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Quality of life of cancer patients living in Trinidad and Tobago

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Abstract

Purpose To determine quality of life (QoL) of cancer patients in The Republic of Trinidad and Tobago using the European Organization for Research and Treatment of Cancer Care Quality of Life Instrument (EORTC QLQ-C30) and examine relationships between QoL and socioeconomic and medical variables.

Method A cross-sectional study, consisting of 480 cancer patients being managed at the National Radiotherapy Centre, was conducted. One-way, multiple analysis of variance (MANOVA) with post hoc testing was used to analyze relationships between socioeconomic and medical variables and scales on the EORTC QLQ-C30. Stepwise linear regression was used to evaluate which independent variables contributed to the global QoL and function scores.

Results Participants were of mean age 64.1 ± 12.1 years (males) and 56.7 ± 16.6 years (females). Mean values for global QoL and function scales were below 75. Persons in younger age groups had significantly better physical and cognitive function scores ($p < 0.05$). Males had higher emotional function scores than females ($p < 0.05$). Persons with higher income and education had better scores on all function scales, except social, and less symptoms ($p < 0.05$). Persons receiving chemotherapy had more nausea/vomiting, appetite loss, and constipation ($p < 0.05$).

Conclusion Age, income, education, and cancer treatment were factors most associated with scores on the EORTC QLQ-C30. Further research is required in this population to examine these variables in more depth and explore methods to improve QoL of cancer patients in this population.

Keywords Quality of life · Cancer · EORTC QLQ-C30 · The Caribbean

Abbreviations

QoL	Quality of life
EORTC QLQ-C30	European Organization for Research and Treatment of Cancer Care Quality of Life Instrument.
MANOVA	Multivariate analysis of variance
ANOVA	Analysis of variance

Introduction

Cancer is the second leading cause of death worldwide with 8.8 million deaths in 2015 [1]. For the period 1999–2002, there was an 11% increase in the number of new cases per year and a 35% increase in the average number of cancer deaths in the Republic of Trinidad and Tobago [2]. With an estimated 14.1 million cases of cancer around the world in 2012, healthcare must focus on both prolonging life and quality of life (QoL) [3, 4].

Quality of life is a multidimensional property that includes, but is not limited to, physical health status, psychological well-being, social and cognitive function, and the impact of illness and treatment on the patient's life experience [5]. Evaluation of QoL can aid health-care practitioners with decision making through all stages of cancer management [6, 7]. It is important, however, that these evaluations are done by the patient [8]. Sociodemographic factors, cancer type and method of treatment have all been shown to have a relationship with QoL in persons with a cancer diagnosis [9–20].

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Studies examining QoL in cancer patients with recent diagnosis as well as long-term survivors have shown age at diagnosis to be a significant predictor of QoL outcomes. Older persons generally reported poorer function on the physical and cognitive domains of QoL whilst younger individuals reported worse outcomes on the social domain [7, 9–13, 19, 20]. Comparison of QoL of German cancer survivors, at one-year post-diagnosis, with the general population showed a larger gap in the QoL between younger cancer patients and their counterparts compared to older cancer survivors [14]. At one-year post-cancer diagnosis one study reported no QoL differences based on gender [14], however, long-term studies have reported males as having better physical health [11, 12]. Young male cancer survivors in Germany had better function and less symptoms than females on all items on the EORTC QLQ-C30 instrument, irrespective of other factors [15]. The relationship between marital status and QoL in cancer survivors is not very clear. Some studies have reported better QoL for married cancer survivors in the early period [14, 16–19], whilst others have shown no difference, especially in the long term [14, 16, 19]. Reports on financial status and education varied, with some showing higher financial status and education being associated with better QoL in both the short and long term [18, 21–23] and others showing no association [19].

