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Health behaviors and depressive symptoms in testis cancer survivors

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Abstract

Objectives—Testis cancer has one of the highest 5-year survival rates of all cancer sites. The survival period is marked by increased risk for secondary cancer and cardiovascular events due to treatment related toxicities. The purposes of this cross-sectional study were to determine the prevalence of health behaviors and depressive symptoms and to assess the relationship between depression and health behaviors.

Methods—162 testis cancer survivors 2 to 10 years post-diagnosis completed a one-time phone interview. The interview included a battery of questions from the BRFSS assessing health behaviors (smoking, physical activity, cholesterol screening, colorectal cancer screening, alcohol consumption, and fruit and vegetable intake) as well as the CES-D assessing depressive symptoms.

Results—The interviews revealed low prevalences of health behaviors among testis cancer survivors. The percentage of testis cancer survivors who scored above the cutoff on the CES-D, 17.5%, was higher than large-scale population-based estimates in males aged 19–44, 11%. Smoking was significantly related to depression. Depressive symptoms (CES-D score) differed significantly depending on smoking status (current smokers, M=15.2; former smokers, M=6.2, $p<.001$; and never smokers, M=8.7, $p<.001$).

Conclusions—Given the increased risk of cancer and treatment-related morbidities of these survivors, the findings of this study suggest that health care professionals should encourage testis cancer survivors to engage in health behaviors and check for depressive symptoms.

Keywords

Smoking; cholesterol screening; colorectal cancer screening; alcohol; diet; physical activity; depression; cancer survivor; testicular cancer

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Conflicts of Interest

None

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Introduction

Testis cancer has one of the highest 5-year overall survival rates, 95.5% of all malignancies.¹ Since incidence is highest among 15 to 39 yr olds, the period of survivorship for testis cancer is longer than that of most other groups of cancer survivors. However, long-term testis cancer survivors (TCS) who were treated with cisplatin-based chemotherapy have an increased observed-to-expected (O/E) ratio of 1.4 for secondary neoplasia² and an increased O/E ratio ranging from 2.4³ to 7.1⁴ for cardiovascular morbidities. Behavioral factors such as smoking, diet, alcohol consumption, and cancer screening represent an important pathway for disease prevention^{5, 6}. Unfortunately, little is known about TCS' health behaviors.⁷

Depression may be an important determinant in health behaviors for cancer survivors. In a Norwegian study with 1260 long-term TCS, participants who identified themselves as physically active were 44% less likely to be depressed, compared with physically inactive participants⁸. Studies with other cancer survivors have shown an inverse relationship between depression and various health behaviors, such as diet^{7, 9} and physical activity¹⁰. In non-cancer patient samples, meta-analytic and epidemiologic reviews have shown depression to be an important independent risk factor associated with tobacco use, alcohol abuse, sedentary lifestyle, and increased dietary fat consumption^{11–15}.

Our cross-sectional study investigated whether depressive symptoms were associated with various health behaviors in a cancer survivor sample who were two-to-ten years post-diagnosis. Tobacco and alcohol consumption, colorectal cancer and cholesterol screening behaviors, physical activity level, and fruit and vegetable consumption were assessed. It was hypothesized that for each of these types of health behaviors, TCS who engaged in the unhealthy form of the behavior would have higher depressive symptomatology than those who engaged in the healthy form.

Material and Methods

Background Study

Between January 2000 and June 2002, data were collected as part of a larger cross-sectional study assessing quality of life concerns among 162 TCS two-to-ten yrs post-diagnosis.

