

Other Side of Breast Cancer: Sleep Quality

Samereh Eghtedar¹, Mina Nahamin², Robab Hassanzadeh³,
Fatemeh-Sara Aparnak⁴, Elnaz Asghari^{5*}

¹ Department of Medical-Surgical, School of Nursing and Midwifery, Urmia University of Medical Sciences, Urmia, Iran

² Department of Medical-Surgical, School of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, Iran

³ Department of Midwifery, Bonab Branch, Islamic Azad University, Bonab, Iran

⁴ Department of Midwifery, Urmia Branch, Islamic Azad University, Urmia, Iran

⁵ Student Research Committee, School of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, Iran

Received: 15 Sep. 2016 Accepted: 21 Dec. 2016

Abstract

Background and Objective: Breast cancer is the most common cancer among women. Many of the women with breast cancer suffer from sleep disorders. This study aimed to investigate the quality of sleep and its related issues in women with breast cancer referred to the Hematology and Oncology Research Center affiliated with Tabriz University of Medical Sciences, Tabriz, Iran.

Materials and Methods: In this cross-sectional study, 103 women with breast cancer were chosen using the census method. Data were collected using the Pittsburgh Sleep Quality Index. Descriptive and analytic statistics and linear regression test were used for data analysis.

Results: The mean age of the sample was 42.59 years [standard deviation (SD): 11.72 years] and the average length of diagnosis was 19.90 months (SD: 12.67 months). The mean score of sleep quality was 11.50 (SD: 3.71) in a range from 0 to 21. Except the history of mastectomy, age, smoking status, the remaining demographic data could predict 39.5% of the variance of sleep quality.

Conclusion: The results of this study are a wakeup call for officials. To prevent the negative impact of poor quality of sleep, there is a need to design holistic and appropriate interventions. The findings provide valuable information with scheduling for these interventions.

© 2016 Tehran University of Medical Sciences. All rights reserved.

Keywords: Sleep quality; Breast cancer; Pittsburgh Sleep Quality Index

Citation: Eghtedar S, Nahamin M, Hassanzadeh R, Aparnak FS, Asghari E. **Other Side of Breast Cancer: Sleep Quality.** *J Sleep Sci* 2016; 1(4): 169-75.

Introduction

Sleep is consisted of a series of physiologic and behavioral processes that is necessary for appropriate functions of the human being from physiologic and psychological aspects (1). One sleep cycle is composed of non-rapid eye movement (NREM) and rapid eye movement stages. In the final stage of NREM, growth hormone is secreted for restoring and rebuilding of specialized tissue cells that have significant importance for the patients with cancer (2). It is believed that sleep has

numerous benefits for organizing and facilitating immune system's activities as well as restoring damaged tissues (3). Therefore, some researchers emphasize the importance of sleep disorders with the same level of importance as anemia and metabolic disorders in patients with cancer (4).

Many patients with cancer suffer from sleep disorders. In this respect, the results of two large studies showed that between 44% and 48% of patients with cancer needed the prescription of sleep medications (5). While sleep disorders should be treated in all patients with cancer, they need more attention in women with breast cancer. Breast cancer is the most common cancer in women with an increasing prevalence of 5% in year. Moreover, sleep disorders are more common in young adults

* **Corresponding author:** E. Asghari, Student Research Committee, School of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, Iran
Tel: +984134770648, Fax: +984134770648
Email: asghariel@tbzmed.ac.ir

with cancer. On the other hand, the most common age of breast cancer in Iran is between 45 and 54-year-old, that is 10 years less than the average age of this disease in developed countries; this age range coincides with the peak of responsibilities and work pressure (6). Furthermore, with regards to the psychological pressure in patients with the reproductive system cancers (7), and the influence of psychological pressure on the quality of sleep, attention to sleep disorders in such patients becomes more serious.

Although sleep disorders are one of the major health issues in patients with breast cancer, they have not sufficiently been considered by health-care professionals in the routine oncology care process. The aim of this study was to investigate the quality of sleep and its related issues in women with breast cancer referred to the Hematology and Oncology Research Center affiliated with Tabriz University of Medical Sciences, Iran.

