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Quality of Life Among Prostate Cancer Patients in Sarawak, Malaysia: A Cross-sectional Analysis of Demographic, Clinical and Treatment Factors

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ABSTRACT

Advancements in prostate cancer management improves survival but each treatment modality has its side effects. Quality of life (QOL) among survivors is equally important as survival. There is currently limited data regarding QOL among prostate cancer patients in Malaysia. The aim of this study was to determine the overall QOL among prostate cancer patients in Sarawak and to explore the relationship between socio-demographic factors, clinical factors and patients' QOL. A cross-sectional study conducted across 4 major hospitals in Sarawak with 205 patients recruited via consecutive sampling. QOL was assessed with validated questionnaires consisted of European Organization for Research and Treatment of Cancer QLQ-C30 and QLQ-PR25 module in Malay and English versions. The mean age of patients was 73.4 years (SD 6.8), majority comprised of Chinese ethnic (55.6%), secondary educational level (45.9%), married (92.2%), unemployed (86.3%) and had no difficulties in medical accessibility (92.7%). About 45.9% of the cohort were of metastatic disease state, 18.5% experienced disease progression, 69.8% were on ongoing active treatment, 74.6% was under androgen deprivation and 81.5% underwent non-surgical management. The mean global health status score was 73.6 (SD 19.9). From the QLQ-C30, the highest functioning and symptom scale were social functioning 83.2 (SD 22.5) and fatigue 32 (SD 22.8). As for QLQ-

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PR25, highest functional and symptom scale were sexual functioning 72.1 (SD 31.6) and urinary symptoms 31.0 (SD 20.2). Our study concludes that men below 80-year-old, Malay ethnicity, unmarried or widowed, employed, higher education level, and have access to medical care reported a better QOL. Factors such as advanced disease, usage of androgen deprivation therapy, presence of disease progression, and ongoing treatment are associated with a lower QOL.

INTRODUCTION

Prostate cancer ranks as the third most prevalent malignancy globally and the second most frequently diagnosed cancer among males with around 1.4 million cases reported worldwide in 2020. Prostate cancer is the third most prevalent cancer among males in Malaysia, with 2146 new cases recorded in 2020. It constitutes 9.3% of all cancer cases in the country, following pulmonary and colorectal cancer and the prevalence of prostate cancer is increasing in a steady trend (Sung et al., 2021).

With advancements of management options of prostate cancer and the improvement in quality and access to medical care, mortality among prostate cancer patients were significantly improved. However, living longer with prostate cancer does not necessarily equate to living well, and quality of life (QOL) among cancer patients may be affected by physical, emotional, social function and financial constraints. Various treatment modalities are available for prostate cancer, but each modality comes with its own set of side effect profile. Treatment modality is generally determined by the stage of the disease, health status and life expectancy of the affected individual.

Shrestha et al. (2019) emphasised the significance of variations in QOL and survival among cancer patients. Elderly people prioritise QOL over longevity, potentially due to their deteriorating physical condition with age. In contrast, younger patients are more inclined to pursue intensive treatments aimed at extending their lifespan (Shrestha et al., 2019). Prostate cancer is typically associated with older individuals and has a relatively favourable median survival time of 58.02 months (95% CI 56.62–61.73), as reported by the Malaysian study on cancer survival (MySCan). This stresses the importance of QOL among prostate cancer survivors.

The notion of QOL is inherently subjective, varying in interpretation among patients at different phases of life. However, there are shared characteristics that may be identified among all cancer patients. Based on these shared characteristics, patient reported outcome measures (PROMs) have been developed and validated for men with prostate cancer. Tools with best evidence for psychometric properties and feasibility for use in daily practice to assess PROMs were European Organization for Research and Treatment of Cancer (EORTC) QLQ-C30 and QLQ-PR25 for patients with prostate cancer (Ratti et al., 2022). Both the EORTC QLQ-C30 and QLQ-PR25 were also validated to be used among prostate cancer patients in Malaysia (Ismail et al., 2020).

Currently, there is a scarcity of data regarding the QOL among prostate cancer patients in Malaysia. This is the first study evaluating QOL among prostate cancer survivors in Sarawak with validated questionnaires. The only study evaluating QOL among prostate cancer patients in Malaysia at the time of literature review was the validation of EORTC QLQ-C30 and QLQ-PR25 by Ismail et al (Ismail et al., 2020). It is worth noting that Sarawak, which is the largest state in Malaysia, accounts for 8.7% of the total population of 31.7 million Malaysians (Department of Statistics Malaysia, 2024). The purpose of this study was to assess the QOL ratings among prostate cancer patients in Sarawak, Malaysia and aims to fill the gaps in knowledge regarding the

relationship between socio-demographic factors, clinical factors and patients' QOL.

MATERIALS AND METHODS

A cross-sectional study was conducted between January 2023 till September 2023 across 4 major hospitals in Sarawak with urological services (Sarawak General Hospital, Sarawak Heart Centre, Hospital Sibu, and Hospital Miri). Figure 1 illustrates the hospitals located in the state of Sarawak which provides urological care and urological visiting services. Ethics approval to conduct this study was obtained from the Medical Research and Ethics Committee. The study was registered in National Medical Research Register with the registration number, NMRR ID-22-01337-K3X (IIR).

Figure 1: Major hospitals located in the state of Sarawak which provides urological care and urological visiting services.

A total of 205 patients were recruited via consecutive sampling. The recruitment sites of this study are the main follow up centres for prostate cancer patients in Sarawak where participants are encountered consecutively. The inclusion criteria for this study were patients from the state of Sarawak with confirmed diagnosis of prostate cancer and who were above 18 years old. Patients with dual malignancy were excluded from this study. Written informed consent was obtained from the patients. Socio-demographic details, diagnosis, and disease stage and treatment modality received were obtained from the case report form to ensure the authenticity of patient's information.

