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Effect of Coping Strategies on Pain and Stress among Acute Leukemia Patients

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Abstract:
Background Patients with acute Leukemia showed symptoms of post-traumatic stress, Pain is common in cancer patients is estimated to be more than 70%**Aim:**To evaluate effect of Coping strategies on pain and stress among acute leukemia patients. **Design:** Purposive Quasi experimental **study and control** research design was used in the present study. **Setting :** This study was carried out at medical oncology intensive care unit at south Egypt cancer institute. **Sample:** Convenient sample of 60 adult patient Tools: include: demographic data ,numerical pain scale, post-traumatic Stress Disorder(PTSD) coping strategies with the Brief coping**. Results:** There were statistical significant differences between two groups before and after Coping strategies. on pain and stress. The change of mean pain score in pre application of coping strategy **7**.73±1.04 to post application of coping strategy 5.93±1.08, coping scores in the study group increased from pre 63.9±8.23 to post 74.9±6.61 (p=0.000), with significant enhancements observed in problem-focused coping (19.07±4.53 to 22.47±2.6, p=0.001) and emotion-focused coping (29.57±2.71 to 32.83±3.22, p=0.000) relationship between coping strategies with the Brief COPE and Post-Traumatic Stress Disorder For Study group on admission (r=-0.170) But There is Was a Negative correlation After I week (r= -.435*), **Conclusions**: statistical significant difference between control and study after using coping strategy to reduce pain and stress **Recommendations**: using coping strategy as routine care for leukemic patients by special team, Reapply this research on a larger sample size from other geographical areas in Egypt to ensure generalization.

Keywords: Coping strategy, Leukemia, Pain & Post-traumatic stress disorder.

Introduction:
An excess of white blood cells (WBCs) forming tissues leads to a significant rise in the number of immature or abnormal WBCs in circulation, which is the cause of leukemia, a type of hematological cancer. Acute leukemia can be more harmful because the quantity of abnormal WBCs in acute leukemia rises more quickly than in chronic leukemia. One or more hematopoietic stem cells can develop into acute leukemia, a malignant clonal illness. Atypical proliferation of primary and immature cells, which can happen at any age, is the disease's hallmark and prevents the bone marrow's normal hematopoietic activity
(Chennamadhavuni et al., 2023).
Over ten million people worldwide get a cancer diagnosis each year .One of the most prevalent symptoms that cancer patients experience is pain, which is a major concern upon receiving a cancer diagnosis. especially when the disease is advanced and the prevalence is thought to be higher than 70%. A patient's performance status and emotional health can be severely impacted by pain and poor relief, which can lower their quality of life and cause increased anxiety, sadness, anger, and even cognitive malfunction. Compared to those without a chronic illness, cancer patients are more likely to experience problems with their mental health. Psychiatric symptoms have negative impacts on patients' quality of life, mortality, and physical health outcomes **(Snijders et al., 2023).**
It occurs during chemotherapy for a variety of malignancies. Both non-pharmacological and pharmaceutical methods can be used to treat anxiety, fatigue, and poor sleep quality. Pharmacological interventions Possible treatments include acetaminophen, opioid analgesics, antidepressants, anticonvulsants, nonsteroidal anti-inflammatory drugs (NSAIDs), nerve blocks, corticosteroids, and anesthetics; specialized injections, infusions, medical devices, or surgical procedures; topical creams and skin patches. One type of non-pharmacological therapy is activity augmentation, or exercise. Using massage as a component of physical therapy Energy treatment, massage therapy, acupressure, yoga, hypnosis, music therapy, relaxation methods, and psychosocial intervention [coping behavior] (**Mestdagh et al., 2023)**.
Nurses are increasingly using these non-pharmacological therapies. By maintaining a balance between the anterior and posterior hypothalamus, muscle relaxation lowers sympathetic nervous system

activity and catecholamine secretion, which in turn lowers heart rate, muscle spasm, strain, anxiety, and exhaustion. **(Wang et al., 2025)**.

Coping has been proposed as one way that people react to stress or hazards, and it is essential to the treatment of cancer patients. It plays a crucial role in helping patients deal with the difficulties that come with receiving a cancer diagnosis and undergoing treatment. This research was Approach-oriented coping strategies (e.g. positive building, problem-solving, and using emotional support) are behavioral and cognitive techniques that directly address or help manage stress, whereas avoidant coping strategies such as denial, avoidance, and emotional suppression) involve removing oneself from the stress. and the illness experience **(Negash et al., 2025).**

In order to provide proper treatment in the intensive care unit, nurses play a crucial technical and psychosocial role as members of the interdisciplinary team that treats these patients. Nurses' major responsibilities in the intensive care unit are to keep patients safe and closely monitor them in order to identify any issues early **(Patrician., 2024).**

Patients and Method:

Aim of the study

To evaluate effect of coping strategies on pain and stress among acute leukemic patients

Study design:

Quasi experimental study & control research design was adopted to conduct this study.