Materials and Methods

This was a cross-sectional study conducted in the Hematology and Oncology Center affiliated with Tabriz University of Medical Sciences. Since the majority of patients with breast cancer are followed in this center once in every 2 months, at least 2 months was necessary to conduct sampling. Participants were the women with breast cancer diagnosis, who were in recovery phase and visiting their doctor as follow up process in an inpatient clinic. All eligible women referred to the center between January and May 2016 were entered the study. The inclusion criteria were: age between 15 and 65-year-old, diagnosis of breast cancer, no history of severe mental disorders, experience of no pain and acute illness during data collection, and having no other cancers. The final number of samples chosen using the census method was 103 women. Data collection tools were (i) the demographic data questionnaire including marital status, history of pregnancy, educational level, insurance coverage, treatment history, etc. and (ii) the Pittsburgh Sleep Quality Index (PSQI). PSQI consists of 19 individual items, creating 7 components that produce one global score, and takes 5-10 minutes to complete.

It is composed of domains as sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction. Each domain is scored from 0 to 3. The final scores range be-

tween 0 and 21 with higher scores indicating worse quality of sleep. The validity and reliability of the PSQI have been confirmed in previous studies with similar contexts (range of Cronbach's alpha from 0.84 to 0.88) (8, 9).

Data were analyzed using the SPSS for Windows (version 16; SPSS Inc., Chicago, IL, USA). The normality of the data was confirmed by the Kolmogorov-Smirnov test. Therefore, the relationships between the quality of sleep, as a quantitative variable, with other quantitative variables such as age and the duration of disease were tested using the Pearson correlation coefficient. The independent t-test was used to examine the relationships between the quality of sleep and binary qualitative variables such as the history of pregnancy, smoking, and breast surgery. Furthermore, the relationships between the quality of sleep and multinary qualitative variables such as the level of education, exercise habits, and employment status were tested using the ANOVA test. Since the assessed variables were only demographic ones, those variables that had the value of $P < 0.1000$ were entered the linear regression test with the main effect model. Since all variables entered the multiple linear regression model were quantitative in nature, qualitative variables incorporated into the model as dummy variables.

This study was approved by the Research Council (decree number 5.4.11785) affiliated with Tabriz University of Medical Sciences, Tabriz, Iran. The samples were informed about the purpose and method of the study and were asked to sign written informed consent. The study proposal was approved by the ethical committee of Tabriz University of Medical Sciences. The researcher gave necessary information about the aim and study procedure to participants. Confidentiality of data, voluntarily nature of the study and the possibility of unsubscribing at any time were explained in addition.

Results

The mean age of the sample was 42.59 years [standard deviation (SD): 11.72 years] in a range from 21 to 67 years, and the average duration of disease was 19.90 months (SD: 12.67 months) in a range from 4 to 70 months. The total score of quality of sleep reported as 11.50 (SD: 3.71). According to the result of Pearson correlation coefficient, the relationship between sleep quality with age ($r = 0.1$, $P < 0.0500$) and duration of disease

($r = -0.3$, $P < 0.0500$) were significant. Further details of the demographic data and the relation-

ships between demographic data and the quality of sleep are provided in table 1.

Table 1. The relationships between the quality of sleep and demographic data (N = 103)

