

ORIGINAL ARTICLE

Quality Of Life among Cancer Patients Undergoing Chemotherapy in Government Hospitals in Peninsular Malaysia

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ABSTRACT

Introduction: To determine the quality of life (physical health, psychological, social relationships and environment domains) among cancer patients undergoing chemotherapy in government hospitals in Peninsular Malaysia. **Methods:** The data were collected using self-administered questionnaires. Descriptive statistics were conducted to obtain frequency and percentage of variables. Independent sample T-test and One way ANOVA were used to determine the association between variables. Multiple linear regression model was used to determine the significant predictors. The predictors of each domain was analysed separately. **Results:** Quality of life among cancer patients undergoing chemotherapy in this study was determined by four domains which were physical health, psychological, social relationships and environment. The overall mean score for physical health was 52.60, psychological was 52.55, social relationships was 50.79 and environment was 51.16. The significant predictors of physical effect domain were monthly income, cancer stage, social support, nausea and vomiting. The significant predictors of psychological domain were race, marital status, cancer stage, nausea and vomiting. The significant predictors of social relationships domain were race, educational level, social support, nausea and vomiting. The significant predictors of environment domain were race, marital status, hopelessness level, nausea and vomiting. **Conclusion:** The quality of life among chemotherapy cancer patients is important to be observed. Based on the predictors found in this study, appropriate interventions can be taken to improve the quality of life outcomes and the response towards the treatment.

Keywords: Cancer, Chemotherapy, Quality of life, Social support, Hopelessness

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INTRODUCTION

Cancer is an important health concern at the global level as some new fourteen million cases were registered in 2012, thus emerging as one of the top reasons for the escalating rates of mortality and morbidity at the global scale (1). In 2015, cancer was responsible for 8.8 million deaths making it the second leading cause of death globally (2). Based on a Malaysian National Cancer Registry (MNCR) report a whopping 103,507 is the number of established new cases of cancer between 2007 and 2011 in Malaysia. This is made up of 46,794 (45.2%) in males and 56,713 (54.8%) in females and 1 in every 10 males is prone to get cancer while the probability in female is 1 in 9 (3). According to a report by The Star, death from cancer has increased from 20100 in 2008 to 21700 in 2012. By 2025, occurrence

of cancer related deaths in less developed areas is expected to increase by 80%. Cancer related deaths are rising tremendously due to factors such as smoking and tobacco use, poor diet, alcohol, lack of exercise or being overweight (2). The main cause of fatality among most females and males in Malaysia diagnosed with cancer has been breast cancer and colon cancers respectively (4). Patients' quality of life can be impacted largely by diagnosis as well as treatment for cancer. The basic treatments for cancer can be: local treatments of surgery, radiotherapy, systemic treatments using biological agents (for example hormones, antibodies and growth factors) and chemotherapy (4). Chemotherapy, which appears to be a treatment that plays a vital role in mitigating cancer, can be carried out in isolation or combined with other treatments, such as radiotherapy and surgery. Chemotherapy side effects can worsen quality of life in cancer patients (5). Nevertheless, it is also the treatment that can improve quality of life in cancer patients (6). The effectiveness of a certain treatment for cancer can be determined by looking into quality of life, which reflects the measure of one's primary end-point, which

also reflects patient's opinion about the effect of cancer diagnosis and treatment on daily living (7). Study on the quality of life conducted among chemotherapy cancer patients showed that chemotherapy treatment highly affects the quality of life among cancer patients compared to patients undergoing other treatments. Thus it is important to evaluate the quality of life in chemotherapy cancer patients progressively. This study will be a baseline study for future research to enhance our understanding of the relationship between chemotherapy cancer treatment and how it is affecting patient's quality of life.

MATERIALS AND METHODS

Study Design and Setting

A cross sectional study was conducted between April 2016 and April 2017 with a total of 1333 chemotherapy cancer patients. Probability proportionate to size technique was used to determine the sample size from each hospital. Patients were recruited from ten state government hospitals in Peninsular Malaysia. The chemotherapy cancer patients list was obtained from Cytotoxic Drug Reconstitution (CDR) unit. Malaysian cancer patients above 18 years old that were undergoing chemotherapy were selected from the ten state hospitals to be included in this study. Patients with communication problems and extremely ill patients were excluded. Chemotherapy cancer patients attending the Daycare center and in-patients from oncology wards who consented to participate in this study were each given the self-administered questionnaire consisted of socio demographic characteristics, World Health Organization (WHO) Quality of Life-BREF WHOQOL-BREF, Multidimensional Scale of Perceived Social Support (MSPSS), The Beck Hopelessness Scale (BHS) and Common Terminology Criteria for Adverse Events (CTCAE) version 4.0.

