

Longitudinal variations of sleep quality in women with breast cancer

Variação longitudinal da qualidade do sono em mulheres com câncer de mama

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Keywords

Sleep/physiology; Breast neoplasms/ complications; Hope/physiology; Depression/physiology; Quality of life

Descritores

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Abstract

Objectives: To compare sleep quality, depression, and hope in women with breast cancer over an approximate period of 1 year.

Methods: This longitudinal study included 107 women assisted at a teaching hospital. The following instruments were used: Questionnaire on Socio-demographic and Clinical Characteristics; Pittsburgh Sleep Quality Index; Beck Depression Inventory; and Herth Hope Scale. Data were collected at T0, before tumor removal surgery, and after surgery at T1 (average of 3.2 months), T2 (average of 6.1 months), and T3 (average of 12.4 months).

Results: Poor sleep quality persisted over the follow-up; hope increased at T1; the proportion of women with moderate and severe depression increased at T3. There was a significant correlation among scores indicating sleep quality, depression, and hope in all four time points.

Conclusion: Our study findings suggest the significance of long-term follow-up.

Resumo

Objetivo: Comparar a qualidade do sono, a depressão e a esperança em mulheres com câncer de mama ao longo de aproximadamente um ano.

Métodos: Estudo longitudinal, com 107 mulheres, em hospital universitário. Foram utilizados os instrumentos: questionário de caracterização sociodemográfica e clínica; Índice de Qualidade do Sono de *Pittsburgh*; Inventário de Depressão de *Beck* e Escala de Esperança de *Herth*. Os dados foram coletados em T0, antes da cirurgia de retirada do tumor, e após a mesma em: T1, em média 3,2 meses; T2, em média 6,1 meses; em T3, em média 12,4 meses.

Resultados: A má qualidade do sono persistiu ao longo do seguimento; a esperança aumentou em T1; a proporção de mulheres com depressão moderada e grave elevou-se em T3. Houve correlação significativa entre os escores indicativos de qualidade do sono, de depressão e de esperança nos quatro tempos.

Conclusão: Os achados deste estudo indicam a importância do seguimento por tempo prolongado.

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Introduction

In Brazil the estimation of the 2014/2015 biennium determine an incidence of approximately 576,000 new cases of cancer. Breast cancer is the second most common cancer in women, with 57,000 new cases.⁽¹⁾

Sleep disorders, depression, and lack of hope are common symptoms that often negatively affect the life of women with breast cancer.⁽²⁾ Their onset precedes chemotherapy and they may outlast clinical treatment, negatively affecting life quality.⁽³⁾

However, little is known about the trajectory of these symptoms - particularly, about the assessment of hope in these women, as high levels of hope allow better coping with the disease and it should be taken into consideration during treatment.⁽⁴⁾

In several studies, hope is seen as an effective strategy to help patients cope with difficulties and accomplish their goals, particularly in individuals with cancer. Authors suggest hope is evidently beneficial to patients and contributes to their accepting and living with the disease and its treatment.^(4,5)

A complex relationship - under the influence of several factors - can be distinguished between depression and breast cancer, despite the former often being undiagnosed and untreated.⁽⁶⁾ Depression and mood swings may present throughout treatment or even after its conclusion.^(7,8)

Depressive symptoms are predictors of subjective sleep quality in women with breast cancer before, during and after radiation therapy.⁽⁹⁾ Other authors have found that women with early-stage breast cancer when compared with a control group including women without breast cancer, showed a worsening in sleep quality, higher depressive symptoms, more fatigue, and lesser quality of life, one year after chemotherapy.⁽¹⁰⁾ Along the same lines, a different study verified that sleep quality in women with breast cancer may predict quality of life and psychological well-being between 1 and 10 years after treatment.⁽⁷⁾

Considering that gaps still existing concerning the knowledge on trajectory of sleep quality, depression, and hope during breast cancer treat-

ment - as well as regarding the significance of this information -, longitudinal studies assessing these variables are paramount, particularly including Brazilian women.

This study compared scores indicating sleep quality, depression, and hope in different stages of follow-up and verified these variables over the course of the follow-up.

Methods

This was an analytical, longitudinal, and prospective study of 107 women with breast cancer in 3 outpatient clinics and the surgical oncology unit of a teaching hospital specializing in women's health, set in a non-metropolitan region of the State of São Paulo, Brazil.

We included women aged 18 years and older; with a diagnosis of breast cancer; any stage TNM;⁽¹¹⁾ admitted for mastectomy or quadrantectomy preoperative procedures or currently in follow-up care in the outpatient clinics of the previously stated study centers.

