developed survey questionnaire to examine socio-demographic variables and clinical characteristics of the patient group; (2) PSS-10 by Sheldon Cohen, Tom Kamarck and Robin Mermelstein, adapted by Zygfryd Juczyński and Nina Ogińska-Bulik [22]; and (3) STAI self-assessment questionnaire, sheets X-1 and X-2 (authors: C.D. Spielberger, J. Strelau, M. Tysarczyk, K. Wrześniewski) [23, 24].

A total of 100 individuals participated in the study (Table 1). Women comprised 54% of the sample, while men accounted for 46%. The mean age of the participants was 48.46 (SD = 16.13), with the youngest participant being 18 years old and the oldest 85. The largest group were patients in late adulthood (34%), while the least numerous were the oldest (aged 71–85 – 5%) and the youngest patients (aged 18–25 – 11%). The majority of participants were married, followed by single individuals. Every fifth participant was widowed or divorced. Most had higher or secondary education (75%), with 14% having vocational education and 11% primary education. More than half of the participants were employed (53%), 34% were retired or on a pension, and 10% were unemployed. The majority of participants lived in cities, while 41% of participants lived in rural areas.

Table 1. **Characteristics of participants in terms of selected socio-demographic variables**

Variable	**Group**	***N***	%
Gender	Female	54	54.00
	Male	46	46.00
Age	18-25	11	11.00
	26-40	21	21.00
	41-55	29	29.00
	56-70	34	34.00
	71-85	5	5.00
	M = 48.46; SD = 16.13; min. = 18, max. = 85		
Marital status	Single	18	18.00
	Married	62	62.00
	Widowed	9	9.00
	Divorced	11	11.00
Education	Primary	11	11.00
	Vocational	14	14.00
	Secondary	35	35.00
	Higher	40	40.00
Occupational status	Unemployed	10	10.00
	Retired	34	34.00
	Employed	53	53.00
	Other	3	3.00
Place of residence	Urban	59	59.00
	Rural	41	41.00
Clinical diagnosis	Acute leukaemia	23	23.00
	Chronic leukaemia	19	19.00
	Lymphoma	20	20.00
	Plasma cell myeloma	28	28.00
	Polycythaemia	10	10.00
Time since diagnosis (in years)	*M* = 4.88; SD = 5.45; min. < 1; max. = 24		
Coexisting diseases	No	61	61.00
	Yes	39	39.00

Clinical diagnoses included plasma cell myeloma as the largest group. Almost one-fourth of the patients had acute leukaemia, one-fifth had chronic leukaemia and also one-fifth had lymphoma, 10% had erythraemia. The mean time since diagnosis

was 4.88 years (*SD* = 5.45), with the shortest time less than a year and the longest 24 years. The majority of participants (61%) did not have concurrent diseases. The most commonly reported comorbidities were hypertension and diabetes. Family was the most frequently mentioned source of support, followed by friends for every fourth participant, medical staff for every fifth, and associations dedicated to fighting the disease for 2% of participants.

The results were described using means and standard deviations, minimum and maximum values, and the shape of the distribution was assessed using kurtosis and skewness coefficients and Kolmogorov-Smirnov tests. Percentage distributions were used to describe the participant group. The levels of stress and anxiety were assessed using one-sample *t*-tests and 95% confidence intervals for the mean. Parametric methods were chosen despite deviations from statistically normal distribution due to small deviations in this regard and the large group size.

Kruskal-Wallis *H* tests were used to assess the relationship between socio-demographic variables, disease characteristics and the level of anxiety and stress. The choice was influenced by the non-normal distribution of analysed variables in individual subgroups, their small size and uneven distribution. The interdependence between the anxiety level of the participants, the level of stress, age, and the time since diagnosis was examined using Spearman's rho coefficients. The choice of nonparametric methods was influenced by the presence of outliers in the two-dimensional distributions of correlated variables.

Results

Perceived stress in patients with proliferative disease of the haematopoietic system

Below are presented the results obtained by the participants on the *Perceived Stress Scale* (PSS-10), estimating the level of stress in individuals with proliferative diseases of the haematopoietic system (Table 2) and whether this level is related to socio-demographic variables and disease characteristics (Table 3).

