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REVISTA DE ENFERMAGEM DA UFSM

UFSM
Rev. Enferm. UFSM - REUFSM
Santa Maria, RS, v. 9, e20, p. 1-18, 2019
DOI: 10.5902/2179769232732
ISSN 2179-7692

Original Article Submission: 23/05/2018 Acceptance: 19/03/2019 Publication: 30/08/2019

Sleep quality and fatigue in women with breast cancer during chemotherapy

Qualidade do sono e fadiga em mulheres com câncer de mama durante o tratamento quimioterápico

Calidad del sueño y fatiga en mujeres con cáncer de mama durante la quimioterapia

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Abstract: Objective: To identify the occurrence of changes in sleep before, during and after chemotherapy treatment and to correlate sleep disorders with episodes of fatigue in women with breast cancer. **Method:** Twenty-six women followed at the Mastology Outpatient Clinic of a university hospital who responded to the Pittsburgh Sleep Quality Index and to the Functional Assessment of Cancer Therapy Fatigue to assess sleep and fatigue, respectively, in three moments. **Results:** The participants presented sleep disturbances throughout the treatment, characterized by night heat and difficulty to start sleep and that influenced the quality of sleep. There was a correlation between sleep quality and fatigue, with poor sleep quality increasing episodes of fatigue. **Conclusion:** Identifying the occurrence of these events during chemotherapy helps the professional team to provide guidelines for an adequate management of adverse events.
Descriptors: Nursing; Breast neoplasms; Drug therapy, combination; Sleep; Fatigue

Resumo: Objetivo: identificar a ocorrência de alterações no sono antes, durante e após o tratamento quimioterápico e correlacionar as alterações do sono com episódios de fadiga em mulheres com câncer de mama. **Método:** participaram do estudo 26 mulheres seguidas no Ambulatório de Mastologia de um hospital universitário que responderam o *Pittsburgh Sleep Quality Index* e a *Functional Assessment of Cancer Therapy Fatigue* para avaliar o sono e a fadiga respectivamente, em três momentos. **Resultados**: as participantes apresentaram distúrbios do sono, ao longo do tratamento, caracterizados por calor noturno e dificuldade em iniciar o sono e que influenciaram na piora da qualidade do mesmo. Houve correlação entre qualidade do sono e fadiga, sendo que a má qualidade do sono aumentou os episódios de fadiga. **Conclusão:** a identificação da ocorrência destes eventos durante a quimioterapia favorece que a equipe profissional realize orientações para manejo adequado dos eventos adversos.
Descritores: Enfermagem; Neoplasias da mama; Quimioterapia Combinada; Sono; Fadiga

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Resumen: **Objetivo:** identificar la manifestación de cambios en el sueño antes, durante y después de la quimioterapia y correlacionar las alteraciones del sueño con episodios de fatiga en mujeres con cáncer de mama. **Método:** participaron del estudio 26 mujeres controladas en el Ambulatorio de Mastología de un hospital universitario que respondieron el *Pittsburgh Sleep Quality Index* y la *Functional Assessment of Cancer Therapy Fatigue* para evaluar el sueño y la fatiga respectivamente, en tres momentos. **Resultados:** las participantes presentaron trastornos del sueño, a lo largo del tratamiento, caracterizados por calor nocturno y dificultad para iniciar el sueño, trastornos que ejercieron un efecto adverso sobre la calidad del sueño. Se registró una correlación entre la calidad del sueño y la fatiga, siendo que la mala calidad del sueño aumentó la cantidad de episodios de fatiga. **Conclusión:** identificar la manifestación de estos eventos durante la quimioterapia ayuda a que el equipo profesional realice orientaciones para el manejo adecuado de los eventos adversos.
Descriptores: Enfermería; Neoplasias de la mama; Quimioterapia combinada; Sueño; Fatiga
Doi: 10.5902/2179769232732

Introduction

Chemotherapy is one of the therapeutic modalities employed in cancer control, and its adverse events are related to different aspects of individuals' lives, since they affect the biopsychosocial spheres and generate serious discomforts such as emotional changes, nausea, vomiting, sleep disorders and fatigue.[1]

