Effects of Auricular Acupressure on Sleep Quality, Anxiety, and Depressed Mood in RN-BSN Students With Sleep Disturbance

Ke-Hsin Chueh¹ • Chia-Chuan Chang² • Mei-Ling Yeh³*

ABSTRACT

Background: Students in 2-year registered nurse to Bachelor of Science in nursing (RN-BSN) programs usually work full-time and study part-time. Sleep disturbance, anxiety, and depression are known to be common health problems among these students. Prior research has described the effectiveness of auricular acupressure (AA) in reducing sleep disturbance and improving mood.

Purpose: The aim of this study was to evaluate the effect of using a 4-week AA program that adheres to a magnetic pellet on the shenmen acupoint on sleep quality, anxiousness, and depressed moods in nursing students with sleep disturbance.

Methods: This study used a one-group, quasi-experimental design with repeated measures. Eligible students were recruited from an RN-BSN program offered by a university in northern Taiwan, and all were currently experiencing sleep disturbance. A 4-week AA intervention that applied a magnetic pellet on the shenmen acupoint was used. The Pittsburgh Sleep Quality Index, Beck Anxiety Inventory, and Beck Depression Inventory-II were used to measure sleep quality and mood outcomes each week during the 4-week intervention. Improvements in sleep quality, anxiety, and depressed moods were analyzed using the generalized estimating equation.

Results: Thirty-six participants with a mean age of 32 years were enrolled as participants. After adjusting for confounding factors, continuous and significant improvements in sleep quality, anxiety, and depressed mood (p < .05) were observed throughout the intervention, with 4-week improvements in sleep quality, anxiety, and depressed mood averaging 26.7%, 43.5%, and 25%, respectively.

Conclusions/Implications for Practice: This study showed the efficacy of using a 4-week AA that applies a magnetic pellet on the shenmen acupoint in terms of improving sleep quality, anxiousness, and depressed mood in RN-BSN students experiencing sleep disturbances. Especially, the emotional mood of participants improved significantly as early as the first week. The 4-week AA for reducing sleep disturbance, and improving students’ anxiety, and depressed moods may be applied on primary healthcare.

Key Words:
RN-BSN students, sleep quality, anxiety, depression, auricular acupressure.

Introduction

Around 54.5% of college students in Taiwan (Wu, Li, & Chang, 2015), 17% in Canada (Lee, Shin, Suen, Park, & Ernst, 2008; Tavernier & Willoughby, 2014), and 39% in New Zealand (Samaranayake, Arroll, & Fernando, 2014) have been reported as experiencing sleep disturbance. Moreover, approximately 70% of registered nurses in Taiwan experience sleep disturbance (Lee, Chen, Meg Tseng, Lee, & Huang, 2015). In addition, 94% of nurses in 2-year registered nurse to Bachelor of Science in nursing (RN-BSN) programs reportedly experience sleep disturbance (Chueh & Chang, 2014). Working full-time while studying part-time may be the main causal factor of sleep disturbance. Sleep disturbance is associated with psychological distress in RN-BSN students (Chueh & Chang, 2014). Particularly, sleep disturbance is known to be concomitant with psychological distresses (American Psychiatric Association, 2013) such as anxiety and depression (Cho et al., 2013; Samaranayake et al., 2014). About 17.3% and 19.7% of college students in New Zealand have been identified with anxiety and depression, respectively (Samaranayake et al., 2014).

According to a systematic review, auricular acupressure (AA) is one of the most effective interventions for managing sleep problems (Lee et al., 2008). Previous studies support the positive effects on sleep quality of applying AA on single or multiple acupoints (Lee et al., 2008; Suen, Wong, & Leung, 2002; Wang et al., 2003; Wang, Yeh, Chung, & Yang, 2008). Shenmen is the most commonly proposed acupoint for improving sleep quality (Lee et al., 2008). This acupoint could be used alone to reduce sleep problems (Cheung, Chan, & Yip, 2015), calm the mind (Arai et al., 2013), and relieve anxiety (Kuo, Tsai, Chen, & Tzeng, 2016). However, studies that use the shenmen acupoint as a standalone intervention to treat sleep disturbance and that measure its effect repeatedly remain limited in Taiwan. This study investigated the effects on ameliorating sleep disturbance and improving

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psychological status of a 4-week AA intervention that applied a magnetic pellet on the shenmen acupoint.