Variable	Category	N (%)	Mean \pm SD of sleep quality	P-value
Marital status	Married	76 (73.8)	11.47 \pm 2.42	< 0.0001*
	Single	20 (19.4)	12.24 \pm 3.20	
	Divorced	3 (2.9)	13.52 \pm 3.75	
	Widow	4 (3.9)	15.73 \pm 4.02	
Insurance coverage	Yes	97 (94.2)	11.47 \pm 2.26	0.2000**
	No	6 (5.8)	17.93 \pm 5.6	
History of pregnancy	Yes	80 (77.7)	11.06 \pm 2.75	< 0.0001**
	No	23 (22.3)	14.58 \pm 3.98	
Undergoing mastectomy surgery	Yes	80 (77.7)	12.41 \pm 3.84	< 0.0001**
	No	23 (22.3)	9.87 \pm 2.84	
Undergoing radiotherapy	Yes	75 (72.8)	12.45 \pm 3.64	0.0700**
	No	28 (27.2)	10.22 \pm 3.12	
Undergoing chemotherapy	Yes	97 (94.2)	11.30 \pm 3.25	< 0.0001**
	No	6 (5.8)	20.69 \pm 5.63	
History of sleep disorder	Yes	38 (36.9)	11.96 \pm 3.17	0.3100**
	No	65 (63.1)	11.77 \pm 3.11	
Cigarette smoking	Yes	17 (16.5)	11.64 \pm 3.45	< 0.0001**
	No	86 (83.5)	11.47 \pm 2.98	
Educational level	Illiterate	29 (28.2)	11.45 \pm 3.67	0.8100*
	Below diploma	31 (30.1)	11.52 \pm 3.57	
	Diploma	22 (21.4)	11.52 \pm 3.59	
	Academic degree	21 (20.4)	13.15 \pm 3.97	
Employment status	Housewife	72 (69.9)	11.69 \pm 3.26	0.1100*
	Employee	5 (4.9)	11.25 \pm 3.64	
	Retired	13 (12.6)	12.78 \pm 3.88	
	The other	13 (12.6)	12.00 \pm 3.75	
History of another diseases	Yes	39 (37.9)	11.98 \pm 3.76	0.0900**
	No	64 (62.1)	11.76 \pm 3.62	
Doing sport	Daily	3 (2.9)	11.21 \pm 3.11	0.0100*
	2 times in weeks	9 (8.7)	11.21 \pm 3.20	
	1 time in week	28 (27.2)	11.37 \pm 3.23	
	< 1 time in week	17 (16.5)	11.52 \pm 3.41	
	Rarely	46 (44.7)	12.77 \pm 4.00	
Income (million tomans)	< 1	40 (38.8)	11.74 \pm 3.71	0.1500*
	1-2	45 (43.7)	11.69 \pm 3.63	
	2-4	16 (15.5)	14.07 \pm 4.26	
	4-6	17 (16.5)	12.47 \pm 4.08	
Enough income for living expenses	Yes	23 (22.3)	11.82 \pm 3.86	0.1200*
	To some extent	14 (13.6)	11.98 \pm 3.91	
	No	65 (63.1)	12.01 \pm 4.02	
Residence place	Urban	83 (80.6)	11.47 \pm 3.70	0.1100**
	Rural	20 (19.4)	13.40 \pm 4.39	
Time period between going to bed until falling asleep (minutes)	< 15	6 (5.8)	9.11 \pm 2.013	0.0300*
	16-30	30 (29.1)	11.59 \pm 2.96	
	31-60	40 (38.8)	12.12 \pm 4.06	
	> 60	27 (26.2)	12.37 \pm 2.09	
Night sleep duration (hours)	> 7	7 (6.8)	9.32 \pm 3.08	< 0.0001*
	6-7	21 (20.4)	11.57 \pm 3.42	
	5-6	44 (42.7)	11.98 \pm 3.65	
	< 5	31 (30.1)	12.41 \pm 4.15	
Sleep apnea	Never	17 (16.5)	11.18 \pm 3.16	< 0.0001*
	Rarely	28 (27.2)	11.45 \pm 3.18	
	< 1 per week	27 (26.2)	12.19 \pm 4.12	
	1-2 times in week	25 (24.3)	12.21 \pm 4.06	
	> 3 per week	6 (5.8)	12.47 \pm 4.08	

*ANOVA; **Independent t-test; SD: Standard deviation

Table 2. Predictors of quality of sleep in multiple linear regression analysis

Variables	Category	Regression coefficient	95% CI		P-value
			Lower bound	Upper bound	
Doing sport	Daily	0.04	-0.08	0.22	0.0900
	2 times in weeks	-1.05	-1.00	1.49	0.7000
	1 time in week	-0.01	-0.42	0.13	0.0800
	< 1 time in week	1.34	0.58	2.49	0.1300
History of pregnancy	Rarely		Reference		0.0900
	Yes	-1.01	-1.72	1.29	0.6000
Marital status	No		Reference		0.3100
	Widow	-2.173	-3.76	1.70	0.1300
	Divorced	1.444	0.98	2.39	0.0300
	Single	-1.069	-2.15	1.00	0.0600
History of another diseases	Married		Reference		0.0600
	Yes	-0.01	-0.52	0.11	0.5800
Cigarette smoking	No		Reference		0.1000
	Yes	-0.71	-0.82	0.71	0.8800
Age	No		Reference		0.7800
	Yes	0.01	-0.09	0.12	0.0500
Treatment	Mastectomy	1.45	1.29	2.39	0.0030
	Chemotherapy	1.069	0.13	2.00	0.0400
	Radiotherapy		Reference		0.0300
Time period between going to bed to sleep (minutes)	> 60	0.01	-0.08	0.11	0.0500
	31-60	0.00	-0.09	0.10	0.0500
	16-30	0.02	-0.02	0.07	0.0500
	< 15		Reference		0.0300
Night sleep duration (hours)	< 5	1.44	0.48	2.39	< 0.0001
	5-6	-1.228	-1.05	-1.40	0.7500
	6-7	0.01	-2.792	-1.236	0.6100
	> 7		reference		0.0300
Sleep apnea	> 3 per week	2.37	0.01	3.01	< 0.0001
	1-2 times in week	2.21	1.01	2.59	0.0500
	< 1 per week	1.92	0.11	2.03	0.0500
	Rarely	1.44	1.00	1.91	0.0400
	Never		reference		0.0300