Sleep disorders and fatigue are often classified as the most impactful and debilitating adverse events of cancer treatment, although their rates are difficult to estimate because of the different measures used and the lack of clinical specificity.[2]

Difficulty in maintaining sleep can be linked to diagnosis, stress, anxiety, or other symptoms related to one's own treatment such as pain, nausea, and even fatigue itself. It should be noted that it may occur before, during and up to five years after the end of chemotherapy treatment and may also be associated with depression and pain.[3-4]

However, concern is intensified in women with breast cancer. Studies show that fatigue and sleep disorders are the most reported symptoms by women treated for early breast cancer and, of these, fatigue was among the most distressing in chemotherapy patients.[5] In addition, these women have more depressed mood and depression six months after the end of treatment,

asserting the magnitude of the effects of chemotherapy and the importance of their identification and proper management.[6-7]

Fatigue may increase with the start of treatment, but it does not increase with time. During chemotherapy, the frequency and duration of night awakening and difficulty falling asleep increases, and reports have shown poorer sleep quality on the first night after treatment.[8]

Possible antecedents and outcomes of fatigue and sleep disorders during chemotherapy were studied. Although age was not reported to be related to fatigue during chemotherapy, older adult women had worse sleep quality; income and disease stage were not related to fatigue or sleep disturbance during treatment. In addition, it was observed that fatigue and poor sleep quality may predict a decreased activity level during chemotherapy for breast cancer.[8]

Thus, considering that the more we know about a symptom, the better the assistance may be, the following question raises: What is the relation between the changes in sleep quality and the occurrence of fatigue among women with breast cancer who are undergoing chemotherapy? Thus, this study aimed to identify the occurrence of sleep changes before, during and after chemotherapy treatment and to correlate sleep changes with fatigue episodes in women with breast cancer.

Method

An analytical and longitudinal study, developed at the Mastology Outpatient Clinic of a university hospital in the state of São Paulo, from June 2012 to January 2013. The study population consisted of women who were diagnosed with breast cancer and were referred for chemotherapy treatment. Inclusion criteria were women aged 18 years old and over and who would begin neoadjuvant or adjuvant chemotherapy treatment for the first time. Exclusion criteria were women who could not express themselves individually; with reading and

comprehension difficulties; with metastatic disease or other type of malignant tumor in the diagnosis of breast cancer and women in the pregnancy-puerperal cycle.

The sample size was calculated from an estimate of 100 new cases/year of breast cancer treated at the outpatient clinic, using the following formula:[9]

$$n=\frac{(Z\alpha/2)^2 \times p \times q}{E^2} \qquad n=\frac{(1.96)^2 \times 0.5 \times 0.5}{0.2} = 24$$

In the above formula, the values of *n* were calculated in such a way that the error in the estimation of proportions does not exceed the value *E*, with probability P. The value for *p* and *q* was 0.50 to ensure that *E* be the maximum possible error value. The component (Zα/2) is the value of the normal curve that corresponds to the desired probability P. Thus, with P=95% corresponding to 1.96 in the normal distribution and *E*=20%, *n*=24 participants for this study was obtained. However, due to the possibility of losing participants during follow-up, an additional 10% was added to the final *n*, totaling 26 participants included.

For data collection, the participants answered an instrument with data about the sociodemographic characterization, clinical information and the proposed treatment. These were obtained in an interview with the participant prior to the chemotherapy treatment (T0) and by reviewing the medical records. To evaluate sleep and fatigue, specific instruments were used, applied at T0, at half of treatment (T1) and after the last cycle (T2).

To assess fatigue, the *Functional Assessment of Cancer Therapy Fatigue* (FACT – F) version 4 scale was applied. FACT-F was specifically designed to measure fatigue in cancer patients and validated with American patients and is validated for use in Brazil.[10-11] In this study, the use of the scale was authorized by the authors, who also provided instructions for the application and analysis of the data.