Studies investigating QoL and cancer type have shown persons with gynecological cancers reporting significantly better QoL compared to those with breast cancer [10]. Persons with breast cancer experienced more fatigue and tended to worry a lot more than those with gynecological cancers [10]. Lung cancer survivors in Shanghai showed worse physical function that those with gynecological, colorectal or liver cancer. These cancer survivors also had more dyspnea than other cancer types. Persons who had survived colorectal cancer had more diarrhea than other cancer types and persons with liver cancer had poorest score for emotional well-being compared to the other cancer types [24].

Patients have reported poorer quality of life while undergoing cancer treatment. Research in Japan showed that chemotherapy-induced nausea/vomiting, anorexia and diarrhea had a significant impact on QoL [25]. Mental and psychosocial as well as physical and functional domains were all adversely affected by these side effects with maximum decrease in scores being observed within the first week of treatment [25]. In the USA, chemotherapy-induced emesis was reported to be associated with a deterioration in QoL [26]. Research has also shown that long-term cancer survivors who had received chemotherapy had poorer physical, emotional, social and functional well-being that those who had not [27]. A significant decrease in all QoL domain scores during and up to 6 weeks after radiotherapy treatment has also been reported [28, 30]. In Greece, no difference in QoL was reported for those receiving radiotherapy and combined radiochemotherapy [31]. In Iraq, persons undergoing chemotherapy showed poorer physical and social well-being than those receiving radiotherapy [30].

Though some similarities in QoL data trend have been observed, there are still significant variations in the actual QoL scores of patients living in different countries. This may be related to cultural and socioeconomic differences. It is important that health-care providers collect relevant QoL data for their own populations and not rely solely on that of other countries to guide practice. This study sought to determine the QoL of cancer patients in The Republic of Trinidad and Tobago using the EORTC QLQ-C30 and examine the relationships between QoL and selected sociodemographic and medical factors.

This twin island republic is in the Caribbean region and has a population of approximately 1.33 million people. The country has a relatively stable economy and is ranked as a high income, developing country. Approximately 16.7% of the population live in poverty, with these households mostly headed by women. Education is free up to tertiary level and literacy rates of 99% have been reported [32]. Mostly women are enrolled in tertiary level institutions. Educational status parallels socioeconomic status in the country. Despite the female population being more educated, it is a patriarchal society with gender inequities in reproductive health, empowerment and labor market [32]. The two largest ethnic groups are East Indian and African. The largest religious group is Roman Catholic followed by Protestants and Hindus.

Methods

Participants

The target population for this cross-sectional study was cancer patients 18 years and older being managed at the National Radiotherapy Centre in The Republic of Trinidad and Tobago. A total of seven hundred was targeted for this study, and four hundred and eighty persons agreed to participate.

Procedure

Data collection began after ethical approval was obtained from the University of the West Indies Ethics Committee and the Ministry of Health Trinidad and Tobago. Patients were recruited from the waiting area of the facility. All who consented to participate were asked to complete the number coded EORTC QLQ-C30 questionnaire. Completed questionnaires were returned directly to the researchers or placed in a drop box at the registration desk of the facility.

QoL assessment

The EORTC QLQ-C30 version 3 was used for this study. The instrument consists of 30 questions and incorporates five functional scales, three symptom scales, a global health status/QoL scale, six single items assessing additional symptoms commonly reported by cancer patients and perceived financial impact of the disease [33]. Each scale consists of a set of unique items. The instrument has been widely used in numerous countries to assess QoL of cancer survivors and has been tested for validity, reliability and responsiveness [34–36].

Statistical analysis

Data was analyzed with SPSS version 22 for Windows. Scale scores were calculated (ranging from 0 to 100) using standard procedures for the instrument [35]. Higher scores on the global health and function scales indicated a better status. Higher scores on the symptom scales and individual symptom questions indicated a greater presence of the specific symptom. The one-way, multiple analysis of variance (MANOVA) was used to investigate the relationship between sociodemographic (age, gender, marital status, income, education) (Table 2) and medical (cancer type, cancer treatment, time since diagnosis) (Table 3) variables and the scales on the EORTC QLQ-C30. The global QoL and five function scales were included as dependent variables in one model and the 3 symptom scales, and six individual items were included together in another model. In cases where significance was obtained on the MANOVA, post hoc testing was done to determine between which pairs of variables significant associations occurred. All testing was done at an alpha level of 0.05. Preliminary assumption testing was conducted, with no serious violations noted. A stepwise linear regression was done to determine which factors contributed to the global QoL and function scores for this group. The independent variables used were gender, age, income, marital status, education, cancer type, cancer treatment and diagnosis time.