**Literature Review**

Long-term sleep disturbance may lead to insomnia, which may impose a high societal expense and cause negative impacts on work productivity, economic welfare, accident rates, and health-related quality of life (Léger & Bayon, 2010). Furthermore, sleep disturbance has been associated in college students with gender, psychosocial function, and interpersonal stress (Tavernier & Willoughby, 2014). In addition, circadian rhythm disorders and lack of activity exacerbate sleep disturbance (Samaranayake et al., 2014). A longitudinal study revealed that sleep disturbance predicted increases in the prevalence of subsequent anxiety and depression (Shanahan, Copeland, Angold, Bondy, & Costello, 2014). Sleep disturbance may be one of the core symptoms used to diagnose anxiety and depressed mood (American Psychiatric Association, 2013). In addition, anxiety and depressed mood may be the most prevalent causes of sleep disturbance (Samaranayake et al., 2014).

In Taiwan, students who are enrolled in 2-year RN-BSN programs also work full-time in the hospital. Hence, they are often under great pressure from both their studies and shift work (Lin, Chueh, & Lin, 2015) and sometimes take medicine for their sleep problems (Chueh & Chang, 2014). One study reported that 94% of 2-year RN-BSN students in Taiwan experience sleep disturbance (Chueh & Chang, 2014), which is a significantly higher ratio than the ratios among the general population of women (Cheng, 2002) and among nurses in clinics or hospitals (Chien et al., 2013). Other factors that are related to sleep disturbance in student nurses include age, body mass index (BMI), physical health, life stresses, regular exercise, workload, and the use of substances such as cigarettes, alcohol, coffee, and sleeping pills (Chueh & Chang, 2014; Lin et al., 2015).

Within traditional Chinese medicine, AA is held to modulate and alleviate poor health conditions by stimulating specific acupoints on the auricle and meridians that are distributed to other parts of the body to treat various conditions (Lee et al., 2008; Wang, Chen, Yeh, & Lin, 2010). Both physical and psychological problems are due to imbalances in internal energy or the blockage of energy flows (Cheung et al., 2015) and tranquilize the mind (Arai et al., 2013). Significant change has been found in brain activity after 10-minute stimulation at the shenmen acupoint, which was associated with reduced sleep arousal, enhanced mood, and relieved anxiety (Cheung et al., 2015; Kuo et al., 2016). Although the reported efficacy of using AA to treating sleep disturbance has varied, the shenmen acupoint may be the most effective of all the previously studied acupoints.

Magnetic pellets or semen vaccariae are common materials that are used in noninvasive AA interventions (Lee et al., 2002). Magnetic pellets that are used in AA therapy courses must be “renewed” about every 3 days (Suen et al., 2002). AA that employs semen vaccariae must also replace the plaster about every 3–7 days (Wang et al., 2005, 2008). However, pressure must be applied regularly on the semen vaccariae on the acupoint (Wang et al., 2005, 2008) or even reinforced 1 hour before nighttime sleep (Lian & Yan, 1990). AA with magnetic pearls may promote the circulation of qi and blood in the meridians, regulate organ functions, and improve the general physiological functions of the body. Using magnetic pearls may be less traumatic and requires no pressing if the effect of magnetotherapy is present (Suen et al., 2002). Compared with magnetic pellets, semen vaccariae are less effective in reducing sleep disturbance (Suen et al., 2002). AA with one magnetic pellet may be administered feasibly and conveniently.

This study aimed to evaluate the effects of applying AA using a magnetic pellet on the shenmen acupoint only for 4 weeks in improving the sleep quality and psychological status of 2-year RN-BSN students. Significant differences over time in terms of sleep quality, anxiety, and depression, after adjusting the baseline data, were hypothesized.