$R^2 = 0.395$; CI: Confidence intervals

The demographic variables that had relationships with the quality of sleep with a $P < 0.1000$, (including doing sport, history of pregnancy, marital status, history of another diseases, cigarette smoking, age, treatment, time period between going to bed to sleep, night sleep duration, and sleep apnea) were entered the regression analysis. Of these variables, except age, smoking, sport, history of pregnancy, marital status, and history of other diseases, the remaining had the predictive value for the variations of the quality of sleep. They accounted for 39.5% of the observed variance. More details are presented in table 2.

Discussion

According to this study's findings, the women with breast cancer experienced poor quality of sleep. Similarly, Fortner et al. (10) studied 72 women with breast cancer in the USA. They found that 61% of the study samples had sleep disorders. According to the evidence the quality of sleep is affected by both physical and mental health conditions and cancer-related problems such as pain, depression, and a limited level of physical activity; therefore, a low quality of life can lead to the reduction of the quality of sleep. Obviously women with breast cancer are under a

great amount of physical and psychological pressure. Other studies have confirmed the presence of a relationship between the quality of sleep and the physical complications of cancer due to medication, the process of disease, and psychological complications due to changes in personal, family, and social roles (11). In a study by Otte et al. (1), the prevalence of sleep disorders influencing the quality of sleep, night sleep duration, delay in falling sleep, and disturbances in daily life activities were more common in women with breast cancer comparing with healthy women.

Since many variables were described in this study, the discussion is only going around predictive variables. The findings showed that delays in falling asleep was one of the most common sleep disorders as 60% of the samples reported that it took more than 30 minutes to fall in asleep. Another study also in women with breast cancer found that the main cause of sleep complaint was a delay in falling sleep for about 30 minutes (12). According to Beck et al.'s (13) findings, the required time to fall in sleep was 27.7 minutes. Kuo et al. (14), declared that the most common form of sleep disruption in women with breast cancer was delay in falling asleep. One probable reason for such a problem is the situational stress that can lead to tiredness, depression and anxiety during the day. In this respect, some remedies, like drinking warm milk before going to bed and using relaxation techniques that help with promoting sleep are suggested (15). Recently, some researchers have introduced the effectiveness of complementary medicine along with chemical drugs among cancer survivors; In addition, some authors support the effectiveness of exercise especially yoga for improving the quality of sleep (16).

In this study, 30.1% of the women reported sleep time < 5 hours during the night. In the study by Ancoli-Israel et al. (17) conducted with 82 women suffering from breast cancer, the total hours of sleep during the night was 6 hours. Although there is not one standard sleep time for all people, most literature suggests the necessity of about 7 hours sleep time (18), because some complications such as dizziness, forgetfulness, and irritability are reported in patients who have less night sleep time (19).

According to this study's findings, about 24% and 5% of the samples reported one or two and more than three incidences of sleep apnea per

week, respectively. Davidson et al. (20), stated that 9.6% of patients with cancer suffer from sleep apnea. In the study of Fortner et al. (10), 4% of patients with breast cancer experienced sleep apnea three times or more in each week. The mutual relationship between sleep apnea and breast cancer still remains a mystery; women with sleep apnea are more vulnerable to breast cancer development (21), and on the other hand, women with breast cancer experience more sleep apnea. It seems that sleep medications' and taking inappropriate sleep positions especially after mastectomy or because of feeling pain may exacerbate sleep breathing issues (22). The important point is that sleep apnea can increase the mortality of patients with cancer (23), hence needs more attention by health-care specialists.