Study tool

The data were collected using four questionnaires: WHOQOL-BREF questionnaire was used to determine the quality of life level encountered by each patient. This questionnaire consist of 26 questions, being two about quality of life in general and the other 24 representing each of the facets that make up the original instrument. WHOQOL-BREF was chosen as because it comprises the element of physical health, psychological, social relationships and environment elements. The score of each question ranges from one to five and higher scores indicate a better evaluation.

The 12-item Multidimensional scale of perceived social support (MSPSS) was designed to measure the social support received from the three subscales family, friends, and significant other. This 12 items questionnaire measures perception from receiving support from family members (4 items), friends (4 items) and significant others (4 items). All the items in this questionnaire are

based on a scale from 'totally agree' to 'totally disagree'. A high score means a high level of perceived social support.

The Beck Hopelessness Scale (BHS) consist of the 20-item Beck Hopelessness Scale (BHS). This questionnaire measures the level of negative attitude (pessimism) regarding the future life of the participants by employing a '0 to 20' scale; in which '0 until 3' is 'normal', '4 until 8' as 'mild hopelessness', '9 until 14' for 'moderate hopelessness', and '15 and above' for 'severe hopelessness'.

Common Terminology Criteria for Adverse Events (CTCAE) version 4.0 questionnaire was used which includes nausea, vomiting, anorexia, diarrhea, constipation, anemia, fever, fatigue, infection, bleeding, hair loss, mouth, gum and throat infection also skin and nail changes. The participants were requested to mark 'X' for the following scale: '0' for 'none', '1' for 'mild', '2' for 'moderate', '3' for 'severe', and '4' for 'life-threatening'. The scales had been marked in accordance to the level of severity from the effects of chemotherapy. All the study tools were validated and used in both Malay and English language.

Data analysis

The data entered were analyzed using SPSS version 23. Mean and standard deviation (SD) respectively were used to describe the continuous data and independent variable. Independent sample T-test was used to analyze the means between two independent groups. One way ANOVA was used to test dependent and independent groups which had more than two category. The confidence interval (CI) was set at 95% and level of significance at $p < 0.25$. Multiple linear regression model was carried out to determine the significant predictors of quality of life. Level of significance was set at $p < 0.05$.

Ethics consideration

Ethics approval was obtained from the Medical Research Ethics Committee (MREC) Malaysia and the Ethics Committee for Research Involving Human Subjects Universiti Putra Malaysia. Permission was also obtained from all ten state hospitals before commencement of the study. Consent form was taken from each patient participated in this study.

RESULTS

A total of 1333 were included in this study which makes the response rate 100%. According to Table 1, numbers of female patients were almost two times higher than males. Approximately half of the respondents were Malays (53.3%), followed by Chinese (27.2%), Indians (14.6%), and other (5.0%). There were more married patients (68.9 %) participated in this study compared to other marital status. The majority of the patients had primary education (58.4%). Most of the patients are

Table I: Socio demographic characteristics among chemotherapy cancer patients (N=1333)

Variables	Frequency	Percentages (%)
Age		
< 40	181	13.6
41-60	699	52.4
> 61	453	34.0
Gender		
Male	520	39.0
Female	813	61.0
Race		
Malay	710	53.2
Chinese	362	27.2
Indian	195	14.6
Others	66	5.0
Marital status		
Married	918	68.8
Single	205	15.4
Divorced/Widowed	210	15.8
Education level		
No formal education	157	11.8
Primary	779	58.4
Secondary and above/Diploma/University	397	29.8
Working		
Yes	771	57.8
No	562	42.2
Monthly income		
No income	157	11.8
<1500	251	18.8
1501-3500	757	56.8
>3501	168	12.6
Cancer stage		
Stage 1, 2, 3	854	64.1
Stage 4	479	35.9
Chemotherapy cycle		
1st and 2nd cycle	1098	82.4
3rd and 4th cycle or more	235	17.6
Pain due to chemotherapy		
Yes	768	57.6
No	565	42.4
Joined cancer support society		
Yes	158	11.9
No	1175	88.1
Worried of adverse effect due to chemotherapy		
Yes	1048	78.6
No	285	21.4

