

Original Article

Sense of Coherence, Sleep Disorders and Health Related Quality of Life in Women with Breast Cancer in Greece

Anastasia Barbouni, MD, PhD

Pediatrician, elected professor of Public Health, Dept. of Public & Administrative Health, National School of Public Health, Athens, Greece

Alexandra Papakosta, MSc

Medical laboratory technologist, Oncological Hospital of Athens “Agios Savvas”, Athens, Greece

Eirini Amanaki, PhD

Researcher, Dept. of Public & Administrative Health, National School of Public Health, Athens, Greece

Kyriakoula Merakou, PhD

Teaching and Research Associate, Dept of Public & Administrative Health, National School of Public Health, Athens, Greece

Correspondence: Kyriakoula Merakou, Dept of Public & Administrative Health, National School of Public Health, 196, Alexandras Ave., Athens, 11521, Greece. E-mail: kmerakou@esdy.edu.gr

Abstract

Background: Breast cancer and its therapy methods has effects on women’ quality of life, sleep and working and social life. High sense of coherence may help women to cope more effectively with disease stress in everyday life.

Objective: This study aims to determine the factors that contribute to the quality of life, sleep disorders of breast cancer patients and the sense of coherence needed to cope with the illness induced stress.

Methodology: The study population was female outpatients with breast cancer who visited an Anticancer - Oncology Hospital of Athens. One hundred and nine women met the eligibility criteria. Patients reported demographic, socioeconomic, and clinical data, and completed the Greek version of the following questionnaires: a) Sense of Coherence scale (SOC-13), b) Athens Insomnia Scale (AIS), and c) SF-12 Health Related Quality of Life (HRQoL).

Results: The total SOC score was 60.0 and correlated with status of the disease, sleep disorder and Mental Health Summary (MHS). 67.9% of the participants suffered from sleep disorders, significantly affected by co morbidity and total SOC score as well as its three subscales. Regarding HRQoL, the mean of Physical Health Summary (PHS) and Mental Health Summary (MHS) was 39.9 and 46.9 respectively. PHS correlated only with duration of the disease ($p=0.032$) while MHS correlated with status of the disease ($p=0.015$), sleep disorder ($p<0.001$) and total SOC score ($p<0.001$) as well as its three subscales.

Conclusions: Sleep and both components of HRQoL (physical and mental health) are negatively influenced in women with breast cancer. Women with breast cancer, their families need special training to deal with the daily difficulties from the disease.

Keywords: breast cancer; sleep disorder; health-related quality of life; sense of coherence.

Introduction

Breast cancer accounts for 23% of the total cancer cases and 14% of the deaths due to cancer (Jemal et al. 2011). According to these prevalence rates, breast cancer is the most

frequently diagnosed cancer and the main cause of cancer death in women (Amaro et al. 2013). Despite the high prevalence of breast cancer worldwide (Anon n.d.; Assi et al. 2013), new technological advances have

resulted in better detection, differential diagnosis and, therefore, successful treatment and higher survival rates (Narod 2012; Siegel et al. 2015; Torre et al. 2015), as it is shown by the fact that approximately nine to ten women patients in developed countries are anticipated to survive the breast cancer for at least 5 years (Youlten et al. 2012). In conclusion, the number of cancer survivors or individuals living with a chronic disease has increased in recent years (Siegel et al. 2015; Siegel et al. 2014), which underlines the need to further research the long-term consequences of breast cancer and its treatments (Mols et al. 2005).

As a result of having been treated for cancer, the women experience short- and long-term changes of their bodies both visible (e.g., hair loss, loss of skin elasticity, etc.) and invisible (e.g., cessation of menstruation, hot flashes, being constantly tired, etc.) ones (Brunet et al. 2013). Cancer survivors experience psychosocial difficulties, such as depression, anxiety, sleep disorders, fatigue and pain, which may persist and cause further social problems (Baker-Glenn et al. 2011; Merckaert et al. 2010). As with any chronic disease, breast cancer patients face additional problems related to their quality of life, sleep disorders and stress (Fiorentino & Ancoli-Israel 2006; Grabsch et al. 2006; Liu et al. 2013; Stanton & Bower 2015). These problems mainly stem from the threat the disease imposes on their life and their body, the distress about the toxicity of the treatment and their endurance to it, the changes inflicted on their body and their ability to cope with their routine duties (Molassiotis, 2004). Lately, scientific interest has shifted from the identification of the causal or risk factors of breast cancer to the protective or even preventive factors (Narod, 2012).

Through the early detection, the diagnosis, the therapeutic interventions, often harming (partial or total mastectomy), and the accompanying therapies (chemotherapy, radiotherapy) women with breast cancer may suffer from anxiety, depression, uncertainty, sadness, fear, anger (Kyranou et al. 2013; Sarenmalm et al. 2007; Vahdaninia et al. 2010). They often develop a negative self-image concerning their femininity,

attractiveness, sexual activity or even motherhood (Fobair et al. 2006; Montazeri 2008). The patients' quality of life exhibits a significant decrease, with additional consequences such as feelings of despair, loneliness and social withdrawal. Health-Related Quality of Life (HRQoL) assesses the impact of the disease and its therapeutic treatment on a physical, psychological, intellectual and social level (21). Measuring HRQoL helps clinicians complete the clinical evaluation, reflecting the multifactorial load borne by the patients through the different stages they experience, and also decide upon the most appropriate course of treatment and services to address the consequences of the disease. Thus, one of the main purposes of this study was to investigate HRQoL of the women with breast cancer, in order to limit the focus specifically in health matters (Tishelman et al. 2010).

