Sleep Hygiene Education: Efficacy on Sleep Quality in Working Women

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ABSTRACT

Background: Although sleep hygiene education represents a promising approach for patients with poor sleep quality, little research has been devoted to understanding the sleep hygiene behavior and knowledge of working women.

Purpose: The purpose of this study was to investigate the efficacy of a short-term sleep hygiene education program on working women with poor sleep quality.

Methods: This pilot study was a prospective and an exploratory intervention study. The intervention was tested on 37 selected working women with poor sleep quality. After a pretest to assess sleep quality, researchers implemented a 5-week sleep hygiene education program that addressed good sleep environments/habits, emotional stress, the influence of diet/alcohol/tobacco on sleep, exercise, and alternative therapies. Tests administered midway through the program and after program completion provided the data used to analyze effective sleep quality changes.

Results: Results showed sleep hygiene education to improve participant sleep quality significantly (p < .001). The sleep quality of all participants improved over both the 3- and the 5-week education program. The six components of the Pittsburgh Sleep Quality Index (i.e., subjective sleep quality, sleep latency, sleep duration, sleep disturbances, use of sleeping medication, and daytime dysfunction) also improved.

Conclusion/Implications for Practice: A brief and effective sleep hygiene education program delivered by a nurse can improve sleep quality in working women with sleeping problems.

Key Words: sleep hygiene, working women, sleep quality, Pittsburgh Sleep Quality Index (PSQI).

Introduction

The changes in society and the needs of industry have impacted upon working hour arrangements in ways that indirectly influence individual lifestyles and sleep quality (Ellis & Grunstein, 2001). Sleep disturbance has been recognized as a major public health issue that is associated with high societal costs (Léger & Bayon, in press). Sleep disturbance can impact significantly upon employee behavior, mental alertness, physical appearance, daytime physiology, emotional condition, and health (Hood, Bruck, & Kennedy, 2004; Savard, Laroche, Simard, Ivers, & Morin, 2003). One survey in Taiwan found that 24.2% of working women suffer from sleep problems, a prevalence higher than in working men (18.4%; Directorate-General of Budget Accounting and Statistics Executive Yuan, 2005). Therefore, promoting better sleep quality in working women is an important issue.

Factors that influence sleep quality in working women include (a) sleep environment and sleep habits (traffic/television noise, inappropriate room temperature, excessive lighting, irregular bedtime hours/sudden schedule shifts, changes in working hours, etc.; Jefferson et al., 2005; Tzeng, Yang, & Lin, 2005), (b) emotional stress (e.g., nervousness, hostility, anxiety, and depressive mood; Grano, Vahtera, Virtanen, Keltikangas-Jarvinen, & Kivimaki, 2008), (c) eating habits (e.g., diet, consumption of drinks with caffeine and/or alcohol, and tobacco use; Cheek, Shaver, & Lentz, 2004; Jefferson et al., 2005), (d) exercise (e.g., inactivity, exercise with inappropriate intensity/duration, and lack of aerobic exercise; Atlantis, Chow, Kirby, & Singh, 2006), and (e) physiologic changes (e.g., changes in neuroendocrine hormones, body temperature, mood, and emotional state during the menstrual cycle; pregnancy; menopause; and disease symptoms; Wang et al., 2005; Young, Rabago, Zgierska, Austin, & Laurel, 2003).

Sleep hygiene refers to the establishment of good personal sleep habits (LeBourgeois, Giannotti, Cortesi, Wolfson, & Harsh, 2005). It is a noninvasive behavioral therapy, which can treat insomnia, improve sleep quality, and reduce daytime sleepiness (Mastin, Bryson, & Corwyn, 2006). Sleep hygiene is an applicable education strategy that takes into consideration the limited time available and economic efficiency required for working women (Tzeng et al., 2005). This study adopted social and behavioral approaches to develop a sleep hygiene education strategy suited to working women. Results were tested using the Pittsburgh Sleep Quality Index (PSQI) to
measure participant sleep quality. Findings are hoped to provide a valuable reference for clinical practice and sleep education.

