Title Page

Psychometric Properties of Functional Assessment of Cancer Therapy-Prostate (FACT-P) in Chinese Patients with Prostate Cancer

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Abstract

Purpose: The aim of the study was to assess the validity, reliability and sensitivity of the FACT-P (Version 4) in Chinese males with prostate cancer.

Methods: Construct validity was assessed using Spearman's correlation test against the 12-item Short Form Health Survey (SF-12v2). Internal consistency and test-retest reliability was assessed using Cronbach's α coefficient and intra-class correlation coefficient, respectively. Sensitivity was determined by performing known group comparisons by independent t-test.

Results: FACT-P subscale scores had a moderate correlation with the corresponding SF-12v2 domain score that conceptually measures the similar construct providing evidence for adequate construct validity. Internal consistency was acceptable (α: 0.687-0.900) for all subscales aside from the Prostate Cancer Subscale (α: 0.505) and Trial Outcome Index (α: 0.562). FACT-P subscale and total scores showed good test-retest reliability (range: 0.753-0.913). All total scales and most of the subscales were sensitive in detecting differences between subjects with different levels of functional impairment but not different cancer stages or levels of prostate-specific antigen.

Conclusions: The measure is a valid and reliable measure to assess the health-related quality of life of Chinese males with prostate cancer. The FACT-P is sensitive to detect difference between subjects with varying functional status.

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Manuscript Text

Introduction

Prostate cancer is the second commonest cancer in adult males worldwide[1]. As patients with prostate cancer had poorer well-being[2-4], assessment of health-related quality of life (HRQOL) can be used clinically to assist healthcare providers identify individuals who may be at risk of poor well-being, to help guide treatment planning, and to evaluate the effectiveness of interventions[5].

The Functional Assessment of Cancer Therapy-General (FACT-G)[6] is a well-established and validated instrument which has been widely used to measure HRQOL in cancer patients[7-9]. One limitation of the FACT-G is that it only evaluates generically the impact of cancer on HRQOL without consideration of the specific impacts which cancer may have on HRQOL. In response to this, the Functional Assessment of Cancer Therapy-Prostate (FACT-P) was developed to more specifically capture the HRQOL relevant to prostate cancer patients. The FACT-P is a modification of the FACT-G to include a Prostate Cancer Subscale[10; 11]. However, there is still a lack of evidence on the psychometrics of the FACT-P in Chinese patients with prostate cancer.

Objective of the present study was to assess the validity, reliability and sensitivity of the FACT-P in Chinese patients with prostate cancer.

Methods

Subjects and Setting

Convenience sampling of patients with histological proof of prostate cancer were recruited between May 2013 and January 2014 in a major teaching hospital in Hong Kong. Patients were excluded if they could not understand or speak Cantonese, refused to participate or were too ill to give consent.

Subjects who consented were subsequently asked to answer a structured questionnaire which consisted of the traditional Chinese version of FACT-P (version 4), the Chinese Hong Kong version of Short Form-12 Health Survey version 2 (SF-12v2) and questions on socio-demographics.

Clinical data for each subject including the undertaken of androgen deprivation therapy, Prostate-Specific Antigen (PSA) level, the stage of cancer as classified by 7th Edition of TNM American Joint Committee on Cancer and the Karnofsky Performance status (KPS)[12], were retrieved from subject's medical record.

All subjects were contacted again through telephone within two weeks after their baseline interview to assess test-retest reliability.

Study Instruments

Functional Assessment of Cancer Therapy-Prostate (FACT-P)

The traditional Chinese version of FACT-P (version 4) has 39 items grouped into five subscales: seven items related to Physical Well-Being (PWB), seven items related to Social/Family Well-Being (SWB), six items related to Emotional Well-Being (EWB), seven items related to Functional Well-Being (FWB) and twelve items belonging to the Prostate Cancer Subscale (PCS). Individual subscale scores are calculated by summation of the valued item responses,

with higher scores indicating better HRQOL. The PWB, FWB and PCS subscales are combined to yield the FACT-P Trial Outcome Index (TOI). The sum of PWB, SWB, EWB and FWB subscale scores gives the overall FACT-G score with a range from 0 to 108. The PCS score is combined with the overall FACT-G score to form the overall FACT-P score with a range from 0 to 156.