working (57.8%) where most of them were earning in the range of RM 1501- RM 3500 (56.8%). The majority cancer patients (64.1%) were having stage 1, 2 and 3 cancer followed by 35.9% diagnosed with stage 4 cancer. Most of the patients involved in this study were in their first and second cycle of chemotherapy which was 82.4%. There were 57.6% patients who

experienced pain during chemotherapy treatment. Some 88.1% patients did not join any cancer support society and 78.6% patients were worried about adverse drug reaction due to chemotherapy cancer. Table II shows that 51.2% patients received high social support and 38.0% patients had mild level of hopelessness was the highest in determining the quality of life in patients.

Table II: Social support and Hopelessness level among chemotherapy cancer patients (N=1333)

Variables	Frequency	Percentages (%)
Social support		
Low	233	17.5
Medium	417	31.3
High	683	51.2
Total	1333	100
Hopelessness level		
None or Minimal	136	10.2
Mild	507	38.0
Moderate	412	30.9
Severe	278	20.9
Total	1333	100

Table III shows the summary of results for physical effect among chemotherapy cancer patients. The table shows the highest number of patients (51.5%) were affected due to mild skin nail changes during chemotherapy, followed by 49.0% affected with mild hair loss during chemotherapy.

Table IV shows the mean of quality of life in cancer patients undergoing chemotherapy. The highest mean of quality of life was for the physical health domain 52.60 (± 19.94) followed by psychological domain 52.55 (± 21.44). The mean of overall quality of life shows 3.51 (± 0.721).

Table V and VI shows that age, race, marital status, education level, working, monthly income, cancer stage and pain during chemotherapy, social support, hopelessness level, nausea, vomiting, fatigue and nail and skin changes were found to be statistically significant associated with all the domains of quality of life (physical health, psychological, social relationships and environment domain) among chemotherapy cancer patients ($p < 0.25$).

Association between social demographic characteristics and quality of life among chemotherapy cancer patients. Patient more than 65 years old have reported the highest score for mean value in terms of quality of life in the psychological domain. Malay patients showed the highest mean score in the psychological domain, thus leading to a better quality of life. This study found that patients with single status had the highest mean score of quality of life in the psychological domain compared to married and divorced or widowed patients.

Table III: Physical effects of chemotherapy among chemotherapy cancer patients (N=1333)

Variables	Frequency	Percentage (%)
Nausea		
None	560	42.0
Mild	380	28.5
Moderate	285	21.4
Severe	108	8.1
Vomiting		
None	367	27.5
Mild	455	34.1
Moderate	381	28.6
Severe	130	9.8
Anorexia		
None	354	26.6
Mild	454	34.1
Moderate	387	29.0
Severe	138	10.3
Diarrhea		
None	313	23.5
Mild	377	28.3
Moderate	368	27.6
Severe	275	20.6
Constipation		
None	523	39.2
Mild	335	25.1
Moderate	200	15.0
Severe	275	20.7
Anemia		
None	266	20.0
Mild	363	27.2
Moderate	430	32.2
Severe	274	20.6
Fever		
None	515	38.6
Mild	236	17.7
Moderate	305	22.9
Severe	277	20.8
Fatigue		
None	146	11.0
Mild	322	24.1
Moderate	453	34.0
Severe	412	30.9
Infection		
None	344	25.8
Mild	374	28.0
Moderate	394	29.6
Severe	221	16.6

Table III: Physical effects of chemotherapy among chemotherapy cancer patients (N=1333) (cont)

Variables	Frequency	Percentage (%)
Bleeding		
None	567	42.5
Mild	434	32.6
Moderate	219	16.4
Severe	113	8.5
Hair Loss		
None	186	14.0
Mild	378	28.4
Moderate	654	49.0
Severe	115	8.6
Mouth gum Throat Infection		
None	348	26.1
Mild	438	32.9
Moderate	254	19.0
Severe	293	22.0
Skin Nail Changes		
None	458	34.4
Mild	687	51.5
Moderate	116	8.7
Severe	72	5.4