Even though HRQOL does not predict the recurrence of breast cancer, the changes in HRQOL over time may predict said recurrence (Browall et al. 2013). For example, it has been found that the risk for recurrence within 3 years of initial diagnosis is higher for the women who experience a higher impairment in physical well-being (Sarenmalm et al. 2009). The aforementioned data further emphasized the need for a deeper investigation of the HRQoL of the women with breast cancer.

Sense of coherence (SOC) is a theory by Aaron Antonovsky concerning "health genesis" (salutogenesis) (Antonovsky 1993a). It is a comprehensive view, which attempts to explain why some people successfully manage stress and stay healthy, while others crumble (Lamprecht & Sack 2003). A strong SOC helps the person view the world as structured and predictable, the problems as manageable and the demands of life as meaningful challenges (Jakobsson 2011).

Although the SOC seems to have a mediating role in the interpretation of health, it does not explain the overall health by itself. It is, however, positively associated with perceived good health, affecting indirectly the quality of life. Thus, it appears that the stronger the SOC,

the lower the number of subjective complaints and symptoms of the disease, both physical and psychological (Eriksson et al. 2007). A patient with a high SOC is expected to cope effectively with health related stress (Jakobsson 2011).

Insomnia affects 32% of people, while 24% reports that they do not sleep well, according to the results of a cross-sectional survey conducted in 10 countries (Soldatos et al. 2005). Additionally, women with breast cancer frequently report insomnia symptoms (Bardwell et al. 2008; Fiorentino & Ancoli-Israel 2006; Fiorentino & Ancoli-Israel 2008; Otte et al. 2010), especially after completing their treatment (almost half of them) (Savard et al. 2001; Savard & Morin 2001; Savard et al. 2005) and even 2-5 years after their diagnosis (Lindley et al. 1998). It is thus suggested that insomnia is a chronic problem for women with breast cancer, with 20% of them meeting the criteria for insomnia syndrome (Savard & Morin 2001; Savard et al. 2005).

Although sleep disorders are a common occurrence in women with breast cancer, especially after chemotherapy (Beck et al. 2010; Kuo et al. 2006; Liu et al. 2009; Savard et al. 2009), they have been underestimated, because they have been considered as ordinary and anticipated responses to the disease and its subsequent treatment (Roscoe et al. 2007). They may include difficulty in falling asleep, multiple awakenings during the night or waking earlier than desired, total duration of sleep and ultimately affect the quality of sleep (Fiorentino & Ancoli-Israel 2006; Girschik et al. 2013). Insomnia in breast cancer has been associated with a variety of risk factors, including pain (Ancoli-Israel 2006; Koopman et al. 2002), fatigue (Ancoli-Israel 2006; Payne et al. 2006), stage of cancer (Koopman et al. 2002; Savard et al. 2001), physical health (Ancoli-Israel 2006; Bardwell et al. 2008), treatment (Fortner et al. 2002; Kuo et al. 2006; Savard et al. 2001), poor social support (Koopman et al. 2002), lower education (Koopman et al. 2002), and being widowed or separated (Savard et al. 2001). On the other hand, no sufficient research has focused on the nature, severity and duration of sleep

difficulties experienced by breast cancer patients (Savard et al. 2001).

Reflecting the above, the present investigation deals with the further consideration of the issue of insomnia in women with breast cancer, focusing intensively on the correlation between the occurrence of insomnia with HRQoL of breast cancer patients, through the identification of their SOC, which influence their ability to cope with the illness induced stress.

Research Questions and Hypothesis

In this study the main hypothesis was whether quality of life related to health, sleep and sense of coherence have been affected by cancer therapy in women with breast cancer

The research questions under investigation included:

- The assessment of women' quality of life related to health
- The assessment of their sleep quality
- The estimation of their sense of coherence
- The investigation of the association among demographics and the three variables.

Methodology

Sample

The study protocol was approved by the Ethics Committee of the National School of Public Health, Athens, Greece (decision number 1350/20-9-2013) and by the D' Department of Surgery (Breast) of the Anticancer - Oncology Hospital of Athens "Agios Savvas". Patients were informed in person about the aim of the study and that their anonymity would be guaranteed. Women were eligible to participate in the study if they met the following criteria: (i) ≥ 18 years of age; (ii) diagnosed with breast cancer at any kind of stage at least three months before; (iii) spoke and understood Greek adequately; (iv) were able to provide written informed consent; and (v) were not a first time outpatient at the breast cancer clinic. One hundred and fifty women

met the eligibility criteria and 109 of them (72.7%) provided written consent. The administration of the consent forms and the questionnaires took place from Monday until Friday, in the morning and evening outpatient hours, in order to include all categories of patients (e.g. working women, women from rural areas, etc.). The research lasted three months, from October to December of 2013. The questionnaires were answered in written form and the time required for their completion was 15'-20'.