**Methods**

**Design and Sample**

This pilot study was conducted using the quasi-experimental method. A total of 66 adult working women (age > 18 years) with sleep disorders were recruited from eight communities in northern Taiwan. Eligibility for inclusion considered the following criteria: (a) currently experiencing sleep disorders (PSQI score > 5), (b) agreement to participate, and (c) ability to communicate in either Mandarin or Taiwanese. This study excluded subjects already receiving regular sleep therapy (sleeping pills or tranquilizers), diagnosed with severe mental illness, or experiencing serious physical pain. A total of 37 of the recruited working women joined the sleep hygiene education.

**Measures**

A questionnaire was administered to assess the current sleep status and demographic characteristics of participants. Sleep quality status was assessed using PSQI, a measurement tool often used to evaluate sleep quality in intervention researches (Hsu, Hsu, & Sun, 2006; Wang et al., 2005). The PSQI contains 19 items and generates seven components, including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction during the past month. The score for each component ranged from 0 to 3. The potential global score total ranged from 0 to 21, with a higher global score correlating to poorer sleep quality. A global score of less than 6 indicated a good sleeper, with good diagnostic sensitivity of 89.6% and specificity of 86.5% (κ = .75, p < .001; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The overall reliability coefficient (α) of the Chinese version PSQI was previously evaluated as .85 (Yao, Yu, Cheng, & Chen, 2008). A test-retest reliability (r) of .74 over one month was also found for the instrument (Chung & Tang, 2006). To measure with greater precision the sleep quality of participants during the research, we modified the PSQI to measure changes from the past 2 weeks rather than the past month. The Cronbach’s α for this study was .73.

**Procedures**

The institutional review board at Yuanpei University reviewed and approved this study. This study was conducted without financial or personal conflicts of interest the authors may have with products, technologies, or methodologies mentioned in the manuscript. Before the commencement of sleep hygiene education, trained nurses obtained written informed consent from participants and interviewed them one on one using study questionnaires. Interviewers explained the written informed consent and the self-report questionnaire to study participants and stressed the importance of giving scores that truly reflect participant opinions and perceptions.

To avoid expectancy bias, we assigned research staff as either “interviewers” or “interventionists.” Both groups participated in a standard training workshop. The interventionists were asked to administer education in accordance with the research protocol. Pretest and midway test were administered to collect participant sleep data reflecting the start and the fourth week of education. Researchers then implemented 30-minute group or individual sleep hygiene education classes over a 5-week period. Participants who arrived late to the group sleep hygiene education course were given individual instruction after class dismissal. Posttest sleep data were collected in the sixth week, after completion of the fifth week of education.

**Intervention**

Focus and flow of the 5-week sleep hygiene education program reflected both participant needs and expert opinions. We arranged data into a protocol that included the following:

First week: arranging a good sleep environment and habits. Participants were taught that room temperature and sounds should be optimized for relaxation (Gellis & Lichtstein, 2009; Stepanski & Wyatt, 2003). A quiet sleep environment was achieved by putting up heavy curtains, maintaining the humidity in the 60% to 70% range, selecting comfortable mattresses and bedding, and encouraging participants to lie on their side to enhance feelings of safety and relaxation (Tzeng et al., 2005). Good sleep habits were cultivated, including regular bed/wake up times, avoiding napping in bed, reducing exposure to light (which causes the release of melatonin and rising body temperature), reducing the time required to fall asleep, and increasing sleep duration, to improve sleep quality. If participants were unable to fall asleep after 30 minutes in bed, they were requested to leave the bedroom and read a book or watch TV until they felt sleepy. Participants were also asked to get up at a regular time, even if they did not enough sleep the night before (Jefferson et al., 2005; Tzeng et al., 2005).

