2012

Current Exercise Behaviors of Breast Cancer Patients Diagnosed with Chemotherapy-Induced Peripheral Neuropathy

Karen Y. Wonders  
Wright State University

Daniel G. Drury  
Gettysburg College

Follow this and additional works at: https://cupola.gettysburg.edu/healthfac

Part of the Oncology Commons

Share feedback about the accessibility of this item.


This is the publisher's version of the work. This publication appears in Gettysburg College's institutional repository by permission of the copyright owner for personal use, not for redistribution. Cupola permanent link: https://cupola.gettysburg.edu/healthfac/17

This open access article is brought to you by The Cupola: Scholarship at Gettysburg College. It has been accepted for inclusion by an authorized administrator of The Cupola. For more information, please contact cupola@gettysburg.edu.
Current Exercise Behaviors of Breast Cancer Patients Diagnosed with Chemotherapy-Induced Peripheral Neuropathy

Abstract

Introduction: Chemotherapy-induced peripheral neuropathy (CIPN) is a common, dose-limiting effect of cancer therapy. The neuropathic pain associated with CIPN often has negative implications on an individual’s quality of life (QOL) and has long been recognized as one of the more difficult types of pain to treat. Treatment of neuropathic pain due to CIPN often requires a multidisciplinary approach, with much attention focused on the use of pharmacological therapies. However, in most instances, these agents have been shown to have additional negative side effects for cancer patients. Thus, other interventions that address the symptoms of CIPN should be considered. One such possible intervention is exercise rehabilitation, which has previously been reported effective in attenuating numerous cancer treatment-related toxicities and enhancing the QOL of patients. However, to our knowledge, there have been no published clinical trials examining the role of exercise in preserving neurological function following chemotherapy. As such, the purpose of this investigation was to examine the current exercise habits of breast cancer patients who are diagnosed with CIPN and the impact on pain and QOL.

Methods: 300 women listed in the Breast Cancer Registry of Greater Cincinnati database were recruited by mail and asked to complete three questionnaires (McGill QOL, Leeds Assessment of Neuropathic Symptoms and Signs, and Current Exercise Behaviors). Data was analyzed at the 0.05 level of significance using a student’s t-test and a Pearson’s product moment correlation.

Results: 134 completed surveys were returned and analyzed (44.6% response rate). Overall, QOL and exercise behaviors were moderately correlated ($r = 0.56$). Patients reported exercising an average of 2.3 d/wk and an overall QOL of 4.7. Of the patients completing the recommended amount of physical activity (EX, $n = 21$), QOL was 6.3, which was significantly higher than patients who did not meet these recommendations (SED, $n = 113$, $p<0.001$). Likewise, only 15% of EX patients reported experiencing pain compared to 72% of SED patients ($p<0.001$). Conclusions: Based on these data, it seems likely that an exercise intervention would be successful in attenuating symptoms of CIPN and improving the overall QOL of breast cancer patients.

Keywords
Chemotherapy-induced peripheral neuropathy, Exercise behaviors, Quality of life, Pain

Disciplines
Medicine and Health Sciences | Oncology

This article is available at The Cupola: Scholarship at Gettysburg College: https://cupola.gettysburg.edu/healthfac/17
Introduction: Chemotherapy-induced peripheral neuropathy (CIPN) is a common, dose-limiting effect of cancer therapy. The neuropathic pain associated with CIPN often has negative implications on an individual's quality of life (QOL) and has long been recognized as one of the more difficult types of pain to treat. Treatment of neuropathic pain due to CIPN often requires a multidisciplinary approach, with much attention focused on the use of pharmacological therapies. However, in most instances, these agents have been shown to have additional negative side effects for cancer patients. Thus, other interventions that address the symptoms of CIPN should be considered. One such possible intervention is exercise rehabilitation, which has previously been reported effective in attenuating numerous cancer treatment-related toxicities and enhancing the QOL of patients. However, to our knowledge, there have been no published clinical trials examining the role of exercise in preserving neurological function following chemotherapy. As such, the purpose of this investigation was to examine the current exercise habits of breast cancer patients who are diagnosed with CIPN and the impact on pain and QOL.

