A SECONDARY DATA ANALYSIS ON THE RELATIONSHIP BETWEEN BREAST CANCER SURVIVORS' SYMPTOMS AND PHYSICAL ACTIVITY LEVELS MEASURED BY FITBIT (STEPS/DAY)

by

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Abstract

Survival rates for breast cancer have increased significantly in recent years. Although more patients are surviving now, these women still experience many symptom clusters years post-treatment. One such cluster includes fatigue, sleep disturbances, and pain. In order to better manage this symptom cluster (fatigue, sleep disturbances, and pain), additional research is needed. Additionally, little is known about the relationship of physical activity levels and symptoms among breast cancer survivors (BCS). However, race and age may explain some of the variation in symptoms and activity levels. Further, excess body mass index (BMI) may impact the overall health of BCS and can be mediated by increased physical activity.

This secondary data analysis aims 1) to describe the usual physical activity (steps/day via FITBIT®) of BCS, 2) to explore a correlation between physical activity levels and BMI of BCS, 3) to identify differences in physical activity levels by race of BCS and 4) to examine relationships between physical activity and symptoms of BCS.

A convenience sample of 39 BCS were recruited from an outpatient cancer center. The subjects completed multiple survey instruments, included were the Patient-Reported Outcome Measurement Information System (PROMIS) Pain Intensity, Pain Interference Short Form 6a, Sleep Disturbance Short Form 6a, Emotional Distress-Anxiety Short Form 6a, and the Piper Cancer Fatigue Scale SF-12. The subjects wore a FITBIT ® for seven days. The sample consisted of patients with an average age of 59 years old (Range = 41-73) and approximately half black (19) and white (19), with one identified as “other”. The majority of participants also underwent both chemotherapy and radiation (29). Further relationships will be examined as data is analyzed. The results of this data analysis and the relationships found will aid in establishing the best patient care and providing the best quality of life for BCS.

Introduction

Most previous research studies found improvement in symptoms with increased physical activity. Dennett, Peiris, Shields, Prendergast and Taylor (2016) found that increased physical activity was a very effective intervention to reduce cancer-related fatigue. Other researchers have studied the relationship between physical activity and the symptoms of pain and sleep disturbances. Peppone, Janelsins, Kamen, et al. (2015) found that physical activity, in the form of yoga, led to a significant reduction in physical discomfort and pain. Increased physical activity also has a direct link to decreased BMIs (Bradbury, Guo, Cairns, Armstrong, & Key, 2017). Patients who are overweight (25<BMI<29.9) or obese (BMI >30) have higher levels of recurrence and mortality from breast cancer (Fazzino, Sporn, & Befort, 2016). African American BCS are 70% more likely to be obese than their European American counterparts (Ogden, Carroll, Kit, & Flegal, 2012). For a sample of breast cancer survivors, an exercise intervention reduced sleep disturbances (Rogers et al., 2014). An exercise-focused oncological rehabilitation program for cancer survivors resulted in lower levels of anxiety (Dittus, et al., 2015).

Since these symptoms (pain, fatigue, anxiety, and sleep disturbances) are highly correlated (Schreier et al., 2018); it is reasonable to assume that increased physical activity is associated with improvements in this symptom cluster. If increased physical activity is shown to significantly reduce this symptom cluster, then nurses could use this evidence to encourage and support breast cancer survivors to increase their physical activity post-treatment.

Many studies have begun to establish this potential connection between increased physical activity and decreased symptoms; but, no conclusive evidence has emerged yet. It is difficult to make conclusions about this relationship because there is little consistency in the type of physical activity interventions, the measurements of effectiveness, and the widely varying sample groups.

Materials/Methods

Many different data collection tools were utilized, included were the Patient-Reported Outcome Measurement Information System (PROMIS) Pain Intensity, Pain Interference Short Form 6a, Sleep Disturbance Short Form 6a, Emotional Distress-Anxiety Short Form 6a, and the Piper Cancer Fatigue Scale SF-12. The subjects also wore a FITBIT ® for seven days. The FITBITs measured the subject's steps taken per day. Using the data received from these survey instruments, the FITBIT data, and demographic data, many analyses were completed using IBM SPSS version 26. Two in particular were the basis of the analysis: T-tests and correlational examinations. T-tests are key in confirming if there is a significant difference between two variables. Correlational examinations are key in confirming if there is a significant relationship between two variables. A key correlation that was examined was BMI and steps/day. Correlations also were examined looking for racial differences.

Results

The demographic and clinical characteristics of the BCS in this study are outlined in Table 1. This sample was composed of 39 participants. Their average age was 59 years old. The majority of the sample had been diagnosed with Stage II breast cancer. Both radiation and chemotherapy were used as the initial treatment for over half of the sample. The most common surgery type was a lumpectomy or partial mastectomy, as compared to single or double mastectomies.

The reported average steps per day (via FITBIT®) of 37 BCS was 4,100 steps. There were no significant differences between Black and White participants in steps per day. There was also no correlation between physical activity (steps/day via FITBIT®) and BMI of BCS. The average BMI of the sample was 33.66. Of the 37 BCS who reported their steps/day, there were 20 BSC who were White and 17 BCS who were Black. The White BCS averaged 4033 steps/day. The Black BCS averaged 4180 steps/day. This difference between groups was not significantly different. There was also no significant relationship between physical activity (steps/day) and the symptoms of anxiety, sleep disturbance, pain intensity, or pain interference in this sample.

There were however additional significant findings that were unexpected. There were significant differences between Blacks and Whites in pain. Table 2 shows Blacks reporting significantly higher pain intensity and pain interference levels. There was also a significant negative correlation between average steps per day and the Fatigue Sensory Subscale Score ($r = -.322$) shown in Table 3. There were significant positive correlations between fatigue scores and both pain interference ($r = .637$) and sleep disturbances ($r = .482$) as shown in Table 3.