FACT-F consists of 13 items and each one has a *Likert* scale of five points which follow this pattern: "Not at all", "A little", "More or less", "Very", "Very much". Women were instructed to answer one item per question regarding the last seven days. The final FACT-F score is obtained by the sum of the scores, and can vary from 0 to 52 points, the higher the number of points the lower the occurrence of fatigue.[10-11]

The evaluation of sleep-related aspects was performed by applying the *Pittsburgh Sleep Quality Index* (PSQI), which is the gold standard and the most widely used measure of sleep quality in various populations in research studies. The PSQI measures the subjective quality of sleep and the occurrence of sleep disorders over the month prior to application.[12] The PSQI has been translated and validated for Brazil.[13]

The questionnaire consists of 19 open and closed questions, grouped into seven components: subjective sleep quality, duration, latency, efficiency, sleep disturbance, use of sleeping medication, and daytime dysfunction. Each component receives an established score from zero to three points, and the overall score ranges from 0 to 21 points. Scores higher than five indicate poor sleep quality.[13]

Data analysis was performed using descriptive statistics with means, medians and standard deviation of the variables of interest. For comparison of results, correlation coefficients of *Spearman* were used and respective significance tests to evaluate possible correlations between the fatigue subscale and PSQI scores; and the *Mann-Whitney* Test to compare the magnitude of the scores of each scale in two sleep quality classes. *Crombach alpha* was also applied to assess the internal consistency of the scales' and the instrument's responses.[9]

This study was approved by the Research Ethics Committee on June 1, 2011 (Protocol number 1302/2011). The research was conducted respecting the required ethical principles.

Results

The age range of the participants was from 27 to 68 years old, the majority (53.9%) were in the age group of 31 to 50 years old, and the average age was 48 years old (SD: 11.7). Of the participants, 65.4% had a partner; 57.7% reported having 3 to 10 years of study (Table 1).

Regarding comorbidities, 65.3% reported at least one, and 34.6% reported having systemic arterial hypertension. Regarding the use of medications, 57.7% reported regular use of one or more, with antihypertensive, antidiabetic and antidepressant drugs being the most reported; 61.5% were premenopausal and 73.1% did not perform physical activity (Table 1).

Table 1- Distribution of the women undergoing chemotherapy for breast cancer according to age, marital status, years of schooling, comorbidities, medication use, physical activity and menopause. Ribeirão Preto (SP), 2013.

Variable	N	%
Age		
≤30	01	3.8
31 to 40	06	23.1
41 to 50	08	30.8
51 to 60	06	23.1
61 to 68	05	19.2
Marital status		
Has a partner	17	65.4
No partner	09	34.6
Schooling years		
3 to 10 years	15	57.7
11 to 15 years	11	42.3
Comorbidities		
No comorbidities	09	34.7
With comorbidities	17	65.3
Medication use		
Yes	15	57.7
No	11	42.3
Menopause status		
Premenopausal	16	61.5
Postmenopausal	10	38.5
Practices physical activity		

Yes	07	26.9
No	19	73.1

Source: Research database

All participants underwent surgical treatment. Of these, 87.5% underwent conservative surgery, and the most frequent was tumorectomy. Among the participants, 38.5% underwent neoadjuvant chemotherapy and 61.5%, adjuvant. The protocols used were FEC (Fluouracil; Epirubicin and Cyclophosphamide), EC-T (Epirubicin, Cyclophosphamide and Docetaxel), EC-TH (Epirubicin, Cyclophosphamide, Docetaxel and Trastuzumab) and TC-H (Docetaxel, Cyclophosphamide and Trastuzumab).

Poor sleep quality, estimated by the overall PSQI-BR score, was 42.3% at T0, 34.6% at T1 and 57.5% at T2. PSQI-BR reliability analysis showed satisfactory results for *Crombach alpha* in the three moments: T0- 0.73; T1- 0.80; T2- 0.76.

Sleep quality was associated with sociodemographic and clinical variables (age, years of education, current employment status, marital status, physical exercise, comorbidities, medication use, menopause, chemotherapy regimen, type of chemotherapy, duration of chemotherapy, and type of surgery) in the three applications of the questionnaire. There was a statistically significant score only for marital status, in the three moments, confirming the importance of this aspect for the quality of sleep in women with breast cancer (Table 2).

Table 2- Distribution of the women undergoing chemotherapy for breast cancer according to sleep quality in relation to the marital status variable. Ribeirão Preto (SP), 2013.