Research hypothesis:

Coping strategies for acute leukemic patients is expected to have appositive effect in reducing pain and stress in study compare to control of patients

Setting:

The South Egypt Cancer Institute's medical oncology acute care unit served as the study's setting.

Variables:

Independent variable: Coping strategies.

Dependent variable: Pain and stress with acute Leukemic patients.

Sample: A purposive sample of 60 adult patients (male and female) study and control with acute leukemia in ICU, were included in the study.

Sample size

This sample was calculated according to Epi Info 2000. Based on special formula at a confidence interval of 95% and precision of (2%). The sample was increased by 10% to overcome problems related to non-responses and missing date. The power of study was 80%. Considering the following matching criteria age group, sex, and marital status, level of education.

They were divided into two equal groups at random: 30 patients received regular care as the control group, and 30 patients received coping skills as the study group.

Inclusion criteria:

- Newly admitted patients
- Both sex: (male and female)
- Patient age: (20-60 years).
- All patients diagnosed with acute Leukemia.

Exclusion criteria:

- Children.
- Pregnant women.
- Terminal stage of disease

Data Collection tools:

After reviewing the literature, the researcher developed three tools:

Tool (1): Demographic data assessment tool;

After reviewing the literature, the researcher developed this tool. It contains the following data: patient code, age, gender, marital status, and level of education.

Tool (2): Coping strategies with the Brief COPE, this tool adopted by **Carver., 1997) and** used by **(Cheng et al., 2023 used to reduce pain and stress.**

Tool (3): numerical pain scale adopted from, **The Australian Pain Society., 2018).** This tool was used to assess the severity of pain intensity among the studied patients. "On a scale of zero to 10, with zero meaning no pain and 10 meaning the worst pain possible.

A total score of this scale equal (10) divided into

Mild to moderate(0-7) severe(8-!0)

Tool (4): Post-Traumatic Stress Disorder Checklist– Civilian Version (PTSD)

.which developed by Weathers et al., 2013).Recently used by (**Forkus et al., 2023)** It will use the 17-item Post-Traumatic Stress Disorder Checklist to assess posttraumatic distress disorder (PTSD) symptoms.

No. Response Not at all (1)-A little bit (2)-Moderately (3)-Quite a bit(4)- Extremely(5)

Total score of this scale equal (85)

Ascore of 44 has been suggested as acut-off for the diagnosis of PTSD. total score ranges from 17 to 85, with higher scores indicating more sever PTSD symptoms.

Content Validity:

By creating the tools, following a comprehensive review of relevant literature and then submitted to a panel of five experts in the fields of critical care and emergency nursing. The suggested modifications were made, and the final versions were ready for use.

Reliability of the study tool:

The reliability of tools was done by using Cronbach's Alpha test to measure the internal consistency of the components of tools.

The reliability of patient demographic data assessment tool was 0.850.

Patients and Method:

The study was conducted throughout three phases, which are preparatory phase, implementing phase and evaluation phase.

Preparatory phase:

- An official letter from the faculty of nursing was sent to the accountable authorities of the hospital, and approval was obtained to conduct this study after an explanation of the nature and aim of the study.
- The tools which used in the present study were developed by the researcher **(tool I).**

Pilot Study:

A pilot study was done to test the feasibility and applicability of the tools, and the necessary modifications were made on (10%) of the patients (6 patients).

Ethical consideration:

Approval was obtained from the Research Ethics Committee at the Faculty of Nursing, Assiut University. Informed consent was secured from the patients before their inclusion in the study, following a clear explanation of the study objectives, data collection procedure, tools, and expected outcomes. The researcher emphasized that patients voluntary and were informed that there were not obligated to participate and could withdraw at any time without providing reason .the collected data was used solely for research purpose .Anonymity and confidentiality were ensured ,and patients were assured that their withdrawal would not impact on their research.. Additionally, fairness was maintained to prevent any harm to both the control and study groups. All patients including those in the control group, were given access to the benefits of the research.