We further recommended that shift workers (a) adjust their sleep schedule several days before commencing a new shift schedule, (b) expose themselves to bright light during breaks, (c) wear sunglasses on the way home after a night shift, (d) reduce noise and light at home in preparation for sleep, and (e) take short afternoon naps before commencing a night shift (Atlantis et al., 2006).

Second week: reducing emotional stress. Working women often cope with pressure, hostility, and emotion from their multiple societal and familial roles (Grano et al., 2008). Such limits their ability to relax emotionally, which affects sleep quality and alters hormonal balances (Brown, Buboltz, & Soper, 2002). Participants were encouraged to report their emotional stress, were helped to confront their problems, an were advised to seek comfort from friends and help from therapists. Bolstering the ability of working women to confront emotional stress and psychological problems can improve sleep and not only promote personal life quality but also enhance efficiency on the job (Tzeng et al., 2005).
Third week: controlling diet, alcohol consumption, and tobacco use. We gave instruction on the proper intake of calcium and magnesium in the daily diet and advised that drinking a glass of warm milk with sugar helps facilitate a good night’s sleep (Cheek et al., 2004; Jefferson et al., 2005). Avoidance of eating gas-producing food or drinking a large quantity of water before going to bed can reduce bloating/decrease urination during the night, both of which affect sleep quality (Jefferson et al., 2005). Alcohol should also be avoided before bedtime (Cheek et al., 2004). Polysomnographic sleep research has proven that alcohol disturbs sleep–wake homeostatic and circadian timing, which promote sleepiness (Rupp, Acebo, & Carskadon, 2007). Alcohol can reduce or even eliminate the quantity and percentage of slow-wave sleep (SWS; Gann et al., 2004). Moreover, caffeinated drinks such as tea or coffee should be consumed only in small quantities during the 4 to 6 hours before bedtime (Cheek et al., 2004). Caffeine stimulates the central nervous system, increases heart rate, and excites brain functions, all of which reduce sleepiness (Stepanski & Wyatt, 2003). Tobacco use close to bedtime is also linked to decreased sleep quality (Jefferson et al., 2005). We also made special recommendations to shift workers that they: (a) adjust meal times to be consistent with sleep times and (b) avoid large meals and caffeine toward the end of their shift (Atlantis et al., 2006).

Fourth week: exercising regularly. We provided information of the beneficial effects of aerobic exercise on sleep quality and its related factors. Regular exercise encourages the body to release endorphins, which promote sleep, relieve depression, and relax muscles. Exercise in the early evening in particular can enhance health, regulate physiological and psychological stress, and improve sleep quality (Jefferson et al., 2005; Tzeng et al., 2005). We educated participants as to how to perform aerobic exercise with moderate-to-high intensity for 20 minutes at least 3 days per week using a variety of machines, including bicycles. Exercise conducted in the afternoon or 2 hours before bedtime was advised to have the greatest positive impact on sleep quality (Atlantis et al., 2006). We further recommended that shift workers adjust exercise times to be consistent with sleep times.

Fifth week: introducing alternative therapies. We provided information on widely recommended alternative therapies, including relaxation training, musical therapy, and aromatherapy, geared to improve sleep quality (Lai & Good, 2005; Sun et al., 2004). Relaxation training includes progressive muscle relaxation, guided image, meditation, and hypnotherapy (Yang, 2000). Music therapy usually uses soft music free of sudden changes in pace, volume, and tempo. Listening to music can soothe moods and relieve emotional stress to improve sleep disorders (Lai & Good, 2005). In aromatherapy, lavender oil has been shown to promote sleep, to stabilize the nervous system, and to reduce pressure, and rose oil has been shown to ease anxiety. The application of five to six drops of oil to the pillow before sleep has been recommended to help attain a peaceful sleep (Sun et al., 2004).