Assessments

Patients reported demographic (age, marital status, number of children, place of residence) and socioeconomic (highest education, employment status and occupational activities) data by answering close-ended questions.

Clinical data as well as patients' medical history were obtained. Respondents were asked to report any chronic diseases from a checklist of the primary causes of morbidity (i.e., osteoporosis, diabetes, hypertension, hypercholesterolemia, etc.). The number of the chronic diseases was evaluated. Moreover, patients were asked to report their weight in kilograms and their height in meters. Body mass index (BMI) is calculated as weight divided by height squared and rounded to the nearest tenth. Following the current recommendations, individuals with a BMI ≥ 25 kg/m² were considered overweight, while those with a BMI ≥ 30 kg/m² were classified as obese (Flegal et al. 2012). Subsequently, patients gave information on the treatment they followed (mastectomy, radiation therapy, chemotherapy, etc.) and the course of the disease ("How would you describe the course of your illness?").

Insomnia-related symptoms were measured with the Greek version of the Athens Insomnia Scale (AIS) (Soldatos et al. 2000), which is a self-administered psychometric instrument based on the ICD-10 criteria and designed for quantifying the severity of insomnia. The scale consists of eight items, each of which is scored on a Likert scale, ranging from 0 to 3. The total score ranges from 0 to 24. Higher scores indicate higher levels of sleeping difficulties.

The first five items refer to awakenings during the night, final awakening, sleep induction, total sleep duration and sleep quality. The last three items refer to well-being, functioning capability and sleepiness during the day. The diagnosis of insomnia was based on a cut-off score of ≥ 6 on the AIS (Soldatos et al. 2003).

The SOC was assessed by the short version of the Sense Of Coherence scale (SOC-13) developed by Antonovsky (Antonovsky 1993b). The scale consists of 13 items, each of which is scored on a Likert scale, ranging from 1 ("very often") to 7 ("very seldom or never"). The SOC-13 scale includes three dimensions: comprehensibility (five items, measuring the person's perception of the internal and external elements of its environment as structured and predictable); manageability (four items, referring to the person's ability to meet the demands of said environment successfully); and meaningfulness (four items, measuring the person's ability to view those demands as worthy challenges, thus referring to its motivation). After reversing the scores of the negatively worded items, the scores of the 13 items were added to obtain the overall SOC score. The SOC score could range from 13 to 91, with higher scores indicating stronger SOC. The SOC-13 scale has been translated into many languages, including Greek (Karalis et al. 2004; Merakou et al. 2013).

The self-perceived HRQoL was assessed with the Greek version SF-12 (Kontodimopoulos et al. 2007), the 12-item short form of the widely used SF-36 Health Status Questionnaire (Ware et al. 1996). The SF-12 provides physical health and mental health component summary scores. These two subscales (Physical health and Mental health) are scored with a mean of 50 and a SD of 10. Higher scores on these subscales indicate better HRQoL.

Statistical analysis

Continuous variables are presented with mean and standard deviation (SD). Qualitative variables are presented with absolute and relative frequencies. The association of SOC-13 dimensions with demographic and clinical characteristics was evaluated with linear regression analyses in a stepwise method.

Also, linear regression analyses in a stepwise method was used to investigate the association of insomnia with demographic, clinical characteristics and SOC-13 dimensions and the association of SF-12 dimensions with demographic, clinical characteristics, insomnia and SOC-13 dimensions. Regression coefficients (β) with their standard errors (SE) were computed from the results of linear regression analyses. Each SOC-13 dimension which correlated significantly with insomnia or SF-12 dimensions, was examined separately in the linear regression model because model diagnostics with two or more dimensions of SOC-13 in the models indicated that the regression estimates were highly collinear. All p values reported are two-tailed. Statistical significance was set at 0.05 and analyses were conducted using SPSS statistical software (version 19.0).

Results

Demographic and clinical characteristics of the sample are shown in Table 1. The average BMI of the participants was 27.3 units (± 4.5) and the majority of them (36.8%) had normal body weight. Most patients were married (67%) and had children (85.3%). Regarding their education, 37.7% reported an average education level and 34.8% reported higher levels. Approximately three out of four patients (74.3%) lived in urban areas with more than 250,000 residents. In addition, 69.2% of the study's participants characterized their financial situation as being average. A significant number of patients (21.1%) were current smokers, while 54.1% of them had at least one comorbid disease.

The most frequent disease was osteoporosis (24.8%), followed by arthritis (14.7%) and the disease of the upper gastrointestinal system (11.0%). The median duration of breast cancer was 4 years (1-10 years). In 98.2% of the participants the primary focus was in the chest area. Of these women, 51.4% had undergone segmental resection, 36.7% total mastectomy and 6.4% had received both procedures. Moreover, 70.1% of the patients had undergone radiotherapy, 57.8% chemotherapy

and 37.5% hormone therapy. More than half of them (55.0%) were in recession/had stopped treatment, 36.7% of them were still being treated, while an 8.3% showcased another affected organ. On the 10-point self-assessment scales of physical and mental health, the participants reported a mean score of 7 points (± 1.9) on the physical and 7 points (± 2.1 points) on the mental scale as well. A large number of women (67.9%) suffered from insomnia, a percentage much higher than the corresponding percentage in the general population (25.3%) (Paparrigopoulos et al. 2010).