For cancer treatment, the group that was categorized as other represented those who had completed chemotherapy or radiation and were being monitored at the facility.

Results

A total of 480 persons (21.7% males, 78.3% females) participated in the study. The females were significantly younger that the males (56.7 ± 16.6 years; 64.1 ± 12.1; $p = 0.00$) (Table 1). Global QoL and function scores were below 75 for both males and females.

Table 1 Demographic and medical data

Variable	Males	Females	*p*
Age (years) (mean ± standard deviation)	64.1 ± 12.1	56.7 ± 16.6	0.00
Gender (%) (*N* = 480)	21.7	78.3	
Marital status (%) (*N* = 476)			
Married	76.7	53.4	0.00
Not married	23.3	46.6	
Monthly income (%) (*N* = 383)			
< TT$3,000.00	53.8	63.4	0.11
≥ TT$3,000.00	46.2	36.6	
Highest educational level (%) (*N* = 465)			
Primary	47.1	38.6	0.30
Secondary	32.4	38.5	
Tertiary	20.5	22.9	
Cancer type (%) (*N* = 473)			
Prostate	48.5	0.0	0.00
Breast	0.0	64.3	
Lung and bronchus	13.9	4.0	
Gastrointestinal	24.8	8.60	
Gynecological	0.0	14.8	
Other	12.9	8.3	
Treatment (%) (*N* = 466)			
Chemotherapy	45.9	47.0	0.17
Radiation	16.3	9.8	
Other	37.8	43.2	
Diagnosis time (%) (*N* = 474)			
< 2 years	46.6	49.3	0.63
≥ 2 years	53.4	50.7	

The results of the MANOVA showed a significant difference based on age in the model which included the global QoL and function scales ($p = 0.00$) (Table 2). Persons in the two younger age groups had better physical function and cognitive scores that those in the 80 to 99 years age group. Significant differences were also seen for gender ($p = 0.00$). This was most evident for emotional function where males had a significantly higher emotional function score than females (Table 2). There was no difference for single or married persons on the combined dependent variables ($p = 0.29$). Significant findings were also obtained for income and education levels. Persons with income levels ≥ $3000.00 had significantly better scores on all function scales, except social function and persons with tertiary education had better scores than those with lower levels of education (Table 2). There was no significant association between marital status and the global QoL and function scales.

Table 2 Results of the statistical tests examining the relationship between socioeconomic variables and scores on the EORTC QLQ-C30