Table 1

Demographic and Clinical Characteristics of Participants (N=39)

Characteristic	N	%
Age		
35-50	12.8	
51-60	43.6	
61-79	43.6	
Race		
White	51.3	
Black	46.2	
Other	2.6	
BC Stage		
I	23.1	
II	43.6	
III	17.9	
IV	15.4	
Initial Treatment		
Radiation	15.4	
Chemotherapy	10.3	
Radiation & Chemotherapy	74.4	
Surgery Type		
Single Mastectomy	23.1	
Double Mastectomy	15.4	
Lumpectomy or Partial Mastectomy	56.4	
Current Hormone Therapy		
Yes	56.4	
No	43.6	

Table 2

Means, Standard Deviations and Range for Pain, Anxiety, Sleep Disturbance and Fatigue (N=40)

Symptom	White N=20 Mean(SD)	Black N=18 Mean(SD)	Total N=38 Mean(SD)
Pain Intensity	43.52(6.09)	50.48(9.33)	46.80(8.34)
Pain Interference	54.32(7.16)	60.01(6.57)	57.0(7.27)
Anxiety	55.45(8.84)	56.38(8.62)	55.6(8.7)
Sleep Disturbance	55.91(8.26)	53.38(9.47)	54.64(8.71)
Piper Fatigue Total Score	4.48(2.16)	4.91(2.45)	4.72(2.26)
Piper Fatigue Cognitive Subscale	3.37(2.94)	3.52(2.69)	3.49(2.77)
Piper Fatigue Affective Subscale	5.08(2.83)	5.39(3.11)	5.24(2.89)
Piper Fatigue Sensory Subscale	5.13(2.02)	5.56(2.26)	5.36(2.1)
Piper Fatigue Behavioral Subscale	4.32(2.65)	5.19(3.13)	4.79(2.87)

Table 3

Correlations of Symptoms and Average Steps per Day in a Sample of BCS (N=39)

Variable	1	2	3	4	5	6	7	8	9	10
1. Pain Intensity	--									
2. Pain Interference	.519**	--								
3. Sleep Disturbance	.018	.220	--							
4. Anxiety	.155	.219	.166	--						
5. Piper Total Fatigue	.178	.637**	.482**	.190	--					
6. Piper Cognitive Fatigue subscale	.115	.487**	.558**	.230	.809**	--				
7. Piper Sensory Fatigue subscale	.378*	.442**	.273	-.004	.789**	.519**	--			
8. Piper Affective Fatigue subscale	.044	.517**	.475**	.191	.909**	.644**	.629**	--		
9. Piper Behavioral Fatigue subscale	.129	.695**	.304	.186	.879**	.556**	.620**	.776**	--	
10. Average Steps per Day	-.079	-.188	-.204	.038	-.202	-.096	-.322*	-.151	-.156	--

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Discussion

This study had 4 aims. First, it aimed to describe the usual physical activity of BCS through their steps/day. There was a low average steps per day (via FITBIT®) of 4,100. This is much lower than the generic recommendation of 10,000 steps per day for the average person (Tudor-Locke & Bassett, 2004) and lower than the expected value of breast cancer survivors' steps per day, 7409 steps per day (Tudor-Locke, Washington, & Hart, 2009). This could be due to an increased BMI or increased pain and fatigue levels in this sample.

The next aim was to explore a correlation between physical activity levels and BMI of the BCS. There was no correlation. The third aim was to identify differences in physical activity levels by race of BCS. There was a very minor difference in steps that was not significant. The last aim was to examine the relationship between physical activity and symptoms of the BCS. There was also no significant relationship between physical activity (steps/day) and the symptoms of anxiety, sleep disturbance, pain intensity, or pain interference in this sample - Lahart, Metsios, Nevill, & Carmichael (2014) came to this same conclusion. One potential cause for the lack of significant relationships is that the sample had a high BMI and a low physical activity level – therefore, leading to less steps per day (via FITBIT®).

However, there were significant findings that were unexpected. Blacks and Whites had significant differences in their reported levels of both pain intensity and pain interference. Black BCS average pain intensity was 50.48 and White BCS was 43.52 as seen in Table 2. Black BCS average pain interference was 60.01 and White BCS was 54.32 as seen in Table 2. This can be due to a multitude of reasons. One potential reason was examined by Hoffman, Trawalter, Axt, & Oliver (2016). They found that Blacks are typically undertreated for their pain in relation to Whites.

Another significant relationship found was a negative correlation between average steps per day and the Fatigue Sensory Subscale Score (r = -.322) shown in Table 3. A similar finding of a negative relationship between fatigue and physical activity was also found by Zimmer, et al. (2017). This is logical because if they are feeling tired, weak, or sleepy, they would not be getting a lot of steps per day. There were also significant positive correlations between fatigue scores and both pain interference (r = .637) and sleep disturbances (r = .482) as shown in Table 3. Bower, et al. (2000) found a similar result in their classic study.

Conclusion

The majority of results found are concurrent with related literature. There was no clear relationship found between increased physical activity and decreased symptoms. There was however higher pain intensity and pain interference recorded in Black BCS vs White BCS. Other significant findings were a negative correlation between average steps per day and the Fatigue Sensory Subscale Score (r = -.322). A positive correlation was found between fatigue scores and both pain interference (r = .637) and sleep disturbances (r = .482). Some limitations of this study were that the BCS were recruited from the same clinic, they all live in a rural area, and it was a small sample size. In conclusion, BCS all have unique symptom experiences. Future research should focus on the cause of higher reported pain in Black BCS and relationships related to the symptom cluster of pain, sleep disturbance, anxiety, and fatigue.

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