ORIGINAL ARTICLE

SYMPTOM CLUSTERS AND QUALITY OF LIFE AMONG WOMEN LIVING WITH CANCER

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ABSTRACT

The prevalence of cancer in Indonesia has increased and is one of the biggest causes of death. Symptom clusters, a collection of symptoms in cancer patients that appear together and are related to one another, can affect the quality of life of cancer patients. This study aims to identify the relationship between symptom clusters and the quality of life of advanced cancer patients. This research used cross-sectional quantitative survey data from a cancer patient care unit at a referral hospital in West Java Province with a total of 140 respondents. Consecutive sampling was conducted for three months in stage III or IV cancer patients who were undergoing therapy. This study used descriptive analysis, factor analysis with the Principal Components Analysis (PCA) approach, and multiple linear regression analysis. Five symptom clusters were identified: the psychological cluster, the gastrointestinal cluster, the numbness cluster, the pain cluster, and the respiratory distress cluster. The results showed that symptom clusters influence the quality-of-life dimension. The symptom clusters' coefficient of determination (R^2) for the physical dimension was 0.231 (weak), the role dimension was 0.191 (very weak), the emotional dimension was 0.484 (moderate), the cognitive dimension was 0.011 (very weak), the social dimension was 0.420 (moderate), and the general-health dimension was 0.202 (weak).

Keywords: *Advanced stage; cancer; quality of life; symptom cluster*

INTRODUCTION

Cancer is one of the highest causes of death in the world. In 2018, the International Agency for Research on Cancer (IARC) recorded 18.1 million new cancer cases and 9.6 million cases of cancer deaths (International Agency for Research on Cancer [IARC], 2018). In Indonesia, cancer prevalence increased from 1.4% in 2013 to 1.8% in 2018, and the disease became one of the country's largest causes of death (Kemenkes RI, 2018).

Patients with cancer are known to suffer from several physical, social, and psychological symptoms that range from mild to severe (Fan et al., 2007). These symptoms often occur together, arising due to the disease and the side effects of treatment (Ji et al., 2017). The collection of symptoms in cancer patients that appear together and are related to each other is known as a symptom cluster (Kim et al., 2005). The symptoms in symptom clusters are characterized by cohesiveness, simultaneity, and stability. They may also have a common biological mechanism (Zhou et al., 2023).

In advanced cancer patients, there are two typical symptom clusters: the psychological cluster (anxiety and depression) and the physical cluster (fatigue, drowsiness, nausea, decreased appetite, and shortness of breath). Both clusters are influenced by the location of the primary cancer (Cheung et al., 2009). In about 40% of patients, these symptoms often appear together and rarely appear as a single symptom

(Cooley & Siefert, 2016). The symptoms in the cluster may or may not have the same etiology.

Previous studies have identified that cluster symptoms can affect the quality of life of cancer patients (Lopes-Júnior et al., 2022). Choi and Ryu (2018) and Wang and Fu (2014) stated that cluster symptoms experienced by lung cancer patients negatively affect their quality of life. Therefore, it is important to consider the consequences of other symptoms when treating one of these symptoms, as increasing the severity of symptoms can ultimately interfere with the quality of life of advanced cancer patients (Hamada et al., 2016).

Previous studies exploring the relationship between symptom clusters and quality of life in advanced cancer patients have been conducted in developed countries, such as the United States (Omran et al., 2017) and Japan (Hamada et al., 2016). The absence of research exploring the relationship between symptom clusters and quality of life in advanced cancer patients in Indonesia is a research gap. Therefore, this study aims to identify the relationship between cluster symptoms and quality of life in advanced cancer patients in Indonesia. This study's results are expected to be a basis for nurses to develop appropriate intervention models to manage symptom clusters in advanced cancer patients to improve their quality of life.

METHOD
Study design
This is a cross-sectional quantitative study.

Sample
This study used survey data from a cancer patient care unit at a referral hospital in West Java Province with a total of 140 respondents. The researchers selected this specific hospital because it was a class A hospital and the highest referral hospital in West Java Province. It is also a good quality National Referral Hospital and a competitive Teaching Hospital. In addition, malignancy/cancer are the highest cases treated at the hospital in outpatient and inpatient installations. The consecutive sampling method was conducted for 3 months. The inclusion criteria set are stage III or IV cancer patients who are undergoing therapy.

Instrument
Descriptive analysis was used to obtain an understanding of the respondents' quality of life and symptoms. The factor analysis was used with the Principal Components Analysis (PCA) approach to determine the symptoms studied. Furthermore, the multiple linear regression analysis was used to forecast the value of the influence of the independent variables on the dependent variable.

This study measured cluster symptom data using the Edmonton Symptom Assessment Scale (ESAS). The ESAS instrument briefly examines 17 common symptoms focusing on palliative aspects, such as pain, fatigue, nausea, depression, anxiety, drowsiness, appetite, mood (feeling at the time of measurement), and tightness. The five clusters identified were the psychological, gastrointestinal, numbness, pain, and respiratory distress clusters.

In addition, the questionnaire used to measure the quality of life is the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core 30 (EORTC QLQ C30). This questionnaire, also known as the Core Questionnaire, is specifically designed for a broad application to measure the quality of life of cancer patients. The five functional scales that measure the quality of life on this questionnaire are physical function, role function, emotional function, cognitive function, and social function (Mystakidou et al., 2001).

After validity and reliability tests, the ESAS questionnaire was declared valid with a Cronbach alpha value of 0.89 (>0.6) and reliable with a correlation value or r count of 0.36 (>0.3) (Chang et al., 2000). The EORTC QLQ C30 questionnaire used in this study is already in the Indonesian version. It has been declared valid with a Cronbach alpha value of 0.70 (>0.6) and reliable with a correlation value or r count of 0.40 (>0.3). (Perwitasari et al., 2011).

