# Evaluation on Symptoms and Self-Treatment due to Radiotherapy and Chemotherapy Based on Different Cancer Stage

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Keywords: Radiotherapy, Chemotherapy, Cancer Stage, Self-treatment.

Abstract: Radiotherapy and chemotherapy is modality therapy in cancer patients to minimize metastatic, but it causes disruption of the overall organ system and decrease in various body functions. It can interfere the daily needs fulfilled, and the patient become discouraged and worsened their condition. This study was to identify the symptoms and self-treatment due to radiotherapy and chemotherapy based on the different cancer stage. This was mixed method design and sequential explanatory approach. Samples were 30 cancer patients taken by purposive sampling at Indonesian Cancer Foundation East Java Branch. The instrument was a questionnaire. Result showed the most symptoms complained by all patients in various stages was fatigue. Pain, hair loss and constipation were dominated in cancer stage 4, nausea-vomiting and insomnia were dominated in cancer stage 3. All patients did the self-treatment. The majority self-treatment of fatigue was yoga exercise. Pain and nausea-vomiting were treated by combination of medication and relaxation. Insomnia was treated by mild massage. Constipation was treated by consuming the high fiber foods. Nobody treat the hair loss complaints. Radiotherapy and chemotherapy affect the disturbance of the stimulation hormones and metabolism that cause several of physical symptoms. Self-treatment by the patient could reduce the symptoms effectively.

## 1 BACKGROUND

Cancer is tumor cells which has the ability to replicate rapidly and invade the normal body tissues. (Bunz, 2008). Cancer can metastatic to all of organs depending on the stage of cancer. Prevention of metastatic can be done through radiotherapy and chemotherapy. It is expected to has a longer survival. In prior studies of women with breast cancer post-chemotherapy found that the survival rates of patients increased reaching 5 years (92.1%) and 10 years (81.9%)(Rossi *et al.*, 2015). The effectiveness of radiotherapy and chemotherapy in prolonging survival was followed by various effects on physical conditions. It will lead to disruption of the patient's daily activities and if it lasts longer can worsen the quality of life of the patient. In the prior studies mentioned the various physical effects post-chemotherapy and radiotherapy separately. No research identify these effect and the beneficial treatment by patient to reduce it based on the cancer stage.

In 2013 based on the basic health research stated that the prevalence of cancer in Indonesia reached 1.4 per mil with the highest areas of Yogyakarta (4.1 ‰), Central Java (2.1 ‰), Bali (2 ‰), Bengkulu and DKI Jakarta respectively (1.9 ‰), while in East Java reaches 1.6 ‰(HRDI, 2013).

Research on 100 cancer patients found that the majority effects of chemotherapy is a weakness 95% and fatigue 90%(Shahbaz Aslam *et al.*, 2014). Another research reported that 15 patients performed radiotherapy, majority complained were totally exhausted, pain like skin burning and itching(Schnur *et al.*, 2009). Radiotherapy and chemotherapy trigger the occurrence of oxidative stress not only in the target tissue, but also on healthy tissue. It causes the toxicity and organ dysfunction(Gilliam and St. Clair, 2011). Exposure to oxidative stress on radiotherapy and chemotherapy to the muscles can cause weakness and progressively increase the occurrence of fatigue(Powers and Jackson, 2008). Oxidative stress can lead to apoptosis, metabolic disorders, neuroinflammation, metabolic disturbances and neuronal failure(Areti *et al.*, 2014). Target cell damage due to radiation on the tissues can cause DNA damage(Baskar *et al.*, 2014).



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Therefore the physical symptoms due to chemotherapy and radiotherapy is very important to be recognized by patients earlier and empower patients to reduce symptoms independently is essential to improve the patient's adaptation process. This study was to identify the physical symptoms and self-treatment due to radiotherapy and chemotherapy based on the cancer stage.

## 2 METHODS

This was mixed method design and sequential explanatory approach. Sample was cancer patients with radiotherapy and chemotherapy program at Indonesian Cancer Foundation East Java Branch which amounted to 30 people, taken by purposive sampling technique.

The questionnaire as an instrument was made by researchers based on theories about the effects of chemotherapy and radiotherapy. It consists of closed-ended questions that describe a wide range of physical complaints in post-chemotherapy and radiotherapy. The instrument has been tested the validity and reliability test, the result of the correlation coefficient was 0.872 and cronbach's alpha result was 0.923. It means that the instrument is valid and reliable.

