Symptom clusters using the Brief Pain Inventory in patients with breast cancer

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Introduction

- Symptoms clusters (SCs), which are composed of a minimum of two symptoms that co-occur in patients, are important in management of patient quality of life (1).
- The majority of research conducted on symptom management in patients with breast cancer (BC) undergoing chemotherapy is focused on isolated symptoms – most commonly fatigue, pain, anxiety, and depression (2).
- There is limited research on SCs in these patients despite SCs being named as a priority (3).
- Although currently limited, research on SCs in women with BC undergoing chemotherapy may better illustrate their experiences and help to improve symptom identification and management.
- The objective of this study was to investigate SCs in patients with non-metastatic BC during and after chemotherapy.

Materials and Methods

Patients with non-metastatic BC completing three cycles of docetaxel, paclitaxel, or nab-paclitaxel chemotherapy at Sunnybrook Odette Cancer Centre and North York General Hospital were enrolled in this study.

The Brief Pain Inventory (BPI) is a multiple-item measure of pain used in the cancer patient population (4). Patients completed the BPI at baseline, days 1-21 through all three cycles (acute phase), and at 1, 3, 6, 9, and 12 months post-treatment (delayed phase).

- The *sensory* component measures intensity of pain on 4 different scales (worst, least, average, and current pain) wherein higher scores are indicative of worse pain.
- The *affective* component assesses effect of pain on 7 functional items at baseline: general activity, normal work, walking ability, mood, sleep, relationships, and enjoyment of life.
  - During the delayed phase, mood and walking ability were not assessed.

Statistical analysis

All analyses were conducted using Statistical Analysis Software (SAS version 9 .4 for Windows).

Descriptive analyses were conducted on demographics and medications taken during treatment cycles.

All BPI items were summarized at baseline, acute phase and delayed phase.
Statistical techniques used on BPI items included Spearman correlation and principle component analysis (PCA) with varimax rotation to delineate SCs.
PCA transforms observed variables into a smaller number of principal components wherein the first component accounts for as much variability in the data as possible. Number of significant principal components was selected with Eigenvalue >0.6 and each component explained more than 10% of the variance. The highest factor loading score predicted assignment of individual symptoms to an independent factor. Cronbach's alpha values were calculated to estimate internal consistencies and reliabilities of SCs.
The varimax rotation results in uncorrelated components, maximizing the variance of a column of the factor pattern matrix.

Robust relationship and correlation among symptoms was displayed with a biplot graphic. The longer the length and closer together the arrows were, the higher the correlation between symptoms.

Results

228 patients were accrued onto the study. The mean age was 52 years, with almost half of patients post-menopausal. Docetaxal was administered the most (88%) of the three regimens. Most patients were chemotherapy-naïve (96%).

Baseline

Spearman correlations between all BPI items were significant ($p<0.0001$). Cumulatively, 87% of the variance was accounted for by the first two components.

Cluster 1: mood, relationships, sleep, and enjoyment of life.
Cluster 2: general activity, walking ability, and normal work.

Final communalities (proportion of variance in observed variable that is accounted for by retained clusters) ranged from 0.77 to 0.92. Cronbach's alpha values were 0.92 and 0.94 for the two clusters respectively, demonstrating good internal consistencies.

Delayed phase

Clusters were identified at 1 month and 3 months post-treatment. BPI scores for mood and walking ability were not collected during delayed phase. Spearman correlations at months 1 and 3 between the remaining BPI items were all significant ($p<0.0001$).

At 1 month, there were two clusters cumulatively explaining 87% of the variance.

Cluster 1: general activity, normal work, and enjoyment of life.
Cluster 2: relationships and sleep.

Final communality values ranged from 0.79 to 0.93. Cronbach's alpha values for the two clusters were 0.94 and 0.79 respectively, indicating good internal consistencies.

At 3 months, two clusters were identified cumulatively accounting for 88% of the total variance.

Cluster 1: general activity, normal work, and relationships.
Cluster 2: sleep and enjoyment of life.

Final communalities ranged from 0.81 to 0.95. Cronbach's alpha values for the two clusters were 0.94 and 0.82 respectively, indicating good internal consistencies.

Conclusions

BC patients undergoing chemotherapy may present with SCs in physical and psychological/social interference.

SCs were identified at baseline and in the delayed phase and were different at the assessed stages, indicating dynamic behavior.

Given the demonstration of clusters and a lack of functional recovery to baseline levels, symptoms should be continuously managed following completion of chemotherapy.

References

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