	Mean and standard error (SE) for scores on the EORTC QLQ-C30 for different socioeconomic categories with significant differences on an analysis of variance identified.												
	Age (years) Mean (SE)				Gender Mean (SE)		Marital status Mean (SE)		Net income Mean (SE)		Education mean (SE)		
Dependent variables	20–39	40–59	60–79	80–99	Male	Female	Single	Married	< TT$3000/ month	≥ T$3000/ month	Primary	Secondary	Tertiary
Function scales													
Physical	76.17 (2.95)	74.57*,e (1.66)	69.29 (1.74)	59.28*,e (4.83)	71.43 (2.41)	72.14 (1.26)	72.1 (1.73)	72.07 (1.46)	67.22 (1.59)	78.66* (1.94)	67.93*,a (1.78)	71.81 (1.79)	79.08*,a (2.31)
Role	66.67 (5.81)	68.41 (2.27)	65.47 (2.25)	57.50 (7.93)	63.92 (3.27)	67.28 (1.71)	67.38 (2.36)	66.22 (1.99)	59.86 (2.18)	74.77* (2.66)	62.67*,a (2.44)	64.89*,c (2.46)	75.08*,a (3.18)
Emotional	68.52 (4.15)	69.98 (1.86)	70.91 (1.80)	75.83 (5.01)	75.17* (2.56)	69.44 (1.35)	70.97 (1.87)	70.4 (1.58)	66.76 (1.75)	76.14* (2.13)	69.49*,a (1.94)	68.06*,c (1.95)	76.87*,a (2.52)
Cognitive	84.75*,d (3.47)	77.57*,e (1.79)	70.79 (1.91)	57.93*,d,e (5.93)	73.54 (2.62)	75.00 (1.37)	73.8 (1.89)	75.32 (1.6)	69.42 (1.74)	80.02* (2.13)	68.52* ,a(1.93)	77.02*,b (1.94)	81.02*,a (2.51)
Social	62.04 (5.34)	67.92 (2.29)	71.87 (2.12)	80.83 (4.72)	65.29 (3.10)	71.28 (1.62)	73.53 (2.23)	67.69 (1.89)	67.66 (2.04)	71.58 (2.49)	73.59 (2.34)	67.36 (2.35)	67.99 (3.04)
Global QoL	67.36 (2.96)	65.16 (1.75)	61.47 (1.79)	54.36 (5.79)	60.05 (2.49)	64.15 (1.3)	63.28 (1.79)	63.36 (1.52)	57.95 (1.59)	70.32* (1.93)	60.48 (1.84)	63.07 (1.85)	68.89*,a (2.4)
Multivariate analysis of variance	$F(6,440)=3.75$ $p=0.00$				$F(6, 460)=3.51$ $p=0.00$		$F(6, 449)=1.24$ $p=0.29$		$F(6, 364)=7.58$ $p=0.00$		$F(6, 441)=5.49$ $p=0.00$		
Symptoms scale													
Fatigue	46.39 (4.21)	38.42 (1.97)	41.75 (1.99)	49.20 (6.92)	42.06 (2.84)	40.63 (1.54)	41.05 (2.11)	41.06 (1.77)	45.83 (1.95)	33.41* (2.36)	43.45*,a (2.14)	42.75 (2.21)	34.01*,a (2.79)
Nausea/vomiting	25.22*,f (5.35)	17.98 (1.85)	13.57*,f (1.51)	7.94 (3.37)	12.586 (2.41)	16.77 (1.30)	14.78 (1.80)	16.80 (1.51)	17.95 (1.69)	11.86 (2.04)	15.38 (1.85)	17.94 (1.91)	12.96 (2.41)
Pain	27.93 (5.21)	30.47 (2.18)	31.52 (2.15)	44.45 (7.03	29.59 (3.06)	30.70 (1.66)	31.07 (2.67)	29.97 (1.90)	36.62 (2.09)	22.07* (2.53)	38.49 (2.26)	c 28.03* (2.34)	20.71*,a (2.95)
Single items													
Dyspnea	29.63 (4.56)	22.11*,e (1.95)	21.69*,g (1.81)	41.67*,e,g (7.59)	27.21 (2.69)	21.79 (1.45)	22.22 (2.01)	23.71 (1.68)	25.16 (1.84)	18.07 (2.22)	22.02 (2.04)	25.90 (2.11)	19.53 (2.66)
Insomnia	32.43 (5.85)	31.59 (2.37)	28.71 (2.30)	49.21 (9.92)	32.10 (3.41)	29.65 (1.84)	29.57 (2.54)	31.36 (2.12)	35.10 (2.37)	25.59 (2.87)	33.93*,a (2.56)	33.76*,c (2.65)	19.86*,a (3.34)
Appetite loss	24.32 (4.21)	24.87 (2.45)	25.28 (2.45)	35.00 (9.20)	28.57 (3.44)	23.98 (1.86)	25.61 (2.57)	25.03 (2.15)	29.97 (2.34)	17.14* (2.83)	29.76*,a (2.58)	26.75*,c (2.67)	13.80*,a (3.37)
Constipation	17.59*,d (4.09)	23.58 (2.24)	26.03 (2.24)	42.86*,d (9.24)	27.89 (3.18)	23.68 (1.72)	27.12 (2.37)	23.19 (1.98)	29.65 (2.17)	17.84* (2.62)	29.17*,a (2.43)	23.99 (2.51)	18.52*,a (3.16)
Diarrhea	11.11 (3.75)	8.78 (1.46)	7.77 (1.28)	8.33 (5.34)	8.16 (1.99)	8.36 (1.08)	8.47 (1.49)	8.43 (1.25)	8.65 (1.41)	8.68 (1.71)	7.94 (1.52)	10.62 (1.58)	5.39 (1.99)

