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Effectiveness of Deep Breathing Exercise in Reducing Pain among Cancer Patients

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Abstract: ***Background: Cancer pain is one of the most prevalent and distressing symptoms experienced by cancer patients, significantly affecting their physical, psychological, and social well-being. In addition to pharmacological management, deep breathing exercise is a simple, safe, and cost-effective complementary nursing intervention that may help reduce pain. Objective: To evaluate the effectiveness of deep breathing exercise in reducing pain among cancer patients. Methods: A quantitative research approach with a true experimental pre-test–post-test control group design was adopted. Sixty eligible cancer patients were recruited using purposive sampling and randomly allocated to the experimental (n = 30) and control (n = 30) groups using the lottery method. Pain was assessed using the Numerical Pain Rating Scale (NPRS). The experimental group received deep breathing exercise twice daily for five consecutive days in addition to routine hospital care, whereas the control group received routine hospital care alone. Data were analyzed using descriptive and inferential statistics. Results: The mean pain score in the experimental group decreased significantly from 4.50 (SD=1.59) before the intervention to 0.23 (SD=0.72) after the intervention. The paired t-test demonstrated a statistically significant reduction in pain (t=4.775, p=0.001). Comparison of post-intervention pain scores between the experimental and control groups also revealed a statistically significant difference, confirming the effectiveness of deep breathing exercise in reducing pain. Conclusion: Deep breathing exercise was effective in reducing pain among cancer patients. As a simple, safe, non-invasive, and cost-effective nursing intervention, it can be incorporated into routine oncology nursing practice as an adjunct to pharmacological pain management.***

Keywords: Cancer patients; Deep breathing exercise, Cancer pain, Pain management, non-pharmacological intervention

1. Introduction

Cancer is a major global health problem and a leading cause of morbidity and mortality. Pain is one of the most common and distressing symptoms experienced by cancer patients and may result from the disease itself or its treatment. Uncontrolled pain adversely affects physical functioning, emotional well-being, sleep, daily activities, and quality of life, making effective pain management an essential component of comprehensive cancer care.[1]

Although pharmacological therapy remains the primary approach for cancer pain management, many patients continue to experience inadequate pain relief and medication-related adverse effects. Consequently, there is increasing emphasis on integrating evidence-based non-pharmacological interventions as complementary strategies to enhance pain management and improve patient comfort.[2]

Deep breathing exercise is a simple, safe, cost-effective, and non-invasive relaxation technique that promotes physiological relaxation through autonomic nervous system regulation.[3] Previous studies have demonstrated that deep breathing exercise can reduce pain intensity and improve quality of life among patients with cancer and other chronic conditions.[4] However, evidence regarding its effectiveness among hospitalized cancer patients remains limited, highlighting the need for further research. Therefore, the present study was undertaken to evaluate the effectiveness of deep breathing exercise in reducing pain among cancer patients.

Objective of the study:
To evaluate the effectiveness of deep breathing exercise in reducing pain among cancer patients.

2. Methodology

A quantitative research approach with a true experimental pre-test–post-test control group design was adopted to evaluate the effectiveness of deep breathing exercise in reducing pain among cancer patients. The study was conducted at Mizoram State Cancer Institute (MSCI), Aizawl, Mizoram. A total of 60 cancer patients were selected using purposive sampling and randomly allocated into an experimental group (n = 30) and a control group (n = 30) using the lottery method.

Inclusion Criteria

- Patients diagnosed with any type of cancer.
- Patients experiencing pain with a Numerical Pain Rating Scale (NPRS) score of ≥3.
- Patients aged 18 years and above.
- Patients able to understand instructions and physically able to perform deep breathing exercise.
- Patients willing to participate and provide written informed consent.

Exclusion Criteria

- Patients who were critically ill or on mechanical ventilation.

- Patients with severe respiratory disorders (e.g., severe chronic obstructive pulmonary disease or respiratory distress) that could interfere with deep breathing exercise.
- Patients with cognitive impairment or psychiatric illness affecting communication.
- Patients already practicing structured breathing or relaxation techniques regularly.
- Patients receiving analgesic medications for pain management.

Ethical approval was obtained from the Institutional Ethics Committee (IEC), RIPANS (No.F. 13016/1/2024-RIPANS/15). Administrative permission was obtained from the Director, Mizoram State Cancer Institute (MSCI), Aizawl (NO.A.35024/2/2023-MSCI). Written informed consent was obtained from all participants before data collection. Confidentiality and anonymity were maintained throughout the study. Pain was assessed using the Numerical Pain Rating Scale (NPRS). The experimental group received deep breathing exercise in addition to routine hospital care. Participants were instructed to inhale slowly through the nose for 4 seconds, hold their breath for 2 seconds, and then exhale slowly through pursed lips for 6 seconds. Each session consisted of 10 breathing cycles and was performed twice daily for five consecutive days. The control group received routine hospital care alone. Pain was reassessed on the fifth day using the NPRS. The collected data were analyzed using descriptive statistics (frequency, percentage, mean, and standard deviation) and inferential statistics (paired t-test and independent t-test).