Data collection
Data collection was carried out from June 2019 to July 2019 at RSUP Dr. Hasan Sadikin Bandung. Data were collected by researchers and research assistants.

Data analysis
Descriptive analysis, factor analysis with the Principal Components Analysis (PCA) approach, and multiple linear regression analysis were used in this study.

Ethical consideration
This research has received ethical approval number: LB.02.01/X.6.5/144/2019 from RSUP Dr. Hasan Sadikin Bandung.

RESULTS
Univariate
Characteristics of respondents

Table 1. Frequency distribution of respondent characteristics (N = 140)

Variable	n	%	Mean ± SD
Age (years)			48 ± 12
Gender			
Man	39	27.9	
Woman	101	72.1	
Religion			
Islam	137	97.9	
Christian	3	2.1	
Marital status			
Married	137	97.9	
Unmarried	3	2.1	
Education			
No school	3	2.1	
Elementary school	64	45.7	
Junior high school	24	17.1	
Senior high school	37	26.4	
Diploma 3	1	0.7	
Bachelor	10	7.1	
Master	1	0.7	
Job			
Civil Servants	9	6.4	
Private	8	5.7	
Self-employed	11	7.9	
Laborer	5	3.6	
Housewife	86	61.4	
Doesn't work	21	15.0	
Earnings per month (Rp)			
<1,500,000	96	68.6	
1,500,000-3,900,000	32	22.9	
>3,900,000	12	8.6	
Stadium			
III	116	82.9	
IV	24	17.1	

Variable	n	%	Mean ± SD
Long seeking treatment			
<1 week	20	14.3	
1-2 weeks	45	32.1	
>2 weeks-<1 months	30	21.4	
1-2 months	27	19.3	
>2 months	18	12.9	
First treatment			
Public Health Center (PHC)	51	36.4	
Hospital	59	42.1	
Practicing physician	14	10.0	
Mantri	4	2.9	
Clinic	2	1.4	
Practicing Midwife	6	4.3	
Alternative Therapies	2	2.9	

Table 1 exhibits that the average age of the 140 respondents was 48 years (standard deviation 12). Most of the respondents were women (72.1%), Muslim (97.9%), and married (97.9%). Most had an elementary school education level (45.7%), were homemakers as their employment status (61.4%), and had a monthly income of <1,500,000.00 (68.6%). They were also mostly stage III cancer patients (82.9%) that been seeking treatment for 1-2 weeks (32.1%), and their first treatment was conducted at the hospital (42.1%).

Quality of life overview
Table 2. Quality of life distribution of advanced cancer patients (N = 140)

Quality of life	Median	Min-Max
Scale/ common domain		
General health status	66.67	0.00 - 83.33
Scale/ functional domain		
Physical	80.00	0.00 – 100.00
Role	83.33	0.00 – 100.00
Emotional	75.00	25.00 – 100.00
Cognitive	100.00	0.00 – 100.00
Social	83.33	0.00 – 100.00
Total score	**428.33**	**50.00 – 500.00**
Scale/ domain symptoms		
Fatigue	55.56	0.00 – 100.00
Nausea and vomiting	50.00	0.00 – 100.00
Pain	66.67	0.00 – 100.00
Shortness of breath	0.00	0.00 – 100.00
Sleep pattern disturbances	66.67	0.00 – 100.00
Loss of appetite	33.33	0.00 – 100.00
Constipation	0.00	0.00 – 100.00
Diarrhea	0.00	0.00 – 100.00
Financial difficulties	33.33	0.00 – 100.00
Total Score	**355.56**	**33.33 – 655.56**
Quality of life score	811.67	501.67 – 1125.56

The analysis showed that the median value of the total quality of life score was 811.3 with a range of 501.67 - 1125.56. This result indicates that the quality of life of advanced cancer patients, who were the respondents in this study, was at a moderate level.

Cluster symptom overview
Table 3. Distribution of advanced cancer symptoms (N = 140)

Symptom	Median	Min-Max
Pain	8	0-10
Numbness	0	0-10
Tingling	1.5	0-10
Fatigue	8	0-10
Sleep pattern disturbances	8	0-10
Sleepy	4.5	0-10
Nausea	8	0-10
Vomiting	0	0-10
Appetite	5	0-10
Dry mouth	0.5	0-9
Diarrhea	0	0-10
Constipation	0	0-10
Depression	0	0-10
Anxiety	5	0-10
Mood	2	0-10
Cough	0	0-10
Shortness of breath	0	0-10

Of the 17 symptoms that appear, pain, fatigue, sleep pattern disturbances, and nausea have the highest median score of 8.

Table 4. Factor analysis of 16 symptoms in advanced cancer patients (N = 140)

Row cluster	Factor loading	Cronbach's Alpha
Factor 1		
Mood	0.936	0.858
Depression	0.901	
Anxiety	0.869	
Dry mouth	0.578	
Factor 2		
Nausea	0.818	0.702
Vomiting	0.802	
Appetite	0.677	
Diarrhea	0.506	
Factor 3		
Numbness	0.892	0.711
Tingling	0.857	
Fatigue	0.407	
Factor 4		
Sleep pattern disturbances	0.877	0.727
Sleepy	0.869	
Pain	0.503	
Factor 5		
Cough	0.883	0.753
Shortness of breath	0.858	

Factor extraction method: Principal Factor Analysis; rotation method: Varimax with Kaiser Normalization

The analysis results show that there are five symptom clusters. Each cluster consists of 2-4 symptoms experienced by advanced cancer patients regardless of the type of cancer experienced by respondents. The Cronbach alpha for these five factors ranges from 0.702 to 0.858. In contrast, Hamada et al. (2016) examined patients with advanced lung cancer and identified three symptom clusters. The dynamic experience of symptoms causes different groupings of symptoms.