Table 2. **Perceived stress of participants – adjusted results**

Variable	*M*	*SD*	*Me*	Min.	Max.	SKEW	KURT	Shapiro–Wilk Test	
								W	*P*
PSS	6.76	1.92	7	3	10	-0.15	-0.99	0.95	0.001

The average perceived stress among participants, compared to the normative group, was 6.76 sten [95% CI (6.38; 7.14)] with a standard deviation of 1.92. Half of the participants scored equal to or higher than sten score of 7. The Kolmogorov-Smirnov test showed statistically significant differences between the distribution in the perceived stress scale and the normal distribution (KS = 0.151; $p < 0.001$), with skewness and kurtosis coefficients (SKEW = – 0.150; KURT = – 0.930) indicating that these deviations were not very large, mainly concerning kurtosis.

The Student's *t*-test indicated that the participants had a statistically significantly higher level of stress than the average person in the normalisation group of the tool ($t(99) = 6.569$; $p < 0.001$; $d = 0.663$).

Table 3. **Selected socio-demographic and disease characteristic variables and perceived stress**

Variable	Category	Perceived stress				Kruskal-Wallis *H* test			
		M	*SD*	*N*	*Mr*	*H*	*df*	*P*	ε2
Gender	Female	21.81	7.05	54	54.97	2.798	1	0.094	0.029
	Male	19.33	6.15	46	45.25				
Marital status	Single	25.06	8.26	18	68.92	9.740	3	0.021	0.100
	Married	19.32	6.27	62	44.81				
	Widowed	21.22	4.35	9	53.17				
	Divorced	20.64	5.68	11	50.23				
Education	Primary	21.73	4.43	11	55.45	0.558	3	0.906	0.006
	Vocational	19.86	6.05	14	47.86				
	Secondary	20.29	6.81	35	49.06				
	Higher	21.00	7.54	40	51.33				
Occupational status	Unemployed	26.00	4.90	10	73.95	8.955	3	0.030	0.092
	Retired	19.74	6.45	34	46.50				
	Employed	20.55	6,88	53	49.89				
	Other	15.67	5.13	3	28.50				
Place of residence	Urban	21.10	6.69	59	52.59	0.751	1	0.386	0.008
	Rural	20.05	6.84	41	47.49				
Clinical diagnosis	Acute leukaemia	22.74	7.68	23	60.26	5.303	4	0.258	0.055
	Chronic leukaemia	19.37	5.78	19	45.58				
	Lymphoma	22.10	7.11	20	54.80				
	Plasma cell myeloma	19.54	6.89	28	46.13				
	Polycythaemia	18.70	3.47	10	41.05				
Coexisting diseases	No	21.25	6.43	61	52.79	0.975	1	0.324	0.010
	Yes	19.77	7.19	39	46.92				

N – number of observations; *M* – mean; *SD* – standard deviation; *Mr* – mean rank; *H* – test score; *p* – probability test; *df* – degrees of freedom; ε^2 – effect size

The selected socio-demographic variables and disease characteristics in the context of perceived stress are presented in Table 3. The analyses showed statistically significant, moderate relationships between marital status and perceived stress in the participants. Single individuals experienced the highest level of stress, followed by widowed individuals, then divorced individuals, and the lowest level of stress was

reported by married people. Post hoc tests revealed that single individuals differed in terms of perceived stress from married individuals ($Z = 5.62$; $p = 0.000$), widowed individuals ($Z = 3.72$; $p = 0.000$) and divorced individuals ($Z = 4.72$; $p = 0.000$). No statistically significant differences were found between the other groups.

