Effect of Flexibility Exercise on Symptom Distress of Cancer Patient Undergoing Chemotherapy

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Abstract

Background: Cancer is a growing disease and a leading cause of death globally. Cancer can be treated with chemotherapy treatment which causes side effects like symptom distress. Symptom distress can be overcome by non-pharmacological, one of which is flexibility exercise.

Object: to identify effect of flexibility exercise on symptom distress in cancer patients undergoing chemotherapy.

Methods: The study design used a quasi-experimental design with an equivalent control group. There were 40 respondents of cancer patients who are undergoing chemotherapy which were divided into two groups, 20 intervention, and 20 control groups. The sampling technique was consecutive sampling. The data were collected by the Symptom Distress Scale. The data were analyzed by a paired t-test in the intervention group before and after the intervention and control group.

Results: The results obtained were differences in symptoms distress in the intervention group after flexibility exercise (t=13.24, p=0.00). The study was also analyzed by an independent t-test showing that there were differences in symptoms distress between the intervention and the control group of cancer patients undergoing chemotherapy (t=-2.42, p=0.02).

Conclusion: The flexibility exercise can be a non-pharmacological measure to help reduce symptoms of cancer patients undergoing chemotherapy.

Keywords: *Cancer patient, Flexibility exercise, Symptom distress*

Introduction

Cancer is a condition that disrupts the process of growth and spread of cells that can cause death. In 2018, cancer is the second leading cause of global death which has reached 9.6 million deaths. Lung, prostate, colorectal, stomach and liver cancers are the most common types of cancer in men, and cancers often affecting women are breast, colorectal, lung, cervical and thyroid cancers.(1)

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Cancer in Indonesia in 2013 amounted to 347,792 people. Java, especially the Central and Eastern parts, is an area with most people with cancer in Indonesia, namely ±68,638 and ±61,230 people. Cancer cases in North Sumatra province reached 1.0% (13,391 people) of the total number of cancer patients in Indonesia.(2)

The treatment used for cancer patients is chemotherapy. Bruce said that chemotherapy is a treatment given in several cycles whose function is to kill cancer cells or slow their growth.(3) Chan and Ismail said that the administration of chemotherapy will cause side effects.(4) According to Choi et al. Said that chemotherapy can negatively affect body image, psychosocial well-being, and depression of breast cancer patients.(5) Besides, cancer patients will also experience

insomnia.[6] These side effects are part of symptoms of distress.

Symptoms distress occurs due to a diagnosis of cancer, increased side effects of treatment, and severity of symptoms.[7] Symptom distress arises by looking at several symptoms namely nausea (frequency and intensity), appetite, insomnia, pain (frequency and intensity), fatigue, bowel movements, concentration, appearance, breathing, sight, and cough.[8] Pettersson et al. showed that cancer patients undergoing chemotherapy will experience symptoms distress that are tingling in the hands/feet (64%), lack of energy (62%), feeling sleepy (49%), and nausea (45%). Symptom distress can be reduced by physical exercise.[9]

According to Paul, that exercise that is applied to patients must be adapted to the physical condition of the patient and he recommends the type of exercise for cancer patients undergoing chemotherapy is flexibility exercise. Paul said flexibility exercise is an exercise to extend muscles and tendons that can increase muscle tone and joint movement.[10] The Christie NHS Foundation Trust explains that exercise flexibility is one exercise that if done regularly can overcome side effects of chemotherapy.[11]

Methods

This research was quantitative research with a quasi-experimental with a pre-test post-test with a control group approach. This study was 40 people (20 intervention and 20 control groups) cancer patients undergoing chemotherapy at Haji Adam Malik General Hospital Medan.

Inclusion criteria namely: cancer patients who after 24 hours of undergoing chemotherapy by the intravenous route, chemotherapy is performed at least in the second cycle, do not experience musculoskeletal disorders, do not suffer from heart disease, bone cancer, and do not experience cancer that have been metastases to the bone, do not experience anemia, leukopenia, and thrombocytopenia, respiratory rate, heart rate, body temperature and blood pressure within normal limits, do not vomit within the previous 24 to 36 hours and have full awareness, Cooperative.

Measurement of symptoms distress using the Symptom Distress Scale (SDS) questionnaire. This measuring instrument has been validated by 3 experts, CVI=0.99, internal consistency test 0.916, interrater reliability test 0.67. Measuring instruments were used to measure symptoms before and after flexibility exercise.

The flexibility exercise intervention was carried out in 3 sets which were carried out 5 times a week, for 20-30 minutes, and carried out in 2 weeks in cancer patients undergoing chemotherapy. The data were analyzed by pair t-test in the intervention group before and after the intervention and control group and also analyzed by independent t-test.