Table 2 presents summary statistics for SF-12 and SOC-13 dimensions.

Results from multiple linear regression analysis in a stepwise method for SOC-13 are shown in Table 3. Status of the disease was the only independently factor associated with total score of SOC-13. Women still being on therapy had significantly greater values on total score of SOC-13 in comparison with women that had metastasis. Additionally, it was found that women from rural areas had greater score on Comprehensibility as compared with those from urban areas. Socioeconomical status and status of the disease were independently associated with Manageability. Women still being on therapy had significantly greater values on Manageability in comparison with women that had metastasis, while patients with moderate to very good socioeconomical status had greater scores on Manageability in comparison with those having poor socioeconomical status. No factor revealed significant association with Meaningfulness dimension. Results from multiple logistic regression analyses with dependent the variable presented insomnia and independent all demographics, clinical data and SOC-13 dimensions (Table 4) showed that the odds of insomnia increases when a concomitant disease was present. Also, increase score on total score SOC-13 or its dimensions was found to be associated with lower odds of insomnia.

Table 1. Demographic and clinical characteristics

		N	%
Age, mean±SD		59.8±11.5	
BMI, mean±SD		27.3±4.5	
Weight status	Normal (BMI < 25)	39	36.8
	Overweight (25 ≤ BMI < 30)	37	34.9
	Obese (BMI ≥ 30)	30	28.3
Family status	Single	10	9,2
	Married	73	67.0
	Divorced/Widowed	26	23.8
Children	No	16	14.7
	Yes	93	85.3
Level of Education	Low (primary education)	30	27.5
	Middle (secondary education)	41	37.7
	High (university)	38	34.8
Socioeconomic status	Lower	20	18.7
	Middle	74	69.2
	Upper	13	12.2
Residence	Urban	81	74.3
	Rural	28	25.7
Socioeconomical status	Poor	20	18,7
	Moderate	74	69,2
	Good	11	10,3
	Very good	2	1,9
Smoking status	No	69	63.3
	Current smoker	23	21.1
	Past smoker	17	15.6
Concomitant disease	No	50	45.9
	Yes	59	54.1
Duration of disease, mean±SD, median (IQR)		6.6±7.6	4 (1 - 10)
Primary cancer	No	2	1,8
	Yes	107	98,2
Surgery	No	6	5.5
	Lumpectomy	56	51.4
	Mastectomy	40	36.7
	Lumpectomy and Mastectomy	7	6.4
Radiation therapy	No	32	29.9
	Yes	75	70.1
Chemotherapy	No	46	42.2
	Yes	63	57.8
Hormone therapy	No	65	62.5
	Yes	39	37.5
Status of the disease	Stable disease	60	55.0
	On therapy	40	36.7
	Metastasis	9	8.3
Insomnia	No	35	32.1
	Yes	74	67.9

Table 2. Summary statistics for SF-12 and SOC-13 dimensions

	Minimum	Maximun	Mean	SD
SF-12				
Physical health	27.2	53.4	39.9	5.5
Mental health	17.2	68.6	46.9	13.3
SOC-13				
Total score	30.0	91.0	60.6	13.6
Comprehensibility	6.0	35.0	22.2	6.7
Manageability	7.0	28.0	17.7	4.7
Meaningfulness	8.0	28.0	20.6	4.6

Table 3. Results from multiple linear regression analysis in a stepwise method for SOC-13

	β^{\ddagger}	SE**	P
<i>SOC-13- Total score</i>			
Status of the disease			
Metastasis, reference			
Stable disease	7.78	4.72	0.102
On therapy	12.69	4.89	0.011
<i>Comprehensibility</i>			
Residence			
Urban, reference			
Rural	-3.59	1.42	0.013
<i>Manageability</i>			
Socioeconomical status			
Poor, reference			
Moderate to very good	2.64	1.15	0.024
Status of the disease			
Metastasis, reference			
Stable disease	2.78	1.66	0.097
On therapy	4.69	1.69	0.006

Note. \ddagger regression coefficient; **standard error.

Table 4. Results from multiple logistic regression analysis in a stepwise method for having insomnia

	OR (95% Δ E) \ddagger	P
Concomitant disease	4.70 (1.76 - 12.52)	0.002
Total score SOC-13	0.92 (0.88 - 0.96)	<0.001
Comprehensibility *	0.85 (0.77 – 0.92)	<0.001
Manageability *	0.82 (0.73 – 0.91)	<0.001
Meaningfulness *	0.86 (0.76 – 0.96)	0.007

Note. \ddagger Odds Ratio (95% Confidence Interval);*regression coefficient derived from a new model

Table 5. Results from multiple linear regression analysis in a stepwise method for SF-12 dimensions

	β^{\ddagger}	SE**	P
<u>Physical health</u>			
Duration of disease	0.15	0.07	0.032
<u>Mental health</u>			
Status of the disease			
Metastasis, reference			
Stable disease	8.83	3.57	0.015
On therapy	2.84	3.75	0.451
Insomnia (yes vs. no)	-10.66	2.24	<0.001
Total score SOC-13	0.36	0.08	<0.001
Comprehensibility (SOC-13)*	0.66	0.16	<0.001
Manageability (SOC-13)*	0.93	0.23	<0.001
Meaningfulness (SOC-13)*	0.64	0.23	0.007

Note. \ddagger regression coefficient; **standard error; *regression coefficient derived from a new model.