The analyses also showed statistically significant, moderate relationships between the occupational status of the participants and their perceived stress. The highest stress was observed in the unemployed group, followed by the employed participants, then retirees and pensioners. Post hoc tests revealed that unemployed individuals statistically significantly differed in terms of perceived stress from retirees and pensioners ($Z = 5.83$ $p < 0.001$), employed individuals ($Z = 3.63$; $p < 0.001$) and individuals with other statuses ($Z = 17.73$; $p = 0.000$). Retirees and pensioners differed in terms of perceived stress from the 'other' group (2.51; $p = 0.006$), similarly, individuals with other statuses differed from the employed group ($Z = 1.93$; $p = 0.027$). No statistically significant differences were found between the other groups.

No statistically significant relationships were observed between the perceived stress of the participants and their age (rho = – 0.183; $p = 0.069$) and time since diagnosis (rho = – 0.106; $p = 0.293$).

Table 4. **Sources of support for participants and perceived stress**

Support source	Receiving support	Perceived stress				Kruskal-Wallis *H* test			
		M	*SD*	*N*	*Mr*	*H*	*df*	*p*	ε2
Family	No	23.73	6.67	15	62.60	3.079	1	0.079	0.032
	Yes	20.13	6.64	85	48.36				
Friends	No	21.42	6.38	77	53.53	3.653	1	0.056	0.038
	Yes	18.17	7.43	23	40.37				
Medical staff	No	21.12	6.65	81	52.13	1.349	1	0.245	0.014
	Yes	18.74	6.95	19	43.55				
Associations fighting diseases	No	20.68	6.81	98	50.56	0.022	1	0.882	0.000
	Yes	20.00	0.00	2	47.50				

N – number of observations; *M* – mean; *SD* – standard deviation; *Mr* – mean rank; *H* – test score; *p* – test probability; *df* – degrees of freedom; ε^2 – effect size

No statistically significant relationships were found between the sources of support for participants and the stress they perceived (Table 4).

Anxiety in the studied group of patients with proliferative disease of the haematopoietic system

Next, the participants' scores on the STAI were analysed. The level of anxiety experienced by individuals with haematologic malignancies was assessed (Table 5 and 6), and it was also checked whether this level was associated with socio-demographic and disease-specific variables (Table 7).

Table 5. **State anxiety – adjusted results**

Variable	*M*	*SD*	*Me*	Min	Max	SKEW	KURT	Shapiro-Wilk test	
								W	*p*
Anxiety (state)	5.05	2.55	5	1	10	0.05	-1.08	0.95	0.000

The average sten score in the anxiety scale, representing the currently experienced state of anxiety, was 5.05 [95% CI (4.54; 5.56)] with a standard deviation of 2.55. Half of the participants scored equal to or higher than sten score of 5. The Kolmogorov-Smirnov test indicated statistically significant differences between the distribution in the state anxiety scale and the normal distribution (KS = 0.126; p <0.001). Skewness and kurtosis coefficients (SKEW = 0.05; KURT = – 1.08) suggested that these deviations were not very large, mainly concerning kurtosis.

The conducted Students' *t*-test did not show statistically significant differences between the state anxiety level of the participants and the average anxiety level in the normalisation group of the tool ($t(99) = 1.763$; $p = 0.081$; $d = 0.225$). The 95% confidence interval also shows that the respondents had a moderate level of state anxiety.

Table 6. **Trait anxiety – adjusted results**

Variable	*M*	*SD*	*Me*	Min	Max	SKEW	KURT	Shapiro-Wilk test	
								W	*p*
Anxiety (Trait)	4.09	2.44	4	1	10	0.42	-0.45	0.93	0.000

The average sten score in the anxiety scale, representing the trait anxiety (tendency to react with anxiety), was 4.09 [95% CI (3.61; 4.57)] with a standard deviation of 2.44. Half of the participants scored equal to or higher than sten score of 4. The Kolmogorov-Smirnov test indicated statistically significant differences between the distribution in the trait anxiety scale (tendency to feel this emotion) and the normal distribution (KS = 0.128; $p < 0.001$). Skewness and kurtosis coefficients (SKEW = 0.42; KURT = – 0.45) suggested that these deviations were not very large.

The conducted Students' *t*-test showed statistically significant, moderate differences between the trait anxiety level of the participants and the average trait anxiety level in the population ($t(99) = 5.785$; $p < 0.001$; $d = 0.588$). The subjects were characterised by a lower tendency to react with anxiety than people from the normalisation group of the tool.

