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Original article

Unemployment risk and income change after testicular cancer diagnosis: A population-based study

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Abstract

Background: Among patients with cancer, returning to full working may serve as an indicator for return to normal lifestyle following illness, as opposed to unemployment or shifting to part-time work. The aim of the project was to clarify the association between unemployment risk and decreased income at 4 years after the diagnosis of testicular cancer (TC).

Participants and methods: A case control in a cohort study includes baseline measurement of people participating in the Israeli Central Bureau of Statistics 1995 National Census, and follow-up until 2011. Cancer incidence, employment status, and income level were ascertained through the Israel Cancer Registry and Tax Authority, respectively. A matched group was sampled from the population in the census. Binary logistic regression analyses were used to assess odds ratios (ORs) for study's outcomes, while controlling for age, ethnicity, education, and socioeconomic and employment status at 2 years before diagnosis.

Results: A total of 113 cases of TC and 468 persons in the matched group were included in the study after excluding persons who died during the study period. No association was found between TC and subsequent risk after the 4 years of unemployment (OR = 1.12, 95% CI: 0.65–1.95) or decreased income (OR = 1.41, 95% CI: 0.84–2.36). Predictors of subsequent unemployment were unemployment 2 years before diagnosis (OR = 6.91, 95% CI: 4.39–10.86) and increasing age (OR = 1.03 per year, 95% CI: 1.01–1.06).

Conclusion: TC survivorship is not associated with subsequent unemployment or decreased income at 4 years after diagnosis.

Keywords: Testicular cancer; Survivors; Unemployment; Population-based study

1. Background

Testicular cancer (TC) is the most common malignancy in developed countries among young men aged 15 to 35 years [1]. During the previous decades, an increase in TC incidence has been reported for unknown reasons [1–3]. A similar picture of TC's epidemiology has been reported in Israel [1]. So far, the prognosis of TC has improved substantially over the last 3 decades [4]. This improvement is mainly attributed to the introduction of cisplatin-based chemotherapy in the late 1970s [5]. As a result, the current cure rate exceeds 95% [2,5] and near-normal life expectancy is achieved [5] with similar overall quality of life and minor, if any, differences between survivors and norms in most of the physical domains [6]. In contrast,

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social function and vitality remained lower in long-term survivors [6].

Participation in normal work activities is one of the indicators for a sense of normality, improving quality of life, and it is considered as being helpful in coping with the cancer experiences [7]. On the contrary, unemployment or a delay in returning to work could affect salary, health and welfare, the family budget, and the relationships at work places [8,9]. A meta-analysis [10] found that cancer survivors are more likely to be unemployed than healthy control participants (33.8% vs. 15.2%, relative risk [RR] = 1.37; 95% CI: 1.21–1.55). Factors associated with unemployment include education and background employment [10,11]. However, the risk of unemployment among cancer survivors disappeared after adjustment for diagnosis, age, and background unemployment rates [10].

TC survivors are unique compared with other cancer survivors because of their lower age, which may impair higher education studies and entrance to work. Therefore, this group might need special attention regarding the transition to the labor market. A previous study among 380 TC survivors from North Europe did not find a difference in work ability, 1 to 8 years after cancer diagnosis, between the TC survivors and the reference group [12]. Another study from north Europe did not find differences in the risk of unemployment among TC survivors 2 to 3 years after diagnosis compared to their referents [11]. In a meta-analysis that included 3 studies focused on TC survivors, unemployments among TC survivors and healthy control participants were similar (pooled RR = 0.94, 95% CI: 0.74–1.20) [10]. However, 2 of the 3 studies included Scandinavian countries and only 1 study that included 71 TC survivors was conducted in France [13]. Yet, none of these studies were adjusted for potential confounders, and subgroup analyses according to age groups were not performed. Furthermore, the lack of association in these studies does not exclude the possibility of shifting to part-time work rather than for full return for work. In this situation, income decrease may be a marker for a shifting to part-time work.

Thus, the aim of the project was to clarify the association between unemployment risk and income change 4 years after diagnosis of TC in a case control in a cohort study after controlling for demographic, socioeconomic, and employment status 2 years before TC diagnosis. Using a large national database allows us to adjust the results for potential confounders and mitigating selection and information biases.

2. Material and methods

2.1. Study population

A case control in a cohort study includes baseline measurement from the Israeli Central Bureau of Statistics 1995 census [14]. The study frame includes a representative sample of the whole population that completed a comprehensive interview (1,113,420 persons, which represents 20% of the entire population in Israel).

2.2. Cancer diagnosis and mortality

Data on cancer incidence was ascertained using the Israel National Cancer Registry updated to 2011. The Israel Cancer Registry was established in 1960 and has been notified of cancer incidence by law since 1982. Completeness of the registry was found to be approximately 95% for solid tumors [15]. Patients who were diagnosed with TC and up to age of 60 years at the time of interview were included in the current study.

The matched group included a 4:1 ratio based on age and ethnicity (Jewish vs. non-Jewish), and it was sampled from the population in the census who completed the comprehensive interview. The stratification according to ethnicity was included owing to lower socioeconomic status and more negative health outcomes of the non-Jewish community compared with the Jewish population [16]. For each person in the match group, a single patient with TC was matched. Employment status and income data were defined for each person (patient with TC or healthy control participant at the same year of his match patient with cancer), 2 years before diagnosis and 4 years after diagnosis. Mortality was determined using the Israel Population Registry, Central Bureau of Statistics—Cause of Death File. Patients with TC and healthy control participants who died during the study period were excluded.

2.3. Study variable

Variables assessed in relation to unemployment risk after diagnosis included TC, age (at the time of cancer diagnosis or in the case of healthy control participant from the match group, at the time of matched diagnosis of the patient with cancer), ethnicity (Jewish vs. non-Jewish), years of education at 1995 (continuous variable), residential socioeconomic position (based on the town/city of residence, according to a national classification of 20 clusters by geographical units) [17], and status of employment at baseline (dichotomy variable). Nonspecific symptoms that appear in the year before cancer diagnosis may increase the risk of unemployment. Thus, employment status at baseline was defined 2 years before diagnosis by linking with the Israeli Tax Authority database. The data were derived from individuals' tax returns filed with the Tax Authority.

2.4. Study outcome

Employment status 4 years after cancer diagnosis and decrease in income (dichotomous variables) were defined as the study's outcomes. Annual income based on the tax