Table 2 (continued)

	Mean and standard error (SE) for scores on the EORTC QLQ-C30 for different socioeconomic categories with significant differences on an analysis of variance identified.									
	Age (years) Mean (SE)			Gender Mean (SE)		Marital status Mean (SE)		Net income Mean (SE)		Education mean (SE)	
Financial problems	61.91 (6.71)	51.53 (2.84)	43.02 (2.69)	39.68 (4.89)	46.94 (3.93)	47.56 (2.13)	46.14 (2.92)	49.14 (2.45)	52.88 (2.64)	38.03* (3.19)	49.21*,[a] (2.97)	52.23*,[c] (3.07)	37.04*,[a] (3.87)
Multivariate analysis of variance	$F(9, 344) = 2.31$ $p = 0.00$				$F(9, 433) = 1.62$ $p = 0.11$		$F(9, 430) = 0.06$ $p = 0.80$		$F(9, 350) = 3.47$ $p = 0.00$		$F(9, 424) = 3.29$ $p = 0.00$		

Significant findings on an analysis of variance $^{*}p < 0.05$

Post hoc analysis for education: [a]significant difference between primary and tertiary education, [b]significant difference between primary and secondary, [c]significant difference between secondary and tertiary

Post hoc analysis for age: [d]significant difference between 20 and 39 and 80–99 years, [e]significant difference between 40 and 59 and 80–99 years, [f]significant difference between 20 and 39 and 40–59 years, [g]significant difference between 60 and 79 and 80–99 years

The results of the MANOVA showed significant differences based on age in the model containing the symptom scales and single item scores ($p = 0.00$) (Table 2). These differences were observed for nausea and vomiting, dyspnea and constipation. There were no significant differences in gender ($p = 0.11$) or marital status ($p = 0.80$) in the model containing the symptom scales and single item scores (Table 2). Significant differences were found for income ($p = 0.00$) and education ($p = 0.00$) (Table 2).

The MANOVA showed a significant difference for cancer type ($p = 0.00$) in both models (Table 3). These were mostly observed for breast cancer and lung and bronchus. A significant difference was also found for cancer treatment ($p = 0.00$) and time since diagnosis ($p = 0.00$) (Table 3).

The results of the stepwise linear regression showed income to be a consistent factor associated with global QoL and all function scores (Table 4).

Discussion

The treatment center used for this study provides care for most cancer patients in the country and even with the unbalanced representation of males and females it was felt that the group represented the sociodemographic profile of the target population. Findings in this study were like that reported in the literature [7, 9–13, 19, 20] whereby age, income, education, type of treatment and to a lesser extent times since diagnosis and gender were found to be associated with QoL. Older participants in this study had poorer physical and cognitive function than younger survivors. This was not surprising since normal age-related physiological changes adversely affect physical and cognitive function. Added to this is the cultural norm for Trinidad and Tobago whereby physical activity is reduced with age or with illness. Retirement is viewed as a time to rest as children assume the role of caring for the elders. Likewise, when persons are ill, they are encouraged to stop all physical activity and rest whilst others take care of them. This is a bit different in North America and Europe where persons place greater value on maintaining their independence as they age.