Multiple analyses with dependent the variables presented Physical and Mental health and independent all demographics, clinical data, presence of insomnia and SOC-13 dimensions (Table 5) revealed that the only factor associated with Physical health was duration of disease. Greater duration of disease was associated with better scores on Physical health. The independent variables that were found to be associated with mental health were Status of the disease, insomnia and SOC-13. Specifically, women with stable disease had greater scores on mental health as compared with those having metastasis. Additionally, women with insomnia had lower scores on mental health dimension. All dimensions of SOC-13 and total score were predictive for mental health. Greater scores an all SOC-13 dimensions were associated with better mental health.

Discussion

This present study showed that socioeconomic data (place of residence, financial level) associated with the internal sense of coherence. Patients who viewed their financial situation as being very good had a significantly higher

score in the dimension “manageability” compared with patients who described it as being poor. Probably, their good financial situation gives them the feeling that they can manage their environment, respond effectively to the demands that have arisen from the state of their health, both to the physical and the psychosocial ones, and have access to sources of information and treatment. Consequently, the present study’s finding is not surprising, as it is in agreement with what has been found: deprived women with breast cancer are less likely to have received information and support from their hospital specialist, a breast cancer nurse, magazines, newspapers and television news than affluent women (Macleod et al. 2004). The treatment of women with breast cancer is not limited to oncological and surgical treatments; instead, it includes adequate and reliable information and psychosocial support (Macleod et al. 2004). Moreover, it was found that women who lived in rural areas had lower overall scores on SOC, especially regarding the dimension “comprehensibility”. Perhaps this finding was due to their living in the countryside, away from the oncology clinic, treating physicians

and the necessary treatment practices, which could make them feel detached and cut-off and perceive their environment as unstructured and unpredictable.

The course and the duration of the disease emerged as key determinants of the internal sense of coherence. Thus, patients on a therapeutic regimen had higher SOC, perhaps due to optimism and hope because they are being treated, while women with metastasis showed lower SOC. This finding agrees with the research by Sarenmalm et al. (Sarenmalm et al. 2013), who found that SOC is an anxiety predictor, while dictating the strategies that should be implemented to improve the quality of life of women with breast cancer. As SOC got higher so did the HRQoL. Therefore we were able to establish SOC as a significant factor of HRQoL, corroborating similar results from other researches on chronic illness (Ekman et al. 2002; Eriksson & Lindström 2007). Additionally, it has been found that women with breast cancer and strong SOC report better health status and quality of life and use more coping strategies to handle with stressful events (Sarenmalm et al. 2013). In conclusion, patients with a higher SOC can identify and cope better with their health related problems and, as a result, shield their good health more effectively.

We were able to confirm that breast cancer patients suffer from sleep difficulties, as two out of three of them reported insomnia. It is a chronic problem for them that appears on a much higher level than in the general population (67.9% vs. 25.3%) (Paparrigopoulos et al. 2010). Even though quality of sleep would seem to be a significant element of a person's quality of life, sleep problems of cancer patients have received limited attention (Davidson et al. 2002). Higher insomnia rates were observed in patients with comorbidities. Furthermore, when ratings in the three dimensions of SOC increased, the probability of insomnia occurrence was lower. These findings need further research, as recent studies have failed to produce conclusive results (Girschik et al. 2013; McElroy et al. 2006). Systematic

prevalence of sleep problems among breast cancer patients can provide the basis for planning and implementing effective practices of supportive care (Davidson et al. 2002).

Finally, there was a significant relationship between mental and physical health. It is rather understandable that a patient's physical health is compromised. Patients with metastasis exhibited significantly lower mental health, a finding that is in accordance with similar researches (Meisel et al. 2012). Moreover, the longer patients had the disease, the better their physical health was, apparently because of their familiarity and adaptation to the demands of the disease. Similar results have been reported by other researchers (Higginson 2001; Montazeri 2008).

The present study, despite its small sample and focus on patients from one particular hospital, produced significant results. A comparison between patients' SOC, HRQoL and sleep disorders before and after their illness would be an interesting subject of investigation, if such data were available. Additional research is needed to confidently identify and increase those factors that intercede and could advance the self-motivation of breast cancer patients.

Conclusions

In the present study, the socio-economic data (place of residence, financial level) were related to the internal sense of coherence. Similarly, the course and the duration of the disease emerged as key determinants of sense of coherence. Thus, patients on a treatment regimen had higher SOC, while women with metastasis reported lower SOC scores. The higher the SOC was, the higher the health-related quality of life was as well. On the other hand, as the scores in all three dimensions of SOC increased, the probability of insomnia decreased. Lastly, it was found that the longer the participants experienced the disease, the better their physical health was, probably due to their familiarization and adaptation to the disease's demands.