Methods: 300 women listed in the Breast Cancer Registry of Greater Cincinnati database were recruited by mail and asked to complete three questionnaires (McGill QOL, Leeds Assessment of Neuropathic Symptoms and Signs, and Current Exercise Behaviors). Data was analyzed at the 0.05 level of significance using a student's t-test and a Pearson’s product moment correlation.

Results: 134 completed surveys were returned and analyzed (44.6% response rate). Overall, QOL and exercise behaviors were moderately correlated ($r = 0.56$). Patients reported exercising an average of 2.3 d/wk and an overall QOL of 4.7. Of the patients completing the recommended amount of physical activity (EX, $n = 21$), QOL was 6.3, which was significantly higher than patients who did not meet these recommendations (SED, $n = 113$, $p<0.001$). Likewise, only 15% of EX patients reported experiencing pain compared to 72% of SED patients ($p<0.001$). Conclusions: Based on these data, it seems likely that an exercise intervention would be successful in attenuating symptoms of CIPN and improving the overall QOL of breast cancer patients.

Keywords: Chemotherapy-induced peripheral neuropathy; Exercise behaviors; Quality of life; Pain

*Corresponding author: Karen Y. Wonders, Wright State University, Department of Health, Physical Education and Recreation, Wright State University, 316 Nutter Center, 3640 Colonel Glenn Hwy, Dayton, OH 45435, USA, Tel: 937-775-2637; Fax: 937-775-4252; E-mail: karen.wonders@wright.edu

Received March 08, 2012; Accepted April 25, 2012; Published April 27, 2012


Copyright: © 2012 Wonders KY, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.
the purpose of this investigation was to examine the current exercise behaviors of breast cancer patients who were diagnosed with CIPN and to determine the resulting impact on their pain and quality of life.

Methods

Subjects

This investigation used a non-probability sample of convenience. Women who met the eligibility criteria and were listed in the Breast Cancer Registry of Greater Cincinnati (BCRGC) database were recruited by mail in the fall of 2010. The eligibility criteria included women who (a) have recently received a clinical diagnosis of CIPN, and (b) were currently taking the chemotherapy agents Docetaxel, Paclitaxel, or Vinorelbine, and (c) were able to read and write English. The BCRGC is a database established by the University of Cincinnati, Department of Environmental Health for the purpose of supporting studies that focus on breast cancer issues. Women who were breast cancer survivors and were located in the Greater Cincinnati area may become members by signing a consent form and completing a registration form that includes questions specific to the detection, diagnosis, and treatment of their disease. A total of 300 women listed in the BCRGC met the eligibility criteria of the study. All procedures were approved by the Wright State University Institutional Review Board prior to data collection.

Data collection

The 300 women who met the eligibility criteria and agreed to be contacted received a packet that included a cover letter, the McGill Quality of Life questionnaire [25], the Leeds Assessment of Neuropathic Symptoms and Signs questionnaire (LANSS) [26], a questionnaire to measure current exercise behaviors (Reigle), and a self-addressed, stamped envelope. Women were asked to return the completed questionnaires within two weeks of receiving the packet. Women who did not respond within two weeks were sent a reminder postcard.

Data analysis

Descriptive statistics have been computed as means and standard deviations. A Pearson’s product moment correlation was used to determine the relationship between QOL and current exercise behaviors for the group as a whole. A student’s T-test was used to compare the overall QOL ratings, as well as the prevalence of pain ratings, among patients who received the recommended amount of exercise compared to those who did not. All data was analyzed at the 0.05 level of significance.