Bivariate

The relationship between cluster symptoms with quality of life

Table 5. Correlation of cluster symptoms to five dimensions of quality of life and general health status of advanced cancer patients

Symptom cluster	General health status	Physical function	Role function	Emotional function	Cognitive function	Social function
Psychological	-0.393**	-0.245**	-0.387**	-0.658**	0.001	-0.567**
Gastrointestinal	0.066	0.008	0.120	0.052	-0.005	0.150*
Numbness	-0.029	-0.152*	-0.140*	-0.061	-0.127	-0.092
Pain	-0.089	-0.363**	-0.221**	-0.191*	-0.165*	-0.109
Respiratory Disorders	-0.116	-0.205**	-0.135	-0.052	-0.036	-0.023

*$p<0.05$, **$p<0.01$*

From the analysis results, all cluster symptoms identified in this study revealed a meaningful correlation to five dimensions of quality of life and general health status. Therefore, all clusters were included in the multiple linear regression analysis. The next step was to perform multiple linear regression analyses between the symptom clusters and each quality of life dimension. Then, a value was obtained to predict the influence of two symptom cluster independent variables on one independent variable, which is each dimension of quality of life. Table 6 shows the results of the analyses.

Table 6. Multiple linear regression analysis between symptom cluster and quality of life dimension

Symptom cluster	Coefficient B	SE	Adjusted correlation	p	R^2
Physical dimensions					
Constant	74.19	1.780		<0.001	0.231
Psychological	-6.812	1.787	-0.284	<0.001	
Gastrointestinal	1.814	1.787	0.075	0.312	
Numbness	-2.415	1.787	-0.100	0.179	
Pain	-6.648	1.787	-0.277	<0.001	
Respiratory disorders	-7.059	1.787	-0.294	<0.001	
Role dimensions					
Constant	75.119	1.870		<0.001	0.191
Psychological	-9.482	1.877	-0.385	<0.001	
Gastrointestinal	2.945	1.877	0.120	0.119	
Numbness	-0.862	1.877	-0.035	0.647	
Pain	-3.518	1.877	-0.143	0.063	
Respiratory disorders	-4.663	1.877	-0.189	0.014	
Emotional dimension					
Constant	73.929	1.156		<0.001	0.484
Psychological	-12.807	1.160	-0.673	<0.001	
Gastrointestinal	2.347	1.160	0.123	0.055	
Numbness	-1.066	1.160	-0.056	0360	
Pain	-3.149	1.160	-0.165	0.008	
Respiratory disorders	-1.266	1.160	-0.066	0.277	
Cognitive dimension					
Constant	96.786	1.151		<0.001	0.011
Psychological	-2.045	1.155	-0.149	0.079	
Gastrointestinal	0.314	1.155	0.023	0.786	
Numbness	-1.316	1.155	-0.096	0.257	
Pain	-1.649	1.155	-0.120	0.156	
Respiratory disorders	-0.232	1.155	-0.017	0.841	
Social dimension					
Constant	81.905	1.619		<0.001	0.420
Psychological	-16.067	1.625	-0.638	<0.001	
Gastrointestinal	3.069	1.625	0.122	0.061	
Numbness	-1.628	1.625	-0.065	0.318	
Pain	-2.997	1.625	-0.119	0.067	
Respiratory disorders	-0.524	1.625	-0.021	0.748	
General health dimensions					
Constant	59.464	1.375		<0.001	0.202
Psychological	-8.009	1.38	-0.440	<0.001	
Gastrointestinal	1.397	1.38	0.077	0.313	
Numbness	-0.476	1.38	-0.026	0.731	
Pain	-1.547	1.38	-0.085	0.264	
Respiratory disorders	-2.829	1.38	-0.155	0.042	

The symptom clusters' coefficient of determination (R^2) for the physical dimension was 0.231 (weak), the role dimension was 0.191 (very weak), the emotional dimension was 0.484 (moderate), the cognitive dimension was 0.011 (very weak),

the social dimension was 0.420 (moderate), and the general-health dimension was 0.202 (weak).

The relationship between cluster symptoms and the physical function of advanced cancer patients
Table 7. Regression analysis of cluster factors on the physical function of advanced cancer patients

Symptom cluster	Physical function				
	Coefficient B	SE	Adjusted correlation	p	R^2
Constant	74.19	1.780		<0.001	0.231
Psychological	-6.812	1.787	-0.284	<0.001	
Gastrointestinal	1.814	1.787	0.075	0.312	
Numbness	-2.415	1.787	-0.100	0.179	
Pain	-6.648	1.787	-0.277	<0.001	
Respiratory disorders	-7.059	1.787	-0.294	<0.001	

Overall, symptom clusters affect physical function at 23.1%. However, only three symptom clusters had a more significant association with physical function than other clusters. Sequentially, the psychological cluster, the pain cluster, and the respiratory distress cluster had almost the same influence on the physical dimensions of quality of life with weak correlation strengths of -0.284, -0.277, and -0.294. This result suggests that if there is a 1% increase in the psychological cluster, the pain cluster, and the respiratory distress cluster, there will be decreases in physical function of 6.812, 6.648, and 7.059.