	PSQI	Has a partner	No partner	Total	P value
	Good sleep (<8)	**13**	02	15	
T0	Bad sleep (≥8)	04	**07**	11	**0.014**
	Total	17	09	26	
	Good sleep (<8)	**14**	03	17	
T1	Bad sleep (≥8)	03	**06**	09	**0.028**
	Total	17	09	26	

	Good sleep (<8)	**11**	0	11	
T2	Bad sleep (≥8)	06	**09**	15	**0.002**
	Total	17	09	26	

Source: Research database
P<0.05 according to *Fisher's Exact Test*

In the four open questions of the PSQI instrument that are related to the amount of sleep per night, it was more frequent in the three applications to go to bed after 10 PM, to take up to 40 minutes to get to sleep, to wake up between six and eight in the morning, and to sleep seven to nine hours a night. Data suggests an absence of changes in the quantitative aspects of sleep during chemotherapy; however, some women reported problems that interfered with sleep initiation and continuity during treatment, which was mainly classified as unable to sleep in less than thirty minutes (T0=38.5%, T1=38.5%, T2=50%), waking up at night to go to the bathroom (T0=53.8%; T1=50%, T2=57.7%) and complaints about night heat (T0=30.8%, T1=46.1%, T2=61.5%) with a frequency of three or more times per week (Table 3).

Table 3- Distribution of the women undergoing chemotherapy for breast cancer according to sleep disorders of the PSQI instrument. Ribeirão Preto (SP), 2013.

Sleep disorders	**T0** N (%)	**T1** N (%)	**T2** N (%)
Failed to sleep in less than thirty minutes	10 (38.5%)	10 (38.5%)	13 (50%)
Woke up in the middle of the night or in the morning earlier than usual	09 (34.6%)	13 (50%)	11 (42.3%)
Had to get up to go to the bathroom	14 (53.8%)	13 (50%)	15 (57.7%)
Had trouble breathing	02 (7.6%)	01 (3.9%)	02 (7.6%)
Coughed or snored loudly	09 (34.6%)	04 (15.4%)	09 (34.6%)
Felt cold	04 (15.4%)	05 (19.2%)	07 (26.9%)
Felt hot	08 (30.8%)	12 (46.1%)	16 (61.5%)
Had nightmares	01 (3.9%)	04 (15.4%)	01 (3.9%)

Source: Research database

FACT-F showed good internal reliability at the three data collection moments, with a *Crombach alpha* of 0.85 at T0; of 0.85 at T1; and of 0.83 at T2. The maximum and minimum scores did not vary widely throughout the study (Table 4).

Table 4- Distribution of the women undergoing chemotherapy for breast cancer according to the maximum, minimum, mean and standard deviation scores for FACT-F in the three phases of collection: T0, T1 and T2. Ribeirão Preto (SP), 2013.

FACIT-F (0-52)	Max.	Min.	AV	SD
T0	52	26	44.54	7.79
T1	52	32	42.54	6.44
T2	51	28	42.04	5.55

Source: Research database
Caption: Max: maximum, Min: minimum, AV: average, SD: Standard Deviation

The results of FACT-F were also associated by means of the *Fisher* Exact Test, with sociodemographic characteristics and, in T0, showed a significant relationship with schooling. Women who had between six and ten years of schooling had the lowest scores and felt less fatigue.

At T2, the variables of menopause and physical activity showed significant results. Participants who were premenopausal before starting chemotherapy were the most fatigued after the last chemotherapy. Regarding the practice of physical activity, seven women reported practicing some type of activity, such as walking and cycling. Of these, however, only three practiced systematically on a weekly basis. Even with this small number, women who practiced some physical activity reported less perception of fatigue compared to those who did not.

No significant relationship was found between sleep and fatigue, but there was a correlation between sleep quality and negative fatigue, indicating an inverse relationship between the variables, i.e., as one increases, the other decreases. Between treatment (T1) and

after the last chemotherapy (T2), there was a significant correlation of mean intensity between the variables, as shown in Table 5.