Results

Tabel 1. respondent characteristics

Variables	Intervention Group		Control Group	
	n	%	n	%
Ages				
Early adult	2	10,00	1	5,00
Late adult	2	10,00	10	50,00
Early elderly	6	30,00	7	35,00
Late elderly	10	50,00	2	10,00
Mean ± SD	52,10 ± 8,99		46,10 ± 6,73	
Min – Max	34 – 65		35 – 62	
Gender				
Man	3	15,00	3	15,00
Women	17	85,00	17	85,00

Cont... **Tabel 1. respondent characteristics**

Educational				
Primary	1	5,00	7	35,00
Junior	3	15,00	7	35,00
Senior	11	55,00	4	20,00
College	5	25,00	2	10,00
Employment				
Unemployment/ housewives	11	55,00	6	30,00
Entrepreneur	3	15,00	5	25,00
Private employee	3	15,00	3	15,00
Civil officer	3	15,00	1	5,00
Farmer	-	-	5	25,00
Cancer types				
Breast	12	60,00	12	60,00
Ovarium	4	20,00	4	20,00
Nasofaring	2	10,00	2	10,00
30%Non-Hodgkin Lymphoma	2	10,00	2	10,00
Long suffered cancer				
Chronic	12	60,00	12	60,00
Acute	8	40,00	8	40,00
Chemotherapy cycles				
II	6	30,00	8	40,00
III	4	20,00	4	20,00
IV	5	25,00	4	20,00
V	3	15,00	1	5,00
VI	2	10,00	3	15,00

Table 1. shows that the majority of late elderly (50%), the majority gender were women (85%), the majority education were senior high school (55%), the majority respondents were unemployed/housewives (55%), the majority of cancer were breast (60%), chronic cancer was the suffering from the respondents (60%), and the chemotherapy cycle was undergone second cycle (30%). Characteristics of control group based on age showed that the majority of late adult (50%), the majority gender were women (85%), the majority education were primary (35%) and junior high school (35%), the majority respondents were unemployed/housewives (30%), the majority of cancer were breast (60%), chronic cancer was the suffering from the respondents (60%), and the chemotherapy cycle was undergone second cycle (40%).

Table 2. distribution frequency of symptom distress

Symptom Distress	Intervention group				Control group			
	before		after		before		after	
	n	%	n	%	n	%	n	%
Mild	3	15	12	60	3	15	8	40
Moderate	6	30	8	40	5	25	8	40
Severe	11	55	-	-	12	60	4	20
Mean ± SD	32,15 ± 7,28		22,40 ± 4,74		33,10 ± 6,80		26,40 ± 5,66	
Min - Max	18 – 43		14 – 30		22 – 43		16 – 37	

Table 2. shows that the intervention group before the flexibility exercise more than half the number of respondents (55%) experienced severe symptoms distress with an average score of 32.15 (SD = 7.28) and the control group also more than half the number of respondents (60%) experienced severe symptoms distress with an average score of 33.10 (SD=6.80). After done flexibility exercise for 2 weeks, the symptom distress decreased, which is more than half the number of respondents (60%) experienced mild symptoms distress in the intervention group with an average score of 22.40 (SD=4.74) and the control group less than half experienced mild (40%) and moderate (40%) symptoms distress with an average total score of 26.40 (SD=5.66).

Table 3. symptom distress based on the items

Symptom Distress Scale	Intervention group		Control group	
	before	after	before	after
Nausea (frequency)				
Mean ± SD Min – Max	2,75 ± 0,79 1 – 4	1,95 ± 0,69 1 – 3	2,65 ± 0,67 2 – 4	1,90 ± 0,72 1 – 3
Nausea (Intensity)				
Mean ± SD Min – Max	2,20 ± 0,83 1 – 4	1,60 ± 0,68 1 – 3	2,30 ± 0,80 1 – 4	1,80 ± 0,62 1 – 3
Appetite				
Mean ± SD Min – Max	2,85 ± 1,09 1 – 5	2,05 ± 0,89 1 – 4	2,95 ± 1,05 1 – 5	2,35 ± 0,93 1 – 4
Insomnia				
Mean ± SD Min – Max	3,25 ± 1,25 1 – 5	2,25 ± 0,91 1 – 4	3,30 ± 1,03 1 – 5	2,80 ± 1,11 1 – 5
Pain (frequency)				
Mean ± SD Min – Max	2,55 ± 0,76 1 – 4	1,80 ± 0,62 1 – 3	2,60 ± 0,94 1 – 4	2,00 ± 0,73 1 – 3