The relationship between symptom clusters and the role functioning of advanced cancer patients
Table 8. Regression analysis of cluster factors on the role functioning of advanced cancer patients

Symptom cluster	Role functioning				
	Coefficient B	SE	Adjusted correlation	p	R^2
Constant	75.119	1.870		<0.001	0.191
Psychological	-9.482	1.877	-0.385	<0.001	
Gastrointestinal	2.945	1.877	0.120	0.119	
Numbness	-0.862	1.877	-0.035	0.647	
Pain	-3.518	1.877	-0.143	0.063	
Respiratory disorders	-4.663	1.877	-0.189	0.014	

The multiple linear regression analysis showed that the psychological cluster, the gastrointestinal cluster, the numbness cluster, the pain cluster, and the respiratory distress cluster could explain role functioning by 19.1%. The psychological and respiratory distress clusters have a significant influence on role functioning. The psychological cluster was the dominant factor impacting role functioning with low correlation strength (r = -0.385). A negative correlation indicates that the higher the psychological cluster, the lower the role functioning.

The relationship between symptom clusters and the emotional functioning of advanced cancer patients
Table 9. Regression analysis of cluster factors on the emotional functioning of advanced cancer patients

Symptom cluster	Emotional functioning				
	Coefficient B	SE	Adjusted correlation	p	R^2
Constant	73.929	1.156		<0.001	0.484
Psychological	-12.807	1.160	-0.673	<0.001	
Gastrointestinal	2.347	1.160	0.123	0.055	
Numbness	-1.066	1.160	-0.056	0.360	
Pain	-3.149	1.160	-0.165	0.008	
Respiratory disorders	-1.266	1.160	-0.066	0.277	

Only two symptom clusters are associated with emotional functioning: the psychological symptom cluster and the pain cluster. However, all symptom clusters account for emotional functioning at 48.4%. The psychological cluster was the dominant factor impacting emotional functioning with high correlation strength (r = -0.673). The negative correlation indicates the higher the psychological cluster, the lower the emotional functioning.

The relationship between symptom clusters and the cognitive functioning of advanced cancer patients
Table 10. Regression analysis of cluster factors on the cognitive functioning of advanced cancer patients

Symptom cluster	Cognitive functioning				
	Coefficient B	SE	Adjusted correlation	P	R²
Constant	96.786	1.151		<0.001	0.011
Psychological	-2.045	1.155	-0.149	0.079	
Gastrointestinal	0.314	1.155	0.023	0.786	
Numbness	-1.316	1.155	-0.096	0.257	
Pain	-1.649	1.155	-0.120	0.156	
Respiratory disorders	-0.232	1.155	-0.017	0.841	

Although the entire cluster had a meaningful relationship with cognitive functioning, cluster symptoms could only explain a small effect of cognitive functioning at 1.1%.

The relationship between cluster symptoms and the social functioning of advanced cancer patients
Table 11. Regression analysis of cluster factors on the social functioning of advanced cancer patients

Symptom cluster	Social functioning				
	Coefficient B	SE	Adjusted correlation	p	R²
Constant	81.905	1.619		<0.001	0.420
Psychological	-16.067	1.625	-0.638	<0.001	
Gastrointestinal	3.069	1.625	0.122	0.061	
Numbness	-1.628	1.625	-0.065	0.318	
Pain	-2.997	1625	-0.119	0.067	
Respiratory disorders	-0.524	1.625	-0.021	0.748	

Overall, cluster symptoms can explain changes in social functioning at 42%. However, only the psychological cluster had a meaningful relationship to social functioning and was the dominant factor impacting social functioning with high correlation strength (r = -0.638).

The relationship between cluster symptoms and the general health status of advanced cancer patients
Table 12. Regression analysis of cluster factors on the general health status of advanced cancer patients

Symptom cluster	General health status				
	Coefficient B	SE	Adjusted correlation	p	R²
Constant	59.464	1.375		<0.001	0.202
Psychological	-8.009	1.38	-0.440	<0.001	
Gastrointestinal	1.397	1.38	0.077	0.313	
Numbness	-0.476	1.38	-0.026	0.731	
Pain	-1.547	1.38	-0.085	0.264	
Respiratory disorders	-2.829	1.38	-0.155	0.042	

Table 12 shows the results of the regression analysis of cluster factors on general health status, which obtained a coefficient of determination R2 of 0.202. This coefficient of determination shows that all symptom clusters contribute only 20.2% to general health status, and other factors influence the remaining 79.8%.

DISCUSSION

The analysis showed that the median value of the total quality of life score was 811.3 with a range of 501.67 - 1125.56. This result indicates that the quality of life of advanced cancer patients, who were the respondents in this study, was at a moderate level. This aligns with Husen, Suharti, and Hardian's (2016) research in advanced lung cancer patients undergoing chemotherapy. The total quality of life score they obtained was 799.6, which was interpreted to be moderate quality of life.

Cognitive function has the highest median value for the quality-of-life dimension. This result shows that cognitive function is the least affected component, both by the cancer itself and the cancer treatment undertaken. Age response can also affect the cognitive function components. The average age of the respondents in this study was 48 years (SD 12). Thus, there has been no decline in cognitive function. In addition, the type of cancer, its location, and metastasis also affect cognitive function, such as in brain cancer patients who tend to experience impaired cognitive function due to pressure on the skull. This pressure results in changes in concentration, memory decline, or even confusion Of the 17 symptoms that appear, pain, fatigue, sleep pattern disturbances, and nausea have the highest median score of 8. This study's results align with Kwekkeboom et al. (2018), where pain, fatigue, and disruption of sleep patterns are common symptoms in advanced cancer patients receiving cancer therapy. Similarly, Cheung, Le, Gagliese, and Zimmermann (2010) revealed that pain, fatigue, and disruption of sleep patterns are factors causing the high prevalence and severity of distress in cancer patients. In addition, the 17 symptoms in this study correspond to common symptoms in advanced cancer patients receiving treatment (Esper, 2010).