Table 5- Distribution of the women undergoing chemotherapy for breast cancer according to mean scores and to the correlation of the Fatigue subscale with PSQI. Ribeirão Preto (SP), 2013.

		Fatigue subscale		
		T0	**T1**	**T2**
PSQI≤ 5 good sleep		44.80	44.12	43.91
PSQI> 5 bad sleep		44.18	39.56	40.67
P value		0.86	0.12	0.14
Sleep	R	- 0.05*	- 0.48*	- 0.39*
	r≠0	0.78	**0.01**	**0.04**

Source: Research database

Caption: p<0.05 according to *Mann Whitney Test*

r- correlation coefficient of *Spearman*; r≠0 indicates whether the correlation coefficient of *Spearman* / is significantly non-zero

DISCUSSION

It is known that sleep disorders in cancer patients can be a pre-existing condition that worsens with the disease or as a result of the diagnosis and proposed therapy and, among the various cancers, breast cancer is the one with the highest sleep alteration rates.[14] These changes may be linked to the chemotherapeutic toxicity suffered by the central nervous system, which would result in indirect sleep disorders, since chemotherapeutic drugs do not have cell specificity and reach normal tissue.[15]

In the present study, it was identified that the participants did not present quantitative sleep alterations; however, the problems of sleep initiation and maintenance are present and are characterized by nocturnal awakenings due to nocturia and hot flashes, with a frequency of three or more times a week.

These findings are corroborated by a study conducted with 80 women with breast cancer which prospectively assessed sleep quality by means of PSQI at three moments: pre-chemotherapy, during treatment and six months after its termination. The results showed that the most frequently reported disturbances were getting up several times to go to the bathroom and night heat with gradual increase between moments and, consequently, more episodes of fatigue ($p<0.001$).[16]

Cancer-related fatigue and poor sleep in women with breast cancer have been considered reciprocal, both in samples with different cancers and in studies conducted only with women with breast cancer during chemotherapy.[17-18] The results of this research are still inconsistent in pointing to cancer-related fatigue as a risk factor for bad sleep.

However, it is possible to observe that the occurrence of fatigue worsens sleep quality and compromises quality of life, further interfering with depressive symptoms,[16] data that confirms the association between sleep quality and the occurrence of fatigue found in the present study.

It is noteworthy that there is a negative correlation in the current findings because, as sleep quality worsens, fatigue episodes become more frequent, which may be justified by the participants' description of the difficulty in maintaining sleep. This symptom relationship was also observed in a study that found changes in sleep quality after chemotherapy initiation, highlighting that sleep would be important to deal with other adverse events, such as fatigue.[3]

The occurrence of fatigue and sleep alterations in individuals with cancer diseases can be observed in previous studies.[19-20] Other studies also show that women with breast cancer undergoing chemotherapy have fatigue and poor sleep quality at any phase of the treatment, either before starting it, during or after its termination.[3,6]

The persistence of fatigue symptoms and of sleep alterations at the end of chemotherapy may be related to behavioral, social and physiological factors arising from their experience with

the disease and concerns about future health. The period varies from months to five years after this treatment, but with no association between these two symptoms.[4,21]

Termination of chemotherapy may normalize sleep and rest patterns for some women, but non-restoring night-time sleep and daytime sleepiness may persist for others. Sleep disorders may become chronic, especially if other treatment modalities are recommended after chemotherapy.[15]

Another aspect observed in the present study that deserves attention is the association between menopause and the fatigue *status*, with premenopausal women having higher scores. Hot flushes may be one of the contributing and/or aggravating factors of fatigue and sleep disorders, as pointed out in the results. The literature indicates that menopausal symptoms, such as hot flashes and mood disorders due to hormonal changes, are strongly associated with the occurrence of fatigue and changes in sleep pattern.[16,22,23] Thus, it is suggested that chemotherapy-induced early menopause may intensify such adverse events.