Short Form-12 Health Survey version 2 (SF-12v2)

The Chinese (HK) SF-12v2 has been validated and normed on the Hong Kong Chinese adults[13; 14]. The SF-12v2 has eight domain scales and two summary scales, with higher scores indicating better HRQOL.

Statistical Analysis

The construct validity of the FACT-P was assessed using spearman's correlation test against the SF-12v2 domain scores holding similar constructs.

The internal consistency was assessed by Cronbach's alpha using a value ≥ 0.7 to indicate adequate internal consistency[15]. Test-retest reliability was assessed by examining the intra-class correlation coefficient (ICC) over the 2-week period. An ICC of ≥ 0.7 was used to indicate good reproducibility[16].

The sensitivity of the FACT-P was determined by performing known group comparisons by independent t-test and effect size. Cohen's effect size was calculated as the difference between mean scores, divided by pooled SD. Known clinical groups were (i) early cancer stage I/II versus late cancer stage III/IV; (ii) KPS $\leq$80 versus KPS>80 and (iii) PSA<10ng/ml versus PSA$\geq$10ng/ml. It was hypothesized that patients with more severe cancer staging, lower KPS,

higher PSA level or androgen deprivation therapy were associated with poorer HRQOL as measured by the FACT- P instrument.

Data analyses were conducted using SPSS Windows 21.0 (IBM SPSS Inc., Chicago, IL, USA). P-value<0.05 was statistically significant.

Results

Baseline characteristics of study subjects and results of construct validity are shown in Table 1 and Table 2, respectively. It was observed that the PWB, SWB, EWB and FWB subscale had a moderate correlation (r: 0.44–0.69) with the corresponding SF-12v2 subscale that conceptually held the similar construct.

The reliability of the FACT-P is shown in table 3. The Cronbach's alpha coefficient exceeded 0.7 in the PWB, SWB, EWB and FWB subscale. The Cronbach's alpha coefficients were just short of 0.7 in FACT-G and FACT-P total scale, still acceptable, according to Churchill's benchmark[17]. The ICCs of all subscales, FACT-G total scale, TOI and FACT-P total scale exceeded 0.7.

The sensitivity of the FACT-P in differentiating known clinical groups is shown in Table 4. The FACT-P was not able to detect differences between subjects with different cancer stages (I/II vs. III/IV) or subjects with different PSA levels. Statistically significant differences were detected between subjects with KPS≤80 and those with KPS>80 by PWB, SWB, FWB, prostate cancer subscale, FACT-G total scale, TOI, and FACT-P total scale. Moreover, patients with androgen deprivation therapy had statistically worse FWB score than those without.

Discussion

This study reported the psychometric properties of the FACT-P in Chinese patients with prostate cancer. Of note, the present study was not the first one to report the results of psychometric testing of prostate cancer-specific HRQOL instrument among Chinese patients with prostate cancer.

This study contributed further insights into the floor and ceiling effects of the FACT-P, identifying that a significant ceiling effect was evident in the PWB and EWB subscales. One interpretation is that physical well-being and emotional well-being are not negatively affected by prostate cancer in our study population. A previous study conducted in Singapore also found a significant ceiling effect in PWB and EWB subscales in Chinese patients with gastric cancer[18]. Clinicians and researchers should therefore interpret the PWB and EWB subscale scores with caution, especially when evaluating interventions for patients with prostate cancer as interventions may appear to be ineffective due to the significant ceiling effects.

The PWB, SWB and FWB subscales, TOI, FACT-G and FACT-P total scale were able to differentiate patients with different degrees of functional impairment. These findings also revealed that there are moderate differences in HRQOL between patients with varying functional impairment. This finding was in line with a previous study which suggested that the level of functional impairment as measured by the KPS had a significant association with HRQOL[19]. Moreover, the FWB subscale score was able to differentiate patients treated with and without androgen deprivation therapy. The change in functional well-being due to androgen deprivation therapy was supported by previous studies[20-22]. The measure was not able to discriminate known clinical groups, by cancer staging or PSA level. It appeared that the stage of cancer and PSA level did not significantly affect the HRQOL of our study subject with prostate cancer. This was contrary to a previous study of Chinese patients which found that subjects with stage

III/VI prostate cancer had poorer HRQOL in the physical functioning, role functioning and social functioning domains as measured by QLQ-C30 than those with stage I/II prostate cancer[23]. A further examination of the inter-relationships between known clinical groups and HRQOL is warranted.