References

Amaro, J, Severo, M, Vilela, S, Fonseca, S, Fontes, F, La Vecchia, C, Lunet, N. 2013. Patterns of breast

- cancer mortality trends in Europe. *The Breast*, 22(3), pp.244–253.
- Ancoli-Israel, S., 2006. The impact and prevalence of chronic insomnia and other sleep disturbances associated with chronic illness. *The American journal of managed care*, 12(8 Suppl), pp.S221–9.
- Anon, GLOBOCAN 2012: Estimated Cancer Incidence, Mortality and Prevalence Worldwide in 2012. *International Agency for Research on Cancer, World Health Organization*. Available at: http://globocan.iarc.fr/Pages/fact_sheets_cancer.aspx [Accessed July 22, 2015].
- Antonovsky, A., 1993a. Complexity, conflict, chaos, coherence, coercion and civility. *Social Science & Medicine*, 37(8), pp.969–974.
- Antonovsky, A., 1993b. The structure and properties of the sense of coherence scale. *Social Science & Medicine*, 36(6), pp.725–733.
- Assi, H.A, Khoury, KE, Dbouk, H, Khalil, LE, Mouhieddine, TH, El Saghir, NS (2013) Epidemiology and prognosis of breast cancer in young women. *Journal of thoracic disease*, 5 Suppl 1, pp.S2–8.
- Baker-Glenn EA, Bark B, Granger L, Symonds P, and Mitchell AJ (2011) Desire for psychological support in cancer patients with depression or distress: validation of a simple help question. *Psychooncology* 20(5): 525–531.
- Bardwell WA, Profant J, Casden DR, Dimsdale JE, Ancoli-Israel S, Natarajan L, Rock CL, and Pierce JP (2008) The relative importance of specific risk factors for insomnia in women treated for early-stage breast cancer. *Psychooncology* 17(1): 9–18.
- Beck, S.L, Ann M. Berger, A.M, Andrea M. Barsevick A.M, Wong, B, Katie A. Stewart, K.A, Dudley, W.N. 2010. Sleep quality after initial chemotherapy for breast cancer. *Supportive care in cancer: official journal of the Multinational Association of Supportive Care in Cancer*, 18(6), pp.679–89.
- Browall, M, Östlund, U, Henoeh, I, Wengström, Y. 2013. The course of Health Related Quality of Life in postmenopausal women with breast cancer from breast surgery and up to five years post-treatment. *The Breast*, 22(5), pp.952–957.
- Brunet, J., Sabiston, C.M. & Burke, S., 2013. Surviving breast cancer: women's experiences with their changed bodies. *Body image*, 10(3), pp.344–351. Available at: <http://www.sciencedirect.com/science/article/pii/S1740144513000260> [Accessed September 10, 2015].
- Davidson JR, MacLean AW, Brundage MD, and Schulze K (2002) Sleep disturbance in cancer patients. *Soc Sci Med* 54(9):1309–1321.
- Ekman, I, Fagerberg, B. & Lundman, B., 2002. Health-related quality of life and sense of coherence among elderly patients with severe chronic heart failure in comparison with healthy controls. *Heart & Lung: The Journal of Acute and Critical Care*, 31(2), pp.94–101.
- Eriksson, M. & Lindström, B., 2007. Antonovsky's sense of coherence scale and its relation with quality of life: a systematic review. *Journal of epidemiology and community health*, 61(11), pp.938–944.
- Eriksson, M., Lindström, B. & Lilja, J., 2007. A sense of coherence and health. Salutogenesis in a societal context: Aland, a special case? *Journal of epidemiology and community health*, 61(8), pp.684–688.
- Fobair P, Stewart SL, Chang S, O'Onofrio C, Banks PJ, and Bloom JR (2006) Body image and sexual problems in young women with breast cancer. *Psychooncology* 15(7): 579–94.
- Flegal, K.M, Carroll, MD, Kit, BK, Ogden, CL. 2012. Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999-2010. *JAMA: the journal of the American Medical Association*, 307(5), pp.491–497.
- Fortner, B. V, Stepanski, EJ, Wang, SC, Kasprovicz, S, Durrence, HH. 2002. Sleep and Quality of Life in Breast Cancer Patients. *Journal of Pain and Symptom Management*, 24(5), pp.471–480.
- Girschik, J., Heyworth, J. & Fritschi, L., 2013. Self-reported sleep duration, sleep quality, and breast cancer risk in a population-based case-control study. *American journal of epidemiology*, 177(4), pp.316–327.
- Grabsch B, Clarke DM, Love A, McKenzie DP, Raymond D, Snyder RD, et al (2006) Psychological morbidity and quality of life in women with advanced breast cancer: A cross-sectional survey. *Palliat Support Care* 4(1):47–56.
- Higginson, I.J., 2001. Measuring quality of life: Using quality of life measures in the clinical setting. *BMJ*, 322(7297), pp.1297–1300.
- Karalis, I, Langius, A, Tsirogianni, M, Faresjö, T, Nettelblatt, P, and Lionis, C (2004). The translation-validation of the sense of coherence scale into Greek and its use in primary health care. *Archives of Hellenic Medicine* 21(2): 195–203.
- Kontodimopoulos, N, Pappa, E, Niakas, D, and Tountas, Y (2007) Validity of SF-12 summary scores in a Greek general population. *Health Qual Life Outcomes* 5:55-65.
- Kyranou, M, Paul, SP, Dunn, LB, Puntillo, K, Aouizerat, BE, Abrams, G. (2013). Differences in depression, anxiety, and quality of life between women with and without breast pain prior to breast cancer surgery. *Eur J Oncol Nurs* 17(2):190–195.
- Jakobsson, U. 2011. Testing Construct Validity of the 13-Item Sense of Coherence Scale in a Sample of