Exclusion criteria were Karnofsky scale under 70; clinical (such as mucositis, pain, nausea, dyspnea, vomiting) and emotional (crying, apathy, aggression) conditions, which would prevent subjects from taking part in an interview.

Sample: Data was collected from all women who met the inclusion criteria between March and December 2013, under the guidance of the institution's Statistics Service (n=156), which comprised the convenience sample.

Data collection began a night before tumor removal surgery (T0) and continued over follow-up visits for medical treatment (visits, chemotherapy, or radiation therapy) or tests.

Instruments used:

- Questionnaire on Socio-demographic and Clinical Characteristics: This questionnaire was adapted from another cancer patient study⁽¹²⁾ (as authorized by its authors) and used to collect subject socio-demographic and clinical information.

- Pittsburgh Sleep Quality Index (Brazilian Portuguese version of the PSQI): Index used to assess quality and disorders of sleep presenting over the last month of study, validated for use in Brazil.⁽¹³⁾ It contains 19 questions grouped in 7 components: subjective sleep quality, latency, duration, efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction. Global score ranges from 0 to 21 points (0 to 3 points per component); a score of 5 and above suggests poor sleep quality.⁽¹³⁾
- Beck Depression Inventory/BDI: Depression self-assessment instrument widely used in research and clinical practice, validated to be used in Brazil.⁽¹⁴⁾ Its original scale entails 21 items, including symptoms and attitudes, with intensity ranging from 0 to 3. Items refer to sadness, pessimism, sense of failure, self-dissatisfaction, guilt, punishment, self-dislike, self-accusations, suicidal ideas, crying spells, irritability, social withdrawal, indecisiveness, distortion of body image, work difficulty, sleep disorders, fatigability, loss of appetite, weight loss, somatic preoccupation, and loss of libido. Recommended cut-off points are: under 10, absence of or minimal depression; 10 to 18, mild to moderate depression; 19 to 29, moderate to severe depression; 30 to 63, severe depression.⁽¹⁴⁾
- Herth Hope Scale/HHS: A scale that can be easily and rapidly applied, validated to be used in Brazil.⁽¹⁵⁾ HHS was employed to facilitate the assessment of hope over a period of time intervals, where variations in levels of hope may be identified. It comprises 12 statements that must be answered with a Likert scale scoring between 1 and 4. Total score ranges from 12 to 48, in which the higher the score, the greater the level of hope.⁽¹⁵⁾

Except for the Questionnaire on Socio-demographic and Clinical Characteristics, used at T0 for sample characterization, all instruments were applied in all 4 time points. Instrument data have been considered incomplete due to lack of information on hormone receptors (estrogen receptor and progesterone receptor), a clinical data set that was not analyzed. This research focused solely on

tumor staging, treatment, and dimension; pain was analyzed dichotomously, without assessment of intensity.

Data were input in 2007 Microsoft® Excel for Windows (Microsoft Corporation Inc.) and imported into SAS 9.4 for analysis, with the support of the institution's Statistics Service. Descriptive statistics and non-parametric tests were applied, due to data not being of normal distribution. The following tests were conducted: Friedman's ANOVA test, to compare instrument scores from all 4 time points, with a 5% significance level; Wilcoxon's test, to compare 2 time points at a time, with the application of a Bonferroni correction due to there being multiple comparisons, and a 0.083% significance level; Spearman's rank correlation coefficient, to analyze correlation among instrument scores from all 4 time points. The Brazilian Portuguese version of the PSQI was assessed for reliability with Cronbach's alpha coefficient.

The study was registered in Brazil under the Platform Presentation of Certificate number for Ethics Assessment (CAAE) 00762112.0.0000.5404.

Results

Study ranged from T0, preceding surgery, to T1 (average of 3.2 months, SD 0.7), T2 (average of 6.2 months, SD 0.9) and T3 (average of 12.4 months, SD 1.0), following surgery and T0. Forty-nine (49) subjects were excluded due to loss in follow-up (missed visits and deaths) and incomplete instrument response, resulting in a total of 107 women. The last follow-up visit dated December 2014.

Most women were white (77.6%), married (56.1%), retired or on disability benefits (47.7%), and had an income up to five minimum wages (91.6%). Women had an average age of 56.1 years old (SD 12.4, median age 55.0) and 5.4 (SD 4.0) years of formal education on average.