3. Results

The findings of the present study are presented below to evaluate the effectiveness of deep breathing exercise on the level of pain among cancer patients.

3.1 Demographic and Clinical Characteristics of the Participants

The demographic and clinical characteristics of the participants are presented in Tables 1 and 2.

Table 1: Frequency and percentage distribution of demographic variables among cancer patients in experimental and control groups, n= 60, (E = 30, C = 30)

Demographic variables	Experimental group		Control Group	
	f	%	f	%
Age in years				
18–25 years	2	6.7	0	0
26–35 years	1	3.3	1	3.3
36–45 years	4	13.3	7	23.3
46–55 years	9	30	10	33.3
56–65 years	10	33.4	4	13.3
66 years and above	4	13.3	8	26.7
Gender				
Male	16	53.3	14	46.7
Female	14	46.7	16	53.3
Marital status				
Single	4	13.3	2	6.7
Married	25	83.4	23	76.7
Widowed	0	0	4	13.3
Divorced/ separated	1	3.3	1	3.3
Educational status				
No formal education	2	6.7	2	6.7
Primary education	13	43.3	14	46.6
Secondary education	9	30	5	16.7
Higher secondary education	3	10	4	13.3
Graduate and above	3	10	5	16.7
Occupation				
Unemployed	3	10	3	10
Government employee	3	10	3	10
Private employee	8	26.7	4	13.3
Self-employed	4	13.3	4	13.3
Farmer	9	30	7	23.4
Homemaker	3	10	5	16.7
Other	0	0	4	13.3
Family monthly income				
Less than ₹10,000	2	6.7	4	13.3
₹10,001 – ₹20,000	10	33.3	14	46.7
₹20,001 – ₹40,000	11	36.7	11	36.7
₹40,001 – ₹60,000	7	23.3	1	3.3
Above ₹60,000	0	0	0	0

The majority of participants in the experimental group were aged 56–65 years (33.4%), whereas the majority in the control group were aged 46–55 years (33.3%). Males predominated in the experimental group (53.3%), while females predominated in the control group (53.3%). Most participants in both groups were married (83.4% and 76.7%, respectively). Primary education was the most common educational level in both groups (43.3% and 46.6%, respectively). Farming was the most common occupation in both groups (30% and 23.4% respectively). In both groups, the highest proportion of participants in the experimental group had a monthly family income of ₹20,001–₹40,000 (36.7%), whereas in the control group it was ₹10,001–₹20,000 (46.7%).

Table 2: Frequency and percentage distribution of clinical variables among cancer patients in experimental and control groups, n= 60, (E = 30, C = 30)

Clinical variables	Experimental group		Control Group	
	f	%	f	%
Type of cancer				
Breast cancer	4	13.3	4	13.3
Lung cancer	2	6.7	2	6.7
Cervical cancer	5	16.6	2	6.7
Gastrointestinal cancer	15	50	17	56.6
Head and neck cancer	2	6.7	2	6.7
Hematological cancer	2	6.7	2	6.7
Other	0	0	1	3.3
Duration since diagnosis				
Less than 6 months	16	53.4	15	50
6 months – 1 year	10	33.3	10	33.3
1 – 2 years	3	10	3	10
More than 2 years	1	3.3	2	6.7
Stage of Cancer				
Stage I	3	10	5	16.7
Stage II	7	23.3	4	13.3
Stage III	9	30	8	26.7
Stage IV	1	3.3	1	3.3
Not known	10	33.3	12	40
Treatment currently receiving				
Chemotherapy	20	66.6	17	56.7
Radiotherapy	2	6.7	1	3.3
Surgery	4	13.3	6	20
Combination therapy	2	6.7	4	13.3

Palliative care	2	6.7	2	6.7
Duration of current treatment				
Less than 1 month	14	46.6	12	40
1 – 3 months	11	36.7	12	40
3 – 6 months	3	10	3	10
More than 6 months	2	6.7	3	10
Site of pain				
Head	0	0	0	0
Neck	2	6.7	3	10
Chest	5	16.6	5	16.7
Abdomen	19	63.3	13	43.3
Back	2	6.7	7	23.3
Limbs	2	6.7	2	6.7

The majority of participants in both the experimental and control groups had gastrointestinal cancer (50% and 56.6%, respectively). Most participants had been diagnosed within the previous 6 months (53.4% and 50%, respectively) and were receiving chemotherapy (66.6% and 56.7%, respectively). An unknown stage of cancer was reported in 33.3% of the experimental group and 40% of the control group. The majority of participants had been receiving treatment for less than 1 month in the experimental group (46.6%) and for 1–3 months in the control group (40%). The abdomen was the most common site of pain in both the experimental and control groups (63.3% and 43.3%, respectively).