Table 7. **Selected socio-demographic variables, disease characteristics and the level of perceived anxiety**

Variable	Category	Anxiety (State)				Kruskal-Wallis *H* test			
		M	*SD*	*n*	*Mr*	*H*	*df*	*p*	ε2
Gender	Female	37.09	12.69	54	50.72	0.007	1	0.934	0.000
	Male	36.37	10.55	46	50.24				

table continued on the next page

Marital status	Single	46.17	12.23	18	72.00	12.286	3	0.006	0.127
	Married	34.35	11.08	62	45.03				
	Widowed	36.33	8.87	9	49.67				
	Divorced	35.27	9.54	11	46.82				
Education	Primary	39.36	10.01	11	57.32	1.272	3	0.736	0.013
	Vocational	34.36	8.98	14	44.61				
	Secondary	36.37	12.96	35	49.56				
	Higher	37.23	12.01	40	51.51				
Occupational status	Unemployed	46.70	12.02	10	72.65	9.033	3	0.029	0.093
	Retired	34.88	11.08	34	46.78				
	Employed	36.62	11.45	53	50.25				
	Other	27.33	2.31	3	23.33				
Place of residence	Urban	37.68	10.88	59	53.14	1.189	1	0.276	0.012
	Rural	35.44	12.82	41	46.71				
Clinical diagnosis	Acute leukaemia	40.22	12.37	23	58.93	5.480	4	0.242	0.056
	Chronic leukaemia	35.42	10.90	19	47.89				
	Lymphoma	40.15	12.15	20	56.88				
	Plasma cell myeloma	33.07	11.60	28	42.46				
	Polycythaemia	34.90	8.56	10	45.80				
Coexisting diseases	No	38.02	11.65	61	53.03	1.193	1	0.275	0.012
	Yes	34.79	11.65	39	46.54				

N – number of observations; *M* – mean; *SD* – standard deviation; *Mr* – mean rank; *H* – test score; *p* – test probability; *df* – degrees of freedom; ε^2 – effect size

The conducted analyses revealed statistically significant, moderate relationships between the marital status of the participants and the state anxiety. Single individuals experienced the highest anxiety levels, followed by widowed and divorced individuals, while married individuals reported the lowest anxiety levels. Post hoc tests confirmed significant differences between single individuals and married ($Z = 4.18$; $p < 0.001$), widowed ($Z = 6.79$; $p < 0.001$) and divorced individuals ($Z = 7.64$; $p < 0.001$). No statistically significant differences were found between the other groups.

The analyses revealed statistically significant, moderate correlations between the respondents' employment status and state anxiety. The highest anxiety was experienced by the unemployed individuals, followed by the employed individuals and retirees, while the lowest anxiety was experienced by those in the 'other' group. Post hoc tests revealed that the unemployed individuals differed statistically significantly in terms of anxiety (state) from retirees/pensioners ($Z = 5.48$; $p < 0.001$), employed individuals ($Z = 3.86$; $p < 0.001$) and those with other employment status ($Z = 19.24$; $p < 0.001$). Participants with other employment status differed significantly from retirees/pensioners ($Z = 3.41$; $p < 0.001$) and employed individuals ($Z = 2.58$; $p = 0.005$) in terms of state anxiety.

There were no statistically significant correlations between state anxiety and the time since the diagnosis of the disease (rho = –0.080; $p = 0.428$), but a weak correlation was found between state anxiety and the age of the participants (rho = –0.221; p = 0.035).