Implementation phase: Data collection:

The objective of the study was explained to the nurses working in the medical oncology unit at this stage, and they then attended a two-hour training session on how to employ coping mechanisms to lessen the pain and tension experienced by leukemic patients in relation to the control and study groups.

For two groups(study and control)

1- The researcher importance of coping strategy gave daily feedback to The responsible nurse
2- Data were collected in ten months, approximately. The study was conducted from March 2023 to December 2023 with 60 patients who presented with acute leukemia at intensive care unit.

The researcher assigned studied patients (60 patients) to two equal groups (control group and study group).

Studied patients from both group were assessed twice daily by using **(Tool one ,tool two and tool three).**

The data were collected from admission, and at the end of first week. Then the data recorded in the developed tools.

For the control group: The control group was exposed to routine care at intensive care unit at south Egypt cancer Institute.

For the study group: The study group were received Coping Strategies and care for reduce pain and stress by researcher.

Coping is crucial to the care of patients with acute leukemia have been postulated as one mechanism by which individuals respond to threats or stress. and is an integral part of patients' experiences in managing challenges that accompany a cancer diagnosis and treatment.

The Coping Strategies consisted of approaching participants 4 days a week, twice a day (9 am and 5 pm sessions). Coping Strategies include two component **first relaxation techniques for Natural Pain relief and stress , second self-talk .**

Relaxation Techniques for Natural Pain Relief and stress.

Prepare patient to share in relaxation techniques and exercise to reduce pain and stress related acute leukemia through practice relaxation techniques such as deep breathing, meditation, , and progressive muscle relaxation, which activate the body's natural relaxation response. Other helpful methods include visualization, listening to music or nature sounds, engaging in gentle exercise like walking, and using aromatherapy with essential oils. **(Samantha et al., 2023)**

Self-talk Positive has frequently been used by athletes as a cognitive strategy to assist in maintaining focus, enhancing motivation, and coping with negative thoughts, emotions, and events. Researchers have found to be an effective performance enhancement strategy in a variety of sports and athletic tasks (**Thomas et al., 2023**)

Evaluation phase

Study and control groups were evaluated twice first at admission as a base line data and after one week by using study tools

Statistical Design:

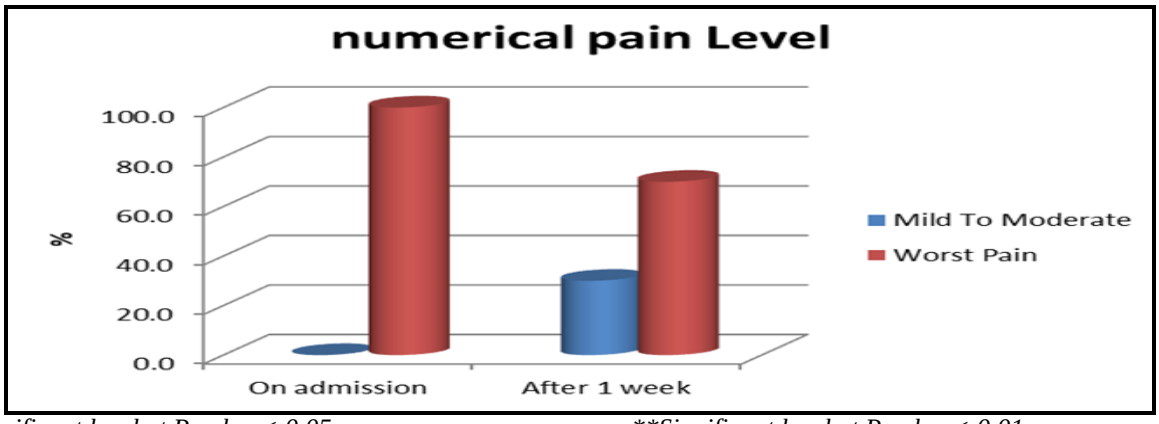
Prior further statistical analysis, the data was examined for homogeneity variances and normality using the Anderson-Darling test. Continuous variables were represented by the mean and standard deviation (mean ± SD), whereas categorical variables were described by number and percentage (N, %). The independent t-test was used to compare continuous variables, while the chi-square test was used to compare categorical variables. IBM SPSS 20.0 software was used for all analyses, and a significance level of less than 0.05 was deemed significant.

