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Title:

Physical Activity and Perceived Fatigue in Men Receiving External Beam Radiation Therapy for Prostate Cancer

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ACCEPTED

Session Title:

Rising Stars of Research and Scholarship Invited Student Posters

Slot:

RS PST1: Sunday, 17 November 2019: 11:45 AM-12:15 PM

Applicable Category:

Students, Researchers

Keywords:

activity, fatigue and prostate cancer

References:

American Cancer Society (2017). What are the key statistics about prostate cancer. Retrieved from http://www.cancer.org/cancer/prostatecancer/detailedguide/prostate-cancer-key-statistics

Cashion, A. K., Gill, J., Hawes, R., Henderson, W. A., & Saligan, L. (2016). National Institutes of Health symptom science model sheds light on patient symptoms. *Nursing Outlook,* 64(5), 499-506. doi:10.1016/j.outlook.2016.05.008

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Minton, O., Berger, A., Barsevick, A., Cramp, F., Goedendorp, M., Mitchell, S. A., & Stone, P. C. (2013). Cancer-related fatigue and its impact on functioning. *Cancer, 119*, 2124-2130. doi:10.1002/cncr.28058

Renner, M., Feng, R., Springer, D., Chen, M., Ntamack, A., Espina, A., & Saligan, L. N. (2016). A murine model of peripheral irradiation-induced fatigue. *Behavioural Brain Research, 307*, 218. doi:10.1016/j.bbr.2016.03.035

Abstract Summary:

Fatigue is reported to be the most distressing side effect of radiation therapy (RT), negatively effecting physical function and quality of life. This study explores the relationship of fatigue with free living activity measured through accelerometry which has been largely unexplored in men receiving radiation therapy for prostate cancer.

Content Outline:

1. Introduction
2. Fatigue is a distressing symptom reported during EBRT for prostate cancer
3. The relationship of fatigue and objectively measured activity has been largely unexplored
4. Body
5. Fatigue is a complex symptom with multifactorial causes and related symptoms
6. Fatigue may be related to treatment or cancer itself
7. *a) Fatigue worsens over time during EBRT for prostate cancer*
8. *b) Fatigue may be related to anemia, sleep and depressive symptoms among others*
9. Activity level prior to and during therapy may demonstrate a relationship with fatigue
10. *a) Free living activity measured objectively with accelerometry and validated fatigue scales have seldom been used together in this population*
11. *b) Activity may be found to mitigate or worsen fatigue at the various observed time points, allowing for prediction of and intervention for men more likely to become fatigued _*
12. Specific Aims/Research Questions
13. a) *Explore the adjusted relationship between physical activity count and perceived fatigue scores in men with non-metastatic prostate cancer receiving external beam radiation therapy at baseline, midpoint of therapy and at conclusion of therapy.*

14. *b) Is there a relationship between baseline activity and fatigue at midpoint of therapy, conclusion of therapy and six months post-therapy?*
15. Theoretical Framework
16. NIH Symptom Science Model
17. *a) Complex symptoms like fatigue are classified into phenotypes*
18. *b) Activity as potential piece of fatigue phenotype*
19. Methods
20. Statistical analysis
21. a) Pearson's correlation
22. b) Linear regression
23. fatigue and physical activity count as the dependent and independent variables
24. controlling for baseline fatigue and activity, age, BMI, anemia, sleep

III. Conclusion

1. Results will be available for this dissertation study at the time of presentation

Topic Selection:

Rising Stars of Research and Scholarship Invited Student Posters (25201)

Abstract Text:

Study Purpose

To explore the adjusted relationship between physical activity count and perceived fatigue scores in men with non-metastatic prostate cancer receiving external beam radiation therapy at beginning, mid-point and end of therapy.

Background/Significance

Prostate cancer is the second most common cancer and is the third leading cause of death in men in the United States, however 2.9 million men diagnosed with prostate cancer are alive today with a 15-year survival rate of 96% (American Cancer Society, 2017). Given the rate of survival and substantial number of men living with prostate cancer, addressing symptoms and quality of life in these men is increasingly important.

Fatigue is reported to be the most distressing side effect of radiation therapy (RT), negatively effecting physical function and quality of life (Minton et al., 2013). Fatigue may be related to both cancer itself and treatment; observed to worsen over time during external beam radiation therapy (EBRT) (Hsiao, Wang, Kaushal, Chen, & Saligan, 2014). Finding measures to predict, treat and help prevent fatigue can improve long term outcomes in cancer treatment. Developing an accurate phenotype of fatigue based

on an understanding of how it changes over time and how those changes relate to physical activity are key in this effort.