In summary, the FACT-P demonstrated satisfactory psychometric properties in terms of validity, reliability and sensitivity in Chinese patients with prostate cancer. Our finding supported the applicability of the instrument to evaluate the HRQOL and its associations with clinical interventions on Chinese patients with prostate cancer.

Ethics

Ethics approval of the study protocol was obtained from the Institutional Review Board of the University of Hong Kong and Hospital Authority (Ref No.: UW13-239).

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Tables

Table 1. Baseline Characteristics of Prostate Cancer Patients

Demographic Characteristics	Total (N=291)		Clinical Characteristics	Total (N=291)	
	N	%		N	%
Age (years, Mean±SD)	74.92 ± 8.61		PSA		
Education			<0.1ng/ml	109	37.46 %
No formal schooling	46	15.81 %	≥0.1 & <10ng/ml	121	41.58 %
Primary	98	33.68 %	≥10ng/ml	39	13.40 %
Secondary	90	30.93 %	Unknown	22	7.56 %
Tertiary or above	53	18.21 %	AJCC Cancer Staging		
Unknown	4	1.37 %	I	58	19.93 %
Marital Status			II	75	25.77 %
Married	222	76.29 %	III	31	10.65 %
Single	17	5.84 %	IV	112	38.49 %
Separated, divorced or widower	48	16.49 %	Unknown	15	5.15 %
Unknown	4	1.37 %	Distant metastasis	59	20.27 %
Currently Working			KPS		
Yes	25	8.59 %	Mean±SD	91.39 ± 12.50	
No	262	90.03 %	≤70	23	7.90 %
Unknown	4	1.37 %	80	34	11.68 %
Monthly income (HKD$)			90	64	21.99 %
≤20,000	238	81.79 %	100	138	47.42 %
>20,000	49	16.84 %	Unknown	32	11.00 %
Unknown	4	1.37 %	Androgen deprivation	116	39.86 %

Note:
SD=standard deviation; PSA=Prostate-specific antigen; KPS=Karnofsky performance status; AJCC=American Joint Committee on Cancer

Table 2. Spearman's Correlation Coefficients of Subscales and Total Scores between the FACT-P and SF-12 Instruments

	SF-12v2 Domain and Summary Scores									
Subscale/Total scale	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS
Physical Well-being	.620	.643	.647	.639	.482	.605	.471	.455	.646	.274
Social Well-being	.363	.448	.337	.410	.453	.440	.324	.414	.375	.329
Emotional Well-being	.187	.291	.238	.382	.474	.376	.672	.690	.110	.712
Functional Well-being	.587	.660	.514	.685	.681	.649	.602	.591	.576	.478
Prostate Cancer Subscale	.599	.663	.614	.662	.534	.563	.506	.517	.629	.354
FACT-G total score	.572	.664	.547	.682	.662	.661	.646	.675	.555	.554
TOI	.675	.738	.654	.754	.637	.668	.595	.603	.688	.426
FACT-P total score	.611	.699	.597	.718	.659	.664	.628	.674	.607	.517

Note:
FACT-P=Functional Assessment of Cancer Therapy-Prostate; FACT-G=Functional Assessment of Cancer Therapy-General; TOI=Trial Outcome Index; PF=physical functioning; RP=role physical; BP=bodily pain; GH=general health; VT=vitality; SF=social functioning; RE=role emotional; MH=mental health; PCS=Physical Composite Scale; MCS=Mental Composite Scale;

Table 3. Internal Consistency Reliability and Test-retest Reliability of FACT-P Subscales and Total Scores

						Cronbach's Alpha			Intra-class correlation			
Subscale/Total score		Mean	Standard deviation	Floor (%)	Ceiling (%)	n	Estimate	95% CI		n	Estimate	95% CI	
Physical Well-being	7 items	24.63	3.64	0.00	25.43	291	.798	0.761	0.832	191	.753	0.684	0.808
Social Well-being	7 items*	19.62	5.18	0.34	6.19	291	.891	0.870	0.909	191	.778	0.715	0.828
Emotional Well-being	6 items	21.08	3.76	0.34	23.71	290	.704	0.648	0.754	191	.806	0.750	0.851
Functional Well-being	7 items	19.72	5.38	0.34	9.28	290	.900	0.882	0.917	191	.878	0.841	0.907
Prostate Cancer Subscale	12 items	35.82	6.61	0.00	0.00	289	.505	0.416	0.585	191	.878	0.841	0.907
FACT-G total score	27 items*	85.04	13.90			289	.691	0.638	0.741	191	.900	0.869	0.924
TOI	26 items	80.17	13.74			289	.562	0.485	0.631	191	.893	0.860	0.918
FACT-P total score	39 items*	120.94	19.22			288	.687	0.633	0.736	190	.913	0.886	0.934