All participants were given an explanation of the purposes, benefits and risks of this study, and who agreed to sign a voluntary and non-compulsory informed consent sheet.

After the participants filling out the questionnaire, it continued with interviewed about the self-treatment to reduce the symptoms. After the data collected, it was compare among the symptoms and self-treatment based on cancer stage and calculate the percentage.

## 3 RESULTS

Below is the general and particular data of participants about physical symptom and self-treatment.

Table 1 shown the majority participants were female (73.3%) with average of age 41 – 50 years old (40%). The most type of cancer was breast cancer (30%), based on cancer stage was III (40%) and majority time of diagnosed with cancer was 1 - < 2 years (40%).

Table 1. General Data of Participants at Indonesian Cancer Foundation East Java Branch, 2017.

| General Data | Categories | Frequency (Person) | Percentage (%) |
|---|---|---|---|
| Age | 25 – 30 years | 3 | 10 |
| | 31 – 40 years | 4 | 13.3 |
| | 41 – 50 years | 12 | 40 |
| | 51 – 60 years | 9 | 30 |
| | > 60 years | 2 | 6.7 |
| Sex | Female | 22 | 73.3 |
| | Male | 8 | 26.7 |
| Type of cancer | Breast | 9 | 30 |
| | Cervix | 6 | 20 |
| | Nasopharing | 8 | 26.7 |
| | Colon | 2 | 6.7 |
| | Ovary | 2 | 6.7 |
| | Lung | 1 | 3.3 |
| | Lymphoma Hodgkin | 1 | 3.3 |
| | Rectum | 1 | 3.3 |
| Cancer stage | I | 4 | 13.3 |
| | II | 6 | 20 |
| | III | 12 | 40 |
| | IV | 8 | 26.7 |
| Time of diagnosed with cancer | < 1 years | 11 | 36.7 |
| | 1 - < 2 years | 12 | 40 |
| | 2 - < 3 years | 2 | 6.7 |
| | > 3 years | 5 | 16.6 |

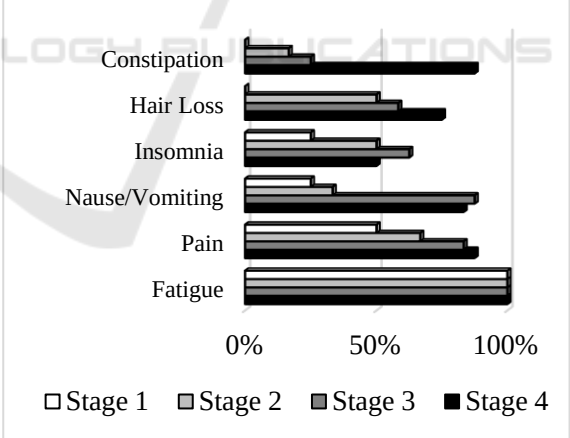


Figure. 1: The symptoms due to radiotherapy and chemotherapy based on cancer stage

Graph as shown in fig. 1 that found six symtopms due to radiotherapy and chemotherapy, but fatigue was found in all of stage of cancer. In stage 1 no symtomp about hair loss and constipation. In stage 2 – 4 all symtomps was found. Pain, hair loss and constipation symptoms were dominated in cancer stage 4, whereas nausea/ vomiting and insomnia were dominated in cancer stage 3.

Table 2: Description of details characteristic symptoms due to radiotherapy and chemotherapy based on cancer stage.

| Stage of Cancer | Fatigue | | Pain | | Nausea | |
|---|---|---|---|---|---|---|
| | Weakness & lack of energy (%) | Fatigue disturbing of daily activity (%) | Hand, feet & back cramps (%) | Abdominal & back lancinating (%) | When smell of food sometimes followed by vomiting (%) | Any time sometimes followed by vomiting |
| Stage 1 | 100 | 0 | 75 | 25 | 100 | 0 |
| Stage 2 | 66,7 | 33,3 | 75 | 25 | 100 | 0 |
| Stage 3 | 25 | 75 | 60 | 40 | 10 | 90 |
| Stage 4 | 0 | 100 | 28,6 | 71,4 | 14,3 | 85,7 |

Table 3: Description of details characteristic of symptom due to radiotherapy and chemotherapy based on cancer stage.