Table IV: Mean for quality of life among cancer patients receiving chemotherapy

Variable	Physical health	Psychological	Social relationships	Environment	Overall Quality of life
Mean (±SD)	52.60 (19.94)	52.55 (21.44)	50.79 (20.94)	51.16 (19.61)	3.51 (0.721)

Education above secondary level was associated with the highest mean score of quality of life in the psychological domain compared to those with primary education and no formal education. This study suggests that employed chemotherapy patients had a better quality of life in the physical health domain and patients with monthly income exceeding RM3501 had a better quality of life in the psychological domain compared to chemotherapy cancer patients who were earning less. Cancer stage 1, 2 and 3 and no pain during to chemotherapy in this study has reported highest mean score of quality of life in the psychological domain. Results showed that cancer patients with stage 1, 2 and 3 have a higher mean score of quality of life in psychological domain compared to those in stage 4.

Association between social support and quality of life among chemotherapy cancer patients

There were significant differences between social support and quality of life in chemotherapy cancer patients in all four domains (physical health, psychological, social relationships and environment). High social support was associated with the highest mean score of quality of life

Table V: Association between socio demographic characteristics, social support, hopelessness level and quality of life among chemotherapy cancer patients

Variables		Physical health		Psychological		Social relationships		Environment	
		Mean(±SD)	p	Mean(±SD)	p	Mean(±SD)	p	Mean(±SD)	p
Socio Demographic Profile									
Age	<45	49.15(20.27)	0.04*	48.11(21.86)	0.010*	46.25(22.21)	0.01*	47.67(19.98)	0.040*
	45-54	52.90(18.65)		53.00(20.24)		52.43(19.80)		51.59(18.57)	
	>65	53.51(21.56)		53.64(22.86)		51.61(21.92)		51.89(20.89)	
Gender	Male	51.90(18.04)		51.95(19.34)	0.400	50.62(18.96)	0.81	50.80(18.21)	0.590
	Female	53.05(21.06)	0.29	52.94(22.69)		50.90(22.12)		51.39(20.47)	
Race	Malay	53.71(20.23)		53.80(21.95)	0.030*	51.55(21.27)	0.03*	51.68(19.83)	0.160*
	Chinese	51.85(18.92)	0.10*	52.21(20.09)		51.33(19.74)		51.52(18.58)	
	Indian	51.27(20.16)		50.61(21.46)		49.38(20.80)		50.24(19.95)	
	Others	48.64(21.03)		46.85(22.12)		43.82(22.98)		46.22(21.36)	
Marital status	Single	58.50(21.40)	<0.001**	58.65(24.19)	<0.001**	54.42(24.53)	0.02*	55.42(21.97)	0.003*
	Married	51.56(19.65)		51.43(21.05)		50.09(20.45)		50.32(19.22)	
	Divorced/Widowed	51.21(18.65)		51.36(19.10)		50.18(18.69)		50.55(18.30)	
Education level	No formal education	47.68(18.81)	<0.001**	47.45(18.62)	<0.001**	47.19(18.82)	0.003*	47.15(18.02)	<0.001**
	Primary	51.35(18.78)		51.22(19.98)		50.15(19.67)		50.37(18.62)	
	Secondary and above /Diploma/University	57.00(21.75)		57.19(24.30)		53.46(23.70)		54.30(21.62)	
Working	Yes	54.47(20.86)	<0.001**	54.07(22.43)	<0.001**	52.06(21.80)	0.010*	52.37(20.49)	0.007*
	No	50.59(18.43)		49.93(19.73)		49.05(19.57)		49.50(18.22)	
Monthly income	<1500	55.90(19.47)	<0.001**	54.94(23.23)	0.012*	53.42(21.26)	0.024*	53.44(20.70)	0.010*
	1500-3500	51.06(19.61)		51.37(20.50)		49.75(20.34)		50.09(19.07)	
	>3501	56.02(21.42)		55.43(23.18)		53.54(23.19)		53.59(20.46)	
Cancer profile									
Cancer stage	1,2,3	54.17(20.51)	<0.001**	54.26(22.25)	<0.001**	51.79(21.62)	0.02*	52.48(20.27)	0.010*
	4	49.78(18.57)		49.51(19.56)		49.01(19.56)		48.81(18.17)	
Chemotherapy cycle	1,2	52.86(20.29)	0.270	52.57(21.79)	0.950	50.67(21.15)	0.650	51.22(19.86)	0.68
	3,4 or more	51.39(18.20)		52.47(19.80)		51.36(19.95)		50.86(18.33)	
Pain during chemotherapy	Yes	51.05(18.82)	<0.001**	50.95(19.53)	0.002*	50.42(18.46)	0.130*	50.42(18.46)	0.120*
	No	54.70(21.20)		54.73(23.64)		50.98(21.05)		52.16(21.05)	
Cancer support***	Yes	51.54(19.47)	0.480	50.75(20.27)	0.260	49.41(19.83)	0.380	49.72(18.98)	0.310
	No	52.74(20.01)		52.80(21.59)		50.97(19.54)		51.35(19.70)	
Worried of adverse effect due to chemotherapy*	Yes	52.90(20.09)	0.310	52.59(21.78)	0.920	50.70(21.32)	0.730	51.16(19.86)	0.970
	No	51.55(19.37)		52.46(20.23)		51.16(21.21)		51.21(18.75)	
Social support	Low	46.21(17.94)	<0.001**	45.39(20.06)	<0.001**	45.50(19.00)	<0.001**	44.89(18.31)	<0.001**
	Medium	51.12(19.91)		52.53(20.07)		49.70(20.71)		50.94(19.32)	
	High	55.67(20.01)		55.41(22.12)		53.26(21.33)		53.43(19.77)	
Hopelessness level	None/minimal	58.93(22.90)	<0.001**	58.74(24.61)	<0.001**	55.18(24.67)	<0.001**	55.44(22.30)	<0.001**
	Mild	54.22(18.76)		54.43(21.12)		52.50(19.86)		52.74(19.21)	
	Moderate	50.30(20.41)		50.92(20.68)		49.17(21.36)		50.42(19.31)	
	Severe	49.95(18.86)		48.53(20.53)		47.93(19.67)		47.27(18.71)	