Study Design and Sample

Participants for the study (n=162) were eligible if they were: 1) aged 18–80, 2) diagnosed with seminomatous or non-seminomatous germ-cell testis cancer between two-to-ten yrs prior to evaluation, 3) residing in the U.S., and 4) able to give informed consent. Four hundred and forty-one potential participants were identified using a list of testis cancer patients previously treated at the M. D. Anderson Genitourinary Center. Of these, 212 patients were unable to be contacted due to incorrect addresses or phone numbers (five attempts were made to reach the patient before stopping). From the remaining list, 229 patients were approached either in person during their follow-up appointments at the Center or via letter and telephone if they were not followed at M. D. Anderson. Of these, 37 refused. The remaining patients agreed to participate and were consented (telephone consenters were mailed a consent form and return envelopes), yielding a participation agreement rate of 83.8% of reachable survivors. Of the 192 consented participants, 162 completed the questionnaire battery via a structured telephone interview with a trained master's-level study coordinator. The structured interviews were scheduled mostly during the evenings and weekends in order to maximize completion rates.

Measures

Depression was measured as a continuous variable using the Centers for Epidemiological Studies- Depression (CES-D).¹⁶ Demographics were *age* (years), *race* (White or non-White), *education* (highest grade level), *employment* (currently working or student status, versus unemployed, retired, or unable to work), and *income* (collapsed into 6 levels, see Table 1).

Clinical variables were employed as control variables in the ANOVA: *Time since diagnosis* was measured as a continuous variable in years. *Type of tumor* was dichotomized into seminomatous and non-seminomatous type. *Stage* was categorized into five levels, I, IIa, IIb, IIc, and III.

The following items from the 1999 CDC Behavioral Risk Factor Surveillance Survey have demonstrated moderate-to-high reliability and validity¹⁷. *Smoking* was categorized into three levels, current smoker, former smoker, and never smoker. *Physical activity* was assessed by measuring the number of minutes, distance (if applicable), speed, and intensity for each leisure physical activity (LPA) volunteered, then categorized into four levels (sedentary, irregular, regular moderate, regular vigorous; see Table 2). The *cholesterol screening* variable consisted of BRFSS items asking about the recency of blood cholesterol screening and was categorized into two levels (within the past year, more than a year or never). *Alcohol consumption* was measured in three different ways: 1) *Percentage who used alcohol in the past month*; 2) *Number of Drinks per occasion*; and 3) *Problem Drinking episodes in the past month*. *Daily fruit and vegetable* servings was derived from a series of questions about intake frequency of green salad, fruits, fruit juices, vegetables, and dichotomized as 5 or more versus less than 5 per day. Due to their low frequency, *Colorectal Cancer screening* behaviors were collapsed into an index variable dichotomizing whether home blood stool kits or sigmoidoscopy or colonoscopy were ever done.

Analysis

A one-way analysis of variance (ANOVA) was utilized to determine whether the TCS who engaged in the unhealthy behavior of interest had significantly higher levels of depressive symptoms compared with survivors who engaged in the healthy behavior of interest, controlling for demographic and medical data. Separate one-way ANOVAs were conducted for each behavior of interest (smoking, physical activity, alcohol consumption, daily fruit and vegetable intake, and cancer screening) to determine whether they were significantly associated with level of depressive symptoms. With the exception of the cholesterol screening analysis, all of the ANOVAs controlled for age, race, BMI, educational level, income level, stage of disease, histologic type (seminomatous vs. non-seminomatous), and time since diagnosis. Since patients with a history of hypercholesterolemia would be more likely to engage in cholesterol screening, having been told of high blood cholesterol was added as a covariate for the cholesterol analysis only. Post-hoc contrast tests for significant ANOVA findings used a Tukey's correction.

Results

The demographics of the sample are presented in Table 1. The mean age was 37.2 yrs, and the majority of the sample (87%) were white and 9% were Hispanic. Most of the men (65%) were married, and just over half had completed four years of college or more (51%). Analyses comparing the medical and demographic characteristics of the 162 participants versus the 212 unreachable survivors revealed no differences between the two groups in disease stage ($p=.35$) or histology at time of last contact ($p=.28$). Compared with our participants, unreachable survivors tended to be younger at the time of diagnosis ($p=.002$), non-married ($\chi^2=.003$), non-white ($\chi^2=.002$).