In addition, it was possible to identify significantly that two contexts contributed to the alleviation of fatigue and to the improvement of sleep quality. Regarding fatigue, it was identified that the practice of physical activity helped in its post-treatment management. Previous studies with women with breast cancer corroborate the findings of the present study, showing that physical exercises positively interfere with the relief of fatigue, besides contributing to the structuring and improvement of sleep quality, insomnia and excessive sleepiness.[3,24]

Regarding the association between sleep quality and marital status, it was observed that women with a partner had better sleep quality. It is believed that this association occurs through family support that can minimize anxiety and fear levels. As evidenced by a study of women with breast cancer who investigated their perceptions of their partners' support, and the

participants perceived proactively their partners' support during treatment, even when they did not understand the suffering caused by the adverse events of the therapy.[25]

It is important to highlight the role of the health team in face of conditions that may contribute to the occurrence of sleep disorders in women with breast cancer, such as nocturia, hot flashes, pain and difficulty in initiating sleep due to anxiety and fear. These conditions are investigated and known by health professionals; however, they do not receive proper attention and therapeutic monitoring. It is believed that one of the reasons for this situation is the absence of complaints from women and the lack of a systematic evaluation from the health team.

Many studies conducted with this theme are cross-sectional, and so they do not allow the identification of the cause and effect relationship between the symptom and cancer, facts that highlight the importance of an investigation prior to treatment to assess the presence of these disorders and their possible management.

Such data justify the research in this area because, associated with the increased vulnerability of this specific population, it is subject to the cumulative effect of chemotherapy and to the physical impact of adverse events. Associated with these issues are changes in daily activities, anxiety and depressed mood, which contribute to the occurrence of sleep disorders, especially during and after chemotherapy.

Conclusion

With the intent to identify the occurrence of changes in sleep pattern before, during and after chemotherapy treatment and to correlate these with episodes of fatigue in women with breast cancer, the results found made it possible to confirm their occurrence. The sleep pattern alteration were characterized by difficulty in initiating and maintaining sleep and nocturnal awakenings throughout the treatment.

In addition, it was found that there is a correlation between poor sleep quality and the occurrence of fatigue episodes. It is noted that the findings of this study point to the impact of poor sleep quality during treatment and to the importance of its proper identification, to promote proper management in order to avoid recurrent episodes and intensification of fatigue. The results also suggest that physical exercise and the presence of a partner may contribute to the relief of such adverse events.

In this sense, the role of health professionals, especially nurses, in identifying and controlling these events is emphasized. Guidance and appropriate management of symptoms, such as fatigue and sleep disorders, by the nursing staff are believed to be necessary and essential to alleviate discomforts and to improve the well-being of women undergoing chemotherapy.

It is noteworthy that the sample size was a limiting factor in the study. However, the results suggest further studies with larger samples, increased periodicity of both sleep and fatigue evaluations between chemotherapy cycles, and periodic evaluations after the end.

References

1. Ferreira RGR, Franco LFR. Efeitos colaterais decorrentes do tratamento quimioterápico no câncer de mama: revisão bibliográfica. Revista da Universidade Vale do Rio Verde. [internet] 2017 Ago [acesso em 2018 Abr 12];15(2):633-638. Disponível em: http://periodicos.unincor.br/index.php/revistaunincor/article/view/3759/pdf_725 doi: http://dx.doi.org/10.5892/ruvrd.v15i2.3759.

2. Chaoul A, Milbury K, Spelman A, Basen-Engquist K, Hall MH, Wei Q, et al. Randomized trial of Tibetan yoga in patients with breast cancer undergoing chemotherapy. Cancer. [internet] 2018 Jan [cited 2018 Jun 26];124(1):36-45. Available from: https://onlinelibrary.wiley.com/doi/epdf/10.1002/cncr.30938.

3. Amorim JR, Silva IA, Shimizu IS. Avaliação da qualidade do sono em pacientes com câncer de mama em quimioterapia. Rev bras mastologia. [internet] 2017 Set [acesso em 2018 Abr 12];27(1):3-7. Disponível em: http://www.rbmastologia.com.br/wp-content/uploads/2017/01/MAS-v27n1_3-7.pdf doi: 10.5327/Z201700010002RBM.

4. Lamino DA, Pimenta CAM, Braga PE, Mota DDCF. Fadiga clinicamente relevante em mulheres com câncer de mama: prevalência e fatores associados. Investig enferm. [internet] 2015 Jan [acesso em 2018 Jun 24];17(1):65-76. Disponível em: http://www.redalyc.org/html/1452/145233516005/.