*p < 0.25 significant, **p < 0.001 significant, ***T-test

Table VI: Association between physical effects of chemotherapy and quality of life among chemotherapy cancer patients

Variables		Physical health		Psychological		Social relationships		Environment	
		Mean(±SD)	p	Mean(±SD)	p	Mean(±SD)	p	Mean(±SD)	p
Physical effects of chemotherapy									
Nausea	Yes	46.21(17.94)	<0.001**	68.38(18.88)	<0.001**	64.82(17.81)	<0.001**	64.86(16.14)	<0.001**
	No	51.12(19.91)		41.09(14.89)		40.63(16.74)		41.23(15.50)	
Vomiting	Yes	54.98(18.58)	0.005*	55.15(20.78)	0.006*	53.41(20.28)	0.004*	53.70(18.57)	0.003*
	No	51.69(20.37)		51.57(21.62)		49.80(21.20)		50.19(19.92)	
Anorexia	Yes	53.05(19.92)	0.630	53.53(21.14)	0.320	51.25(20.93)	0.630	51.96(19.27)	0.370
	No	52.43(19.95)		52.20(21.55)		50.62(20.95)		50.87(19.74)	
Diarrhea	Yes	53.40(20.38)	0.410	53.22(21.87)	0.410	51.23(21.42)	0.670	51.70(19.73)	0.580
	No	52.35(19.80)		52.35(21.31)		50.65(20.79)		50.99(19.58)	
Constipation	Yes	52.05(20.34)	0.320	51.82(21.56)	0.320	50.35(21.29)	0.540	50.54(19.67)	0.360
	No	52.95(19.68)		53.02(21.36)		51.07(20.71)		51.56(19.58)	
Anemia	Yes	53.42(21.16)	0.990	53.29(23.24)	0.560	50.58(22.81)	0.870	50.85(21.00)	0.790
	No	52.39(19.63)		52.37(20.98)		50.84(20.45)		51.24(19.26)	
Fever	Yes	52.61(20.38)	0.990	53.30(21.57)	0.310	51.40(21.00)	0.40	51.56(19.61)	0.560
	No	52.59(19.67)		52.08(21.36)		50.91(19.62)		50.91(19.62)	
Fatigue	Yes	60.22(21.23)	<0.001**	61.70(24.89)	<0.001**	57.38(23.91)	<0.001**	57.70(21.46)	<0.001**
	No	51.66(19.58)		51.43(20.71)		49.98(20.40)		50.35(19.23)	
Infection	Yes	53.53(21.19)	0.330	53.77(23.19)	0.260	50.81(22.73)	0.980	51.73(21.18)	0.550
	No	52.27(19.48)		52.13(20.79)		50.78(20.28)		50.96(19.04)	
Bleeding	Yes	52.76(21.02)	0.800	52.81(21.45)	0.710	51.10(21.00)	0.670	51.44(19.57)	0.640
	No	52.48(19.90)		52.36(21.45)		50.56(20.90)		50.95(19.66)	
Hair Loss	Yes	52.09(18.47)	0.710	52.42(20.82)	0.930	50.78(19.60)	1.000	50.95(19.03)	1.000
	No	52.68(20.17)		52.57(21.55)		50.79(21.15)		51.19(19.71)	
Mouth throat infection	Yes	53.53(20.43)	0.300	53.51(22.25)	0.330	50.99(21.92)	0.830	51.58(20.33)	0.640
	No	52.26(19.76)		52.20(21.14)		50.71(20.57)		51.00(19.35)	
Skin nails changes	Yes	54.44(19.99)	*0.030	54.42(22.17)	0.020*	52.45(21.39)	0.036*	52.81(19.68)	0.030*
	No	51.63(19.86)		51.58(21.00)		49.92(20.65)		50.29(19.53)	