Prostate cancer patients attending the urology outpatient clinic who consented to participate in this study were each given the EORTC self-administered questionnaires which consists of QLQ-C30 and QLQ-PR25 module with the option of English or Malay version. The EORTC QLQ-C30 set consists of 30 items with three main domains consisted of functional scale, symptom scale and global health status while EORTC QLQ-PR25 consists of 25 questions with both functional and symptom scales. Breakdown of the items of the questionnaires are as per Figure 2. Completion of the questionnaires were ensured as all the participants were assisted to answer the missing questions and were asked for their comment on understanding of the

Domain	Number of Questions
EORTC QLQ-C30	
Global Health Status	2
Functional Scales	
Physical Functioning	5
Role Functioning	2
Emotional Functioning	4
Cognitive Functioning	2
Social Functioning	2
Symptom Scales	
Fatigue	3
Nausea and vomiting	2
Pain	2
Dyspnea	1
Insomnia	1
Appetite loss	1
Constipation	1
Diarrhea	1
Financial difficulties	1
EORTC QLQ-PR25	
Functional Scales	
Sexual activity	2
Sexual functioning	4
Symptom Scales	
Urinary symptoms	8
Incontinence Aid	4
Bowel symptoms	6
Hormonal treatment related symptoms	1

Figure 2: EORTC QLQ-C30 and QLQ-PR25 questionnaire domains and items.

questionnaires by medical doctors and allied health professionals.

All raw data were linearly transformed to give a score between 0-100. A high score for a functional scale represents a healthy level of functioning whereas a high score for a symptom scale represents a high level of symptomatology or problems. An exception for the "sexual activity" variable of the functional scale of QLQ-PR25 where a higher score represents poor level of functioning. High scores on the global and functional scales indicate good QOL, on the symptom scales low scores represent less intense symptom experience, hence higher QOL and vice versa (Fayers & Bottomley, 2002; van Andel et al., 2008).

Sample Size

For this study, the sample size was estimated using the rule of thumb to determine the factors associated with the Global health status score (GHS-S) for multiple linear regression analysis as suggested by Tabachnick and Fidell (2013). The sample size calculation 50 + 8 (p) was used as a guideline, where p equals to the number of predictor variables, assuming an error 0.05 and 0.80 for power of the study. Since this study had 12 factors, therefore, the minimal required sample of 146 was determined based on the for a medium-sized relationship. The final sample of this study was 205.

Statistical Analysis

Descriptive data will be expressed as mean and standard deviation (SD) or frequencies and percentages unless otherwise stated for socio-demographic characteristics of the respondents and the scales in the EORTC questionnaires. Normality analysis was carried out for continuous variables. For comparison between the QOL scores and categorical data, Kruskal-Wallis or Mann Whitney U tests will be utilised. Simple and multiple linear regression was used to identify the associated factors (i.e., age, ethnicity, education level, marital status, employment status, difficulty in seeking medical care, current disease stage, disease progression, treatment modality, ongoing androgen deprivation therapy (ADT) and ongoing treatment) and GHS-S. For multiple linear regression analysis (MLR), a significance level of $P<0.25$ for factors in simple linear regression (SLR) was chosen to produce a model of best fit, parsimonious, and biological plausibility in multivariate analysis process (i.e., variable selection steps).

The study used a cutoff of $P<0.25$ in univariate analysis to ensure important variables were not excluded, as some variables might become significant when analysed alongside others in multivariable analysis. For the final multivariate model, a stricter cutoff of $P<0.05$ was applied to determine statistical significance, consistent with prior studies (Bursac et al., 2008; Mohammad Ziaul Islam & Tanvir, 2020). All tests were performed using IBM SPSS Statistics 28.0.

RESULTS

The study involved a cohort of 205 participants diagnosed with prostate cancer. Table 1 and Figures 3-5 present the socio-demographic and disease characteristics of the patients. The mean age of the participants in this study was 73.4 years (SD 6.8). Majority of participants, accounting for 56.6%, were in the age range of 70-80 years. The youngest patient was 52 years, whilst the eldest of the participants was 92 years. Majority of the cohort were of Chinese ethnicity (55.6%) followed by others (Local Sarawak ethnics, 24.9%), Malay (19%) and Indian (0.5%). Most common educational level among the cohort were secondary level (45.9%) followed by primary (29.8), tertiary (16.6%) and no formal education (7.8%). 92.2% of the cohort were married and majority of the cohort were unemployed (86.3%). 92.7% of the patients had no difficulties in terms of accessibility to medical care.

During the trial, 45.9% of the patients were in metastatic disease state, localised

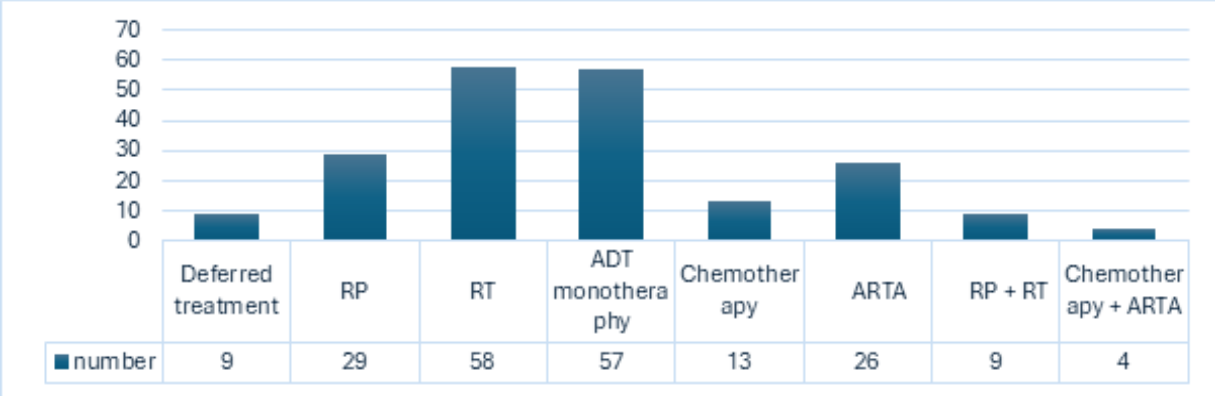
Table 1: Socio-demographic and disease characteristics of responde