3.2 Effectiveness of Deep Breathing Exercise in Reducing Pain

The effectiveness of deep breathing exercise in reducing pain among cancer patients is presented in Tables 3 and 4 and figure 1.

Table 3: Comparison of pre-test and post-test mean pain scores in the experimental group, n= 30

Variables	Comparison	Mean	*SD*	Mean D	*t* value	*df*	*p* value
Experimental group	Pre-test	4.50	1.59	4.26	4.775	29	0.001*
	Post-test	0.23	0.72				

***P<0.05 level of significance**

The pre-test mean pain score in the experimental group was 4.50 ± 1.59, which decreased to 0.23 ± 0.72 in the post-test, with a mean difference of 4.26. The paired t-test revealed that the reduction in pain was statistically significant (t = 4.775, df = 29, p = 0.001), indicating that deep breathing exercise was effective in reducing pain among cancer patients.

Table 4: Comparison of pre-test and post-test mean pain scores between the experimental and control groups, n= 60

Variables	Comparison	Mean	*SD*	Mean D	*t* value	*df*	*p* value
Pre-test	Experimental	4.50	1.59	0.63	1.520	58	0.134
	Control	5.13	1.63				
Post-test	Experimental	0.23	0.72	2.26	7.257	58	0.001*
	Control	2.50	1.54				

***P<0.05 level of significance**

The pre-test mean pain scores were 4.50 ± 1.59 in the experimental group and 5.13 ± 1.63 in the control group, with no statistically significant difference between the groups (t = 1.520, df = 58, p = 0.134). In the post-test, the mean pain score was significantly lower in the experimental group (0.23 ± 0.72) than in the control group (2.50 ± 1.54). The independent t-test revealed a statistically significant difference between the groups (t = 7.257, df = 58, p = 0.001), indicating that deep breathing exercise was effective in reducing pain among cancer patients.

4. Discussion

The present study evaluated the effectiveness of deep breathing exercise in reducing pain among cancer patients. The findings revealed a statistically significant reduction in pain among patients who received deep breathing exercise. Although there was no statistically significant difference in the pre-test mean pain scores between the experimental and control groups, the post-test mean pain score was significantly lower in the experimental group, demonstrating the effectiveness of deep breathing exercise in reducing pain among cancer patients.

The findings of the present study are consistent with those of Rezaei et al. (2024), who reported that deep diaphragmatic breathing significantly reduced pain intensity among patients with metastatic gastrointestinal cancer. [3] Similarly, Wang et al. (2023) also reported that structured breathing exercises improved pain management and quality of life among cancer survivors.[4] The observed reduction in pain in the present study also supports the view of Gupta and Bruera (2022) that complementary non-pharmacological interventions can enhance conventional pain management and improve patient comfort.[2] These findings support the effectiveness of breathing-based interventions as complementary strategies for cancer pain management.

The beneficial effect of deep breathing exercise may be attributed to its ability to promote relaxation, improve oxygenation, reduce muscle tension, and stimulate the parasympathetic nervous system, thereby decreasing pain perception and enhancing comfort. These physiological mechanisms are consistent with the findings of Wang et al. (2023), who reported that breathing exercise are effective supportive interventions for reducing chronic pain and improving quality of life among cancer survivors.[4]

The findings of the present study suggest that deep breathing exercise is a simple, safe, non-invasive, and cost-effective nursing intervention that can be incorporated into routine oncology nursing care to reduce pain among cancer patients.

5. Conclusion

The present study concluded that deep breathing exercise was effective in reducing pain among cancer patients. The findings demonstrated a statistically significant reduction in pain among patients who received deep breathing exercise compared with those who received routine care. The study supports the incorporation of deep breathing exercise into routine oncology nursing care as a simple, safe, non-invasive, and cost-effective complementary intervention for pain management.

6. Recommendations

Further studies may be conducted with a larger sample size and over a longer intervention period to further evaluate the effectiveness of deep breathing exercise in reducing pain among cancer patients. Future research may also evaluate the effect of deep breathing exercise on other patient outcomes, such as anxiety and quality of life.

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