This study aims to improve scientific knowledge in cancer related fatigue by providing insight into free living activity measured through accelerometry, a key piece of the symptom which has been largely unexplored in men receiving radiation therapy for prostate cancer.

Accelerometry and fatigue scales have seldom been used together in this population. A relationship between activity and fatigue may be established. Activity may be found to mitigate or worsen fatigue at the various observed time points, allowing for prediction of and intervention for men more likely to become fatigued.

Specific Aims/Research Questions

Explore the adjusted relationship between physical activity count and perceived fatigue scores in men with non-metastatic prostate cancer receiving external beam radiation therapy at baseline, midpoint of therapy and at conclusion of therapy.

Is there a relationship between baseline activity and fatigue at midpoint of therapy, conclusion of therapy and six months post-therapy?

Theoretical Framework

The National Institutes of Health Symptom Science Model (NIH SSM) is the theoretical framework for this study. The model arose from the work of the Division of Intramural Research of the National Institutes for Nursing Research where early connections were being made between symptoms, symptom clusters and emerging “omics” methods of biomarker discovery. The basic premise of the NIH Symptom Science Model is that complex symptoms can be classified into various phenotypes, which then have associated biomarkers which can lead to clinical applications. The model is represented as a circle, rather than linear to demonstrate continued discovery in each interconnected area (Cashion, Gill, Hawes, Henderson and Saligan, 2016). This study will contribute to the connection between symptoms and phenotype of cancer related fatigue.

Methods

An observational, correlational study will be utilized to examine the relationship between physical activity level and perceived fatigue at three time points, baseline (prior to EBRT), midpoint (Day 19-21) and post-therapy (Day 38-42).

This study will assess free living physical activity, measured with an accelerometer and through daily logs and perceived fatigue, measured with the Functional Assessment of Cancer Therapy-Fatigue FACT-F at the beginning, midpoint and conclusion of EBRT in men with prostate cancer.

The study is carried out at the National Institute for Nursing Research (NINR). Data was collected by the NINR team at the Hatfield Clinical Research Center of the National Institutes of Health (NIH), National Institute for Nursing Research (NINR). Data was gathered from study databases, participant records and the NIH Clinical Center medical record. Accelerometry data was retrieved from the secure NINR server. Accelerometry data was inspected and cleaned by the investigator. This process includes determining amount of time device was worn, locating and removing periods of non-wear, assessing for erroneous

values and determining activity counts (Deere et al., 2016). Activity counts were calculated for the entire wear period and for the hours of 2:00pm-6:00pm, a time period shown to have significant radiation induced fatigue in an animal model (Renner et al., 2016).

Variables were collected as follows:

Variables measured at baseline:	
Demographics/Clinical Characteristics	**Measurement**
Age	Years
Weight	Kg
Height	Cm
Race	White, African American, Asian, Hispanic
BMI	Kg/m^2
Gleason Score	2-10 (extracted from medical record based on scoring by pathologist)
Androgen deprivation therapy	Yes/No
History of prostatectomy	Yes/No
Hemoglobin	g/dl
Hamilton Depression Rating Scale (HAM-D)	0-23
PROMIS-SD	T score

Variables measured at Various Time Points		
Variable	**How measured**	**When measured**

Physical activity counts: Total and 2:00 pm-6:00 pm	Accelerometer- Total counts per day for four consecutive days/total hours (continuous variable)	Baseline (prior to EBRT) Midpoint of EBRT Conclusion of EBRT
Fatigue Score	FACT- fatigue subscale	Baseline (prior to EBRT) Midpoint of EBRT Conclusion of EBRT 6 months post-therapy
Sleep Score	PROMIS-SD	Baseline (prior to EBRT) Midpoint of EBRT Conclusion of EBRT
Hemoglobin	g/dl	Baseline (prior to EBRT) Midpoint of EBRT Conclusion of EBRT

Data Analysis

Statistical analysis will be conducted to determine correlations between physical activity count and fatigue scores. Pearson's correlation will be conducted with each variable (fatigue score, activity count, age, BMI, hemoglobin level and age) at the three time points. Linear regression analysis will investigate if there is a relationship between perceived fatigue scores and activity counts at the three time points, while adjusting for baseline score. Other variables used in regression analysis will include age, BMI, hemoglobin and sleep score, all continuous variables. Linear regression analysis will be utilized with fatigue and physical activity count as the dependent and independent variables, controlling for baseline fatigue and activity, age, BMI, anemia and sleep as potential confounding variables

Results

Results of this dissertation study will be presented at the Sigma 45th Biennial Convention in Washington, DC.