Table 8. **Sources of support indicated by participants and state anxiety**

Sources of support	Receiving support	State anxiety				Kruskal-Wallis *H* test			
		M	*SD*	*n*	*Mr*	*H*	*df*	*p*	ε2
Family	No	39.27	11.38	15	55.87	0.605	1	0.437	0.006
	Yes	36.32	11.77	85	49.55				
Friends	No	38.31	11.07	77	54.11	5.191	1	0.023	0.053
	Yes	31.57	12.50	23	38.41				
Medical staff	No	38.11	11.41	81	53.57	4.792	1	0.029	0.049
	Yes	31.00	11.44	19	37.39				
Associations fighting diseases	No	36.87	11.79	98	50.80	0.510	1	0.475	0.005
	Yes	31.50	2.12	2	36.00				

N – number of observations; *M* – mean; *SD* – standard deviation; *Mr* – mean rank; *H* – test score; *p* – test probability; *df* – degrees of freedom; ε^2 – effect size

The conducted analyses revealed statistically significant, weak correlations between individuals receiving support from friends and those not receiving such support. Participants receiving support from friends exhibited lower levels of anxiety (Table 11.

Similarly, statistically significant, weak correlations were found between individuals receiving support from medical staff and those not receiving such support. Participants receiving this type of support showed a lower level of state anxiety.

Table 9. **Selected socio-demographic variables, disease characteristics and propensity to respond with anxiety**

Variable	Category	Anxiety (State)				Kruskal-Wallis *H* test			
		M	*SD*	*n*	*Mr*	*H*	*df*	*p*	ε2
Gender	Female	39.83	10.27	54	53.73	1.459	1	0.227	0.015
	Male	37.67	9.87	46	46.71				
Marital status	Single	45.11	11.56	18	67.83	8.343	3	0.039	0.086
	Married	37.92	9.06	62	47.94				
	Widowed	36.11	8.33	9	43.94				
	Divorced	36.00	11.58	11	41.91				
Education	Primary	39.27	9.23	11	53.36	0.416	3	0.937	0.004
	Vocational	38.36	8.55	14	49.32				
	Secondary	39.34	10.38	35	52.20				
	Higher	38.45	10.87	40	48.64				
Occupational status	Unemployed	43.30	9.17	10	65.40	6.817	3	0.078	0.070
	Retired	38.24	9.14	34	49.43				
	Employed	39.02	10.70	53	50.30				
	Other	27.67	4.51	3	16.50				
Place of residence	Urban	39.63	10.21	59	52.62	0.769	1	0.381	0.008
	Rural	37.71	9.94	41	47.45				
Clinical diagnosis	Acute leukaemia	40.09	10.10	23	54.83	3.022	4	0.554	0.031
	Chronic leukaemia	40.32	10.01	19	54.58				
	Lymphoma	39.95	10.04	20	53.78				
	Plasma cell myeloma	36.68	10.09	28	44.66				
	Polycythaemia	37.00	11.13	10	42.60				
Coexisting diseases	No	39.82	10.29	61	53.02	1.178	1	0.278	0.012
	Yes	37.31	9.72	39	46.56				

N – number of observations; *M* – mean; *SD* – standard deviation; *Mr* – mean rank; *H* – test score; *p* – test probability; *df* – degrees of freedom; ε^2 – effect size

The analyses revealed statistically significant, moderate correlations between marital status and trait anxiety. Single participants experienced the highest anxiety, followed by married, widowed and divorced individuals. Post hoc tests confirmed that single individuals significantly differed in trait anxiety from married individuals ($Z = 2.99$; $p = 0.001$), widows/widowers ($Z = 7.28$; $p < 0.001$) and divorced individuals ($Z = 7.96$; $p < 0.001$). No statistically significant differences were found between the remaining groups. Selected socio-demographic variables, disease characteristics and the propensity to respond with anxiety are presented in Table 9.

There were no statistically significant associations between the propensity to experience anxiety and both age (rho = – 0.114; $p = 0.260$) and the time since diagnosis (rho = – 0.056; $p = 0.579$).