Results:

Table (1): Distribution of demographic data among studied groups (n=60)

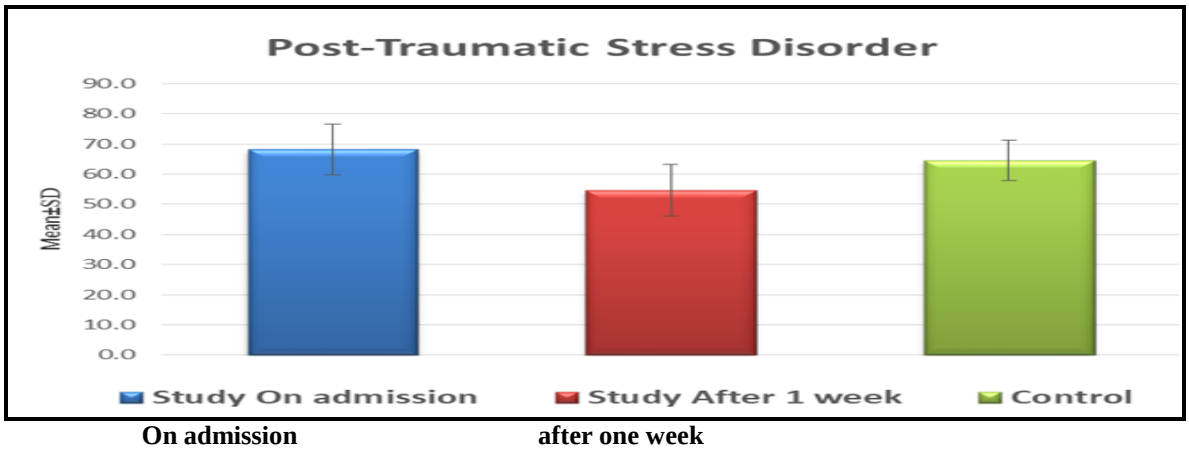
Age	Study(n=30)		Control(n=30)		X2	P. value
	No	%	No	%		
18 > 30 years old	2	6.7	6	20.0	2.70	0.260
30> 40 years old	4	13.3	5	16.7		
40 and above	24	80.0	19	63.3		
Gender						
Male	21	70.0	19	63.3	0.30	0.584
Female	9	30.0	11	36.7		
Marital status						
Single	0	0.0	6	20.0	6.84	0.077
Married	20	66.7	16	53.3		
Divorced	2	6.7	1	3.3		
Widow or widower	8	26.7	7	23.3		
Level of education						
Secondary education	3	10.0	1	3.3	3.61	0.307
Basic education	9	30.0	9	30.0		
Read and write	3	10.0	8	26.7		
Illiterate	15	50.0	12	40.0		

Chi square test for qualitative data between the two groups
**Significant level at P value < 0.05,* ***Significant level at P value < 0.01*



**Significant level at P value < 0.05,* ***Significant level at P value < 0.01*

Figure (1): Relationship Between Study group related to numerical pain Level Before and After coping(n=60)



On admission **after one week**

Significant level at P value < 0.05, ***Significant level at P value < 0.01*

Figure (2): Relationship Between Study and control group related to Post-Traumatic Stress Disorder