Both sexes in this study had similar QoL scores except for emotional function where males had significantly higher scores. Trinidad and Tobago is a male-dominated society, with the culture of dominance being associated with its dominant religions (Roman Catholic, Protestant and Hindu). Men are expected to tolerate pain and suffering without expressing their emotions. It is therefore possible that they over-reported on how well they were doing on the emotional function scale or they were simply better conditioned emotionally than the women to deal with illness. In a predominantly Caucasian, North American population [12] male cancer survivors reported less distress than the

Table 3 Results of the statistical tests examining the relationship between medical variables and scores on the EORTC QLQ-C30

Dependent variable	Mean and standard error (SE) for scores on the EORTC QLQ-C30 for different socioeconomic categories with significant differences on the analysis of variance identified for the individual dependent variable.										
	Cancer type mean (SE)						Cancer treatment mean (SE)			Time since diagnosis mean (SE)	
	Prostate	Breast	Lung and bronchus	Intestinal	Gynecological	Other	Chemotherapy	Radiation	Other	<2 years	≥2 years
Function scales											
Physical function	71.07 (3.44)	72.95*,a (1.54)	55.31*,a,b (4.44)	81.01*,b (3.09)	68.58 (3.20)	70.58 (3.65)	69.70 (1.65)	73.94 (3.59)	73.73 (1.74)	72.29 (1.62)	71.61 (1.57)
Role function	65.19 (4.75)	68.52*,a (2.12)	47.53*,a,b (6.13)	71.13*,b (4.26)	68.59 (4.42)	60.83 (5.04)	61.24* (2.22)	68.94 4.84	71.75* (2.35)	64.13 (2.18)	69.00 (2.12)
Emotional function	74.26 (3.77)	70.77 (1.69)	65.54 (4.87)	77.78 (3.38)	65.76 (3.51)	67.50 (4.00)	68.55 (1.76)	67.87 (3.83)	73.63 (1.86)	68.45* (1.72)	73.35* (1.67)
Cognitive function	70.74 (3.84)	74.67 (1.72)	79.63 (4.96)	75.89 (3.45)	76.28 (3.58)	72.92 (4.08)	78.71* (1.78)	71.97 (3.88)	70.77* (1.88)	75.96 (1.75)	73.51 (1.71)
Social function	67.04 (4.50)	72.45*,a (2.01)	53.70*,a,b (5.81)	77.08*,b (4.04)	69.23 (4.19)	62.92 (4.78)	64.91* (2.11)	74.62 (4.60)	73.89* (2.23)	66.74* (2.08)	72.93* (2.02)
Global health	57.22 (3.54)	67.44*,a (1.58)	52.78*,a,b (4.57)	70.54*,b,d (3.18)	57.85 (3.29)	52.71*,c,d (3.76)	61.04 (1.68)	63.45 (3.66)	65.51 (1.77)	62.25 (1.67)	64.59 (1.62)
Multivariate analysis of variance	$F(6, 445) = 2.62$, $p = 0.00$						$F(6, 440) = 3.724$, $p = 0.00$			$F(6, 446) = 2.948$, $p = 0.00$	
Symptom scales											
Fatigue	43.48 (4.06)	37.41*,a (1.90)	55.97*,a,b (5.31)	34.17*,b (3.79)	48.44 (3.90)	45.22 (4.20)	44.61 (1.97)	41.30 (4.13)	37.71 (2.12)	43.56 (1.92)	38.43 (1.90)
Nausea/vomiting	7.61*,e (3.51)	14.76 (1.64)	22.22 (4.58)	17.93 (3.27)	20.33*,e (3.37)	18.22 (3.63)	22.61*,a,b (1.64)	10.87*,a (3.44)	9.91*,b (1.76)	19.33* (1.63)	12.62* (1.61)
Pain	32.97 (4.45)	28.97 (2.08)	39.51 (5.81)	24.53 (4.15)	34.67 (4.27)	29.85 (4.60)	31.19 (2.15)	33.70 (4.51)	29.52 (2.31)	29.73 (2.08)	31.27 (2.06)
Single items											
Dyspnea	31.88* (3.82)	21.11*,a (1.79)	41.98*,a,b,f,g (4.98)	16.98**,b (3.56)	18.00*,f (3.66)	21.70**,g (3.95)	25.74 (1.87)	19.56 (3.92)	20.76 (2.01)	23.63 (1.83)	22.32 (1.81)
Insomnia	35.51 (4.96)	29.37 (2.32)	35.80 (6.48)	24.53 (4.62)	33.33 (4.76)	31.78 (5.13)	32.84 (2.37)	33.33 (4.98)	27.43 (2.55)	31.14 (2.31)	29.36 (2.28)
Appetite loss	23.19 (4.98)	20.95 (2.33)	32.10 (6.50)	24.53 (4.64)	32.00 (4.77)	34.88 (5.15)	32.18*,b (2.38)	21.01 (4.98)	18.67*,b (2.55)	29.11* (2.32)	21.25* (2.30)
Constipation	29.71 (4.59)	21.27*,a,h (2.15)	38.27*,a (6.00)	23.90 (4.28)	34.67*,h (4.41)	19.38 (4.75)	28.22*,b (2.21)	28.26 (4.63)	19.81*,b (2.37)	27.07 (2.16)	22.32 (2.13)
Diarrhea	5.80 (2.91)	8.10 (1.36)	7.41 (3.80)	15.09 (2.71)	7.33 (2.79)	6.20 (3.01)	9.90 (1.36)	4.35 (2.86)	7.43 (1.46)	9.23 (1.36)	7.65 (1.34)
Financial problems	39.13 (5.71)	46.51 (2.67)	55.56 (7.46)	44.03 (5.32)	52.67 (5.48)	56.59 (5.91)	49.67 (2.74)	52.17 (5.74)	44.76 (2.94)	50.23 (2.67)	44.65 (2.63)