Results

Of the 300 surveys sent out, 134 completed surveys were returned and analyzed, giving a 44.6% response rate. The characteristics of the patients are summarized in Table 1. The distribution of QOL was normal. On average, patients reported exercising 2.3 d/wk (approximately 69 min/wk) and rated their overall quality of life (QOL) as 4.7 on a 10-point scale. CIPN impacted routine activities, functions, and behaviors in the areas of domestic, work, and social/leisure life. A moderate correlation was measured between QOL and current exercise behaviors for the group as a whole (r = 0.56). Table 2 summarizes the results of the Exercise Behaviors Survey for all respondents. Table 3 presents the results of the LANSS survey for all respondents.

Responses were analyzed to determine the percentage of patients completing the recommended amount of physical activity (at least 150 min moderate-intense ex/wk and muscle strengthening activity 2 d/wk [27]. Approximately 15.6% of the patients surveyed reported meeting these recommended levels of physical activity (EX, n = 21). This group of patients reported an overall QOL of 6.3. As demonstrated in (Figure 1), this was significantly higher than those patients who did not meet these recommendations (SED, n = 113), who reported an average overall QOL of 3.4 (p<0.001). Similarly, only 15% of EX patients reported experiencing pain compared to 72% of SED patients (p<0.001) (Figure 2). The pain was frequently described as “tingling” and “numbness” and localized to “hands and feet”. Several respondents (n = 46) indicated that this pain was “better when I exercise”.

Table 1: Subject Characteristics. Values are means ± SE.

<table>
<thead>
<tr>
<th>Age at time of survey (yrs)</th>
<th>Age at time of diagnosis (yrs)</th>
<th>Education Level</th>
<th>Race</th>
<th>Length of Cancer Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>54.9 ± 2.4</td>
<td>50.4 ± 5.7</td>
<td>36 = high school 66 = college 30 = grad</td>
<td>White = 105 Black = 21 Hispanic = 6 Other = 2</td>
<td>4.5 ± 6.4 mo’s</td>
</tr>
</tbody>
</table>

Table 2: Results from Exercise Behaviors Survey. Values are means ± SE.

<table>
<thead>
<tr>
<th>Questions</th>
<th>% of respondents answering Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would you describe your pain as pricking, tingling, pins and needles?</td>
<td>51 ± 1.2%</td>
</tr>
<tr>
<td>Does the skin in the painful areas look different than normal?</td>
<td>17.9 ± 0.5%</td>
</tr>
<tr>
<td>Is the skin sensitive to touch?</td>
<td>33.3 ± 1.7%</td>
</tr>
<tr>
<td>Does your pain come on suddenly in bursts when you are still?</td>
<td>42.3 ± 1.1%</td>
</tr>
<tr>
<td>Do you feel that skin temperature in the painful area has changed?</td>
<td>20.5 ± 2.1%</td>
</tr>
<tr>
<td>Does stroking the affected area with cotton wool produce pain?</td>
<td>9.2 ± 0.3%</td>
</tr>
</tbody>
</table>

Table 3: Results from LANSS Survey. Values are means ± SE.

Figure 1: Overall Quality of Life Ratings. Values are means ± SE. *p<0.001 vs. SED.
The major finding in this investigation was that breast cancer patients with CIPN who received the recommended levels of physical activity reported a significantly higher overall QOL and experienced significantly less pain than their sedentary counterparts. CIPN affected breast cancer patients’ routine activities, functions, and behaviors. While it is unknown if the sedentary individuals abstained from exercise because of their pain, the respondents who stated that their pain was “better when I exercise” indicates that it seems likely that an exercise intervention would be successful in attenuating symptoms of CIPN and improving the overall QOL of breast cancer patients.