| Stage of Cancer | Fatigue | | Pain | | Nausea/ Vomiting | |
|---|---|---|---|---|---|---|
| | Resting (%) | Yoga Exercise (%) | Analgesic drug (%) | Combination of analgesic drug & relaxation (%) | Antiemetic drug (%) | Combination of antiemetic drug & relaxation (%) |
| Stage 1 | 25 | 75 | 50 | 50 | 0 | 100 |
| Stage 2 | 50 | 50 | 33.3 | 66.4 | 0 | 100 |
| Stage 3 | 33,3 | 66,7 | 30 | 70 | 30 | 70 |
| Stage 4 | 62,5 | 37,5 | 25 | 75 | 42,9 | 57,1 |

Table 2 shown that in fatigue symptom identified two details characteristics. The first was weak and lack of energy, it was dominated in cancer stage 1 and the second fatigue disturbing of daily activity fulfilling was dominated in cancer stage 4. In Pain symptom participant felt hand, feet and back cramps was dominated in cancer stage 3 and abdominal & back lancinating was dominated in cancer stage 4. Participants felt nausea when smell of food and sometimes followed by vomiting was dominated in cancer stage 1 and 2. Nausea feel anytime

Table 3 shown that participants got trouble getting started sleeping & woke up early were dominated by cancer stage 3, and woke up at night and could not sleep anymore were dominated in cancer stage 4. In hair loss symptom the most moderate hair loss was dominated in cancer stage 3 and severe hair loss (alopecia) was dominated in cancer stage 4. In constipation symptom all of stage of cancer felt straining during defecation and hard lump of faeces except cancer stage 1.

Table 4 shown that in fatigue symptoms, participants relieve it by resting was dominated in cancer stage 4, but yoga exercise was dominated in cancer stage 1. In pain symptom the majority of cancer stage 3 relieve by analgesic drug consume, but treatment by combination of analgesic drug & relaxation (deep breathing and distraction) were dominated by cancer stage 4. Majority participants in cancer stage 4 relieve nausea/ vomiting by antiemetic drug, but in cancer stage 1 and 2 relieve by combination of antiemetic drug & relaxation (deep breathing).

Table 5 shown that mild massage on head, back, hand and feet were dominated in cancer stage 1 and 2 to relieve insomnia, whereas cancer stage 4 relieve insomnia by sleeping pills. In symptom of hair loss the majority of participants in cancer stage 2 do no treatment, and using hair tonic to stimulate the hair growing were used by cancer stage 3. In symptoms of constipation participants in cancer stage 2 – 3 was relieved by high fiber foods consuming such as vegetables, fruits and drink amount of water.

# 4 DISCUSSION

## 4.1 Symptoms and its Characteristics

The most symptoms after chemotherapy and radiotherapy was fatigue, it occurred in all patients with various stages of cancer. The details characteristic identified were weakness, lack of energy and fatigue disturbing of daily activity. The participants have limitations in the activity and cause the high levels of dependence on others. One of research on 100 cancer patients reported that weakness (95%) and fatigue (90%) after chemotherapy (Shahbaz Aslam *et al.*, 2014). Fatigue (cancer related fatigue) is a subjective complaint against the onset of physical fatigue. Post radiotherapy or chemotherapy majority of respondents got severe fatigue(Kummer *et al.*, 2013),(Bock *et al.*, 2014),(Werdani, 2017). Chemotherapy, surgery, and radiotherapy can lead to increased plasma cytokines, especially TNF-α, IL-

Table 4. Description of details self-treatment to reduce the symptoms.

| Stage of Cancer | Fatigue | | Pain | | Nausea/ Vomiting | |
|---|---|---|---|---|---|---|
| | Resting (%) | Yoga Exercise (%) | Analgesic drug (%) | Combination of analgesic drug & relaxation (%) | Antiemetic drug (%) | Combination of antiemetic drug & relaxation (%) |
| Stage 1 | 25 | 75 | 50 | 50 | 0 | 100 |
| Stage 2 | 50 | 50 | 33.3 | 66.4 | 0 | 100 |
| Stage 3 | 33,3 | 66,7 | 30 | 70 | 30 | 70 |
| Stage 4 | 62,5 | 37,5 | 25 | 75 | 42,9 | 57,1 |

Table 5. Description of details self treatment to reduce the symptoms.

| Stage of Cancer | Insomnia | | Hair Loss | | Constipation |
|---|---|---|---|---|---|
| | Mild massage (%) | Sleeping pills (%) | No Treatment (%) | Using hair tonic (%) | High fiber food consuming (%) |
| Stage 1 | 100 | 0 | 0 | 0 | 0 |
| Stage 2 | 100 | 0 | 100 | 0 | 100 |
| Stage 3 | 66,7 | 33,3 | 42,9 | 57,1 | 100 |
| Stage 4 | 40 | 60 | 50 | 50 | 100 |

1β, and IL-6. TNF-α has been shown to cause changes in neurotransmission of the central nervous system leading to behavioral changes such as lethargy and anorexia(Ryan *et al.*, 2007).