Many problems and unmet needs in advanced cancer patients are mainly related to physical aspects. Some physical symptoms are directly related to the progression of the cancer itself, while others are related to cancer treatments, such as chemotherapy (Omran & Mcmillan,

2018). In this study, the physical problems experienced were pain, numbness, tingling, fatigue, nausea, vomiting, decreased appetite, dry mouth, diarrhea, constipation, cough, and shortness of breath. Some of these physical problems found in advanced cancer patients are related to the effects of chemotherapy agents (Cherwin, 2012; Di Fiore & Van Cutsem, 2009; Hawkins & Grunberg, 2009). As stated by Effendy et al. (2015), meeting the physical needs of advanced cancer patients is still a challenge.

Next, further analysis was performed through factor analysis (Principal Components Analysis) to get a picture of the respondents' cluster symptoms. The analysis results can be seen in Table 4.
The analysis results show that there are five symptom clusters. Each cluster consists of 2-4 symptoms experienced by advanced cancer patients regardless of the type of cancer experienced by respondents. The Cronbach alpha for these five factors ranges from 0.702 to 0.858. In contrast, Hamada et al. (2016) examined patients with advanced lung cancer and identified three symptom clusters. The dynamic experience of symptoms causes different groupings of symptoms.

Cluster naming is based on the name of the variable that represents its group (its cluster). Factor 1 (mood, depression, anxiety, dry mouth) is called the psychological cluster. Factor 2 (nausea, vomiting, appetite, diarrhea) is called the gastrointestinal cluster. Factor 3 (numbness, tingling, fatigue) is called the numbness cluster. Factor 4 (disturbance of sleep patterns, lethargy, pain) is called the pain cluster, and factor 5 (cough, shortness of breath) is called the respiratory distress cluster.

This study's findings differ from previous studies, such as the study conducted by Jiménez et al. (2011) on 406 advanced cancer patients. In their study, four symptom clusters were identified: the confusion cluster (cognitive impairment, agitation, urinary incontinence), the neuropsychological cluster (anxiety, depression, insomnia), the anorexia-cachexia cluster (anorexia, weight loss, fatigue), and the gastrointestinal cluster (nausea, vomiting). This explains that empirically identified symptom clusters or de novo methods of multiple studies show inconsistencies of specific symptoms in various groups (Miaskowski et al., 2007). These inconsistencies can be caused by differences in the number and characteristics of samples, questionnaires used in collecting symptom data, the timing of data collection, and analysis methods used.

From the analysis results, all cluster symptoms identified in this study revealed a meaningful correlation to five dimensions of quality of life and general health status. Therefore, all clusters were included in the multiple linear regression analysis. The next step was to perform multiple linear regression analyses between the symptom clusters and each quality of life dimension. Then, a value was obtained to predict the influence of two symptom cluster independent variables on one independent variable, which is each dimension of quality of life. Table 6 shows the results of the analyses.

Overall, symptom clusters affect physical function at 23.1%. However, only three symptom clusters had a more significant association with physical function than other clusters. Sequentially, the psychological cluster, the pain cluster, and the respiratory distress cluster had almost the same influence on the physical dimensions of quality of life with weak correlation strengths of -0.284, -0.277, and -0.294. This result

suggests that if there is a 1% increase in the psychological cluster, the pain cluster, and the respiratory distress cluster, there will be decreases in physical function of 6.812, 6.648, and 7.059.

Psychological clusters in patients with chronic diseases, such as cancer, include mood changes, depression, and anxiety as psychological pain. This psychological pain can occur along with physical pain and depression. This symptom is one of the most common psychological symptoms in patients with chronic diseases. The fragile psychological condition of advanced cancer patients will disrupt their physical function and hinder them from conducting their usual daily activities. Meanwhile, erratic mood changes due to the disease will cause excessive concern about the prognosis of the disease or diagnostic certainty. Depression typically appears when patients feel their first symptoms, when they receive news of their diagnosis, and during treatment and palliative care (Holland & Alici, 2010).

Physical pain felt by advanced cancer patients can be caused by the disease itself, cancer treatment, and general weakness or discomfort that they experience (Raphael et al., 2010). Moreover, one symptom may cause two other symptoms, such as pain with moderate to severe intensity can wake the patient from sleep at night, disrupting sleep patterns, which causes the patient to be sleepy the next day. This condition will worsen the physical function of advanced cancer patients.

In this study, the cough felt by advanced cancer patients may be caused by a dry throat due to a lack of fluids. Lee and Park (2009) mentioned that the cough and shortness of breath in cancer patients are closely related to the type of cancer experienced or the progression of the disease, where coughing and shortness of breath are symptoms of tumor growth in certain organs. This condition will worsen the patients' physical functions.

The multiple linear regression analysis showed that the psychological cluster, the gastrointestinal cluster, the numbness cluster, the pain cluster, and the respiratory distress cluster could explain role functioning by 19.1%. The psychological and respiratory distress clusters have a significant influence on role functioning. The psychological cluster was the dominant factor impacting role functioning with low correlation strength (r = -0.385). A negative correlation indicates that the higher the psychological cluster, the lower the role functioning.

This result may have occurred because the fluctuating psychological condition of advanced cancer patients will disrupt role functioning. Advanced cancer patients are unable to perform their proper role functions, such as a husband who cannot work. In addition to disturbed physical conditions, erratic moods, and excessive anxiety, this condition makes patients irritable, have difficulty concentrating, and lose confidence, resulting in disrupted work.