Eighty-one percent (81.0%) of all participants presented with early stage cancer (I/II), 24.8% of which under treatment with neoadjuvant chemo-

therapy and 56.6% with total mastectomy. Average tumor dimension was 2.8 cm (SD 1.8) and 41.6% of subjects reported pain associated with the tumor or treatment, after surgery.

In relation to presence of depression over time, the study showed a reduction of the proportion of women in the “absence of or minimal depression” category, from 52.3% at T0 to 32.7% at T3. Thus, there was an increase in the proportion of participants with moderate to severe depression and severe depression, from 29.0% at T0 to 47.7% at T3 (Figure 1).

Poor sleep quality was predominant in all 4 stages, found in 57.0% of women at T0 and 59.8% at T3 (Figure 1).

Comparative analysis of each instrument in each of the 4 follow-up stages is presented be-

low (Table 1). From T0 to T3, there was a significant difference in BDI ($p=0.0038$) and HHS (0.0460) scores, which was not reflected in PSQI-PT scores.

Wilcoxon test (Bonferroni correction was applied to p value) showed a significant difference between depression scores at T3 and T0 ($p=0.005$), T1 ($p=0.0001$), and T2 ($p=0.0035$). Hope scores were significantly different between T0 and T1 ($p=0.0074$).

Significant correlations were seen between PSQI-PT, BDI, and HHS scores on all follow-up stages (Table 2).

PSQI-PT’s Cronbach’s alpha coefficients showed the following results: T0, 0.721; T1, 0.782; T2, 0.795; T3, 0.771.

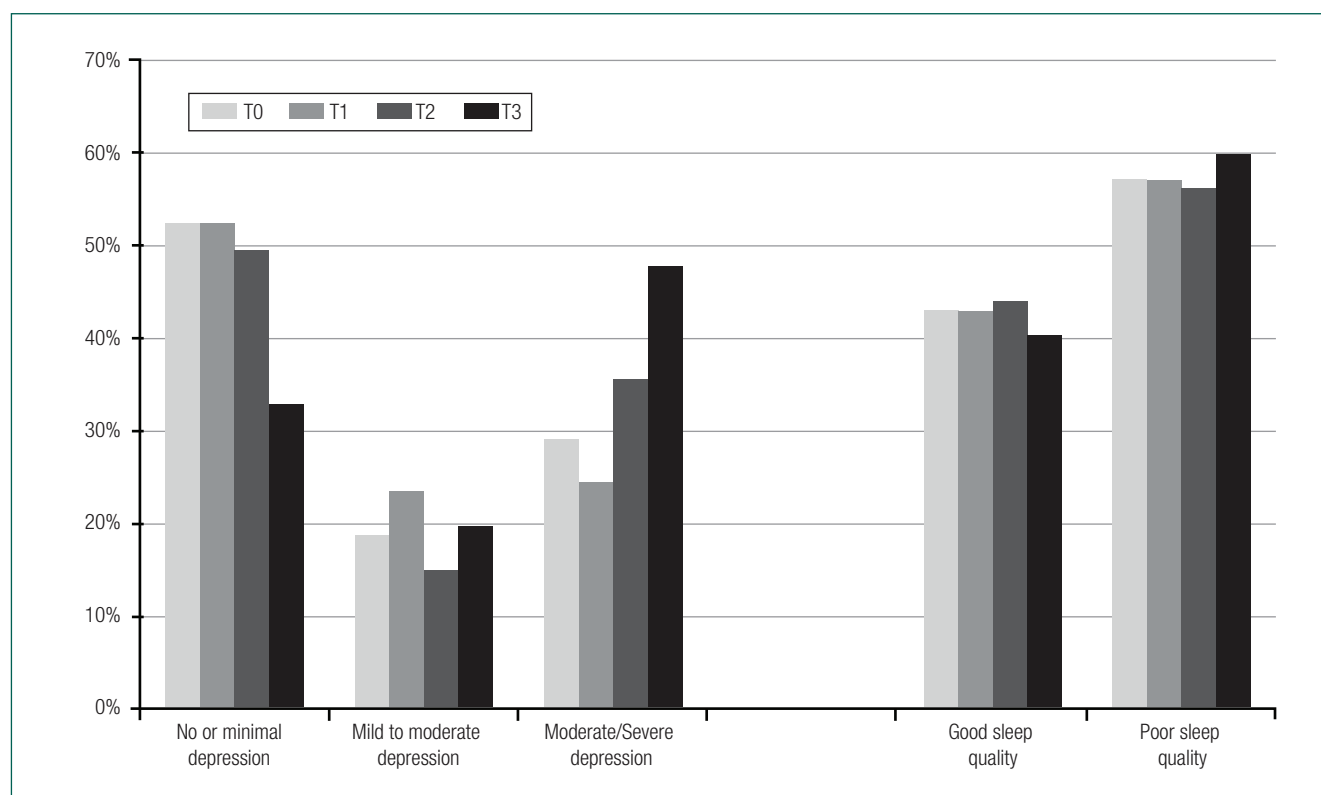


Figure 1. Proportion of women with breast cancer according to categories of depression and sleep quality