Table 3 (continued)

Dependent variable	Mean and standard error (SE) for scores on the EORTC QLQ-C30 for different socioeconomic categories with significant differences on the analysis of variance identified for the individual dependent variable.										
	Cancer type mean (SE)						Cancer treatment mean (SE)			Time since diagnosis mean (SE)	
	Prostate	Breast	Lung and bronchus	Intestinal	Gynecological	Other	Chemotherapy	Radiation	Other	< 2 years	≥ 2 years
Multivariate analysis of variance	$F(9, 429) = 2.02, p = 0.00$						$F(9, 423) = 2.60, p = 0.00$			$F(9, 431) = 2.13, p = 0.03$	

Significant findings on an analysis of variance: $^{*}p < 0.05$

Post hoc analysis for cancer type: [a]significant difference between breast and lung and bronchus, [b]significant difference between lung and bronchus and intestinal, [c]significant difference between breast and other, [d]significant difference between intestinal and other, [e]significant difference between prostate and gynecological, [f]significant difference between lung and gynecological, [g]significant difference between breast and other, [h]significant difference between breast and gynecological

Post hoc analysis for cancer treatment: [a]significant difference between chemotherapy and other, [b]significant difference between chemotherapy and radiation

females. The differences in that study were also thought to be attributed to the way males are taught to report distress. The general lack of significant finding on other scales could be due to gender imbalance in the sample.

Persons with tertiary level education and higher income were found to have better function scores and less symptoms than those who had achieved primary education only. This finding was like that reported in the literature [18, 19, 21–23]. In Trinidad and Tobago, it has been shown that educational levels parallel socioeconomic status [32]. The more educated patients may have also been the wealthier ones in this group and may have had both the knowledge and means to access additional care that could have led to better QoL. For example, they may have had access to special diets or medications which would reduce nausea/vomiting, diarrhea and constipation. They may also have had access to physical therapy and other complementary health-care services through private facilities. It is also possible that the more educated and wealthier patients may have had better health insurance coverage, thus reducing the overall burden of the disease. In both China and India, higher financial status was associated with better quality of life [18, 21]. In China persons with lower income jobs, who were living in more rural communities had poorer health coverage [21]. We did not explore health coverage in this study; however, it is possible that a similar situation existed as for China.