Prevalence of depression

The prevalence of TCS in the sample who scored above the traditional cutoff of 16 on the CES-D was 17.9% ($M=9.4 \pm 9.5$).

Prevalence of health behaviors

Survivors' self-reported practice of health behaviors was low overall. Regarding physical activity, 18% were sedentary, 27.8% had irregular (less than 20 min) activity less than 3X/wk, 38.9% engaged in regular, moderate activity for at least 20 min, 3X/wk or more, and 15% had 20 min or more of regular, vigorous intensity exercise, 3X/wk or more. The prevalence of those who reported eating five or more servings of fruits and vegetables a day was 11%. Forty-five percent reported having their blood cholesterol checked within the past year and 20% had checked it within the last five years. Survivors aged 40 and above who reported having any of three types of cancer screening tests done within the past five years was low (41% for any of the three tests; prevalence of ever performing a home blood stool kit was 26%, sigmoidoscopy, 24%, and colonoscopy, 11%).

Prevalence of risk behaviors

Nineteen percent of the survivors reported current smoking and 20% reported being former smokers. The percentage of participants who reported using alcohol within the past month was 75.6%, while average drinks consumed per occasion was 2.4. Forty-six percent reported at least one problem drinking episode of drinking 5 or more drinks on one occasion in the past month.

Depressive symptoms and health behaviors (see Table 2)

After controlling for the demographics and clinical variables, there were no significant differences in depression between those who *screened for cholesterol* in the past yr versus those who did not.

Depressive symptoms and risk behaviors

After controlling for the demographic and medical variables mentioned previously, *smoking status* (current, former or never smokers) had significantly different levels of depressive symptoms than each other. Post-hoc analysis showed that current smokers had significantly higher levels of depressive symptoms on the CES-D compared with former and never smokers.

Comment

Prevalence of depressive symptoms

Our study found that 17.5% scored above the cutoff on the CES-D, which is much higher than the prevalence reported for U.S. males aged 19–44 in population-based studies 11%¹⁸. Similarly, 21.9% of 83 Japanese TCS who were 1–28 yrs post-treatment scored as depressed on a single 4-point item¹⁹. In contrast, in a large cooperative Norwegian study by Dahl et al., only 9.7% of 1,408 TCS who were 4 to 22 yrs post-treatment scored above the HADS cutoff, and this prevalence was slightly lower than that of their study's community-based control group²⁰. One potential reason for the higher depression level in our sample is that our sample tended to have a higher proportion of nonseminomatous tumor type, which tends to have a more serious prognosis, (67.3%) compared with Dahl et al (50.1%). In turn, a higher proportion of our sample (69% vs 38.5% in the Dahl et al. study) received chemotherapy in addition to surgery, which tends to be more aggressive than protocols without chemotherapy.

Prevalence of health behaviors

Overall, the prevalences of health behaviors in this sample of long-term TCS were low. Regarding physical activity, roughly half of the survivors in our sample were engaging in regular exercise of at least moderate intensity, which is comparable with Thorsen et al.'s analysis of the same previously-mentioned cooperative Norwegian parent study. Thorsen et al. also analyzed data from the same cooperative Norwegian parent study and found that 43% of 1,276 TCS reported engaging in 60–120 min of hard physical activity per week on the average²¹. While this is a much higher prevalence than our prevalence of 15% who engaged in vigorous activity for at least 20 min, 3X/wk, it should be noted that Thorsen et al. employed a single 4-point item to measure LPA whereas our calculations were derived from a structured interview.

Prevalence of Risk behaviors

Nineteen percent of the TCS in the current study reported current smoking, which was similar to the range of 17–18.6% found in van den Belt-Dusebout's study of 2,512 Dutch 5-yr TCS²², but lower than that found in Arai et al.'s study of 83 Japanese TCS, 38.5%¹⁹. The Norwegian studies using the cooperative database also reported higher prevalences of current smoking, 35.1%²³ and 39.1%⁸, depending on the subsample analyzed. The higher educational level in the current study sample may account for the lower smoking rate (51% with at least a bachelor's level vs 19.8% in Thorsen et al.; educational data was unavailable for the Arai et al. and van den Belt-Dusebout et al.'s studies).