Table 1. Comparative analysis of Beck Depression Inventory, Herth Hope Scale, and Pittsburgh Sleep Quality Index scores over the 4 follow-up stages

Instrument scores	T0			T1			T2			T3			p value
	A	SD	M	A	SD	M	A	SD	M	A	SD	M	
BDI*	11.2	9.2	9.0	10.8	10.1	8.0	12.5	11.2	10.0	15.7	10.2	18.0	0.0038
HHS†	34.6	6.4	35.0	36.6	7.9	39.0	36.0	7.6	36.0	36.0	7.5	38.0	0.0460
PSQI-PT‡	07.1	4.4	7.0	7.4	4.8	7.0	7.4	4.7	7.0	7.2	4.3	7.0	0.6563

*Beck Depression Inventory; †Herth Hope Scale; ‡Pittsburgh Sleep Quality Index; p-value resulting from Friedman test.

Table 2. Correlations between Beck Depression Inventory, Herth Hope Scale, and Pittsburgh Sleep Quality Index scores over the 4 follow-up stages

Instrument scores	PSQI-PT				BDI			
	T0	T1	T2	T3	T0	T1	T2	T3
BDI - T0	0.400*				1.000			
BDI - T1		0.423*				1.000		
BDI - T2			0.459*				1.000	
BDI - T3				0.567*				1.000
HHS - T0	-0.229†				-0.414*			
HHS - T1		-0.255†				-0.486*		
HHS - T2			-0.402*				-0.613*	
HHS - T3				-0.260†				-0.337*

*p value <0.001; †p value < 0.05; ‡p value <0.01; Spearman test

Discussion

This longitudinal study showed that poor sleep was presented over the course of the follow-up and hope increased at T1, and drop at the subsequent time points. Scores indicating depression increased and, proportionally, moderate to severe depression showed greater prevalence towards the end of follow-up. There was significant correlation among scores of all instruments in all 4 stages of follow-up.

Breast cancer is presented in literature as commonly related to several symptoms, such as depression, pain, fatigue, and sleep quality.^(16,17)

The proportion of women who had poor sleep quality was predominant over the course of the follow-up. Towards the end of follow-up, poor sleep quality persisted and showed a percentage increase in the incidence, similarly to the findings in another research study including 166 women with breast cancer. That study showed that PSQI score results suggested that women reported poor sleep quality prior to the onset of treatment and reported worsening of sleep quality after its conclusion.⁽¹⁸⁾

A previous longitudinal study of 80 patients with breast cancer also showed that poor sleep quality predominated throughout the whole treatment period in 65.8% of women. However, it did not significantly change over time, rather sleep quality correlations varied. Authors recommended early identification and treatment in order to prevent chronic insomnia in survivors.⁽³⁾ In the present study, women have also reported poor sleep quality at the time of treatment conclusion, which should be treated by health care professionals.

Assessing objective and subjective sleep quality measures, the authors concluded that women with breast cancer have difficulty with sleep maintenance, given that 51% of women reported poor sleep quality and 97% reported getting enough sleep on three or more days of the week.⁽⁹⁾

Sleep specialists have pointed out the relevance of a subjective assessment - with the use PSQI, as has been the case with the present study - and the significance of interindividual differences, by stating that individuals who perceive to get very little or too much sleep should be instructed to seek a health care professional.⁽¹⁹⁾

Furthermore, data analyzed in a longitudinal study after 2 years of treatment showed that five preoperative symptoms had a long-term predictive effect over the quality of life of women with breast cancer. These five symptoms were sleep disorders, cognitive symptoms, physical tiredness, depression, and anxiety. These authors concluded that the assessment of symptoms before treatment is paramount for identifying a high-risk group.⁽²⁾

In addition to the persistence of poor sleep quality in these women, there was an increase in the proportion of women with moderate to severe depression and severe depression, from 29% at the beginning of the study to approximately 50% by the end of follow-up. In another longitudinal study - where breast cancer-related symptoms were followed up - the depression, fatigue, and poor sleep quality presenting before chemotherapy were assessed by patients as having worsened at the end of the fourth course.⁽³⁾

However, in another study, where women with breast cancer were followed up, authors verified the

presence of depressive symptoms before treatment onset, at the 4th course of chemotherapy, and up to 1 year after treatment onset; depression scores, however, returned to their initial numbers after follow-up.⁽¹⁰⁾ The fact that a few of the women participating in this study were still in medical treatment may have contributed to it having different results.