*p < 0.25 significant, **p < 0.001 significant, T-test

in the physical health domain.

Association between hopelessness and quality of life among chemotherapy cancer patients.

There were significant differences relationship between hopelessness level and quality of life in chemotherapy cancer patients in all four domains (physical health, psychological, social relationships and environment). In this study, the mean of hopelessness in chemotherapy cancer patients was highest for the category of none or minimal feeling of hopelessness in physical health domain of quality of life.

Association between physical effects and quality of life among chemotherapy cancer patients.

In this study, the mean value of quality of life was found

highest in patients who were not affected by nausea in the psychological domain of quality of life. From the results of the study, significant differences can be seen between fatigue and quality of life in chemotherapy cancer patients in all domains (physical health, psychological, social relationship, and environment). There was a significant relationship between nail and skin and quality of life in chemotherapy cancer patients in all domains (physical health, psychological, social relationship, and environment), were observed in this study.

Predictors of quality of life

Using multiple regression analysis, there were five statistically significant predictors in physical health domain which were: monthly income, cancer stage,

social support, nausea and vomiting. In psychological domain there were five statistically significant predictors which were race, marital status, cancer stage, nausea and vomiting. In social relationships domain there were five statistically significant predictors which were: race, education level, social support, nausea and vomiting. In environment domain there were five statistically significant predictors: race, marital status, hopelessness level, nausea and vomiting. This can be seen in Table VII.

DISCUSSION

Cancer is a serious national health concern and, furthermore, it is becoming increasingly challenging to manage the affected cancer patient with the poor quality of life who needs more support and medical attention (8). Cancer can be prevented by ensuring healthy diet and activities. Not only that, early discovery of cancer can improve patient's quality of life further increase the survival among them (8, 9). Patient more than 65 years old have reported a better quality of life in the psychological domain in this study. This study shows older aged cancer patients were experiencing a better quality of life comparative to younger patients. Similar outcomes were reported by (10) Ganesh, Lye and Lau (2016) whereby those patients diagnosed with cancer and aged 55 years and above recorded an enhanced quality of life when compared to those younger cancer patients. The reason for such deteriorated quality of life portrayed among those below 55 years is the undue stress from much worry regarding income and career factors. Those elder patients may worry less regarding

finance probably because of financial dependence from their children (10). Other studies reported conflicting association between age and quality of life. The results demonstrated that the improvement of quality of life among breast cancer patients decreased with age (11, 12).