Statistical Method

All statistical analyses were conducted using the Statistical Package for the Social Sciences for Windows (Version 15.0; SPSS Inc., Chicago, IL). Descriptive statistics were used to analyze participant characteristics and sleep quality variables. Associations between sleep quality and continuous variables in the pretest were analyzed using the Pearson correlation or the Mann–Whitney U test. Level of significance was set at .05. The Wilcoxon signed ranks tests were done by analyzing the differences in PSQI scores pretest versus midtest, midtest versus posttest, and pretest versus posttest. The level of significance was set at .017 (.05/3).

Results

The 37 subjects were between 21 and 62 years of age, with a mean of 38.3 years (SD = 11.5). Average daily work hours numbered 9.1 (SD = 1.9), ranging from 4 to 12 hours. Before the program, participants lay in bed for an average 44.1 minutes before falling asleep, and their actual sleep duration was 6.6 hours on average. After completing the 5-week program, participants were asked various questions about their personal sleep situation, such as, “What do you do if you cannot fall asleep after 30 minutes in bed?” and “What Chinese medicine do you use to improving sleep quality?”

Table 1 shows participant demographic data and PSQI scores before the start of sleep hygiene education. Pretest results revealed no significant difference among participants of different age (r = .23, p = .166), college education (p = .517), religious affiliation (p = .225), and marital status (p = .390) or in terms of whether they worked more than 8 hours (p = .517) or shift work (p = 7.61) or earned a living wage or not (p = .180).

Figure 1 shows the relationship between sleep hygiene education and sleep quality. The pretest PSQI score of 6–15 decreased to 0–12 in the midtest and then dropped further to 0–9 in the posttest. The average PSQI score decreased from 9.6 (SD = 2.6) in the pretest to 5.6 (SD = 2.6) in the midtest and 4.8 (SD = 1.8) in the posttest. Moreover, the pretest/midtest (p < .001), the midtest/posttest (p = .006), and the pretest/posttest (p < .001) all showed a statistically significant difference in PSQI scores.

Analysis of pretest/posttest scores identified a significant difference between the PSQI scores for participants in all

![Figure 1](image-url)
demographic groups (Table 2). A detailed analysis indicated that only women who were not earning a living wage did not show a significant difference between pretest and midtest \( (p = .019) \) and midtest and posttest \( (p = .101) \). Only unmarried participants showed a significant difference between pretest and midtest \( (p < .001) \) and midtest and posttest \( (p = .004) \).
Table 3 shows the changes in the 7 PSQI components (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction). With the exception of habitual sleep efficiency ($p = .026$), PSQI components showed significant differences between pretest and posttest results. Furthermore, only habitual sleep efficiency did not show a significantly different difference between pretest and midtest ($p = .222$) and midtest and posttest ($p = .102$). Only daytime dysfunction did show a significant difference between pretest and midtest ($p < .001$) and midtest and posttest ($p = .013$).

**Discussion**

PSQI scores for the working women who participated in this research ranged from 6 to 15, with an average of 9.6 ($SD = 2.6$) before the education intervention. After 3 weeks of sleep hygiene education, including arrangement of good sleep environment/habits, emotional stress management, and education on dietary/alcohol drinking/tobacco usage habits, the PSQI score decreased to 0–12 with an average of 5.6 ($SD = 2.6$). After an additional 2 weeks of sleep hygiene education (regular exercise and alternative therapy courses), the PSQI score decreased to 0–9 with an average score of 4.8 ($SD = 1.8$). This indicated that both the 3- and the 5-week education duration improved participant sleep quality effectively. This result should serve as a valuable reference for clinical practice.