Pain symptom was identified by two characteristics, hand feet and back cramps and abdominal & back lancinating. This complaint is felt by the participants every day and more severe during the activity. Pathophysiology of cancer pain involves somatic, visceral and neuropathy. Somatic pain is usually superficial and arises from the skin, soft tissue and musculoskeletal tissue. Visceral pain is dull originating from internal organs. Neuropathic pain arises from the structure of the somatosensory system such as receptors, peripheral nerves, autonomic nerves and central nervous system(Mishra *et al.*, 2009). Another research reported that 13% of breast cancer patients complained of moderate to severe pain (rating> 4) at early of radiotherapy and 23% reported moderate to severe pain after radiotherapy(Parks *et al.*, 2017). Persistent pain also felt in breast cancer patients after 5-7 years post-chemotherapy(Mejdahl *et al.*, 2013).

Details characteristic of nausea/vomiting were smelling food and at any time and it sometimes followed vomiting, it cause reduce nutritional intake and body weight. Participants only able to spend half the portion of the meal. Vomiting is a reflex triggered by a toxic substance, such as a chemotherapy agent, which causes damage to the gastric mucosa and the small intestine, thus stimulating the vagal afferent interacting with the central nervous system, and generating an emetic response(Hesketh, 2008). Neurotransmitters that affect the emetic response are serotonin, dopamine, acetylcholine, and γ-aminobutyric acid (GABA), histamine, endorphins, and cannabinoids(Navari, 2009). Cancer patients in another research stated that the effects of chemotherapy led to nausea of 77%, vomiting 75%(Shahbaz Aslam *et al.*, 2014).

Insomnia characterized by trouble getting started sleeping & woke up early and woke up at night and could not sleep anymore. It causes respondents often feel tired throughout the day. Radiation and chemotherapy are both reported to produce sleep disturbances(Liu and Ancoli-Israel, 2008). In cancer patients, circadian rhythm disturbance is caused by endocrine changes (such as cortisol, melatonin, prolactin), metabolic processes (such as temperature and circulation levels of proteins), and the immune system (such as leukocyte and neutrophil levels)(Liu and Ancoli-Israel, 2008). Sleep disturbances and increased daytime drowsiness occur in adult and child of various types of cancer including acute lymphocytic leukemia, central nervous system tumor, Hodgkin's lymphoma, soft tissue sarcoma, and bone tumor(Mulrooney *et al.*, 2004).

The symptoms of hair loss is suffered in stage 4 of cancer with degrees of hair loss vary, but it does not make the patient feel ashamed. Research conducted on Caucasian cancer patient reported that post-chemotherapy cause hair loss and alopecia on a moderate scale (Kluger *et al.*, 2012).

Constipation is suffered in stage 4 of cancer. Majority of patients told that difficulty defecation with the fastest frequency of defecation is 1 week once times with stiff consistency of the feces.