Characteristics	Number	%
Age group (years)		
< 70	58	28.3
70 - 80	116	56.6
> 80	31	15.1
Ethnic		
Malay	39	19.0
Chinese	114	55.6
Indian	1	0.5
Others	51	24.9
Education		
Primary	61	29.8
Secondary	94	45.9
Tertiary	34	16.6
None	16	7.8
Marital status		
Single	7	3.4
Married	189	92.2
Widow	9	4.4
Employment status		
Yes	28	13.7
No	177	86.3
Difficulty seeking medical care		
Yes	15	7.3
No	190	92.7
Current disease stage		
Localized	86	42.0
Locally advanced	25	12.2
Metastatic	94	45.9
Disease progression		
Yes	38	18.5
No	167	81.5

disease (42%) followed by locally advanced disease (12.2%). 18.5% of the cohort experienced disease progression during the treatment period. About 69.8% (143 patients) were ongoing active treatment at the time of the study. Moreover, 74.6% of the cohort was under androgen deprivation therapy which included patients underwent orchidectomy. Patients in this cross-sectional study predominantly underwent non-surgical treatment (81.5%) whereas surgical treatment consisted of 18.5%.

Table 2 displays the QOL scores across various domains in the EORTC questionnaires. The mean global health status of the 205 participants was 73.6 (SD 19.9). The QLQ-C30 questionnaire revealed that the highest mean score in the functioning scale was observed for social and emotional functioning, with scores of 83.2 (SD 22.5) and 82.8 (SD 20.0), respectively. On the other hand, the lowest mean score in the functioning scale was found in role functioning, with a score of 77.5 (SD 26.8). In terms of the symptom scale, the highest mean score was observed for the fatigue symptom, with a score of 32 (SD 22.8), while the lowest mean score was found in the nausea and vomiting symptom scale, with a score of 6.3 (SD 13.3). In relation to QOL ratings related to prostate cancer using the prostate cancer module (QLQ-PR25), the group exhibited a generally low level of sexual activity, with an average score of 85.3 (SD 24.1). Out of the 63 individuals (30.7% of the total participants) who reported being sexually active, the average score on the sexual functioning scale was 72.1 (SD 31.6). The urinary symptoms were the most troublesome, with a mean score of 31 (SD 20.2), while the requirement of incontinence help was the least troublesome, with a score of 5.5 (SD 20.7).

Table 3 displays the median QOL scores based on patient demographics categorised by age, ethnicity and employment status. Prostate cancer patients below the age of 80 exhibited a greater overall global health status, which corresponds to an improved QOL. Notable disparities were observed in the functioning scales, including physical, emotional, and cognitive aspects, as well as in the symptom scales, such as constipation, diarrhoea, and sexual activity. The Malay patients had a higher QOL compared to the other patients, with notable disparities observed in the functional scale (physical, role, and social functioning) and



Notes: RP = Radical prostatectomy, RT = Radiotherapy, ADT = Androgen deprivation therapy, ARTA = Androgen receptor targeting agents.

Figure 3: Treatment modality of respondents, n=205.

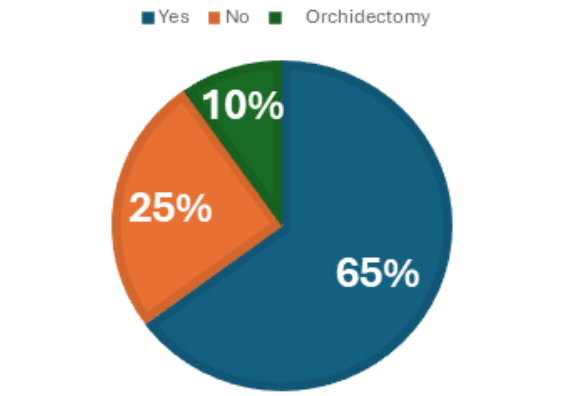


Figure 4: Ongoing androgen deprivation status of respondents, n=205.

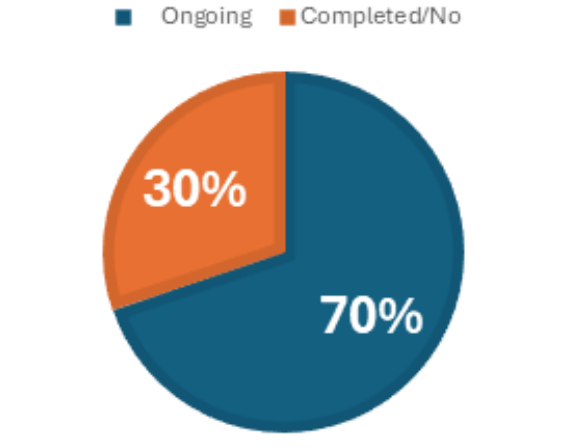


Figure 5: Treatment status of respondents, n=205.

symptom scale (pain, dyspnoea, constipation, and symptoms associated to hormonal treatment). Single and widowed patients reported a higher QOL, but no significant differences were observed on the functioning and symptom scale. Employed patients exhibited a superior QOL in comparison to unemployed patients. Statistically significant disparities were observed in the domains of role functioning and symptoms, namely in the areas of constipation, diarrhoea, and sexual activity. Patients who did not encounter any obstacles in accessing medical care reported a greater QOL, particularly in terms of physical functioning. Additionally, patients with a tertiary education level and those with no formal education also reported a better QOL.

