Are Fatigue, Anxiety and Depression Associated with the Occurrence of Infections in Cancer Patients?

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INTRODUCTION

- Studies have found that fatigue, anxiety, and depression are significantly associated with altered immune functioning in cancer patients. However, mixed results have been obtained on the role of psychological factors on cancer prognosis.
- It has been suggested that a more appropriate outcome measure in psychoneuroimmunological studies of cancer patients would be the occurrence of infections;
- Infections are highly frequent in patients undergoing cancer treatments and cause significant morbidity and mortality;
- The relationship of fatigue, anxiety and depression, with the occurrence of infections has yet to be investigated in cancer patients.

STUDY GOAL

To evaluate the role of fatigue, anxiety, and depression in predicting the occurrence of infectious episodes and symptoms in cancer patients during their treatment trajectory.

METHODS

Participants

Inclusion criteria

- to have received a confirmation for a first diagnosis of non-metastatic cancer;
- to be scheduled to receive a curative surgery;
- to be aged between 18 and 80 years old;
- to be able to read and understand French.

Exclusion criteria

- to have received a neoadjuvant treatment for cancer;
- to have severe cognitive impairments (e.g., Alzheimer's disease) or a severe psychiatric disorder (e.g., psychosis, bipolar disorder) as noted in the medical chart, observed at recruitment, or reported by the patient;
- to have received a diagnosis for a sleep disorder other than insomnia (e.g., obstructive sleep apnea, periodic limb movements);
- to have severe visual, hearing or language defects impairing their capacity to complete the measures.

3196 patients were solicited to take part in this study

- 1677 patients were eligible (52.5% of solicited patients)
- 962 of them agreed to participate (57.4% of eligible patients)

Table 1. Participants' demographic and clinical characteristics at baseline (N = 962)

Variables		*M (SD)*	*%*
Age (years; range: 23-79)		57.0 (9.9)	
Gender	Male		35.6
	Female		64.4
Cancer Site	Breast		48.3
	Prostate		27.3
	Gynaecological		11.5
	Urinary and gastro-intestinal		7.2
	Head and neck		2.3
	Other		3.4
Time since cancer diagnosis (months; range: 0-17)		2.2 (1.9)	
Adjuvant treatments received*			
	Radiation therapy		51.2
	Hormone therapy		38.5
	Chemotherapy		30.6

**The total exceeds 100% because some patients received more than one adjuvant treatment.*

Procedure

As part of a larger longitudinal study:

- Potential participants were recruited at L'Hôtel-Dieu de Québec and l'Hôpital du St-Sacrement, Québec, Canada.
- A research assistant met patients and explained the study goals and procedures.
- Patients agreeing to participate were asked to provide their written consent.
- Patients received a battery of self-report scales and were asked to complete it within two weeks and to return it by mail. After receiving the battery, patients were also asked to complete a telephone interview at six time points:

Study Design

Measures

The battery included:

- the *Hospital Anxiety and Depression Scale* (HADS; Zigmond and Snaith, 1983), assessing:
  - anxiety (HADS-A)
  - depression (HADS-D)
- the *Multidimensional Fatigue Inventory* (MFI; Smets et al., 1995).

The interview included:

- the *Structured Interview for the Assessment of Infectious Illness Symptoms* (SIAIIS; Orts, et al., 1995) assessing:
  - the presence of infectious illnesses (episodes, symptoms, severity).

Statistical Analyses

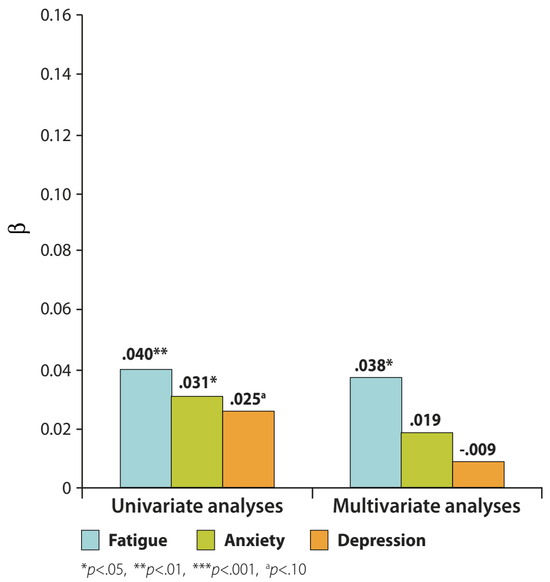
- Linear mixed model regression analyses (univariate and multivariate), controlling for time and patient effects, were performed for all time points.