Only two symptom clusters are associated with emotional functioning: the psychological symptom cluster and the pain cluster. However, all symptom clusters account for emotional functioning at 48.4%. The psychological cluster was the dominant factor impacting emotional functioning with high correlation strength (r = -0.673). The negative correlation indicates the higher the psychological cluster, the lower the emotional functioning. Emotions are closely related to a person's psychological condition, and mood can be expressed in certain forms of behavior, such as sadness,

anger, happiness, disappointment, feelings of inadequacy, anxiety, insecurity, and more. This condition may occur due to the relationship with the respondent's age, gender, type of cancer experienced, treatment undertaken, how the respondent responds to the condition experienced, family support for the respondent in undergoing treatment, and the respondent's financial condition.

Although the entire cluster had a meaningful relationship with cognitive functioning, cluster symptoms could only explain a small effect of cognitive functioning at 1.1%. It can be explained that of the 16 symptoms that meet the assumptions of factor analysis, only depression has a link to cognitive functioning. Patients with depression will experience a decline in cognitive function abilities, such as difficulty focusing attention and decreased memory (Kaplan et al., 2010). This condition shows that advanced cancer patients in this study have not reached the stage of depression.

Overall, cluster symptoms can explain changes in social functioning at 42%. However, only the psychological cluster had a meaningful relationship to social functioning and was the dominant factor impacting social functioning with high correlation strength (r = -0.638).

The negative correlation indicates that the higher the psychological cluster, the lower the social functioning. This result may be caused by the psychological disorders and severe self-rejection that advanced cancer patients can experience, which can worsen the condition of the patient. This condition can cause patients to withdraw from the social environment. Hasnani (2012) mentioned that dominant aspects, such as spiritual, social support, and well-being, influence the quality of life dimension. Family support and religious beliefs, life experiences, and culture are important components of quality of life. Therefore, the provision of care and support throughout the course of cancer treatment in advanced cancer patients can affect the quality of life of patients and family members as a whole (Kagawa-Singer et al., 2010).

General health status is a quality-of-life assessment indicator. A decreasing health status indicates a decrease in quality of life. This is supported by Bello and Bello (2013), who stated that health status affects the patient's quality of life.

Table 12 shows the results of the regression analysis of cluster factors on general health status, which obtained a coefficient of determination R^2 of 0.202. This coefficient of determination shows that all symptom clusters contribute only 20.2% to general health status, and other factors influence the remaining 79.8%. This is evident from the significance of the analysis results, which are marked by only two clusters showing p values < 0.05: the psychological cluster and respiratory disorders. Therefore, only psychological cluster symptoms and respiratory disorders are related to general health status. When viewed from the strength of the relationship, the psychological cluster is the dominant factor related to general health status with sufficient correlation strength (r = -0.440). Meanwhile, for the respiratory disorders cluster, a correlation to general health is obtained at r = -0.155, which means it has low correlational strength.

All symptoms present in advanced cancer patients in this study affect general health status. The multiple linear regression analysis results show that all symptom clusters affect general health status by 20.2%. Thus, the remaining 79.8% is influenced by other factors. However, the psychological cluster was the dominant factor influencing

general health status with sufficient correlational strength (r = -0.440). The negative correlation suggests that the psychological cluster plays a role in lowering the quality of life of advanced cancer patients. This is related to the disease condition and treatment undertaken by advanced cancer patients, which will affect their mood and lead to excessive anxiety and depression. This mood can cause the patient to have no appetite and drink, resulting in a dry mouth. In addition, the respondents in this study were mostly women, where hormonal factors will also affect mood. If women are depressed, they will experience stress more easily than men (American Psychological Association (APA), 2012). This condition will affect the patient's general health status. This finding aligns with Choi and Ryu's (2018) research which revealed that psychological conditions (depression) experienced by advanced lung cancer patients negatively affect their quality of life.

Meanwhile, the respiratory disorders cluster (cough and shortness of breath) influenced general health status with a weak correlation (r = -0.155). This condition may be caused by a link between the type of cancer and the progression of the disease, such as lung cancer which tends to cause respiratory problems or breast cancer, which metastasizes to the lungs. Lee and Park (2009) revealed that cough and shortness of breath are symptoms of the presence of tumors in certain organs or are linked with the disease's progression.

In this study, data were collected through a self-report questionnaire. Some disadvantages of self-report questionnaires include the respondents providing answers that are more socially acceptable than giving honest answers according to their conditions, respondents being unable to assess themselves accurately, and the respondents giving moderate answers to all questions. The study also used a cross-sectional design without considering changes that occurred over time due to therapeutic regimens, disease stages, and patient age.

CONCLUSION AND RECOMMENDATION

The quality of life of advanced cancer patients in this study was at a moderate level. Five symptom clusters were identified: the psychological cluster (mood, depression, anxiety, dry mouth), the gastrointestinal cluster (nausea, vomiting, appetite, diarrhea), the numbness cluster (numbness, tingling, fatigue), the pain cluster (sleep pattern disturbances, drowsiness, pain), and the respiratory disturbance cluster (cough, shortness of breath). There is a significant correlation between symptom clusters and the quality of life of advanced cancer patients in Indonesia. Symptom clusters affect the quality-of-life dimension. The symptom clusters' coefficient of determination (R^2) for the physical dimension was 0.231 (weak), the role dimension was 0.191 (very weak), the emotional dimension was 0.484 (moderate), the cognitive dimension was 0.011 (very weak), the social dimension was 0.420 (moderate), and the general-health dimension was 0.202 (weak).