Tables 4-6 display the median QOL scores based on disease characteristics, including the access to medical care respectively, current stage of the disease, ongoing androgen deprivation therapy, ongoing treatment, and the modality of prostate cancer treatment. When comparing patients at different stages of prostate cancer, those with metastatic illness experienced a lower QOL. This difference was particularly evident in symptom scales, namely in terms of financial issues and sexual activity. Patients who experienced disease progression during the course of treatment also reported a decrease in their QOL score. QOL was better among patients who were not

Table 3: QOL scores stratified by age group, ethnicity, and employment status.

QOL domains	Age group (years)				Ethnicity					Employment status		
	< 70	70 - 80	> 80	P[b]	Chinese	Malay	Indian	Others	P[b]	Yes	No	P[c]
GHS S	83.3 (25.0)	83.3 (16.7)	66.7 (16.7)	0.108	79.2 (16.7)	83.3 (16.7)	25.0 (0.0)	75.0 (16.7)	0.238	83.3 (20.8)	75.0 (16.7)	0.099
PF S	86.7 (33.3)	80.0 (20.0)	66.7 (40.0)	0.009	86.7 (20.0)	86.7 (20.0)	86.7 (0.0)	73.3 (20.0)	0.049	86.7 (13.3)	80.0 (26.7)	0.073
RF S	83.3 (33.3)	83.3 (50.0)	66.7 (33.3)	0.534	100.0 (33.3)	83.3 (33.3)	100.0 (0.0)	66.7 (50.0)	< 0.001	100.0 (16.7)	83.3 (33.3)	0.024
EF S	100.0 (16.7)	83.3 (33.3)	83.3 (25.0)	0.009	91.7 (33.3)	91.7 (25.0)	66.7 (0.0)	83.3 (33.3)	0.423	91.7 (29.2)	91.7 (33.3)	0.597
CF S	83.3 (16.7)	83.3 (33.3)	66.7 (16.7)	0.002	83.3 (33.3)	83.3 (33.3)	50.0 (0.0)	83.3 (33.3)	0.100	83.3 (33.3)	83.3 (33.3)	0.833
SF S	100.0 (33.3)	100.0 (16.7)	66.7 (16.7)	0.263	100.0 (33.3)	100.0 (16.7)	66.7 (0.0)	83.3 (50.0)	0.021	100.0 (25.0)	100.0 (33.3)	0.982
Fatigue S	22.2 (22.2)	22.2 (33.3)	33.3 (33.3)	0.076	27.8 (33.3)	33.3 (22.2)	33.3 (0.0)	33.3 (33.3)	0.104	27.8 (27.8)	33.3 (22.2)	0.311
NauseaV S	0.0 (0.0)	0.0 (16.7)	0.0 (16.7)	0.280	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (16.7)	0.808	0.0 (8.3)	0.0 (0.0)	0.892
Pain S	16.7 (33.3)	16.7 (33.3)	33.3 (16.7)	0.970	0.0 (33.3)	16.7 (33.3)	50.0 (0.0)	16.7 (50.0)	0.013	16.7 (33.3)	16.7 (33.3)	0.467
Dyspnea S	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.157	0.0 (0.0)	0.0 (33.3)	33.3 (0.0)	0.0 (33.3)	0.039	0.0 (0.0)	0.0 (33.3)	0.239
Insomnia S	33.3 (33.3)	0.0 (66.7)	33.3 (0.0)	0.075	33.3 (33.3)	0.0 (33.3)	0.0 (0.0)	33.3 (66.7)	0.069	16.7 (33.3)	33.3 (66.7)	0.358
Appetite S	0.0 (0.0)	0.0 (0.0)	33.3 (0.0)	0.156	0.0 (33.3)	0.0 (33.3)	0.0 (0.0)	0.0 (33.3)	0.579	0.0 (33.3)	0.0 (33.3)	0.676
Constipation S	0.0 (33.3)	0.0 (33.3)	33.3 (0.0)	0.048	0.0 (33.3)	0.0 (33.3)	66.7 (0.0)	0.0 (33.3)	0.023	0.0 (16.7)	0.0 (33.3)	0.041
Diarrhea S	0.0 (0.0)	0.0 (33.3)	33.3 (33.3)	0.049	0.0 (0.0)	0.0 (0.0)	33.3 (0.0)	0.0 (33.3)	0.090	0.0 (0.0)	0.0 (33.3)	0.035

Table 3: *Continued.*

QOL domains	Age group (years)				Ethnicity					Employment status		
	< 70	70 - 80	> 80	P[b]	Chinese	Malay	Indian	Others	P[b]	Yes	No	P[c]
FI S	33.3 (33.3)	0.0 (33.3)	33.3 (0.0)	0.359	0.0 (33.3)	0.0 (33.3)	33.3 (0.0)	33.3 (66.7)	0.158	0.0 (33.3)	0.0 (33.3)	0.351
URI S	20.8 (20.8)	29.2 (25.0)	37.5 (16.7)	0.369	27.1 (29.2)	29.2 (25.0)	29.2 (0.0)	33.3 (25.0)	0.064	29.2 (39.6)	29.2 (29.2)	0.365
AID S	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.056	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.895	0.0 (0.0)	0.0 (0.0)	0.638
BOW S	0.0 (16.7)	8.3 (8.3)	25.0 (8.3)	0.983	8.3 (16.7)	0.0 (8.3)	16.7 (0.0)	8.3 (16.7)	0.388	8.3 (16.7)	8.3 (16.7)	0.657
HTR S	11.1 (11.1)	11.1 (11.1)	11.1 (5.6)	0.984	5.6 (11.1)	11.1 (16.7)	16.7 (0.0)	11.1 (22.2)	0.006	5.6 (13.9)	11.1 (11.1)	0.208
SA S	66.7 (66.7)	100.0 (33.3)	100.0 (33.3)	0.022	100.0 (16.7)	100.0 (16.7)	83.3 (0.0)	100.0 (33.3)	0.122	83.3 (33.3)	100.0 (16.7)	0.030
SF S[a]	83.3 (50.0)	83.3 (50.0)	100.0 (33.3)	0.550	75.0 (41.7)	91.7 (16.7)	Nil	83.3 (66.7)	0.508	70.8 (33.3)	83.3 (50.0)	0.702

Table 4: QOL scores stratified by accessibility to medical care and current disease stage.