Cont... **Table 3. symptom distress based on the items**

Pain (Intensity)				
Mean ± SD Min – Max	2,10 ± 0,72 1 – 3	1,40 ± 0,50 1 – 2	2,05 ± 0,61 1 – 3	1,75 ± 0,55 1 – 3
Fatigue				
Mean ± SD Min – Max	2,50 ± 0,95 1 – 4	1,75 ± 0,71 1 – 3	2,85 ± 1,09 1 – 5	2,30 ± 0,92 1 – 4
Defecation				
Mean ± SD Min – Max	2,45 ± 0,89 1 – 4	1,75 ± 0,72 1 – 3	2,55 ± 1,15 1 – 4	2,00 ± 0,92 1 – 3
Concentration				
Mean ± SD Min – Max	2,15 ± 0,99 1 – 4	1,45 ± 0,69 1 – 3	2,50 ± 0,89 1 – 4	1,90 ± 0,79 1 – 3
Appearance				
Mean ± SD Min – Max	2,80 ± 0,83 1 – 4	1,95 ± 0,69 1 – 3	2,65 ± 1,04 1 – 4	2,25 ± 1,07 1 – 4
Breathing				
Mean ± SD Min – Max	1,65 ± 0,67 1 – 3	1,10 ± 0,31 1 – 2	1,95 ± 0,76 1 – 3	1,40 ± 0,50 1 – 2
View				
Mean ± SD Min – Max	2,75 ± 1,02 1 – 5	1,90 ± 0,85 1 – 4	2,95 ± 0,89 1 – 4	2,45 ± 0,69 1 – 3
Cough				
Mean ± SD Min – Max	2,15 ± 0,88 1 – 4	1,45 ± 0,51 1 – 2	1,80 ± 0,70 1 – 3	1,50 ± 0,61 1 – 3

Table 4. the difference in symptom distress before and after the flexibility exercise

Variables	**Intervention group**	**Control group**
	t (sig)	**t (sig)**
Symptom Distress (total score)	13,24 (0,00)	7,39 (0,00)
Nausea (frequency)	6,84 (0,00)	7,55 (0,00)
Nausea (Intensity)	5,34 (0,00)	4,36 (0,00)
Appetite	8,72 (0,00)	5,34 (0,00)
Insomnia	6,89 (0,00)	4,36 (0,00)
Pain (frequency)	7,55 (0,00)	5,34 (0,00)
Pain (Intensity)	6,66 (0,00)	2,85 (0,01)
Fatigue	7,55 (0,00)	4,82 (0,00)
Defecation	6,66 (0,00)	4,82 (0,00)
Concentration	6,66 (0,00)	4,49 (0,00)
Appearance	7,77 (0,00)	3,56 (0,02)
Breathing	4,82 (0,00)	4,82 (0,00)
View	7,77 (0,00)	4,36 (0,00)
Cough	4,77(0,00)	2,85 (0,01)

Table 4. shows that the results of this study indicate that there were differences in symptom distress between before and after flexibility exercise in the intervention group (t=13.24, p=0.00) and the control group also found differences in symptom distress (t=7.39, p=0.00). The difference in symptoms distress based on the items can be seen in Table 4 below.

Table 5. differences in symptom distress in the intervention and control group

Variables	T	Sig
Symptom Distress (Total Score)	-2,42	0,02
Nausea (frequency)	0,00	1,00
Nausea (Intensity)	-0,98	0,34
Appetite	-1,04	0,30
Insomnia	-2,92	0,01
Pain (frequency)	-0,94	0,35
Pain (Intensity)	-2,10	0,04
Fatigue	-2,11	0,04
Defecation	-0,96	0,34
Concentration	-2,08	0,04
Appearance	-1,06	0,30
Breathing	-2,28	0,03
View	-2,25	0,03
Cough	-0,28	0,78

Table 5. shows that The results found no differences in symptoms distress between the intervention group after the flexibility exercise and the control group of cancer patients undergoing chemotherapy (t -2.42, p=0.02). Symptom distress based on the items shows that there were some items that had differences between the intervention groups after the flexibility exercise intervention and the control group of cancer patients undergoing chemotherapy, namely difficulty sleeping (t -2.92, p=0.01), pain intensity (t=2.10, p=0.04 0.04)), fatigue (t=-2.11, p=0.04), concentration (t = -2.08, p = 0.04)), respiration (t = -2.28, p = 0.03), and views (t = -2.25, p = 0.03).