Table 10. **Sources of support indicated by participants and anxiety as a trait**

Sources of support	Receiving support	Trait anxiety				Kruskal-Wallis *H* test			
		M	*SD*	*n*	*Mr*	*H*	*df*	*p*	ε2
Family	No	41.87	10.55	15	58.17	1.234	1	0.267	0.013
	Yes	38.31	9.98	85	49.15				
Friends	No	39.82	9.42	77	53.56	3.726	1	0.054	0.038
	Yes	35.57	11.74	23	40.26				
Medical staff	No	39.59	10.29	81	52.52	2.067	1	0.151	0.021
	Yes	35.63	8.78	19	41.89				
Associations fighting diseases	No	39.01	10.12	98	51.02	1.579	1	0.209	0.016
	Yes	30.50	3.54	2	25.00				

N – number of observations; *M* – mean; *SD* – standard deviation; *Mr* – mean rank; *H* – test score; *p* – test probability; *df* – degrees of freedom; ε^2 – effect size

No statistically significant associations were found between the sources of support indicated by participants and their propensity to experience anxiety (Table 10).

Discussion

Patients with proliferative disease of the haematopoietic system exhibit the presence of many negative emotions and feelings. The uncertain prognosis of cancer disrupts their previous life and causes significant stress. It is particularly difficult to cope with tension, irritation and so-called personal problems. Correlates of feelings related to the disease also include socio-demographic variables such as social status, marital status, age, as well as type, amount and source of received support. Due to the fact that patients suffering from this disease are aware of the uncertainty of complete recovery, they often lose satisfaction and contentment with both their personal and professional lives. They fear that in this situation, it will be impossible to start a family, achieve planned goals and lead a normal life.

The obtained results were compared to other culturally similar samples. From our own research, it appears that individuals suffering from proliferative disease of the haematopoietic system exhibit a moderately higher level of stress compared with the population. Previous studies indicated that individuals diagnosed with cancer experience significant stress in their daily lives [25, 26]. Patients feel stress related to the unfavourable prognosis of the disease, burdensome symptoms during its course, and during treatment. The significance and role of psychological stress have been confirmed in numerous works, including systematic reviews [5]. Our research showed that individuals with proliferative diseases of the haematopoietic system had a moderate level of state anxiety. Patients with this disease were characterised by a low tendency to respond with anxiety. One possible reason for this phenomenon may be the suppression of anxiety by the participants, a crucial aspect worthy of further investigation using different measurement tools. Controlling and suppressing anxiety may lead to hiding and accumulating emotions, which, if maintained for a long time, can become the cause of many psychological and somatic disorders. The results do not align with those obtained so far in the group of Polish patients [27], where oncological patients exhibited a higher level of both state and trait anxiety compared to non-oncological patients.

Our research also indicates that stress levels in patients with proliferative diseases of the haematopoietic system remain higher. Nervousness and irritation were a particular burden for the studied patients, while coping with responsibilities was relatively less stressful for them. Consistent with other studies conducted in the Polish population [28] stress is an inherent element in the course of cancer. Among all diseases, cancer is the most stressful, accompanying patients at every stage of the disease and intensifying depending on the situation the patient finds themselves in [29].

The conducted research demonstrated that the frequency of stressful situations in patients with proliferative diseases of the haematopoietic system is associated with their marital status. Single individuals exhibited the highest stress levels, followed by widowed individuals and divorced individuals, while patients in a marital relationship showed the lowest stress levels. In line with previous studies [30–32], individuals in relationships were characterised by a high acceptance of the disease and, consequently, lower stress levels compared to widowed and divorced individuals.

Our research showed a weak correlation between state anxiety and the age of patients. The older the person with proliferative diseases of the haematopoietic system, the lower their anxiety level. A young age predisposed patients to the occurrence of state anxiety. Consistent with previous data [25, 33, 34] the younger the patient with cancer, the greater their anxiety. The research indicates a statistically significant, moderate correlation between the frequency of anxiety in patients with proliferative diseases of the haematopoietic system and their marital status. The highest results were obtained by single individuals, followed by individuals in a marital relationship, widows and widowers, and divorced individuals. Studies on this topic [35] indicate that anxiety disorders occurred in 91% of patients subjected to the study. The results show a relationship between the development of depression and anxiety and having a partner. Individuals in a relationship experienced fewer negative emotions, including anxiety and depressive states [36].