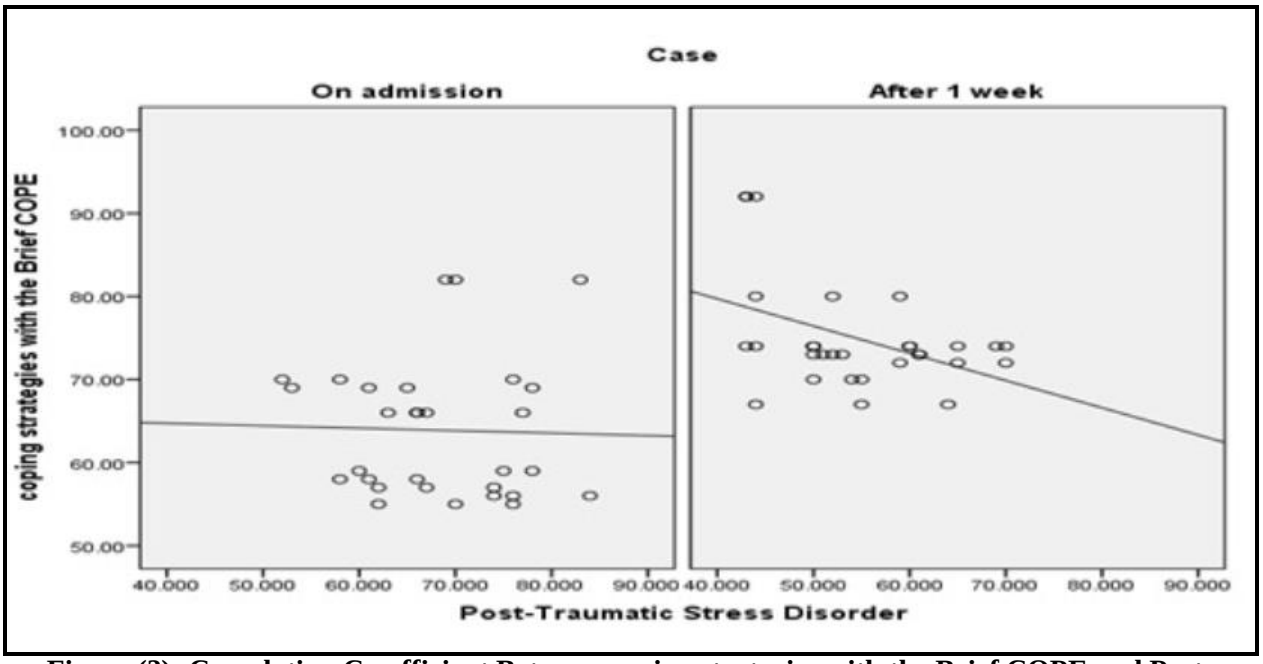


Figure (3): Correlation Co-efficient Between coping strategies with the Brief COPE and Post-Traumatic Stress Disorder

Table (2): Correlation Co-efficient Between Post-Traumatic Stress Disorder With demographic data For Study group On admission and After 1 week (n=60)

Correlations	Post-Traumatic Stress Disorder			
	On admission		After 1 week	
	R	P	R	P
Age	0.006	0.974	0.002	0.990
Sex	-0.098	0.607	-0.164	0.387
Marital status	-0.281	0.133	-0.202	0.284
Level of education	-0.170	0.370	-0.054	0.776

**Statistically Significant Correlation at P. value <0.05* ***Statistically Significant Correlation at P. value <0.01*

Table (1): Shows that there was no significant differences between study and control groups regarding their demographic data. Most patients were aged 40 and above (80.0% in the study group vs. 63.3% in the control group, p=0.260), with no significant age-related difference. Males predominated in both groups (70.0% in the study group vs. 63.3% in the control group, p=0.584). Regarding marital status, the majority were married (66.7% study vs. 53.3% control), while no participants in the study group were single, compared to 20.0% in the control group (p=0.077). In terms of education, illiteracy was highest in both groups (50.0% study vs. 40.0% control, p=0.307),

Figure (1): Demonstrate a statistical significant improvement in pain levels among the study group following the coping strategy ,prior to coping ,100% of participants reported experiencing worst pain .after coping ,this proportion decreased to70%, with 30% of participants reporting mild to moderate pain levels. this change was statistical significant as indicated by the chi-square value(p=0.001**).additionally, the mean pain score decreased notably from 7,37±1.04 before coping to 5.93±1.08 after coping. this reduction was statistically significant ,as shown by the paired sample t-test (t=6.54,p=0.000**)this findings indicate that the coping had a positive impact on reducing pain intensity among patients.

Figure (2): Revealed significant improvements in the study group regarding Post-Traumatic Stress Disorder (PTSD) before and after coping On admission, the study group exhibited a high mean PTSD score of 68.23±8.4, which significantly decreased to 54.67±8.58 after education (p=0.000). The control group showed no comparable improvement, with a mean score of 64.57±6.77 (p=0.158). with p-values consistently below 0.05.

Figure (3): Scatterplot illustrating No Statistically Significant correlation hypothetical data for the relationship between coping strategies with the Brief

COPE and Post-Traumatic Stress Disorder For Study group on admission (r=-0.170) But There is Was a Negative correlation After I week (r= -.435-*)

Table (2): Shows that on admission, PTSD had a significant positive correlation with risk factors (r = 0.468, p = 0.009). There was no significant correlation with other variables such as age, sex, marital status, level of education After one week, PTSD showed a significant negative correlation with side effects of therapy (r = -0.399, p = 0.029). Other socio-medical did not show significant correlations with PTSD after one week.

Discussion:

Because their job as healthcare professionals is to constantly monitor patients, nurses in intensive care units are crucial in preventing pain, stress, and improving patients' quality of life. In order to maintain compliance with nursing practice standards and provide high-quality clinical care, nurses are encouraged to adhere to evidence-based clinical guidelines**. (Eman., et al., 2020)**

Prior to the use of nursing coping strategies, the current investigation observed no statistically significant difference between the two groups. As it suggests that any differences seen following the intervention are probably due to the strategies for coping rather than actual differences between the groups, this interpretation is essential for confirming the validity of the study's conclusions.