QOL domains	Accessibility to medical care			Current disease stage			
	Yes	No	P[c]	Localized	Locally advanced	Metastatic	P[b]
GHS S	66.7 (33.3)	75.0 (16.7)	0.474	75.0 (25.0)	83.3 (25.0)	75.0 (16.7)	0.052
PF S	73.3 (33.3)	86.7 (20.0)	0.028	86.7 (20.0)	80.0 (20.0)	83.3 (26.7)	0.813
RF S	100.0 (33.3)	83.3 (33.3)	0.608	83.3 (33.3)	83.3 (33.3)	83.3 (33.3)	0.899
EF S	75.0 (33.3)	91.7 (33.3)	0.143	87.5 (33.3)	83.3 (33.3)	91.7 (25.0)	0.558
CF S	66.7 (33.3)	83.3 (33.3)	0.206	83.3 (33.3)	83.3 (33.3)	83.3 (33.3)	0.316
SF S	100.0 (33.3)	100.0 (33.3)	0.931	100.0 (33.3)	100.0 (33.3)	100.0 (33.3)	0.998
Fatigue S	33.3 (33.3)	33.3 (33.3)	0.543	33.3 (33.3)	33.3 (33.3)	33.3 (22.2)	0.594
NauseaV S	0.0 (0.0)	0.0 (16.7)	0.247	0.0 (16.7)	0.0 (0.0)	0.0 (16.7)	0.833
Pain S	16.7 (33.3)	16.7 (33.3)	0.691	16.7 (33.3)	16.7 (33.3)	16.7 (33.3)	0.224
Dyspnea S	0.0 (33.3)	0.0 (0.0)	0.068	0.0 (33.3)	0.0 (0.0)	0.0 (0.0)	0.420
Insomnia S	0.0 (66.7)	33.3 (66.7)	0.873	33.3 (66.7)	33.3 (33.3)	33.3 (66.7)	0.929
Appetite S	0.0 (33.3)	0.0 (33.3)	0.627	0.0 (33.3)	0.0 (0.0)	0.0 (33.3)	0.342
Constipation S	0.0 (33.3)	0.0 (33.3)	0.723	0.0 (33.3)	0.0 (33.3)	0.0 (33.3)	0.467
Diarrhea S	0.0 (33.3)	0.0 (33.3)	0.409	0.0 (33.3)	0.0 (33.3)	0.0 (0.0)	0.658
FI S	33.3 (66.7)	0.0 (33.3)	0.078	0.0 (33.3)	0.0 (33.3)	33.3 (33.3)	0.043
URI S	33.3 (33.3)	29.2 (29.2)	0.186	29.2 (29.2)	37.5 (37.5)	29.2 (25.0)	0.123
AID S	0.0 (0.0)	0.0 (0.0)	0.559	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.656
BOW S	8.3 (25.0)	8.3 (8.3)	0.102	8.3 (16.7)	8.3 (16.7)	0.0 (8.3)	0.280
HTR S	11.1 (22.2)	11.1 (11.1)	0.185	5.6 (16.7)	11.1 (16.7)	11.1 (11.1)	0.846
SA S	100.0 (33.3)	100.0 (33.3)	0.480	100.0 (33.3)	100.0 (16.7)	100.0 (16.7)	0.032
SF Sa	45.8 (8.3)	83.3 (41.7)	0.163	66.7 (62.5)	83.3 (41.7)	95.8 (29.2)	0.184

Notes: an = 63, [b]Kruskal Wallis test, [c]Mann Whitney U test, QOL = Quality of life, Significant P in bold, Data presented as median and interquartile range.

Table 5: QOL scores stratified by ongoing androgen deprivation therapy and ongoing treatment.

QOL domains	Accessibility to medical care				Current disease stage		
	Yes	No	Orchidectomy	P[b]	Ongoing	Completed/No	P[c]
GHS S	75.0 (16.7)	83.3 (20.8)	70.8 (33.3)	0.153	75.0 (16.7)	83.3 (16.7)	0.172
PF S	80.0 (26.7)	86.7 (20.0)	76.7 (30.0)	0.067	80.0 (26.7)	86.7 (20.0)	0.088
RF S	83.3 (33.3)	100.0 (33.3)	100.0 (41.7)	0.171	83.3 (33.3)	100.0 (33.3)	0.081
EF S	91.7 (33.3)	95.8 (25.0)	83.3 (33.3)	0.263	83.3 (33.3)	95.8 (33.3)	0.183
CF S	83.3 (33.3)	83.3 (33.3)	83.3 (33.3)	0.399	83.3 (33.3)	83.3 (33.3)	0.184
SF S	100.0 (33.3)	100.0 (33.3)	100.0 (33.3)	0.602	100.0 (33.3)	100.0 (33.3)	0.349
Fatigue S	33.3 (22.2)	22.2 (27.8)	27.8 (38.9)	< 0.001	33.3 (22.2)	22.2 (22.2)	< 0.001
NauseaV S	0.0 (16.7)	0.0 (0.0)	0.0 (16.7)	0.225	0.0 (16.7)	0.0 (0.0)	0.180
Pain S	16.7 (33.3)	0.0 (16.7)	16.7 (41.7)	0.006	16.7 (33.3)	0.0 (16.7)	0.003
Dyspnea S	0.0 (33.3)	0.0 (33.3)	0.0 (0.0)	0.731	0.0 (33.3)	0.0 (33.3)	0.743
Insomnia S	33.3 (66.7)	0.0 (33.3)	33.3 (66.7)	0.173	33.3 (66.7)	0.0 (33.3)	0.146
Appetite S	0.0 (33.3)	0.0 (0.0)	0.0 (33.3)	0.001	0.0 (33.3)	0.0 (0.0)	0.007
Constipation S	0.0 (33.3)	0.0 (33.3)	16.7 (33.3)	0.331	0.0 (33.3)	0.0 (33.3)	0.253
Diarrhea S	0.0 (33.3)	0.0 (0.0)	0.0 (0.0)	0.026	0.0 (33.3)	0.0 (0.0)	0.027
FI S	0.0 (33.3)	0.0 (33.3)	33.3 (50.0)	0.043	0.0 (33.3)	0.0 (33.3)	0.200
URI S	33.3 (29.2)	22.9 (31.3)	33.3 (22.9)	0.079	33.3 (29.2)	25.0 (33.3)	0.049
AID S	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.084	0.0 (0.0)	0.0 (0.0)	0.035
BOW S	8.3 (16.7)	8.3 (12.5)	0.0 (8.3)	0.140	8.3 (16.7)	8.3 (8.3)	0.906
HTR S	11.1 (16.7)	5.6 (11.1)	5.6 (13.9)	< 0.001	11.1 (16.7)	5.6 (11.1)	< 0.001
SA S	100.0 (16.7)	100.0 (33.3)	100.0 (0.0)	0.049	100.0 (16.7)	100.0 (33.3)	0.197
SF Sa	91.7 (41.7)	66.7 (41.7)	83.3 (25.0)	0.313	91.7 (41.7)	66.7 (41.7)	0.116