It is rare for a study of any type of cancer survivor, let alone TCS, to report alcohol use. The only relevant finding in the TCS literature was reported by Dahl et al. who measured problem drinking with a 4-item AUDIT²⁰. Twenty-two percent scored above the cutoff on the AUDIT. In our study, 46.6% answered affirmatively to our single-item problem drinking measure, i.e. having 5 or more drinks at a time. However, comparison of these two findings is difficult since our study's problem drinking measure used a different time frame.

Depressive symptoms and health behaviors

Contrary to our expectations, none of the health behaviors were associated with depressive symptom levels in our study. Our finding that depression was not related to physical activity level was in direct contrast to Thorsen et al.'s finding that physically active TCS had a 44% lower risk of being classified as depressed compared with inactive TCS⁸. To our knowledge, other studies with TCS have not assessed the relationship between depression with diet, cancer and cholesterol screening. The generalizability of our nonsignificant relationship between depression and cholesterol and colorectal cancer screening may be constrained by the low power of these analyses (n=76 and 47, respectively).

Depressive symptoms and risk behaviors

To our knowledge, the relationships between smoking and alcohol use with depression have not been assessed with other cancer survivors. Therefore, we will relate our current findings to the extant literature where relevant. That smoking status was positively related with depression is consistent with the large epidemiological literature delineating the relationship between various smoking behaviors and negative affect.^{11, 24, 25} However, our negative findings regarding alcohol use and depression is inconsistent with national surveys finding strong comorbid relationships between depressive symptom level and DSM diagnoses²⁶. The lower completion rates for the alcohol measures may have underpowered these analyses.

Limitations

Since the study was cross-sectional, the directionality of the association between depression and smoking could not be determined. Prospective studies are needed to yield etiologic information regarding mood determinants of health behaviors in cancer survivors. Second, the typical demographic profile of patients treated at M. D. Anderson Cancer Center tends to be white, well-educated, and relatively wealthy. It is largely unknown how this compares with population-based demographics of TCS since SEER does not currently collect SES information. However, comparison with SEER indicated similar ethnic breakdowns²⁷. Finally, the number of unreachable eligible survivors was approximately 52%, which was a reflection of the young age group of the sample. Our success rate in reaching TCS who were 2 to 10 yrs post-treatment is typical of the follow-up literature in testis cancer. For example, Huddart et al. successfully contacted 680 of 1363 testis cancer patients (49.9%) known to be alive at follow up 5 yrs post-treatment.³

Conclusions

Our study presents prevalence estimates for health behaviors rarely reported in the cancer survivor literature, including cholesterol screening, colorectal cancer screening, and alcohol use. These health behaviors were collected by a trained interviewer using valid items from the BRFSS to measure several parameters for most of the health behaviors: e.g. for physical activity, frequency, intensity and duration were calculated for each type of activity. Given TCS' heightened risks for cardiovascular morbidities and recurrent disease, the rates of healthy behaviors in our sample were alarmingly low. Physicians should encourage preventive health behaviors and be vigilant for signs of depression in testis cancer survivors. In our sample, nearly one in five TCS had a clinically significant level of depressive symptoms. While the CES-D is not a casefinding proxy for treatable depressive episodes, it is nonetheless a significant indicator of distress warranting further follow-up.