Regarding to the demographic data;

The present study found that there was no statistically significant difference between both groups before implementing coping strategy.

According to age

The majority of the patients in this study had acute leukemia and were older than forty **(Zhou et al., 2021)** provided support for this study by stating that the average age of acute myeloid leukemia was 48.9±18.3 years. Acute leukemia is now curable in about 35% to 40% of people under 60, according to **(Lu et al., 2022)**. This discrepancy may be caused by the limited sample size.

Concerning to gender

The current result of this study showed that males made up more than half of the sample. This is on line with me **(Andersen et al., 2023)** who found that acute leukemia is most common in older people and affects males more than females.

Regarding to marital status

The majority of the patients in the age exceed under consideration were married, according to the current study. The results of this study are consistent with those of a study by **(Tebbi., 2021),** which likewise found that married people made up the majority of patients.

Regarding to education level

The present study reported that the majority of the studied patients were illiterates.

According to a global study by **(Zhou et al., 2024),** acute leukemia is increasingly being diagnosed among lower socioeconomic and educational categories, particularly in emerging nations where access to professional employment and education may be restricted. This result is comparable to a study by **(Zhang et al., 2023)** in Canada, which discovered that acute leukemia affects individuals from various socioeconomic backgrounds and that the incidence of the disease is not significantly correlated with professional occupation or educational attainment.

Regarding to pain

According to the current study, a significant percentage of leukemia patients are undergoing chemotherapy. Furthermore, the study group experienced greater bone pain as a side effect of cancer therapies like chemotherapy or radiation therapy, while the control group experienced more nausea and vomiting.

This data indicates that bone pain is a frequent side effect among acute leukemia patients and emphasizes the necessity of efficient management techniques to reduce its symptoms and enhance patients' quality of life while undergoing treatment.

Regarding pain levels:

Following nursing guidline and coping the current study found that numerical pain levels significantly decreased. The study group as a whole first reported the worst pain, with a mean score of 7.73±1.04. Following coping, the mean pain score dropped dramatically to 5.93±1.08 (p=0.000). This decrease demonstrates the value of education in pain management since patients are more likely to have better pain control if they have a better understanding of their illness and coping mechanisms. These findings suggest that coping is essential for lowering patients' levels of pain.

According to the study, knowledge dramatically lowers pain levels, which is especially important for acute leukemic patients who commonly experience intense discomfort as a result of infections, bone marrow suppression, and chemotherapy. Patients who get education not only gain a better understanding of their pain but also acquire tools that can help them manage it, such as relaxation techniques, appropriate medication use, and lifestyle changes. Consequently, education is a useful instrument for enhancing Leukemic patients' perception and management of pain.

Accordingly, **(Liu et al., 2023)** discovered that coping mechanisms helped cancer patients—including those with acute leukemia—manage their pain more effectively by promoting medication compliance and self-care techniques. According to

(**Yennurajalingam et al., 2023),** pain management education programs helped acute leukemic patients experience less pain. They also emphasized the significance of patient education regarding pain mechanisms, which facilitated improved communication with healthcare providers and more efficient pain management strategies. Additionally, (**van Lieshout et al., 2022)** highlighted that offering supportive treatment that included pain education and symptom management techniques helped acute leukemic patients experience less severe pain, which allowed them to better control their discomfort and enhance their general quality of life.

(Amonoo et al., 2022), on the other hand, contended that although education is helpful in understanding pain, it is not enough on its own to effectively manage severe pain in acute leukemic patients. They highlighted the necessity of pharmacological interventions, such as opioid analgesics, to do so. a multimodal strategy that included education, quick pharmaceutical relief, and psychological support was more successful in pain management. However, **Shaulov et al., (2022)** came to the conclusion that in order to improve results, education should be combined with psychological support and the right kind of pain medicine.

Regarding the correlation between coping strategies and Post-Traumatic Stress Disorder:

The results of this study demonstrate a negative relationship between coping mechanisms (as assessed by the Brief COPE) and symptoms of PTSD. This implies that coping mechanisms are more closely linked to PTSD symptoms after a week. In particular, a decrease in PTSD symptoms seems to be associated with improved coping mechanisms, which may indicate a longer period of adjustment during which patients start to apply their coping mechanisms more successfully.