5. Fakih R, Rahal M, Hilal L, Dany M, Karam S, Shehab L, et al. Prevalence and severity of sleep disturbances among patients with early breast cancer. Indian journal of palliative care. [internet] 2018 Jan [cited 2018 Jun 14];24(1):35-38. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5801627/ doi:10.4103/IJPC.IJPC_137_17.

6. Levkovich I, Cohen M, Pollack S, Drumea K, Fried G. Cancer-related fatigue and depression in breast cancer patients postchemotherapy: different associations with optimism and stress appraisals. Palliat Support Care. [internet] 2015 Oct [cited 2018 May 02];13(5):1141-1151. Available from: https://www.ncbi.nlm.nih.gov/pubmed/25201115 doi: 10.1017/S147895151400087X.

7. Jim HS, Jacobsen PB, Phillips KM, Wenham RM, Roberts W, Small BJ. Lagged relationships among sleep disturbance, fatigue, and depressed mood during chemotherapy. Health psychol. [internet] 2013 Jul [cited 2018 Jun 23];32(7):768-74. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3700563/. doi: 10.1037/a0031322.

8.Whisenant M, Wong B, Mitchell SA, Beck SL, Mooney K. Distinct Trajectories of Fatigue and Sleep Disturbance in Women Receiving Chemotherapy for Breast Cancer. Oncol nurs forum. [internet] 2017 Nov [cited 2018 Jun 26];44(6):739-750. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5856248/pdf/nihms948252.pdf.

9. Siegel S, Castellan JRNJ. Estatística não paramétrica para ciências do comportamento. Porto Alegre (SC): Artmed; 2006.

10. Yellen SB, Cella DF, Webster K, Blendowski C, Kaplan E. Measuring fatigue and other anemia-related symptoms with the Functional Assessment of Cancer Therapy (FACT) measurement system. J Pain Symptom Manage. [internet] 1997 Feb [cited 2018 Apr 02];13(2):63-74. Available from: https://www.jpsmjournal.com/article/S0885-3924(96)00274-6/pdf.

11. Ishikawa NM, Thuler LCS, Giglio AG, Baldotto CSR, Andrade CJC, Derchain SFM. Reproducibility of functional assessment of cancer therapy-fatigue (FACT-F) questionnaire for cancer patients. Appl cancer res. [internet] 2008 [cited 2018 Apr 02];28(2):55-61. Available from: https://www.researchgate.net/publication/266160631_Reproducibility_of_Functional_Assessment_of_Cancer_Therapy-_Fatigue_FACT-F_Questionnaire_for_Cancer_Patients.

12. Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The pittsburg sleep quality index: A new instrument for psychiatric practice and research. J psychiatr res. [internet] 1989 May [cited 2018 Apr 05];28(2):193-213. Available from: https://linkinghub.elsevier.com/retrieve/pii/0165-1781(89)90047-4.

13. Bertolazi NA, Fagondes SC, Hoff LS, Dartora EG, Miozzo IC, Barba MEF, et al. Validation of the Brazilian Portuguese version of the Pittsburgh Sleep Quality Index. Sleep medicine. [internet] 2011 Jan [cited 2018 Apr 05];12(1):70-5. Available from: https://www.sleep-journal.com/article/S1389-9457(10)00380-1/fulltext doi: http://dx.doi. org/10.1016/j.sleep.2010.04.020.

14. Savard J, Ivers H, Savard MH, Morin CM. Cancer treatments and their side effects are associated with aggravation of insomnia: results of a longitudinal study. Cancer. [internet] 2015 May [cited 2018 May 03];121(10):1703–1711. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1002/cncr.29244. doi: 10.1002/cncr.29244.

15. Harris B, Ross J, Sanchez-Reilly S. Sleeping in the arms of cancer: a review of sleeping disorders among patients with cancer. Cancer J. [internet] 2014 Sep-Oct [cited 2018 May 03];20(5):299–305. Available from: https://insights.ovid.com/pubmed?pmid=25299138 doi: 10.1097/PPO.0000000000000067.