Notes: an = 63, [b]Kruskal Wallis test, [c]Mann Whitney U test, QOL = Quality of life, Significant P in bold, Data presented as median and interquartile range.

Table 6: QOL scores stratified by treatment modalities.

QOL domains	Treatment modalities								
	Deferred treatment	R^P	R^T	ADT mono-therapy	Chemother-apy	ARTA	RP+RT	Chemother-apy + ARTA	P^b
GHS S	75.0 (16.7)	83.3 (25.0)	83.3 (16.7)	66.7 (25.0)	75.0 (16.7)	83.3 (16.7)	58.3 (16.7)	66.7 (20.8)	0.317
PF S	86.7 (20.0)	93.3 (20.0)	86.7 (20.0)	73.3 (33.3)	86.7 (20.0)	80.0 (26.7)	86.7 (6.7)	66.7 (50.0)	0.096
RF S	83.3 (33.3)	100.0 (33.3)	100.0 (33.3)	66.7 (50.0)	66.7 (50.0)	100.0 (33.3)	83.3 (33.3)	58.3 (66.7)	0.127
EF S	83.3 (33.3)	100.0 (25.0)	91.7 (33.3)	83.3 (33.3)	91.7 (16.7)	91.7 (33.3)	75.0 (25.0)	100.0 (20.8)	0.581
CF S	83.3 (33.3)	83.3 (33.3)	83.3 (33.3)	83.3 (33.3)	83.3 (16.7)	83.3 (33.3)	66.7 (50.0)	75.0 (33.3)	0.370
SF S	100.0 (33.3)	100.0 (33.3)	100.0 (33.3)	100.0 (33.3)	100.0 (16.7)	91.7 (33.3)	83.3 (33.3)	75.0 (66.7)	0.960
Fatigue S	33.3 (22.2)	22.2 (22.2)	27.8 (22.2)	33.3 (22.2)	33.3 (22.2)	33.3 (44.4)	33.3 (11.1)	38.9 (50.0)	0.151
NauseaV S	0.0 (0.0)	0.0 (16.7)	0.0 (0.0)	0.0 (16.7)	0.0 (0.0)	0.0 (16.7)	0.0 (0.0)	16.7 (33.3)	0.332
Pain S	16.7 (16.7)	0.0 (16.7)	16.7 (33.3)	16.7 (50.0)	16.7 (0.0)	16.7 (33.3)	16.7 (33.3)	16.7 (66.7)	0.271
Dyspnea S	0.0 (33.3)	0.0 (33.3)	0.0 (0.0)	0.0 (33.3)	0.0 (0.0)	0.0 (0.0)	0.0 (33.3)	0.0 (16.7)	0.858
Insomnia S	33.3 (66.7)	0.0 (33.3)	33.3 (33.3)	33.3 (66.7)	0.0 (33.3)	33.3 (66.7)	33.3 (66.7)	0.0 (16.7)	0.103
Appetite S	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (33.3)	0.0 (33.3)	0.0 (33.3)	0.0 (0.0)	16.7 (50.0)	0.137
Constipation S	0.0 (33.3)	0.0 (33.3)	0.0 (33.3)	33.3 (33.3)	0.0 (33.3)	0.0 (33.3)	0.0 (33.3)	16.7 (66.7)	0.559
Diarrhea S	0.0 (0.0)	0.0 (0.0)	0.0 (33.3)	0.0 (33.3)	0.0 (33.3)	0.0 (33.3)	0.0 (33.3)	0.0 (0.0)	0.495
FI S	0.0 (33.3)	33.3 (33.3)	0.0 (33.3)	0.0 (33.3)	33.3 (66.7)	33.3 (66.7)	0.0 933.3)	0.0 (33.3)	0.257
URI S	25.0 (41.7)	25.0 (25.0)	33.3 (29.2)	29.2 (29.2)	20.8 (16.7)	31.3 (29.2)	37.5 (20.8)	8.3 (37.5)	0.505
AID S	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (50.0)	0.018
BOW S	8.3 (8.3)	8.3 (16.7)	8.3 (16.7)	0.0 (8.3)	0.0 (8.3)	4.2 (8.3)	8.3 (8.3)	0.0 (4.2)	0.165
HTR S	5.6 (5.6)	5.6 (11.1)	11.1 (16.7)	11.1 (16.7)	5.6 (5.6)	8.3 (11.1)	22.2 (22.2)	13.9 (19.4)	0.096
SA S	83.3 (33.3)	83.3 (33.3)	100.0 (33.3)	100.0 (16.7)	100.0 (33.3)	100.0 (0.0)	66.7 (33.3)	100.0 (16.7)	0.058
SF Sa	91.7 (0.0)	66.7 (41.7)	79.2 (41.7)	100.0 (50.0)	100.0 (100.0)	100.0 (16.7)	66.7 (58.3)	Nil	0.412