Marital status in this study did not significantly impact any aspect of QoL. This was like that reported for long-term cancer survivors in Asia [16, 19]. Like the Asian studies most participants were married, and this may have affected the results. Added to this is the similarity of a communal culture. In the Caribbean people often have large social support networks, inclusive of family and community members and Trinidad and Tobago is no exception to this. Unmarried individuals in this study most likely had the benefit of this type of support network. Like the findings of other studies [25–27, 30] patients who were receiving chemotherapy, had significantly more symptoms compared to the radiation and other group. Findings for patients with cancer of the lung and bronchus were like other studies where they had poorer function and more symptoms [10, 24].

The results of this study showed similar trends to other regions of the world. Though participants in this study had better QoL scores than those reported in Ethiopia and China [17, 24], scores on all scales were poorer than that reported for developed countries [10, 15, 22]. Trinidad and Tobago is classified as a high income, developing country; however, there are significant gaps in the health-care service which could have accounted for QoL scores being poorer than that reported for developed countries. Discussions with the patients indicated that there was often a lengthy delay between diagnosis and start of treatment due to an inadequate amount of equipment and staff for providing

Table 4 Results of the stepwise linear regression for global QoL and function scales on the EORTC QLQ-C30

Variable	R^2	F	df	B	Beta	SE	p
Global QoL							
Income	0.07	13.86	2, 345	12.73	0.26	2.51	0.00
Type of treatment				2.61	0.10	1.31	0.04
Physical function							
Income	0.10	9.75	4. 347	7.88	0.16	2.99	0.00
Age				−0.25	−0.13	0.10	0.02
Type of treatment				3.21	0.12	1.35	0.02
Education				4.01	0.13	1.92	0.04
Role function							
Income	0.08	15.37	2, 347	16.80	0.25	3.46	0.00
Type of treatment				5.45	0.16	1.79	0.00
Emotional function							
Income	0.05	9.36	2, 343	10.30	0.19	2.80	0.00
Time since diagnosis				6.46	0.12	2.76	0.02
Cognitive function							
Income	0.09	10.76	3, 345	8.54	0.16	2.26	0.00
Education				14.68	0.14	2.06	0.02
Type of treatment				−3.11	−0.11	1.46	0.03
Social function				0.45	0.19	0.13	0.00
Age	0.04	5.12	3, 342	8.23	0.13	3.38	0.02
Income				7.96	0.11	3.88	0.04
Gender							

Age (continuous in years); income (0 < TT$3,000.00, 1 ≥ TT $3,000.00); type of treatment (0 = chemotherapy, 1 = radiation, 2 = other); education (0 = primary, 1 = secondary, 3 = tertiary); time since diagnosis (0 = < 2 years, 1 = ≥ 2 years)

treatment. In addition, treatment was often disrupted due to malfunctioning equipment. Persons who had money could seek care at a private facility while waiting for treatment to begin at the National Radiotherapy Centre; however, over 50% of participants in this study had monthly income of less than TT$3000.00 per month and would not have been able to afford private care.

Limitations

This cross-sectional study only looked at QoL at one specific time point and for persons categorized as "other" we did not capture information as to how long ago they had completed treatment and whether they were in remission or receiving palliative care. One must be careful therefore when drawing conclusions about treatment and QoL. A longitudinal study is recommended to investigate this relationship. The sample was smaller than was the targeted and may account for some of the nonsignificant findings. The gender distribution was unbalanced. Social support was not well examined in this study. Though most participants were married, this does not equal a good support system. Future studies should explore the social support structure in greater detail including that from religious groups. It is also recommended that future studies examine any alternative treatment that participants may also be receiving or have received that could have an impact on QoL.

Conclusion

Quality of life presentation of cancer patients in Trinidad and Tobago is like that of other countries but with lower global QoL and function scores than those reported for the rest of the developed world. Age, income, education, type of treatment and to a lesser extent gender and time since diagnosis are important factors associated with global QoL in this group.

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