REFERENCES

American Psychological Association (APA). (2012). 2010 Gender and Stress. https://www.apa.org/news/press/releases/stress/2010/gender-stress

Bello, S. I., & Bello, I. K. (2013). Quality of life of HIV/AIDS patients in a Secondary Health Care Facility, Ilorin, Nigeria. Baylor University Medical Center Proceedings, 26(2), 116–119. https://doi.org/10.1080/08998280.2013.11928933

Chang, V. T., Hwang, S. S., & Feuerman, M. (2000). Validation of the Edmonton Symptom Assessment Scale. Cancer, 88(9), 2164–2171. https://doi.org/10.1002/(sici)1097-0142(20000501)88:9<2164::aid-cncr24>3.0.co;2-5

Cherwin, C. H. (2012). Gastrointestinal symptom representation in cancer symptom clusters: a synthesis of the literature. Oncology Nursing Forum, 39(2), 157–165. https://doi.org/10.1188/12.ONF.157-165

Cheung, W. Y., Le, L. W., Gagliese, L., & Zimmermann, C. (2010). Age and gender differences in symptom intensity and symptom clusters among patients with metastatic cancer. Supportive Care in Cancer 2010 19:3, 19(3), 417–423. https://doi.org/10.1007/S00520-010-0865-2

Cheung, W. Y., Le, L. W., & Zimmermann, C. (2009). Symptom clusters in patients with advanced cancers. Supportive Care in Cancer, 17(9). https://doi.org/10.1007/s00520-009-0577-7

Choi, S., & Ryu, E. (2018). Effects of symptom clusters and depression on the quality of life in patients with advanced lung cancer. European Journal of Cancer Care. https://doi.org/10.1111/ecc.12508

Cooley, M. E., & Siefert, M. Lou. (2016). Assessment of multiple co-occurring cancer symptoms in the clinical setting. In Seminars in Oncology Nursing. https://doi.org/10.1016/j.soncn.2016.08.003

Di Fiore, F., & Van Cutsem, E. (2009). Acute and long-term gastrointestinal consequences of chemotherapy. Best Practice & Research. Clinical Gastroenterology, 23(1), 113–124. https://doi.org/10.1016/J.BPG.2008.11.016

Effendy, C., Vissers, K., Osse, B. H. P., Tejawinata, S., Vernooij-Dassen, M., & Engels, Y. (2015). Comparison of problems and unmet needs of patients with advanced cancer in a European country and an Asian country. Pain Practice : The Official Journal of World Institute of Pain, 15(5), 433–440. https://doi.org/10.1111/PAPR.12196

Esper, P. (2010). Symptom clusters in individuals living with advanced cancer. Seminars in Oncology Nursing, 26(3), 168–174. https://doi.org/10.1016/j.soncn.2010.05.002

Fan, G., Filipczak, L., & Chow, E. (2007). Symptom clusters in cancer patients: a review of the literature. Current Oncology, 14(5), 173. https://doi.org/10.3747/CO.2007.145

Hamada, T., Komatsu, H., Rosenzweig, M., Chohnabayashi, N., Nishimura, N., Oizumi, S., & Ren, D. (2016). Impact of symptom clusters on quality of life outcomes in patients from japan with advanced nonsmall cell lung cancers. Asia-Pacific Journal of Oncology Nursing. https://doi.org/10.4103/2347-5625.196489

Hasnani, F. (2012). Spritualitas dan kualitas hidup penderita kanker serviks (Spirituality and Quality of Life in Cervical Cancer Patients).Quality : Jurnal Kesehatan. https://www.poltekkesjakarta1.ac.id/spiritualitas-dan-kualitas-hidup-penderita-kanker-serviks/

Hawkins, R., & Grunberg, S. (2009). Chemotherapy-induced nausea and vomiting: challenges and opportunities for improved patient outcomes. Clinical Journal of Oncology Nursing, 13(1), 54–64. https://doi.org/10.1188/09.CJON.54-64

Holland, J. C., & Alici, Y. (2010). Management of distress in cancer patients. The journal of supportive oncology, 8(1), 4–12. https://pubmed.ncbi.nlm.nih.gov/20235417/

Husen, A., Suharti, C., & Hardian. (2016). Hubungan antara derajat nyeri dengan tingkat kualitas hidup pasien kanker paru yang menjalani kemoterapi (The relationship between the degree of pain and the quality of life of lung cancer patients undergoing chemotherapy). Diponegoro Medical Journal. 5, 545–557. https://doi.org/10.14710/dmj.v5i4.14251

International Agency for Research on Cancer (IARC). (2018). GLOBOCAN 2018: Latest global cancer data. CA: A Cancer Journal for Clinicians. https://www.uicc.org/news/global-cancer-data-globocan-2018

Ji, Y. B., Bo, C. L., Xue, X. J., Weng, E. M., Gao, G. C., Dai, B. B., Ding, K. W., & Xu, C. P. (2017). Association of inflammatory cytokines with the symptom cluster of pain, fatigue, depression, and sleep disturbance in chinese patients with cancer. Journal of Pain and Symptom Management. https://doi.org/10.1016/j.jpainsymman.2017.05.003

Jiménez, A., Madero, R., Alonso, A., Martínez-Marín, V., Vilches, Y., Martínez, B., Feliu, M., Díaz, L., Espinosa, E., & Feliu, J. (2011). Symptom clusters in advanced cancer. Journal of Pain and Symptom Management, 42(1), 24–31. https://doi.org/10.1016/J.JPAINSYMMAN.2010.10.266

Jing, F., Zhu, Z., Qiu, J., Tang, L., Xu, L., Xing, W., & Hu, Y. (2023). Symptom clusters and quality of life in patients with breast cancer receiving endocrine therapy in China. Seminars in Oncology Nursing, 151443. https://doi.org/10.1016/J.SONCN.2023.151443

Kagawa-Singer, M., Padilla, G. V., & Ashing-Giwa, K. (2010). Health-related quality of life and culture. Seminars in Oncology Nursing. https://doi.org/10.1016/j.soncn.2009.11.008

Kaplan, Sadock, & Grebb. (2010). Sinopsis psikiatri: Ilmu pengetahuan perilaku psikiatri klinis (Synopsis of psychiatry: The behavioral science of clinical psychiatry) (2nd ed.). Jakarta: Bina Rupa Aksara.