According to **(Wang et al., 2021)**, coping strategies may not immediately alleviate PTSD symptoms, but as patients learn to cope with their trauma and their associated emotional reactions, their benefits become more evident. According to (**Waddington et al., 2024),** coping mechanisms that include active problem-solving and emotion control become more successful over time. Additionally **(Yucel et al., 2021)** proposed that adaptive coping mechanisms including accepting aid and asking for it, as well as social support, are crucial in gradually lessening PTSD symptoms.

However, **Schafer et al., (2022)** contended that coping mechanisms take time to develop into more chronic PTSD symptoms and do not directly impact PTSD symptoms, particularly in the early post-traumatic event period (**Potenza et al., 2022).** According to (**Ranasingha., 2024),** a variety of factors, including biological vulnerabilities, the intensity of the trauma, or pre-existing mental health issues, might impact PTSD symptoms. Coping mechanisms may not always be effective in reducing these symptoms.

Conclusion

Coping strategies are essential for individuals and families facing leukemia. Understanding the different types of coping strategies and their functions can help patients navigate the challenges of the disease,reduce pain and stress and maintain a better quality of life

Recommendations

- Using coping strategy as routin care for leukemic patients by special team,
- Re apply this research on a larger sample size from other geographical areas in Egypt to ensure generalization .
- Application of coping strategy success in reduce pain and stress among leukemic patient

Reference:

Amonoo, H., LeBlanc, T., Kavanaugh, A., Webb, J., Traeger, L., Jagielo, A. & El-Jawahri, A. (2022): Posttraumatic stress disorder symptoms in patients with acute myeloid leukemia. Cancer, 127(14), 2500-2506..

Andrés-Jensen, L., Larsen, H., Johansen, C., Frandsen, T., Schmiegelow, K., & Wahlberg, A. (2023): Everyday life challenges among adolescent and young adult survivors of childhood acute lymphoblastic leukemia: An in-depth qualitative study. Psycho-Oncology, 29(10), 1630-1637.

Carver, C. (1997): You want to measure coping but your protocol's too long: Consider the Brief COPE. International Journal of Behavioral Medicine, 4, 92–100. doi:10.1207/s15327558ijbm0401 6

Cheng Cheng, Qingling Wang 2 & Jie Bai (2023): Factor Structure of the Brief Coping Orientation to Problems Experienced Inventory (Brief-COPE) in Chinese Nursing Students Submission received: 27 November 2024 / Revised: 24 January 2025 / Accepted: 28 January 2025 / Published: 29 January 2025

Chennamadhavuni, A., Iyengar, V., Mukkamalla, S. & Shimanovsky, A. (2023): Leukemia. The National Center for Biotechnology \Information. https://www.ncbi.nlm.nih.gov/books/NBK560490

Eman Aziz Mamdouh, Hanan Shehata Mohamed, Dalia Abdallah Abdelatief (2020): Assessment of Nurses' Performance Regarding the Implementation of Patient Safety Measures in Intensive Care Units Egyptian Journal of Health Care, EJHCVol.11No.1

Forkus, S. R., Raudales, A. M., Rafiuddin, H. S., Weiss, N. H., Messman, B. A., & Contractor, A. A. (2023): The Posttraumatic Stress Disorder (PTSD) Checklist for DSM-5: A Systematic Review of Existing Psychometric Evidence. Clinical Psychology: A Publication of the Division of Clinical Psychology of the American Psychological Association, 30(1), 110–121. https://doi.org/10.1037/cps0000111

Liu, Z., Xu, X., Ding, K., & Fu, R. (2023): Quality of life considerations and management in patients with myelodysplastic syndrome. Expert Review of Hematology, 16(11), 849-860

Lu, Y., Lu, X., Shao, C., Wang, C., Xu, T., & Zhang, B. (2022): Empathetic nursing with mindful cognitive therapy for fatigue, depression, and negative emotions in leukemia patients undergoing long-term chemotherapy. World journal of clinical cases, 10(6), 1826

Mestdagh, F., Steyaert, A., & Lavand'homme, P. (2023): Cancer pain management: a narrative review of current concepts, strategies, and techniques. Current oncology, 30(7), 6838-6858.

Negash, B., & Alelign, Y. (2025): Stress and coping strategies of cancer among adult cancer patients in Hawassa University comprehensive specialized hospital cancer centre in 2024: patient, family and health professional perspective. BMC cancer, 25(1), 621.

Patrician, P., Campbell, C., Javed, M., Williams, K., Foots, L., Hamilton, W. M., & Swiger, P. (2024): Quality and safety in nursing: recommendations from a systematic review. The Journal for Healthcare Quality (JHQ), 46(4), 203-219.