Note:
FACT-P=Functional Assessment of Cancer Therapy-Prostate; FACT-G=Functional Assessment of Cancer Therapy-General; TOI=Trial Outcome Index
* One item in Social Well-being is optional item

Table 4. Sensitivity to differentiate known clinical groups

	AJCC Cancer staging					
	Stage I/II (n=133)		Stage III/IV (n=143)			
Subscale/Total score	Mean	SD	Mean	SD	P-value	ES
Physical Well-being	24.36	3.78	24.80	3.46	0.318	-0.12
Social Well-being	19.02	5.80	20.04	4.62	0.105	-0.19
Emotional Well-being	21.10	3.85	21.02	3.65	0.860	0.02
Functional Well-being	19.29	5.80	19.83	5.07	0.416	-0.10
Prostate Cancer Subscale	35.22	6.86	36.22	6.31	0.204	-0.15
FACT-G total score	83.77	15.29	85.68	12.63	0.257	-0.14
TOI	78.87	14.51	80.85	13.02	0.234	-0.14
FACT-P total score	119.13	20.84	121.90	17.67	0.234	-0.14
	KPS					
	≤80 (n=57)		>80 (n=202)			
	Mean	SD	Mean	SD	P-value	ES
Physical Well-being	23.44	4.44	25.00	3.32	0.004	-0.40
Social Well-being	17.49	4.99	20.13	4.92	<0.001	-0.53
Emotional Well-being	20.89	4.53	21.03	3.58	0.809	-0.03
Functional Well-being	17.12	5.98	20.29	5.06	<0.001	-0.57
Prostate Cancer Subscale	33.63	7.24	36.41	6.21	0.004	-0.41
FACT-G total score	78.95	16.67	86.46	12.77	<0.001	-0.51
TOI	74.19	16.32	81.71	12.51	<0.001	-0.52
FACT-P total score	112.82	23.05	122.87	17.58	<0.001	-0.49
	PSA					
	<10ng/ml (n=230)		≥10ng/ml (n=38)			
	Mean	SD	Mean	SD	P-value	ES
Physical Well-being	24.49	3.72	25.11	3.21	0.339	-0.18
Social Well-being	19.67	5.27	19.11	4.88	0.543	0.11
Emotional Well-being	21.13	3.74	21.03	3.49	0.869	0.03
Functional Well-being	19.87	5.58	18.00	4.69	0.052	0.36
Prostate Cancer Subscale	35.80	6.88	36.13	4.87	0.777	-0.06
FACT-G total score	85.16	14.41	83.25	11.61	0.437	0.15
TOI	80.16	14.42	79.24	10.65	0.705	0.07
FACT-P total score	121.06	20.01	119.38	15.04	0.620	0.09
	Androgen deprivation therapy					
	No (n=175)		Yes (n=116)			
	Mean	SD	Mean	SD	P-value	ES
Physical Well-being	24.69	3.60	24.49	3.72	0.734	0.05

Social Well-being	19.89	5.40	19.67	5.27	0.267	0.04
Emotional Well-being	21.04	3.92	21.13	3.74	0.849	-0.02
Functional Well-being	20.27	5.50	19.87	5.58	0.032	0.07
Prostate Cancer Subscale	35.80	6.73	35.80	6.88	0.950	0.00
FACT-G total score	85.89	14.33	85.16	14.41	0.201	0.05
TOI	80.76	13.93	80.16	14.42	0.370	0.04
FACT-P total score	121.70	19.84	121.06	20.01	0.411	0.03

Note:
KPS=Karnofsky performance status; PSA=Prostate-specific antigen; TOI=Trial Outcome Index; SD=Standard deviation; ES=Effect Size
Cohen's effect size was calculated as the difference between mean scores, divided by pooled SD