In this study, there was a statistically significant relationship between the participants' age and the score of PSQI as with higher age, the quality of sleep got worse. Conversely, Mercadante et al. (24), found that with increasing the age, patients experienced less sleep disorders. Nevertheless, increasing the age was accompanied with changes in the quantity and quality of sleep as the manifestations of sleep disorders. Physical problems intensify the incidence of sleep disorders in this age group. Furthermore, retirement and death of family members lead to emotional distress. Therefore, delay in falling sleep and frequent wake up during night in this group are not unexpected (25). However, this variable was unable to predict the quality of sleep.

We found a statistically significant relationship between the duration of disease and improvement of the sleep quality. In the study of Park et al. (26), patients experienced less sleep disorders as the duration of the disease increased. In the study of Chen et al. (5), newly diagnosed patients reported more sleep problems. A probable reason is patients' adaptation with the disease and a reduction of anxiety owing to the diagnosis and primary treatments. With optimism, it is guessed that patients reach a better health condition as they see improvements in their treatment process.

Furthermore, patients after the mastectomy surgery experienced more sleep problems that might be related to the anxiety of body image changes, pain and edema in the side of surgery as barriers to a comfortable night sleep. However, this variable could not be recognized as a predictive factor, maybe because as an inclusion criteri-

on, this study was conducted with patients who passed their acute phase of disease.

According to our findings, single patients and those who had no history of pregnancy experienced more sleep problems. While there are many challenges with regard to marriage and childbearing in our society, current findings support the notion that family union, marriage, and having a child can positively influence the process of disease. Marriage and childbearing are suggested due to their protective effects of breastfeeding on the development of disease and emotional support of them during stressful period of disease (27).

This study shows the prevalence of sleep disruption and its related issues in women with breast cancer. Although it provides valuable information to decision making in this regard, it has some limitations. To control the confounding and background variables, we limited the sampling process to just one center and it limited sample size and even generalizability of findings to only similar settings and patients. In addition, considering sample size, we assessed more variables which limit the use of regression test, although input variables were < 10% of sample size. Furthermore, some important related variables like body mass index and sleeping pills have not assessed. Further studies with more sample sizes and using more objective measures like actigraphy and polysomnography are suggested.

Conclusion

According to recent findings, most of the women with breast cancer suffered from sleep disorders. Since different factors influenced their quality of sleep, there is a need to design holistic and appropriate interventions to help the women with breast cancer to resolve their sleep disorders.

It is advised to assess the quality of sleep in patients' treatment follow up sessions. Moreover, the reliance on medication to resolve sleep disorders may lead to drug dependency. Therefore, complementary and non-pharmacological methods, consultation with psychologists for reducing patients' anxiety and depression are suggested to be used along with medication therapy. Finally to reach stronger conclusion about the study topic, conducting further study in the presence of control and compare groups is suggesting.

Conflict of Interests

Authors have no conflict of interests.

Acknowledgments

The authors of this article sincerely thank the participants for their participation in this study. Also, our gratitude is extended to the administrators and staffs of Hematology and Oncology Research Center, Tabriz University of Medical Sciences.