In the United States and some European countries, studies show that ethnicity or race was found to be an important factor influencing the survival rate of patients (13, 14). Malay patients showed the highest mean score in the psychological domain, thus leading to a better quality of life in this study. This is similar to a study conducted by (15) Farooqui et al. (2013) where Malay patients showed a better quality of life with a higher score in global health. This result is also in line with (16) Harandy et al. (2010) which reported that Muslim Iranian breast cancer patients cope spiritually and religiously with their disease for their psychological well-being. In contrast, a review article reported that Indian respondents had the highest score for global health status followed by Malays, while the Chinese had the lowest score (17). However, when Malay and Chinese breast cancer survivors were compared, it was reported that the Malays had more symptoms of nausea, vomit, dyspnea, and constipation, thus translating to a poorer quality of life compared to Chinese women (18). In contrast to all the studies above, (19) Al-Naggar et al. (2009) reported no significant association between ethnicity and survival time of cancer patients.

This study found that patients with single status had the highest mean score of quality of life in the psychological

Table VII: Predictors of Quality of Life by Using Multiple Linear Regression Model

Variables	Physical health		Psychological		Social relationships		Environment	
	B	p	B	p	B	p	B	p
Socio demographics characteristics								
Race	/	/	-5.34	0.01*	-6.54	0.004*	-4.29	0.037*
Marital status	/	/	2.63	0.04*			2.79	0.020*
Education level					-2.30	0.040*		
Monthly income	2.80	0.02*	/	/	/	/	/	/
Cancer stage	-2.18	0.02*	-2.13	0.03*	/	/	/	/
Social support	-2.97	0.006*			-2.87	0.015*		
Hopelessness level	/	/	/	/	/	/	-3.97	0.004*
Physical effects								
Nausea	-24.99	<0.001**	-27.28	<0.001**	-24.99	<0.001**	-24.23	<0.001**
Vomiting	3.84	<0.001**	4.29	<0.001**	3.72	<0.001**	3.57	<0.001**

*p <0.05 significant, **p<0.001 significant, Multiple Linear regression

domain compared to married and divorced or widowed patients. A similar outcome was shown in a study where single cancer women were also found to have a better quality of life compared to married women. This may be due to single women being less worried about the opinion of their partners (20). However, another study reported that married patients had a better physical functioning quality of life. This was also supported by another study in which married cancer survivors had higher physical health compared to single cancer patients (21). On the other hand, it was also reported that married women experienced better health-related quality of life and less fatigue compared to unmarried women (22). However, another group of scholars found otherwise; marital status was significant with quality of life where divorced patients had better global health scores (6).

Education above secondary level was associated with the highest mean score of quality of life in the psychological domain compared to those with primary education and no formal education. This finding is similar to that in a study by (23)Kwan et al. (2010) where more than 75% of their study subjects were reported to have at least high school education and above. This association between higher education and better quality of life might arise because better cancer knowledge can be obtained as the education level which contributes to early detection and treatment (21). Meanwhile, some other studies showed education had no effect on quality of life among cancer patients undergoing chemotherapy treatment (24, 25). Another study also mentioned education level was not significantly associated with quality of life although the global health score increased as education level increased (17).

Employed chemotherapy patients had a better quality of life in the physical health domain in this study and patients with monthly income exceeding RM3501 had a better quality of life in the psychological domain compared to chemotherapy cancer patients who were earning less. The finding is consistent with that of other previous study where housewives had a poorer quality of life compared to employed cancer patients (25). (26)Guner et al. 2006 similarly reported that quality of life among cancer patients in Turkey was lower in low income patients. Cancer patients with high financial support displayed enhanced quality of life, in comparison to those with average and low financial positions (2). As a matter of fact, the aspect of earning capability has emerged as assurance to enhanced quality of life for cancer patients with chemotherapy as treatment (28). Moreover, according to (29)Yan et al. (2016), households with high income had been linked to enhanced quality of life in terms of all aspects among breast cancer patients.

Cancer stage 1, 2 and 3 and no pain due to chemotherapy in this study has reported highest mean score of quality

of life in the psychological domain. Results showed that cancer patients with stage 1, 2 and 3 have a higher mean of quality of life compared to those in stage 4. This is consistent with another study where results reported that stage 4 cancer patients had worse quality of life compared to stage 1 patients (10). Another study also reported that patients with bone cancer at very advanced stage showed the lowest global health status scores (15). The quality of life scores are significantly associated with the site of cancer, stage of cancer, and the time starting from the diagnosis of the disease (27). Emotional, cognitive and social functions were higher in the early stage of cancer among colorectal cancer patients (30). However, the same study mentioned that there was no significant association between global health status and stages of cancer even though the health status of stage 2 and 3 patients was better than in stage 4 patients.