Our correlation analysis results indicate that poor sleep quality directly correlates to an elevated depression score. In a different study conducted with 396 women before and after 6 months of mastectomy, authors reported that high levels of depression were related to the presence of sleep disorders over the course of follow-up.⁽²⁰⁾ In a longitudinal study of 3,343 women with early stage breast cancer assessed 3 to 4 months after tumor resection surgery, authors verified that depression was the strongest predictive factor for sleep changes.⁽²¹⁾

In addition to depression, pain was also seen to play a significant role in influencing poor sleep quality in the present study. It is a symptom frequently presented by these patients, which affected 41.6% of women in the present research. Among factors negatively affecting their quality of life, patients with breast cancer live with depression, anxiety, fatigue, pain, and sleep disorders, which may contribute to an increase in mortality.⁽⁶⁾

In addition to a positive correlation between poor sleep quality and depression, there was a negative correlation between hope and poor sleep quality scores and, similarly, between hope and depression, in all stages of this study. Furthermore, health status, family support, and self-esteem of women with breast cancer have been shown to indirectly affect depression through hope.⁽²²⁾

There are few studies employing interventions to improve hope.^(23,24) However, a recent study analyses a randomized clinical trial of women who had undergone mastectomy, aiming to assess the effects of a spiritual support intervention on spirituality and clinical parameters. The intervention helped increase the expression of women's spirituality and decrease their heart rate, being positively assessed by women who had undergone mastectomy.⁽²⁵⁾ Similarly to the present research

study, it employed a spirituality scale with sub-items consisting of hope and optimism - which are investigated in our research.

Its authors verified an increase in hope caused by the interventions and concluded that they posed a unique and innovative path for supporting patients and family members living with this illness. Interventions consisted of meditation, guided imagery, music, and relaxation through breathing,⁽²⁵⁾ an example, which may be followed in Brazil in future interventions.

Interventions based on motivating hope in women with breast cancer could be studied as non-pharmacological strategies to improve quality of sleep. This audacious proposal is not based on the present study's results, which do not allow for inferring a causality relationship among its three variables, but do indicate their convergence.

The authors suggest the use of methods such as polysomnography and actigraphy to generate additional information on the magnitude of the sleep changes found.⁽⁹⁾ It is also believed that detailed data from methods such as actigraphy and sleep diaries may contribute for gathering relevant information about intraindividual variability over time, which can then be examined for factors negatively or positively affecting sleep quality.

Thus, these three conditions - i.e., presence of depression, poor sleep quality, and hope - must be assessed in patients with breast cancer, as their identification is essential for the treatment of the first two conditions and for the motivation of hope. The authors remark that further research is needed to determine whether treatment of these changes before medical treatment onset would alleviate their intensity over time.⁽¹⁰⁾

Therefore, the significance of medical attention offered to women with breast cancer to be extended beyond the time of diagnosis or immediate care after cancer resection surgery is evidenced. Our study findings support this remark, as they point out the relevance of long-term follow-up of all symptoms that may accompany poor sleep quality to allow for their collective treatment.

This study limitations include not using objective measures to assess sleep changes that indicate poor quality; absence of detailed follow-up of sleep characteristics that would allow for the assessment of their variability; incomplete data in patient charts; and loss to follow-up, consisting of deaths and missed visits.

Conclusion

The present study did not show significant difference among scores assessing sleep quality over the 4 stages of follow-up of women with breast cancer, and poor sleep quality persisted at all 4 stages. Depression scores significantly increased over the last follow-up stage (T3) when compared to other stages. Hope was significantly higher at T1. A significant correlation was seen among scores indicating sleep quality, depression, and hope, in all 4 stages of follow-up.

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Collaborations

Mansano-Schlosser TC and Ceolim MF contributed to the drafting of the project, analysis and interpretation of data, drafting of the manuscript, critical review relevant for intellectual content and approval of the final version to be published.

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