References

- Otte JL, Carpenter JS, Manchanda S, et al. Systematic review of sleep disorders in cancer patients: can the prevalence of sleep disorders be ascertained? *Cancer Med* 2015; 4: 183-200.
- Potter PA, Perry AG, Stockert P, et al. *Fundamentals of Nursing*. Philadelphia, PA: Elsevier Health Sciences, 2016.
- Walker AJ, Pongsing Y, Nail L, et al. Sleep-wake patterns of school-age children and adolescents before diagnosis and during induction chemotherapy for acute lymphocytic leukemia. *J Pediatr Nurs* 2011; 26: e37-e44.
- Lee K, Cho M, Miaskowski C, et al. Impaired sleep and rhythms in persons with cancer. *Sleep Med Rev* 2004; 8: 199-212.
- Chen ML, Yu CT, Yang CH. Sleep disturbances and quality of life in lung cancer patients undergoing chemotherapy. *Lung Cancer* 2008; 62: 391-400.
- Vahidi M, Mahdavi N, Asghari E, et al. Other Side of Breast Cancer: Factors Associated with Caregiver Burden. *Asian Nurs Res (Korean Soc Nurs Sci)* 2016; 10: 201-6.
- Hawighorst-Knapstein S, Fusshoeller C, Franz C, et al. The impact of treatment for genital cancer on quality of life and body image--results of a prospective longitudinal 10-year study. *Gynecol Oncol* 2004; 94: 398-403.
- Noroozi M. Quality of sleep and related factors in Breast Cancer Patients Receiving Chemotherapy in Qom 2011. *Iran J Breast Dis* 2012; 4: 51-60.
- Kashani F, Kashani P. The effect of massage therapy on the quality of sleep in breast cancer patients. *Iran J Nurs Midwifery Res* 2014; 19: 113-8.
- Fortner BV, Stepanski EJ, Wang SC, et al. Sleep and quality of life in breast cancer patients. *J Pain Symptom Manage* 2002; 24: 471-80.
- Levkovich I, Cohen M, Pollack S, et al. Cancer-related fatigue and depression in breast cancer patients postchemotherapy: Different associations with optimism and stress appraisals. *Palliat Support Care* 2015; 13: 1141-51.
- Carpenter JS, Andrykowski MA. Psychometric evaluation of the Pittsburgh Sleep Quality Index. *J Psychosom Res* 1998; 45: 5-13.
- Beck SL, Schwartz AL, Towsley G, et al. Psychometric evaluation of the Pittsburgh Sleep Quality Index in cancer patients. *J Pain Symptom Manage*

2004; 27: 140-8.

14. Kuo HH, Chiu MJ, Liao WC, et al. Quality of sleep and related factors during chemotherapy in patients with stage I/II breast cancer. *J Formos Med Assoc* 2006; 105: 64-9.

15. Bhasin H. Chronic Insomnia & Its Impact amongst Adolescents. *Int J Ind Psychol* 2016; 3: 70-88.

16. Mustian KM, Sprod LK, Janelins M, et al. Multicenter, randomized controlled trial of yoga for sleep quality among cancer survivors. *J Clin Oncol* 2013; 31: 3233-41.

17. Ancoli-Israel S, Moore PJ, Jones V. The relationship between fatigue and sleep in cancer patients: a review. *Eur J Cancer Care (Engl)* 2001; 10: 245-55.

18. Pettee Gabriel K, Sternfeld B, Shiroma EJ, et al. Bidirectional associations of accelerometer-determined sedentary behavior and physical activity with reported time in bed: Women's Health Study. *Sleep Health* 2017; 3: 49-55.

19. Feyzabadi Z, Jafari F, Feizabadi PS, et al. Insomnia in Iranian traditional medicine. *Iran Red Crescent Med J* 2014; 16: e15981.

20. Davidson JR, MacLean AW, Brundage MD, et al. Sleep disturbance in cancer patients. *Soc Sci Med* 2002; 54: 1309-21.

21. Chang WP, Liu ME, Chang WC, et al. Sleep

apnea and the subsequent risk of breast cancer in women: a nationwide population-based cohort study. *Sleep Med* 2014; 15: 1016-20.

22. Palesh O, Aldridge-Gerry A, Ulusakarya A, et al. Sleep disruption in breast cancer patients and survivors. *J Natl Compr Canc Netw* 2013; 11: 1523-30.

23. Nieto FJ, Peppard PE, Young T, et al. Sleep-disordered breathing and cancer mortality: results from the Wisconsin Sleep Cohort Study. *Am J Respir Crit Care Med* 2012; 186: 190-4.

24. Mercadante S, Girelli D, Casuccio A. Sleep disorders in advanced cancer patients: prevalence and factors associated. *Support Care Cancer* 2004; 12: 355-9.

25. Fiorentino L, Rissling M, Liu L, et al. The Symptom Cluster of Sleep, Fatigue and Depressive Symptoms in Breast Cancer Patients: Severity of the Problem and Treatment Options. *Drug Discov Today Dis Models* 2011; 8: 167-73.

26. Park JH, Lee SJ, Gwak JI, et al. Sleep quality of breast cancer patients receiving chemotherapy in the outpatients setting. *Korean J Fam Med* 2010; 31: 778-85.

27. Hosseinzadeh M, Eivazi ZJ, Mahdavi N, et al. Risk factors for breast cancer in Iranian women: a hospital-based case-control study in Tabriz, Iran. *J Breast Cancer* 2014; 17: 236-43.