High social support was associated with the highest mean score of quality of life in the physical health domain. Studies also have proven that social support received from parents, friends, and healthcare providers is the most important resource for adults with cancer (31, 32). (24)Gunes et al. (2016) also reported that social support received by chemotherapy cancer patients from family members can improve their quality of life. Social support and cancer progression are closely related to each other. Low social support can cause poor health outcomes in cancer patients, which further decreases their quality of life (33, 34). A positive correlation was found between social support and health-related quality of life in breast cancer patients (35). Therefore higher social support results in a higher score of quality of life for cancer patients.

In this study, the mean score of hopelessness in chemotherapy cancer patients was highest for the category of none or minimal feeling of hopelessness in physical health domain of quality of life. The feeling of hopelessness was significantly associated with quality of life in chemotherapy cancer patients. Past studies showed that the coping strategy toward the disease is associated with quality of life and hopelessness in chemotherapy cancer patients (36). Another study reported that married patients had a higher score for hopelessness compared to single patients and also illiterate patients have a higher mean value of hopelessness than educated patients (28). Basically, quality of life of cancer patients is significantly impacted by hopelessness (28).

Mean value of quality of life was found highest in patients who were not affected by nausea in the psychological domain of quality of life. A similar study also supported this finding where chemotherapy patients who were experiencing nausea and vomiting during treatment reported having a negative impact on their daily quality of life (37). In a prospective study, results showed that symptoms such as loss of appetite, nausea, and vomiting had negative effects on the quality of life

among cancer patients (28). Nausea and vomiting which are not managed in chemotherapy cancer patients cause major weight loss and loss of appetite which leads to malnutrition in patients (28).

Fatigue is one of the symptoms that trigger emotional pressure among cancer patients (38). Significant differences can be deduced between fatigue and quality of life in chemotherapy cancer patients in all domains (physical health, psychological, social relationship, and environment). According to a study, fatigue was the main factor affecting the quality of life in colorectal cancer patients. The study also stated that fatigue during chemotherapy was reduced after the chemotherapy cycle was completed (39). Female cancer patients experienced worse fatigue symptoms compared to male patients, causing them to have a poorer quality of life. It could be that cancer has a bigger impact on women both physically and mentally, thus producing more symptoms (17). Cancer patients suffer side effects such as fatigue, which not only decreases quality of life but also shortens lifespan (8).

Significant changes on nail and skin, as well as its association with quality of life in chemotherapy cancer patients in all domains (physical health, psychological, social relationship, and environment), were observed in this study. Significant association on changes to patient's nail and skin because of cancer chemotherapy was reported in a study where patient's quality of life can be negatively affected due to toxic effects on nail and skin leading to treatment interruption or discontinuation (40, 41). Chemotherapy treatment can cause various types of nail changes among cancer patients. Hence knowledge of various changes of nail among patients undergoing chemotherapy is vital for successful patient management (42).

The strength of this study is the sample size was large. There are not many studies published on quality of life among cancer patients undergoing chemotherapy in Malaysia. The findings of this study can further help future researchers to adequately identify the specific needs of each chemotherapy cancer patient. This study shows the importance for health professionals to be aware of the aspects that may affect quality of life of chemotherapy cancer patients. Among the limitations of this study are time and financial constraint as well as this study was limited to Peninsular Malaysia state hospitals only. However, the findings of this current study can still provide a baseline understanding of quality of life among cancer patients undergoing chemotherapy in government hospitals in Malaysia.

CONCLUSION

As found in this study, each of the four domains of quality of life had various predictors; such as monthly income, cancer stage, social support (physical health

domain), race, marital status, cancer stage (psychological domain), race, education level, social support (social relationships domain), and race, marital status, hopelessness (environment domain). There were also similar predictors of all domains of quality of life which were nausea and vomiting. These predictors provide an indication on what factors need to be improved and treated adequately in order to improve the overall quality of life and also each specific domain of quality of life of cancer patients undergoing chemotherapy. It is hoped that by improving the quality of life of these patients, the adherence and outcome to treatment also improves, and this subsequently improves the prognosis and survival rate of each patient. Future studies can include developing intervention programs to improve the quality of life of cancer patients undergoing chemotherapy.

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