RESULTS

Table 2. Descriptive data on study variables

Variables	*M (SD)*	*%*
Infections (SIAIIS)		
(symptoms; range: 0-27)	1.3 (2.0)	
(episodes; range: 0-6)	0.5 (0.8)	
0 episode		60.4
1 episode		29.1
2 episodes		7.6
Fatigue (MFI)		
(range = 0-3.9)	1.4 (0.6)	
Anxiety (HADS-A)		
(range = 0-21)	5.7 (3.9)	
Depression (HADS-D)		
(range = 0-18)	2.9 (3.1)	

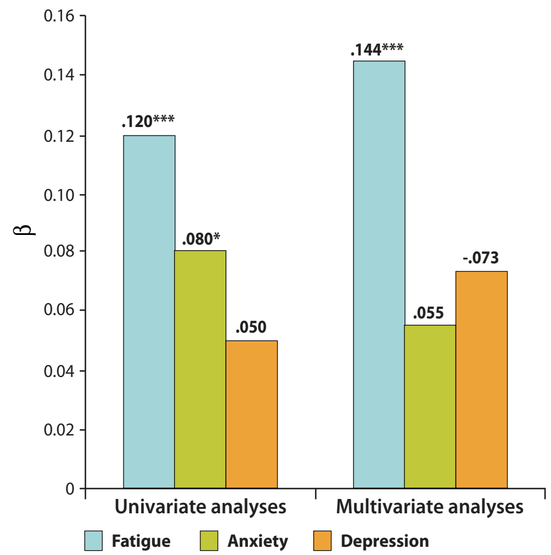
Figure 1. Contribution of fatigue, anxiety, and depression in predicting the occurrence of infectious episodes



**p<.05, **p<.01, ***p<.001, ªp<.10*

- **Univariate analyses** revealed that increased **fatigue** and **anxiety** levels were significant predictors of a greater number of infectious episodes (β = 0.040, *t* (3687) = 2.89, *p* = .004; β = 0.031, *t* (3687) = 2.18, *p* = .03).
- **Multivariate analyses** revealed that only increased **fatigue** levels remained a significant predictor of a greater number of infectious episodes when taking the influence of the other two factors into account (β = 0.038, *t* (3686) = 2.07, *p* = .04).

Figure 2. Contribution of fatigue, anxiety, and depression in predicting the occurrence of infectious symptoms



**p<.05, **p<.01, ***p<.001, ªp<.10*

- **Univariate analyses** revealed that increased **fatigue** and **anxiety** levels were significant predictors of a greater number of infectious symptoms (β = 0.120, *t* (3688) = 3.71, *p* = .0002; β = 0.080, *t* (3688) = 2.41, *p* = .02).
- **Multivariate analyses** revealed that only increased **fatigue** levels remained a significant predictor of a greater number of infectious symptoms when taking the influence of the other two factors into account (β = 0.144, *t* (3686) = 3.32, *p* = .0009).

CONCLUSION

- These results suggest that fatigue and anxiety, but not depression, are associated with the development of infectious episodes and infectious symptoms during the cancer care trajectory;
- The fact that only fatigue remained significant in multivariate analyses suggests the presence of a shared variance between fatigue and anxiety, but that fatigue is the most strongly associated with infections;
- Further research is needed to determine whether there is a causal relationship between fatigue and infections, and in which direction. Indeed, it may be that fatigue leads to an increased vulnerability for infections but the reverse relationship is also possible through activation of pro-inflammatory cytokines.