16. Sanford SD, Wagner LI, Beaumont JL, Butt Z, Sweet JJ, Cella D. Longitudinal prospective assessment of sleep quality: before, during, and after adjuvant chemotherapy for breast cancer. Support Care Cancer. [internet] 2013 Apr [cited 2018 Oct 12];21(4):959-67. Available from: https://link.springer.com/article/10.1007%2Fs00520-012-1612-7 doi: 10.1007/s00520-012-1612-7. Epub 2012 Oct 3.

17. Tian L, Lin L, Li HL, Chen KJ, Zhang XJ, Qian SJ et al. Prevalence and associated factors of cancer related fatigue among patients in Eastern China. Oncologist. [internet] 2016 Nov [cited 2018 Oct 15];21(11):1349-1354. Available from: https: https://www.ncbi.nlm.nih.gov/pubmed/27449523/ doi:10.1634/theoncologist.2015-0537

18. Overcash J, Tan A, Patel K, Noonan A. Factors associated with poor sleep in older women diagnosed with breast cancer. Oncol Nurs Forum. [internet] 2018 May [cited 2018 Oct 15];45(3):359-371. Available from: https://www.ncbi.nlm.nih.gov/pubmed/29683125/ doi: 10.1188/18.ONF.359-371.

19. Fisher WI, Johnson AK, Elkins GR, Otte JL, Burns DS, Yu M, et al. Risk factors, pathophysiology, and treatment of hot flashes in cancer. CA Cancer J Clin. [internet] 2013 May [cited 2018 May 03];63(3):167–92. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3640615/ doi: 10.3322/caac.21171.

20. Mansano-Schlosser TC, Ceolim MF. Fatores associados à má qualidade do sono em mulheres com câncer de mama. Rev latinoam enferm. [internet] 2017 Mar [acesso em 2018 Mai 01];25:e2858. Disponível em: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5363332/ doi: 10.1590/1518-8345.1478.2858.

21. Cheng H, Sit JWH, So WKW. The symptom burden in breast cancer survivors. Curr Breast Cancer Rep. [internet] 2016 Mar [cited 2018 Apr 29]:8(1):40-6. Available from: https://link.springer.com/article/10.1007/s12609-016-0201-z doi: 10.1007/s12609-016-0201-z.

22. Schmidt ME, Wiskemann J, Schneeweiss A, Potthoff K, Ulrich CM, Steindorf K. Determinants of physical, affective, and cognitive fatigue during breast cancer therapy and 12 months follow-up. Int J Cancer. [internet] 2018 Mar [cited 2018 May 04];142(6):1148-1157. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1002/ijc.31138 doi: 10.1002/ijc.31138.

23. Vincent AJ, Ranasinha S, Sayakhot P, Mansfield D, Teede HJ. Sleep difficulty mediates effects of vasomotor symptoms on mood in younger breast cancer survivors. Climacteric. [internet] 2014 Oct [cited 2018 Oct 12];17(5):598-604. Available from: https://www.tandfonline.com/doi/full/10.3109/13697137.2014.900745 doi: 10.3109/13697137.2014.900745.

24. Schmidt ME, Wiskemann J, Armbrust P, Schneeweiss A, Ulrich CM, Steindorf K. Effects of resistance exercise on fatigue and quality of life in breast cancer patients undergoing adjuvant chemotherapy: A randomized controlled trial. Int j cancer. [internet] 2015 Jul [cited 2018 Jun 24];137(2):471-80. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1002/ijc.29383.

25. Yamamoto S, Tazumi K, Arao H. Support not corresponding to transition to a new treatment: Women's perceptions of support provided by their male partners during hormonal therapy. Int J Qual Stud Health Well-being. [internet] 2015 [cited 2018 Oc 12];10(29283):1-9. Available from: https://doi.org/10.3402/qhw.v10.29283.

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How to cite this article

Silva PR, Lóris Cruz AP, Nascimento TG, Gozzo TO. Sleep quality and fatigue in women with breast cancer during chemotherapy. Rev. Enferm. UFSM. 2019 [Acesso at: 2019, june, 15];vol,9 : P1-P18 DOI:https://doi.org/10.5902/2179769232732