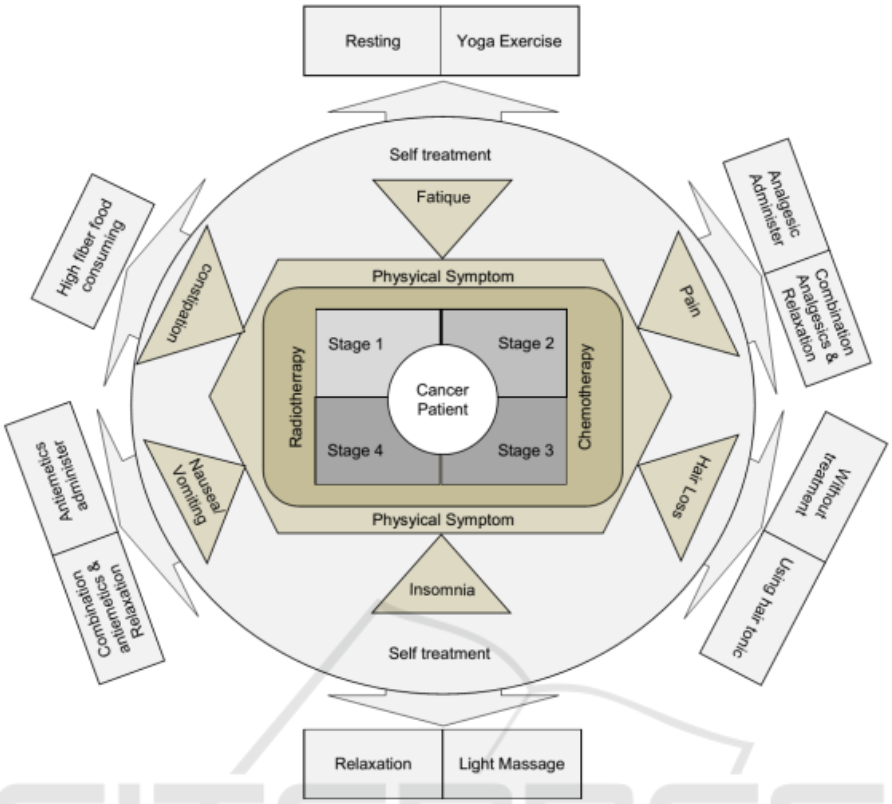


Figure 2: The Patterns of Symptoms and Self Treatment due to Radiotherapy and Chemotherapy Based on Different Cancer Stage



Constipation often occurs 50-87% in patients with advanced cancer(Abernethy, Wheeler and Zafar, 2009). Constipation is the third most common symptom in patients receiving cytotoxic chemotherapy with an overall prevalence of 16%, with 5% being severe and 11% moderate(Anthony, 2010). Chemotherapy and radiation drugs affect the contractile physic activity that contribute to colonic motor activity and peristaltic reflexes (Kuizenga *et al.*, 2015).

## 4.2 Self-treatment to Reduce the Symptoms

The majority of patients who suffered fatigue cope with resting (reduced daily activities and use the time to lie down, while some light activity such as reading, making handwork is done by sitting). But there is a small percentage of patients who overcome fatigue by doing yoga exercise, because they have understood the steps of yoga through social media and training from local cancer organization where they come from. In prior studies reported that the activity of yoga for 12 weeks can reduce fatigue significantly(Bower, Garet and Sternlieb, 2011).

In pain symptoms, the majority of patients overcome by taking analgesic drug from the physician and combined with the deep breathing relaxation and distraction technique. It has learned from health care workers in the hospital. But sometimes the pain is still felt in moderate to mild scale. Meditation, progressive relaxation, rhythmic respiration, therapeutic touch, transcutaneous electrical nerve stimulation (TENS), hypnosis, music therapy, acupressure are among the non-invasive methods of reducing pain in cancer patients(Woolf, 2011). Non-opioid analgesic drugs are the first step to reduce cancer pain, but if the pain is not well controlled then strong opioids such as morphine can be given(PDQ Supportive and Palliative Care Editorial Board, 2002).

In Nausea/ vomiting symptoms, the majority of patients cope with a combination of antiemetic drug and deep breathing relaxation techniques. In the prior studies reported that providing a relaxation intervention with music for 25 minutes is effective

in reducing the intensity of nausea and vomiting in cancer patients(Arakawa, 1997).

In insomnia symptom are overcome by the majority of respondents with deep relaxation techniques such as meditation and mild massage on the head/ hands/ feet/ back performed by family caregiver. Medical massage therapy interventions on cancer patients showed significant differences in sleep quality scores before and after intervention in the treatment group(Kashani and Kashani, 2014). Massage therapy can increase different levels of relaxation in a person's body and can improve sleep habits(Reza *et al.*, 2010).

In hair loss symptom, the majority of patients doing nothing of treatment, but there is a small percentage of patients who use hair tonic to cool the head and stimulate hair growth. Scalp cooling especially in the frontal, superior and occipital areas of the head can reduce hair loss during chemotherapy(Ghaffari M *et al.*, 2015).

In constipation symptoms overcome by increasing the high fiber foods consuming such as fruits, vegetables, and many waters, it help them alleviate perceived complaints. Dietary fiber intake increases the frequency of defecation and improves fecal consistency, which is especially useful for patients who are constipated (Yang *et al.*, 2012).

Figure 2 shown that side effect of cancer therapy (radiotherapy and chemotherapy) cause the complicated symptoms and its details. Many self-treatment done by patients to reduce the symptoms.

## 5 CONCLUSIONS

Radiotherapy and chemotherapy in cancer patients can lead to the physical symptoms that disrupt the balance of individual physiological basic needs fulfilled. Every stage of cancer has different details characteristic of symptoms. The Patients did the self-treatment to reduce the symptoms and every stage of cancer has different ways to overcome it.

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