Kemenkes RI. (2018). Riskesdas 2018. Directorate General of Public Health. https://kesmas.kemkes.go.id/assets/upload/dir_519d41d8cd98f00/files/Hasil-riskesdas-2018_1274.pdf

Kim, H.-J., McGuire, D. B., Tulman, L., & Barsevick, A. M. (2005). Symptom clusters: concept analysis and clinical implications for cancer nursing. Cancer Nursing, 28(4), 270–274. https://doi.org/10.1097/00002820-200507000-00005

Kwekkeboom, K. L., Tostrud, L., Costanzo, E., Coe, C. L., Serlin, R. C., Ward, S. E., & Zhang, Y. (2018). The role of inflammation in the pain, fatigue, and sleep disturbance symptom cluster in advanced cancer. Journal of Pain and Symptom Management, 55(5), 1286–1295. https://doi.org/10.1016/J.JPAINSYMMAN.2018.01.008

LEE, S.-Y., & PARK, H.-A. (2009). Symptom cluster presented by non-small cell lung cancer patients on gefitinib treatment. Journal of Korean Oncology

Nursing, 77–85. https://pesquisa.bvsalud.org/portal/resource/pt/wpr-224136

Lopes-Júnior, L. C., Ferrarini, T., Pires, L. B. C., Rodrigues, J. G., Salaroli, L. B., & Nunes, K. Z. (2022). Cancer symptom clusters in adult patients undergoing chemotherapy: A systematic review and meta-analysis protocol. PLOS ONE, 17(9), e0273411. https://doi.org/10.1371/JOURNAL.PONE.0273411

Miaskowski, C., Aouizerat, B. E., Dodd, M., & Cooper, B. (2007). Conceptual issues in symptom clusters research and their implications for quality-of-life assessment in patients with cancer. JNCI Monographs, 2007(37), 39–46. https://doi.org/10.1093/JNCIMONOGRAPHS/LGM003

Mystakidou, K., Tsilika, E., Parpa, E., Kalaidopoulou, O., Smyrniotis, V., & Vlahos, L. (2001). The EORTC core quality of life questionnaire (QLQ-C30, version 3.0) in terminally ill cancer patients under palliative care: Validity and reliability in a Hellenic sample. International Journal of Cancer, 94(1), 135–139. https://doi.org/10.1002/IJC.1439

Omran, S., Khader, Y., & McMillan, S. (2017). Symptom clusters and quality of life in hospice patients with cancer. Asian Pacific Journal of Cancer Prevention : APJCP, 18(9), 2387. https://doi.org/10.22034/APJCP.2017.18.9.2387

Omran, S., & Mcmillan, S. (2018). Symptom severity, anxiety, depression, self- efficacy and quality of life in patients with cancer. Asian Pacific Journal of Cancer Prevention : APJCP, 19(2), 365. https://doi.org/10.22034/APJCP.2018.19.2.365

Perwitasari, D. A., Atthobari, J., Dwiprahasto, I., Hakimi, M., Gelderblom, H., Putter, H., Nortier, J. W. R., Guchelaar, H. J., & Kaptein, A. A. (2011). Translation and validation of EORTC QLQ-C30 into Indonesian version for cancer patients in Indonesia. Japanese Journal of Clinical Oncology, 41(4), 519–529. https://doi.org/10.1093/JJCO/HYQ243

Raphael, J., Ahmedzai, S., Hester, J., Urch, C., Barrie, J., Williams, J., Farquhar-Smith, P., Fallon, M., Hoskin, P., Robb, K., Bennett, M. I., Haines, R., Johnson, M., Bhaskar, A., Chong, S., Duarte, R., & Sparkes, E. (2010). Cancer pain: Part 1: Pathophysiology; oncological, pharmacological, and psychological treatments: A perspective from the British pain society endorsed by the UK association of palliative medicine and the royal college of general practitioners. Pain Medicine. https://doi.org/10.1111/j.1526-4637.2010.00840.x

Rudiyo, Nugroho, R., Soediro, R., Gondhowiardjo, S., Siregar, N., Djoerban, Z., & Poetiray, E. (2012). Kualitas hidup jangka panjang pada pasien kanker payudara dengan menggunakan kuasioner EORTC QLQ C-30 DAN MODUL BR-23 (Long-term quality of life in breast cancer patients using the EORTC QLQ C-30 AND BR-23 MODULE QUALITY). Journal of the Indonesian Radiation Oncology Society, 3, 88–93.

Victor, I. G. P., Setiaji, K., & Wahyono, R. A. (2016). Faktor-faktor yang mempengaruhi kualitas hidup penderita kanker payudara stadium lanjut lokal yang dirawat sesuai protokol bedah onkologi di RSUP Dr. Sardjito Yogyakarta (Factors affecting the quality of life of locally advanced breast cancer patients treated according to the oncology surgical protocol at Dr. Sardjito Yogyakarta). Universitas Gadjah Mada. http://etd.repository.ugm.ac.id/penelitian/detail/104181

Wang, D., & Fu, J. (2014). Symptom clusters and quality of life in China patients with lung cancer undergoing chemotherapy. African Health Sciences. https://doi.org/10.4314/ahs.v14i1.8

Zhou, K. nan, Wang, Y., Xie, Y., Yang, S. han, Liu, S. ying, Fang, Y. hang, & Zhang, Y. (2023). Symptom burden survey and symptom clusters in patients with cervical cancer: a cross-sectional survey. Supportive Care in Cancer, 31(6), 1–13. https://doi.org/10.1007/s00520-023-07802-7