With neuropathy, muscle mass atrophies and leads to significant decreases in muscular strength [28]. This decline in strength appears to be slow and progressive. It also appears to affect distal muscle groups more so than proximal muscles. Researchers have indicated that this muscle weakness translates into impaired motor performance skills and a reduced exercise capacity [29]. However, several studies have reported improvements in muscular strength following moderate resistance exercises in patients with hereditary motor and sensory neuropathies [30,31], as well as diabetic neuropathies, and those associated with fibromyalgia and chronic fatigue [32-37]. In light of these findings, many researchers recommend that exercise training serve as an important component in the comprehensive treatment plan for patients with peripheral neuropathy [33,34,38]. Moderate-to-intense strength training and aerobic exercise appears to be well tolerated by these patients [38], and is associated with improvements in motor function and nerve conduction velocity [32,35], as well as improved muscle innervation and increased axon regeneration [39]. In addition, one investigation reported that low intensity treadmill exercise promoted Schwann cell proliferation in the injured peripheral nerve [40]. In light of these findings, it is feasible to assume that an individual who has experienced a reduction in muscular strength and functional ability due to CIPN may experience similar improvements following an exercise program.

It is not uncommon for individuals with cancer to experience pain. This pain may be triggered by the disease itself, or by its associated treatments. The direct effect of the tumor accounts for about 70% of the pain related to cancer, while approximately 15% of cancer pain is related to its treatments [41]. The pain associated with CIPN has long been recognized as one of the more difficult types of pain to treat. However, as explained earlier, it is possible that exercise may have a beneficial effect on pain. As illustrated by the respondents in the current study, those individuals who exercised experienced significantly less pain than their sedentary counterparts. Likewise, it was noted that pain became “better” upon exercise. This finding is supported by several studies conducted on healthy populations, whereby pain thresholds and tolerance levels have been reported to increase both during and following exercise. In addition, intensity ratings of pain appear to decrease following exercise [42,43].

While literature examining the role of exercise on symptoms of pain related to CIPN is lacking, we believe that the existing tangential research supports the use of exercise as a means to attenuate general cancer related pain. Exercise during cancer treatment has been shown to have a beneficial effect on pain for breast cancer patients [44-47]. In a similar study to ours, Liou et al. [45] surveyed the daily physical activity levels of individuals who were undergoing chemotherapy, but were not diagnosed with CIPN. These authors reported that those patients who received the recommended 150 min/wk of moderate activity reported significantly less symptoms of pain than their sedentary counterparts.

In light of the findings and the literature surrounding this topic, it seems feasible to assume that a supervised exercise program would provide a beneficial effect on quality of life and pain associated with CIPN in breast cancer patients. More follow up investigations are warranted.

Limitations

The most apparent limitation in the present study is the low response rate from the breast cancer patients (44.6%). However, in survey research, no single response rate is considered a standard [48]. Mail surveys typically have lower response rates than other types of surveys [49]. In the present study, non-respondents were sent a reminder postcard in an attempt to increase the response rate; however, additional measures could have also been employed, such as personal contact. In addition, due to the lack of existing literature examining the effects of exercise on symptoms of CIPN, the authors had to look to the effects of exercise on symptoms of peripheral neuropathy in other chronic diseases (i.e., diabetes) to make its generalizations. Thus, it is possible that an exercise program may not produce similar results in a breast cancer patient. Likewise, since the location of cancer will vary the symptoms related to CIPN, it is possible that the exercise response would produce a different outcome in another form of cancer.

References


27. Centers for Disease Control and Prevention (2011) How much physical activity do adults need?


Submit your next manuscript and get advantages of OMICS Group submissions

Unique features:
- User friendly/feasible website-translation of your paper to 50 world’s leading languages
- Audio Version of published paper
- Digital articles to share and explore

Special features:
- 200 Open Access Journals
- 15,000 editorial team
- 31 days Rapid review process
- Quality and quick editorial, review and publication processing
- Indexing at PubMed (partial), Scopus, DOAJ, ESCSO, Index Copernicus and Google Scholar etc
- Sharing Option: Social Networking Enabled
- Authors, Reviewers and Editors rewarded with online Scientific Credits
- Better discount for your subsequent articles

Submit your manuscript at: http://www.editorialmanager.com/arctgroup/