- Older People. *The Open Geriatric Medicine Journal*, 4, pp.6–13.
- Jemal, A, Bray, F, Center, MM, Ferlay, J, Ward, E, Forman, D. 2011. Global cancer statistics. *CA: a cancer journal for clinicians*, 61(2), pp.69–90.
- Koopman, C. Nouriani, B, Erickson, V, Anupindi, R, Butler, LD, Bachmann, MH, Sephton, M, SE, Spiegel, D. 2002. Sleep Disturbances in Women With Metastatic Breast Cancer. *The Breast Journal*, 8(6), pp.362–370.
- Kuo, H Chiu, M-J, Liao, W-C, Hwang, S-L. 2006. Quality of Sleep and Related Factors During Chemotherapy in Patients with Stage I/II Breast Cancer. *Journal of the Formosan Medical Association*, 105(1), pp.64–69.
- Lamprecht, F, & Sack, M. 2003. Vulnerability and salutogenesis in health and disease. *Public health reviews*, 31(1), pp.7–21.
- Lindley, C, Vasa, S, W T Sawyer, W.T, Winner, E.P. 1998. Quality of life and preferences for treatment following systemic adjuvant therapy for early-stage breast cancer. *Journal of clinical oncology: official journal of the American Society of Clinical Oncology*, 16(4), pp.1380–7.
- Liu, L, Fiorentino, L, Rissling, M, Natarajan, L, Parker, BA, Joel, E, Dimsdale, JE, Mills, PJ, Sadler, GR, Ancoli-Israel, S. 2013. Decreased health-related quality of life in women with breast cancer is associated with poor sleep. *Behav Sleep Med* 11(3):189–206.
- Liu, L, Fiorentino L, Natarajan L, Parker BA, Mills PJ, Sadler GR, Dimsdale JE, Rissling M, He F, Ancoli-Israel S. 2009. Pre-treatment symptom cluster in breast cancer patients is associated with worse sleep, fatigue and depression during chemotherapy. *Psycho-oncology*, 18(2), pp.187–94.
- Macleod, U, Ross, S, Fallowfield, L, and Watt, GCM. 2004. Anxiety and support in breast cancer: is this different for affluent and deprived women? A questionnaire study. *Br J Cancer* 91(5): 879–883.
- McElroy, JA, Newcomb, PA, Titus-Ernstoff, L, Trentham-Dietz, A, Hampton JM, and Egan KM. 2006. Duration of sleep and breast cancer risk in a large population-based case-control study. *J Sleep Res* 15(3): 241–249.
- Meisel, JL, Domchek, SM, Vonderheide, RH, Giobbie-Hurder, A, Lin, NU, Winer, EP, and Partridge, AH. 2012. Quality of life in long-term survivors of metastatic breast cancer. *Clinical Breast Cancer* 12(2): 119–126.
- Merakou, K, Koutsouri, A, Antoniadou, E, Barbouni, A, Bertsiyas, A, Karageorgos, G, Lionis, C. 2013. Sense of coherence in people with and without type 2 diabetes mellitus: an observational study from Greece. *Mental health in family medicine*, 10(1), pp.3–13.
- Merckaert, I, Libert, Y, Messin, S, Milani, M, Slachmuylder, J-L, and Razavi, D. (2010). Cancer patients' desire for psychological support: prevalence and implications for screening patients' psychological needs. *Psychooncology* 19(2):141–149.
- Molassiotis, A. 2004. The importance of quality of life and patient choice in the treatment of breast cancer. *European journal of oncology nursing: the official journal of European Oncology Nursing Society*, 8 Suppl 2, pp.S73–4.
- Mols, F, Vingerhoets, AJ, Coebergh, JW, van de Poll-Franse, LV. 2005. Quality of life among long-term breast cancer survivors: a systematic review. *European journal of cancer (Oxford, England: 1990)*, 41(17), pp.2613–9.
- Montazeri, A., 2008. Health-related quality of life in breast cancer patients: A bibliographic review of the literature from 1974 to 2007. *Journal of Experimental & Clinical Cancer Research*, 27(1), p.32.
- Narod, S.A., 2012. Breast cancer in young women. *Nature reviews. Clinical oncology*, 9(8), pp.460–470.
- Otte, JL, Carpenter, JS, Russell, KM, Bigatti, S, and Champion, VL. 2010. Prevalence, Severity, and Correlates of Sleep-Wake Disturbances in Long-Term Breast Cancer Survivors. *J Pain Symptom Manage* 39(3): 535–547.
- Paparrigopoulos, T, Tzavara, C, Theleritis, C, Psarros, C, Soldatos, C, Tountas, Y. 2010. Insomnia and its correlates in a representative sample of the Greek population. *BMC Public Health* 10(1): 531-537.
- Roscoe, JA, Kaufman, ME, Matteson-Rusby, SE, Oxana, G, Palesh, OG, Ryan, JL, Kohli, S, Michael, L, Perlis, ML, and Gary, R, Morrow, GR. 2007. Cancer-related fatigue and sleep disorders. *Oncologist* 12(1) 35–42.
- Payne, J.K, Piper, B, Rabinowitz, I, Zimmerman, B. 2006. Biomarkers, Fatigue, Sleep, and Depressive Symptoms in Women With Breast Cancer: A Pilot Study. *Oncology Nursing Forum*, 33(4), pp.775–783.
- Sarenmalm, EK, Browall, M, Persson, L-O, Fall-Dickson, J, and Gaston-Johansson, F. 2013. Relationship of sense of coherence to stressful events, coping strategies, health status, and quality of life in women with breast cancer. *Psychooncology* 22(1): 20–27.
- Sarenmalm, EK, Odén, A, Öhlén, J, Gaston-Johansson, F, Holmberg, SB. 2009. Changes in health-related quality of life may predict recurrent breast cancer. *Eur J Oncol Nurs* 13(5): 323–329.
- Sarenmalm, EK, Öhlén, J, Jonsson, T, Gaston-Johansson, F. 2007. Coping with recurrent breast cancer: predictors of distressing symptoms and