Notes: an = 63, [b]Kruskal Wallis test, QOL = Quality of life, Significant P in bold, Data presented as median and interquartile range, Nil = Not available, RP = Radical prostatectomy, RT = Radiotherapy, ADT = Androgen deprivation therapy, ARTA = Androgen receptor targeting agents.

on androgen deprivation therapy. Significant differences were associated with symptoms scale (fatigue, pain, appetite loss, diarrhoea, financial difficulties, hormone treatment related symptoms and sexual activity). Similarly, patients who had completed their treatment reported an improved QOL, with notable disparities in symptoms such as weariness, discomfort, decreased appetite, diarrhoea, urinary symptoms, reliance on incontinence aids, and side effects associated to hormones. Comparison among patients who underwent different treatment modalities, patients among the surgical intervention group (radical prostatectomy), radiotherapy, androgen receptor targeted agents (ARTA) group reported a better QOL. Patients who received a combination of treatments due to disease progression such as adjuvant radiotherapy post-surgery and 2nd line ARTA post chemotherapy reported a worse QOL. Only the symptom scale (usage of incontinence aid) was found to be significantly different. Marital status, education level and disease progression tables are not included in this article.

Table 7 displays the results of the single linear regression analyses conducted to examine the relationship between independent variables and the global health status score. The only significant factor linked with GHS-S was the locally advanced stage (b=9.972, P=0.019). The multivariate analysis in this study did not yield any statistically significant predictors.

DISCUSSION

The Malaysian Study on Cancer Survival (MySCan) reported the median survival time of prostate cancer was 58.02 months (95% CI 56.62–61.73), whilst the 5-year relative survival of stages I, II, III and IV prostate cancer was 97.3%, 92.1%, 93.0% and 43.2%, respectively (National Cancer Registry Malaysia, 2018). Our study shows that majority of the patients (45.8%) were in the advanced stages of prostate cancer where it is consistent with the finding of the Malaysia Prostate Cancer Study (M-CaP) where multi-ethnic Asian men are more likely to present at a later stage of prostate cancer (Lim et al., 2021). With the evolving landscape of the management of prostate cancer where treatment improves overall survival, it is imperative to understand more about the effect of prostate cancer therapies on QOL among prostate cancer survivors.

This study identified factors that contribute to a good QOL among prostate cancer patients. Socio-demographic factors that contributed good QOL are patients below 80 years old, Malay ethnicity, single or widowed, being in employment, higher education level and convenience to medical access. It is known that age strongly influences treatment decision making. Older men are also more likely to be diagnosed with advanced disease and face a higher risk of cancer-specific mortality (Konety et al., 2008). A lower QOL among older men may indicate that they may have a lower baseline QOL score to begin with. Patients <80 years old from our study has better functioning and lower symptom score in all domains as compared to men <80 years old except for the insomnia symptom scale. Religiousness such as seeking God's love or protection, seeking help in religious literature and prayers were positively associated with better QOL and low level of psychological distress (Idler et al., 2009). This could contribute to the higher QOL among the Malay ethnic shown in this study. Married men in this study reported a poorer QOL compared to single or widowed men. This may be a personal reflection that prostate cancer is a burden to their spouse. According to Swedish population-based register study, partners of patients with cancer (n=10353) suffer from significantly more mood disorders, poorer reactions to severe stress and ischaemic heart disease during the year after the cancer diagnosis (Möllerberg et al., 2016). Employed cancer patients reported better QOL (Tamminga et al., 2020). Employment may enhance QOL but a certain level of requirement

Table 7: Factors associated with global health status using

Variables	Simple linear regression (SLR)		
	Crude b	95% CI	P
Age	-0.329	-0.731, 0.074	0.109*
Ethnic			
Indian (ref)	0	Nil	Nil
Malay	3.076	-3.921, 10.074	0.387
Chinese	0.406	-5.132, 5.943	0.885
Employment			
No (ref)	0	Nil	Nil
Yes	5.784	-2.188, 13.757	0.154*
Difficulty to seek medical care			
No (ref)	0	Nil	Nil
Yes	-4.459	-15.007, 6.089	0.406
Marital status			
Single (ref)	0	Nil	Nil
Married	-8.887	-19.071, 1.296	0.087*
Widow	5.362	-8.048, 18.772	0.431
Education			
None (ref)	0	Nil	Nil
Primary	-3.615	-9.612, 2.383	0.236*
Secondary	-0.647	-6.168, 4.874	0.818
Tertiary	4.056	-3.320, 11.433	0.280
Current disease stage[c]			
Metastatic (ref)	0	Nil	Nil
Localized	-3.391	-8.948, 2.165	0.230*
Locally advanced	9.972	1.678, 18.267	0.019*
Progression of disease			
No (ref)	0	Nil	Nil
Yes	-2.830	-9.900, 4.240	0.431
Treatment modalities			
Deferred (ref)	0	Nil	Nil
RP	6.861	-0.156, 13.878	0.055*
RT	1.559	-4.303, 7.421	0.601
ADT monotherapy	-4.233	-10.093, 1.627	0.156*
Chemotherapy	-1.801	-10.687, 7.086	0.690
ARTA	2.577	-4.727, 9.881	0.487
RP+RT	-4.023	-13.730, 5.683	0.415
Chemotherapy + ARTA	0.835	-10.455, 12.125	0.884
Ongoing ADT			
No (ref)	0	Nil	Nil
Yes	-3.977	-9.715, 1.761	0.173*
Orchidectomy	-3.502	-12.763, 5.758	0.457
Ongoing treatment			
No (ref)	0	Nil	Nil
Yes	-3.774	-9.742, 2.194	0.214*