Our study directly addresses two research areas targeted by the November 2005 IOM report on cancer survivors, prevention and psychosocial concerns (specifically in this study the problem of depressive symptoms)²⁸. In our study, depression was not a key variable associated with health behaviors, with the exception of smoking. The lack of relationship between depression and various health behaviors provides an important contribution to the growing literature examining the complex, independent, and predictive role that depression plays in cardiovascular endpoints in community and cancer samples.^{29, 30}

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Table 1

Demographics

Characteristic	Mean	Std. Dev.	Frequency	%
Time since Treatment (yrs)	4.5	1.6	Range= 2.2 to 9.6 yrs	
Seminomatous			53	33
Nonseminomatous			109	67
Stage at diagnosis				
I			50	31
II A/B/C			58	36
III			15	9
Type of Treatment				
Surgery only			2	1
Surgery and radiation			38	29
Surgery and chemo			80	61
Surgery, radiation, and chemo			11	8
Age (yrs) of Participants	37.2	9.0	Range =20 to 59 yrs	
Age of Participants At Time of Dx	32.1	8.6		
Age of Unreachable Survivors at Time of Diagnosis	29.2	8.6		
Age (years)				
20's			35	22
30's			65	40
40's			46	28
50's			14	9
Race of Participants				
White			141	87
African-American			2	1
Asian/Pacific Islander			1	.6
American Indian/Alaska Native			3	2
Hispanic			15	9
Other			0	0
Race of Unreachable Survivors				
White			158	74
African-American			5	2.6
Other			1	0
Spanish Surname			46	23.1
Missing			2	
Education				
Some high school (grades 9–11)			8	5
Grade 12 or GED			25	15
Some college (1–3 yrs)			46	28
College and above (4 yrs or more)			83	51
Household Income				
\$15,000 annually or less			9	6
\$16,000 to \$24,000 annually			18	11

Characteristic	Mean	Std. Dev.	Frequency	%
\$25,000 to \$34,000 annually			18	11
\$35,000 to \$49,000 annually			17	11
\$50,000 to \$74,000 annually			29	18
\$75,000 or more annually			67	41
Marital status				
Married or living with partner			92	65
Not married or living with a partner			49	35
Missing			1	1
Unreachable Survivors				
Married or living with partner			95	50
Not married or living with a partner			94	50
Work Status				
Employed for wages			123	76
Student			9	6
Out of work			7	5
Retired/Stay at home			3	2
Unable to work			2	1

Table 2
ANOVA results regressing health behaviors onto depressive symptom scores*

Behavior	N	Behavior Categories	Adjusted Mean for Depression Level*	Standard Error	P value
Physical activity levels	119				
	20	Physically inactive	10.7	2.1	.85
	33	Irregular activity	9.9	1.6	
	47	Regular activity	8.6	1.3	
	19	Regular vigorous activity	9.2	2.2	
≤ 5 Fruits and Veg/Day	119				
	105	Less than 5 a day	9.9	.9	.09
	14	5 or more per day	5.2	2.6	
Drank 5+drinks/past mth	90				
	48	Zero times past mth	8.5	1.3	.23
	18	1 time past mth	12.4	2.1	
	24	2 + times past mth	7.7	1.8	
Average number of drinks/past mth	119				
	29	0 drinks	8.5	1.8	.12
	11	1 drink	3.5	2.8	
	35	2 drinks	10.9	1.6	
	44	3 or more	10.3	1.4	
Average number of drinking occasions/past mth	90				
	48	0 times past mth	8.6	1.3	.75
	36	1–5 occasions past mth	9.3	1.5	
	6	5 or more occasions past mth	11.5	3.9	
Cancer Screening (Blood Stool test, sigmoidoscopy or colonoscopy)	47				
	27	Ever performed	9.8	2.1	.82
	20	Never performed	9.1	1.8	
Checking Blood Cholesterol	76				
	54	Within the past 12 months	10.9	1.2	.07
	22	Never or more than 1 yr	4.9	1.9	
Smoker	119				

Behavior	N	Behavior Categories	Adjusted Mean for Depression Level*	Standard Error	P value
	23	Current	15.2	2.0	.005**
	24	Former	6.2	1.9	
	72	Never	8.7	1.1	

*

After controlling for age, race, education, income, working status, type of malignancy, BMI, stage at diagnosis, and time since diagnosis

**

Significant at $p < .01$ level. Tukey's post-hoc indicated current smokers were significantly different from former and from never smokers. Former and Never smokers were not significantly different.