- health-related quality of life. *J Pain Symptom Manage* 34(1):24–39.
- Savard, J, Simard, S, Ivers, H, Morin, CM. 2005. Randomized Study on the Efficacy of Cognitive-Behavioral Therapy for Insomnia Secondary to Breast Cancer, Part I: Sleep and Psychological Effects. *J Clin Oncol* 23(25): 6083–6096.
- Soldatos, CR, Allaert, FA, Ohta, F, Dikeos, D. 2005. How do individuals sleep around the world? Results from a single-day survey in ten countries. *Sleep Med* 6(1): 5–13.
- Savard, J, Liu, L, Natarajan, L, Rissling, M.B, Neikrug, A.B, Feng, H, Dimsdale, J.E, Mills, P.J, Parker, B. A, Sadler, G, R, Ancoli-Israel, S. 2009. Breast cancer patients have progressively impaired sleep-wake activity rhythms during chemotherapy. *Sleep*, 32(9), pp.1155–60.
- Savard, J. & Morin, C.M., 2001. Insomnia in the context of cancer: a review of a neglected problem. *Journal of clinical oncology : official journal of the American Society of Clinical Oncology*, 19(3), pp.895–908.
- Siegel, R, Ma, J, Zou, Z, Jemal, A. 2014. Cancer statistics, 2014. *CA: a cancer journal for clinicians*, 64(1), pp.9–29.
- Siegel, R.L., Miller, K.D. & Jemal, A. 2015. Cancer statistics, 2015. *CA: a cancer journal for clinicians*, 65(1), pp.5–29.
- Soldatos, C.R., Dikeos, D.G. & Paparrigopoulos, T.J. 2000. Athens Insomnia Scale: validation of an instrument based on ICD-10 criteria. *Journal of Psychosomatic Research*, 48(6), pp.555–560.
- Soldatos, C.R., Dikeos, D.G. & Paparrigopoulos, T.J. 2003. The diagnostic validity of the Athens Insomnia Scale. *Journal of Psychosomatic Research*, 55(3), pp.263–267.
- Stanton, A.L. & Bower, J.E. 2015. Psychological Adjustment in Breast Cancer Survivors. *Advances in experimental medicine and biology*, 862, pp.231–42.
- Tishelman, C, Lövgren M, Broberger E, Hamberg K, Sprangers MA. 2010. Are the most distressing concerns of patients with inoperable lung cancer adequately assessed? A mixed-methods analysis. *Journal of clinical oncology : official journal of the American Society of Clinical Oncology*, 28(11), pp.1942–1949.
- Torre, L.A, Bray F, Siegel RL, Ferlay J, Lortet-Tieulent J, Jemal A. 2015. Global cancer statistics, 2012. *CA: a cancer journal for clinicians*, 65(2), pp.87–108.
- Vahdaninia, M., Omidvari, S. & Montazeri, A., 2010. What do predict anxiety and depression in breast cancer patients? A follow-up study. *Social psychiatry and psychiatric epidemiology*, 45(3), pp.355–361.
- Ware, J.J.E., Kosinski, M. & Keller, S.D., 1996. A 12-Item Short-Form Health Survey: construction of scales and preliminary tests of reliability and validity. *Medical Care*, 34(3), pp.220–233.
- Youlden, D.R, Cramb, SM, Dunn, NA, Muller, JM, Pyke, CM, Baade, PD. 2012. The descriptive epidemiology of female breast cancer: an international comparison of screening, incidence, survival and mortality. *Cancer epidemiology*, 36(3), pp.237–248.