The presented research revealed statistically significant, weak correlations between support from medical staff received by individuals suffering from proliferative diseases of the haematopoietic system and the level of perceived anxiety. Participants who received support from medical staff were characterised by statistically significantly lower level of state anxiety. According to studies [37, 38], the support of medical staff is an integral part of medical care provided not only by psychologists but also by doctors, nurses and rehabilitation specialists.

Our research showed statistically significant, moderate correlations between the occupational status of patients and the perceived stress. The highest levels of stress and anxiety were observed in unemployed individuals, followed by those who were employed, retirees, and pensioners. The highest levels of negative emotions occurred in unemployed individuals, followed by those who were employed, retirees, and pensioners [39].

Our research revealed statistically significant, strong correlations between the sense of stress and both trait and state anxiety. The higher the sense of stress among participants, the higher their perceived anxiety and the tendency to fall into anxiety.

Conclusions

The analysis of the conducted research has led to the following conclusions:

1. Patients with the current proliferative disease of the haematopoietic system exhibit a higher level of stress compared to the general population. The highest level of stress was observed in the group of singles, followed by widowed individuals and divorced individuals, and the lowest – in married individuals.
2. The highest level of stress was found in the unemployed group, followed by the employed individuals, retirees and pensioners.
3. Patients with proliferative disease of the haematopoietic system displayed a moderate level of state anxiety and a lower tendency to react with anxiety than individuals in the tool's standardisation group.
4. The highest state anxiety was reported by single individuals, followed by widowers and widows, and divorced individuals, while the lowest anxiety level was observed in married individuals.
5. The highest state anxiety was found in patients with proliferative disease of the haematopoietic system who were unemployed, followed by the employed individuals, retirees and pensioners. Older diagnosed individuals tended to have lower state anxiety levels.
6. Participants who received support from friends exhibited lower levels of anxiety.
7. Participants who received support from medical staff had lower levels of state anxiety.
8. The highest level of trait anxiety was reported by single individuals, followed by married individuals, widows and widowers, and divorced individuals.

9. The higher the level of stress experienced by the participants, the higher their perceived anxiety.

Clinical implications

The obtained results provide a basis for recommendations of psychoeducation for a healthy part of the population. From our own research, it is evident that there are statistically significant relationships between the support received from friends by patients with proliferative disease of the haematopoietic system and the level of anxiety they experience. Participants who received support from friends exhibited lower levels of anxiety. Education in this area, along with social campaigns aimed at dealing with one's own fear of the sick, can improve the quality of life for the population of cancer patients. Empathy, support, understanding, and strength received from family and friends are indispensable in the fight against cancer and contribute to the improvement of the patients' mental state. The presence of loved ones reduces the patient's perceived anxiety and other negative emotions. Similarly, results regarding the importance of support from medical staff confirm that patients with the current cancer require care, support and the building of positive relationships by relieving them of negative feelings and emotions. This ensures them a sense of security and, consequently, a significant reduction in anxiety.

Study limitations and future research

The conducted research also showed that patients diagnosed with proliferative disease of the haematopoietic system exhibit a high intensity of stress and anxiety. An area not covered in these studies but worth exploring is the relationship between the patient's personality type and level of analysed parameters. It is assumed that personality traits and temperament will be significant for adopting different attitudes towards coping with the disease. Furthermore, in subsequent studies, it is essential to include the stages of the disease and changes in the intensity of stress and anxiety at each stage (from diagnosis).

In future research on the degree of stress and anxiety, it is recommended to conduct them on a larger group of patients. It would be worthwhile to classify the subjects not only based on the duration of the disease but also considering the degree of its advancement. An area worth deepening is also the manner in which support is provided by close ones, as well as comparing changes in different groups of patients based on various types of cancer.

An important limitation for concluding potential differences between patients diagnosed with proliferative disease of the haematopoietic system and the healthy population is the lack of a control group. In future studies, it is recommended to compare the results of the study participants in terms of the discussed variables with the healthy population, and perhaps also compare them with results of people with another classification of diseases. It should also be taken into account that the lack of a control group makes it impossible to exclude that the observed differences in the

level of stress and anxiety between patients with haematological malignancies and the general population may result from other factors, and not from the disease itself.

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