Discussions

Symptom distress based on insomnia items showed that there was a difference in insomnia (t= -2.92, p=0.01) after the flexibility exercise. The difference after the flexibility exercise intervention was a decrease in insomnia. According to Chuang et al. there was a difference between groups after regular exercise for 21 days in improving sleep quality (t=17.73, p <0.001).[12] In addition to the relaxing effect, physical exercise can increase the activity of the 5-HT system (serotonin) in the cortex, hippocampus and raphe nuclei.[13]

Symptom distress based on pain intensity items showed that there were differences in pain intensity (t=-2.10, p=0.04) after the flexibility exercise was performed. The difference after the flexibility exercise intervention was that respondents feel a decrease in pain intensity. Pain felt by cancer patients undergoing

chemotherapy can be influenced by several things, namely the type of chemotherapy drug regimen given, side effects arising from chemotherapy drugs such as pain from oral mucositis, headache, neuropathy, routes of chemotherapy (such as intraperitoneal chemotherapy that can cause pain acute abdomen) and pain arising from the development of the cancer itself.[14] Brad said that flexibility exercise has benefits for reducing pain and increasing relaxation.[15] According to Banu said that regular physical exercise can stimulate the body to produce endorphins which can reduce pain.[16]

Symptom distress based on item fatigue shows that there was a difference in fatigue (t=-2.11, p=0.04) after the exercise flexibility measures. The difference after the flexibility exercise intervention was that respondents felt a decrease in fatigue. Blood flow that binds with oxygen into the tissue, which then occurs metabolism so that energy is formed and the energy can reduce fatigue.[17] Flexibility exercise can increase energy and can reduce fatigue.[15]

Symptom distress based on the item concentration showed that there were differences in concentration between the groups after the flexibility exercise and the control group (t = -2.08, p=0.04). The difference after the flexibility exercise intervention was an increase in the concentration of the respondents. Based on the qualitative study of Bolton and Isaacs describes the experience of breast cancer women undergoing treatment who have difficulty remembering things and the inability to stay focused on a task.[18] In addition to providing relaxation, flexibility exercise also affects increasing body circulation.[15] Increased blood circulation in the body causes oxygen to be circulated optimally to the body's tissues, especially to the brain. Maximum oxygen in the brain can improve the workings of the brain system and increase concentration power.[16] The results of this study are following Loprinzi and Kane, which is that training done with moderate intensity can increase the cognitive concentration of patients (mean=145.1, SD=26.9, p=0.004).[19] Mustian et al. also said that moderate-intensity exercise can improve the ability of concentration in cancer patients undergoing treatment.[20] Also, the opinion of other researchers said that exercise that was carried out regularly for 24 weeks significantly (r=0.45, p=0.001) could influence the increase in the concentration of cancer patients undergoing treatment.[21]

Symptom distress based on breathing items appeared that there were differences in breathing between groups after the flexibility exercise action and the control group (t=-2.28, p=0.03). The difference after the flexibility exercise intervention was the existence of breathing that returned to normal and reduced difficulty in breathing. Appropriate physical exercise can improve respiratory muscles and lung ventilation muscles so that the lungs can work properly, oxygen levels can increase in the body, and the supply of oxygen to the tissues can be fulfilled.[17] The results are following Jastrzębski et al. that physical exercise performed in 2 months provides reduced dyspnea in lung cancer patients undergoing chemotherapy (p=0.005).[22]

Symptom distress based on the item view shows that there were differences in views (t=-2.25, p=0.03) after doing flexibility exercise. The difference after the flexibility exercise intervention was a decrease in the view of concern or fear of the future. The view in question is anxiety in cancer patients who are receiving chemotherapy treatment. According to Bruce said that flexibility exercise can improve mood and self-confidence of cancer patients who get treatment.[3] This study is by the research of Chen et al. said that the physical exercise program for 12 weeks at home in cancer patients receiving treatment showed an improvement in coping with their anxiety levels in the third month (p = 0.009) and sixth month (p = 0.006) than the group of patients with usual care.[23] Mehnert et al. also gave the same opinion that physical exercise carried out for 2 months 2 weeks influenced the level of anxiety (p = 0.03) in breast cancer patients who received chemotherapy treatment.[24]

Conclusions

Tere were differences in distress symptom between before and after the flexibility exercise intervention in the intervention group of cancer patients undergoing chemotherapy, there were differences in symptom distress between the intervention groups after it was performed flexibility exercise intervention and a control group of cancer patients undergoing chemotherapy. This study recommends that flexibility exercise can be a non-pharmacological measure to help reduce symptoms of cancer patients undergoing chemotherapy.

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