Notes: b = regression coefficient, CI = confidence interval, ref = reference group, Nil = Not available, RP = Radical prostatectomy, RT = Radiotherapy, ADT = Androgen deprivation therapy, ARTA = Androgen receptor targeting agents, *Variables in SLR with P < 0.250 were included in MLR analyses to avoid from losing of important variables. During the MLR steps, none of the factors were found significant.

of functioning may be needed to be able to continue with work. It is evident in our study that employed men have better functioning status in all domains hence it translates to a better QOL. Group educational interventions based on the rationale that providing emotional support adjusting to patients' knowledge, attitude and expectations about cancer can have a positive effect on QOL. Eton et al. (2001) reported that a higher educational level correlates with a better QOL among prostate cancer patients when engaged in group interventions. Although patients from this study were not involved in any formal educational interventions, our results showed better QOL among the patients with tertiary education qualification which may reflect a better understanding of the disease and better management of self-expectations.

The disease's characteristics that positively influenced the QOL included having localised prostate cancer, not being on ADT, no evidence of disease progression, having completed prostate cancer treatment, and not requiring additional treatment due to disease progression. Clinically localised prostate cancer is usually asymptomatic (Thompson et al., 2007). However, in advanced prostate cancer, it commonly metastasizes to the bone leading to bone pain and fractures. Other symptoms associated with metastatic prostate cancer are fatigue and problems with urinary and sexual functioning which correlates with our study population. In the present study, around 74.7% of the study population received ADT therapy, either alone or in combination with other therapies (radiotherapy, chemotherapy, or ARTA), highlighting the importance of evaluating the effects of ADT on the QOL among prostate cancer survivors. QOL among the patients on ADT fair worse compared to patients without ADT (Huang et al., 2019). Patients on ADT reported worse symptoms of fatigue, pain, appetite loss, diarrhoea, financial difficulties, hormone treatment related symptoms and sexual activity. Poorer QOL in the ADT group compared with the non-ADT group may also be due to that patients who require ADT are usually at a more advanced state of prostate cancer be it from progression or diagnosed de-novo.

About 42.4% of our study population underwent localised treatment (radical prostatectomy/radiotherapy) and they reported the best QOL among all other treatment modalities. Adam et al. (2019) reported that patients treated with radical prostatectomy or radiotherapy alone reported the best QOL and the lowest symptom burden based on a population-based study in Germany. Patients fit for curative management are at early stages of the disease with 5-year relative survival rate of > 90% and ADT side effects are negated in the radical prostatectomy group and only short-term ADT of 6-24 months is required in combination with radiotherapy depending on the risk of prostate cancer. Patients in the follow-up phase (not on active treatment or ADT) of this study reported higher QOL scores compared to patients in treatment phase. Median time to testosterone recovery after ADT use ranges from 1.5 to 5.1 years depending on age and duration of ADT (Nabid et al., 2023). Our results showed significant lower symptoms score of fatigue, pain, and hormone treatment related symptoms for the follow-up phase patients.

This cross-sectional study gives an overall insight of the overall QOL of prostate cancer patients in Sarawak, Malaysia. It is to date the first survey on QOL among prostate cancer patients using validated questionnaires namely the EORTC QLQ-C30 and QLQ-PR24 questionnaires among Sarawakians. This study is inclusive of the majority prostate cancer patients treated in the public hospitals in Sarawak thus providing valuable decision-making information for healthcare providers and patients. Treatment landscape of prostate cancer varies according to the disease stage and with the large armamentarium of treatment options, health care providers and patients need to be aware of the benefits and

risks of the different treatment modalities. While survival outcome is the key objective of prostate cancer treatment, QOL among survivors is equally important which it turns has significant public health implications. Limitations of this study are namely that this study was an observational study and hypothesis generating. Consecutive sampling was adopted to overcome patients' accessibility issues due to geographical constraints and the short time frame of this study. While sample size of this study was enhanced to improve the power of statistical test, potential sampling bias was inadvertent. A prospective study with probability sampling and a larger sample size assessing the QOL before and after prostate cancer treatment would be advantageous in the study of treatment impact on QOL. Participants may have provided inaccurate responses to certain questionnaire items, particularly those related to sexual activity and sexual functioning as these domains are subjected to recall bias and social desirability bias where social and gender norms create different expectations about socially acceptable sexual behaviour. Translation assistance from doctors and allied health professionals were provided to patients with linguistic challenges as only the English and Malay versions of the questionnaires were validated for the Malaysian population at the time of this study. Conducting a validation study on the Chinese version of the questionnaires could be advantageous for the Malaysian population. While the multivariate analysis conducted in this study did not find any significant predictors of QOL, our study confirmed strong independent link between patients' self-reported global health status and current disease stage in simple linear regression. Thus, collecting EORTC QLQ-C30 and QLQ-PR25 data in routine clinical practice to achieve a bigger dataset could offer additional useful information for future clinical decision-making and it would be advantageous to explore other socio-demographic and illness factors not considered in this study.

CONCLUSION

Overall, our study provides a comprehensive analysis of the QOL in prostate cancer patients at various stages of the disease who underwent different treatment methods. The QOL of prostate cancer patients was better in those who were below the age of 80, of Malay ethnicity, unmarried or widowed, employed, had a higher level of education, and had convenient access to medical care. Factors such as advanced disease, usage of androgen deprivation therapy, presence of disease progression, and ongoing treatment were associated with a lower QOL. The multivariate analysis in this study did not yield any statistically significant predictors of QOL. Future studies exploring local socio-demographic challenges and disease related factors in relation to QOL is paramount in optimising QOL improvements alongside survival outcomes for prostate cancer patients in Malaysia.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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