Potenza, L., Scaravaglio, M., Fortuna, D., Giusti, D., Colaci, E., Pioli, V., & Bandieri, E. (2024): Early palliative/supportive care in acute myeloid leukaemia allows low aggression end-of-life interventions: observational outpatient study. BMJ Supportive & Palliative Care, 14(e1), e1111-e1118

Ranasingha, N. (2024): The Role of Psychological Interventions for Patients with Hematologic Malignancies: A Review. J Clin Res Case Stud, 2(3), 1-12.

Samantha K. Norelli; Ashley Long; Jeffrey M. Krepps (2023): RelaxationTechniqueshttps://www.mayoclinic.org /healthy-lifestyle/ stress- management/in-depth/relaxation-technique/art-20045368.

Schafer, J., Xiao, T., Kwon, H., Collier, K., Chang, Y., Abdel-Hafiz, H., & Li, Z. (2022): Sex-biased adaptive immune regulation in cancer development and therapy. Iscience, 25(8).

Shaulov, A., Aviv, A., Alcalde, J., & Zimmermann, C. (2022): Early integration of palliative care for patients with haematological malignancies. British journal of haematology, 199(1), 14-30

Snijders, R., Brom, L., Theunissen, M., & van den Beuken-van Everdingen, M. (2023): Update on prevalence of pain in patients with cancer 2022: a systematic literature review and meta-analysis. Cancers, 15(3), 591.

Cameron K Tebbi (2021): Etiology of Acute Leukemia: Cancers (Basel) May 8;13(9):2256. doi: 10.3390/cancers13092256

Thomas M, Brinthapt, Alian Morin (2023): Self Talk: research challenges and opportunities. DOI:10.3389/fpsyg.2023.1210960LicenseCCBY 4.0

Van Lieshout, R., Lize, N., Tick, L., van Deursen, J., Driessen, E., Janssen, T., & Beijer, S. (2022): Nutrition-related problems, nutritional support practices and barriers to adherence to nutritional guidelines during intensive treatment for acute myeloid leukemia, Clinical Nutrition ESPEN, 48, 446-455.

Waddington, F., Amerikanou, M., Brett, J., Watson, E., Abbots, V., Dawson, P., & Henshall, C. (2024): A systematic review to explore the effectiveness of physical health and psychosocial interventions on anxiety, depression and quality of life in people living with blood cancer. Journal of Psychosocial Oncology, 42(1), 113-147.

Wang, J., Yin, Y., Li, Y., Yue, X., & Qi, X. (2021): The effects of solution-focused nursing on leukemia chemotherapy patients' moods, cancer-related fatigue, coping styles, self-efficacy, and quality of life. American Journal of Translational Research, 13(6), 6611

Wang, Y., Aaron, R., Attal, N., & Colloca, L. (2025): An update on non-pharmacological interventions for pain relief. Cell Reports Medicine, 6(2).

Weathers, F.W., Litz, B.T., Keane, T.M., Palmieri, P.A., Marx, B.P., & Schnurr, P.P. (2013): The PTSD Checklist for DSM-5 (PCL-5). Scale available from the National Center for PTSD at www.ptsd.va.gov.

Yennurajalingam, S., Konopleva, M., Carmack, C. L., Dinardo, C. D., Gaffney, M., Michener, H. K., & Bruera, E. (2023): Treatment of cancer-related-fatigue in acute hematological malignancie. Journal of pain and symptom management, 65(3), e189-e197

Yucel, E., Zhang, S., & Panjabi, S. (2021): Health-related and economic burden among family caregivers of patients with acute myeloid leukemia or hematological malignancies. Advances in Therapy, 1-23

Zhang, X., Pan, X., Pan, Y., & Wang, Y. (2023): Effects of preventive care on psychological state and complications in leukemia patients receiving chemotherapy. American Journal of Translational Research, 15(1), 184

Zhou, J., Xu, H., Jiang, M., Cao, H., Jiang, L., Xu, T., & Gu, F. (2021): Effect of PDCA-based nursing management model on the quality of life and complications of patients with acute leukemia undergoing chemotherapy. American Journal of Translational Research, 13(4), 3246

Zhou, Y., Huang, G., Cai, X., Liu, Y., Qian, B., & Li, D. (2024): Global, regional, and national burden of acute myeloid leukemia, 1990–2021: A systematic analysis for the global burden of disease study 2021. Biomarker Research, 12(1), 101.