Both the 3- and the 5-week education duration effectively improved participant sleep quality, with both PSQI score and its six components showing significant positive change. Analyzing the 6 PSQI components individually, the most effective improvements were achieved in sleep environment/habit arrangement, emotional stress management, and diet/alcohol drinking/tobacco use habits. These results were similar to previous research (Cheek et al., 2004; Grano et al., 2008; Jefferson et al., 2005; Tzeng et al., 2005). Only the daytime dysfunction component achieved significant improvement during the last 2 weeks of the intervention. As such, regular exercise and alternative therapies implemented during this period may not be particularly effective. This was a result that differed from previous studies. Esteves, de Mello, Pradella-Hallinan, and Tufik (2009) recommended that postexercise release of beta-endorphins can lead to improved sleep quality. Other research also indicated that people who received music therapy before bedtime attained better sleep quality, attaining better perceived sleep quality, longer sleep duration, greater sleep efficiency, shorter sleep latency, less sleep disturbance, and less daytime dysfunction (Lai & Good, 2005). In our study, participants described their inability to develop regular exercise and alternative therapy regimens in a short time. They required more environmental/family support to do so. Another reason may result from the pilot research design, which had a small sample size, lacked a control group, and lacked a hygiene knowledge measurement tool. Therefore, we recommended that future research reference our study design and confirm the effectiveness of the 3-week education using rigorously designed trials. Confirmation of our findings would then support the efficacy of implementing at least a 3-week program to facilitate improvements in the sleep quality of working women. Moreover, future researchers may alter the sequence of education courses to confirm overall program effectiveness.

Participants indicated a significant improvement in sleep quality over the 5-week sleep hygiene program, independent of demographic variables including college education, religious affiliation, marital status, working in excess of 8 hours per day, working shift work, or earning a living wage. With the exception of economically disadvantaged participants, the 3-week sleep hygiene education improved the sleep quality of all participants. We expect that the sleep quality factors facing women with economic difficulties were not addressed by the 3-week sleep hygiene education program. Therefore, the relationship between personal economic issues and sleep quality deserves further examination in the future.
Conclusion
This study provided valuable knowledge about the response of working women to sleep hygiene education. The 3-week sleep hygiene program, addressing sleep environment/habit management, emotional stress management, and diet/alcohol drinking/tobacco usage habits, effectively improved the sleep quality of participants. It is recommended that future sleep researchers assess sleep data using PSQI.

Limitations
There were several limitations in this pilot study. First, our use of a quasi-experimental method without a control group helped limit sampling bias. Only those interested or motivated to participate would have been included in this study. Second, sleep parameter measurements were limited because of the use of self-reporting to provide estimates without objective verification through actigraphy or home-based poly somnographic monitors.

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References


職業婦女的睡眠衛教成效探討

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背景
睡眠衛教介入是一項可行的睡眠品質改善措施，但卻少見其應用於職業婦女的睡眠衛生行為和知識。

目的
本研究探討睡眠障礙職業婦女的睡眠衛教介入簡化方式與成效。

方法
採前瞻性和探索性的先驅介入研究，以匹茲堡睡眠品質量表（PSQI）的總分大於5分，篩選社區睡眠品質不良的職業婦女，共37位婦女經睡眠品質前測後，由護理人員執行為期五週的睡眠衛教（環境生活習慣、情緒壓力、飲食煙酒使用、規律運動、及另類療法）介入，介入期間與介入後各執行睡眠品質中測及後測，並收集分析資料。

結果
睡眠衛教介入對於改善職業婦女的睡眠品質是有顯著成效（p < .001），且無論職業婦女的個人屬性變項差異，為期三週或五週的睡眠衛教介入，均能有效改善其睡眠品質。對於PSQI其中的六項元素（包括：主觀睡眠品質、睡眠潛伏期、睡眠時數、睡眠困擾、安眠藥使用及日間功能障礙）亦有顯著改善成效。

結論／實務應用
本研究證實護理人員執行簡化與有效的睡眠衛教介入，有助於改善睡眠障礙職業婦女的睡眠品質。

關鍵詞：睡眠衛生、職業婦女、睡眠品質、匹茲堡睡眠品質量表（PSQI）。

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