**Methods**

**Study Design and Sample**

The present research was designed as a one-group, quasi-experimental study with repeated measures. A 4-week AA with a magnetic pellet on the shenmen acupoint was provided to the study participants. The baseline was monitored immediately before the intervention, and the outcome measures were assessed weekly.

Participants were recruited from the RN-BSN program of a university in northern Taiwan. All participants were screened according to the following criteria: (a) enrolled in the same nursing department of the university for at least 1 month and (b) score of > 5 on the Pittsburgh Sleep Quality Index (PSQI) taken within the past week. Students who regularly used hypnotic medication such as sleeping pills or tranquilizers or who had performed regular rotational shift work during the previous 6 months were excluded. Using repeated measurements of data to estimate sample size (Rosner, 2006), the minimum sample size was determined to be at least 32 for one group for an effect size of 0.2, α of
With a 10% attrition rate taken into consideration, a target of 35 participants was set. Figure 1 shows the flowchart of the research design and the allocation of participants. Fifty sleep-disordered students received explanations of the study purpose, procedure, and intervention and were scheduled to receive the 4-week AA intervention. Of these, 37 (74%) returned the signed informed consent form and the completed demographic data sheet, PSQI, Beck Anxiety Inventory (BAI), and Beck Depression Inventory-II (BDI-II) questionnaire. Demographics and PSQI, BAI, and BDI-II were collected before the intervention and used as baseline data. Moreover, PSQI, BAI, and BDI-II were collected weekly to track the intervention effect (Posttests I-IV). One participant was excluded from the study because of her absence at Posttest II, leaving 36 participants who completed the 4-week AA.

All participants received the first-week AA intervention with a magnetic pellet in a classroom setting. The shenmen acupoint is located near the top of the auricle and at the center of the tip of the triangular fossa, as shown in Figure 2. A seed-embedding method with a magnetic pellet (Hong Kong, China) was adopted to prolong the duration of stimulation. A magnetic pellet was taped on the shenmen acupoint of one ear (initially, the right ear), where it remained for 1 week. After 1 week, the pellet was removed, and a new pellet was taped on the other ear. The AA intervention procedure lasted for 4 weeks. Two researchers who were well trained by a traditional Chinese medicine physician embedded all of the magnetic pellets. Furthermore, these two researchers checked the participants’ compliance to the intervention protocol and the accuracy of their AA performance. In the event that a magnetic pellet fell off or was removed prematurely, one of the

![Figure 2. Location of the shenmen acupoint.](image)
two researchers would embed a new pellet on the same acupoint as soon as possible.

Ethical Considerations
The institutional review board of a university approved this study (No. C10004R). All of the participants were volunteers and provided written consent. Participants received written and verbal information about the study as well as instructions on how to care for the magnetic pellet. They could contact the researchers regarding questions and were free to withdraw from the study at any time.

Outcome Measures
The questionnaire contained four parts, which gathered data respectively on the sleep quality, anxiety mood, depressed mood, and demographics of the participants.

Sleep quality
Sleep quality was measured using the PSQI developed by Buysse, Reynolds, Monk, Berman, and Kupfer (1989). The PSQI contains 19 items and generates seven components, including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleeping medication, and daytime dysfunction during the past month. The scores for each component range from 0 to 3, and the sum of the global score ranges from 0 to 21. A higher global score is associated with lower sleep quality. A global score of less than 6 indicates a good sleeper, with a good diagnostic sensitivity of 89.6% and a specificity of 86.5% (Buysse et al., 1989). The overall reliability coefficient ($\alpha$) of the PSQI is .85 (Yao, Yu, Cheng, & Chen, 2008), and a test–retest reliability ($r$) of .74 over a 1-month period was also found (Chung & Tang, 2006). To measure the sleep quality of participants more precisely, this study modified the PSQI to assess sleep quality over the most recent week rather than the most recent month. The Cronbach’s $\alpha$ of the PSQI in this study was .81.

Anxiety
The Chinese version of the BAI was adapted to measure level of anxiety. The BAI is a 21-item self-report inventory that is used to measure the severity of anxiety in psychiatric populations. The responses are rated on a scale from “not at all” (0) to “severely—I could barely stand it” (3) for each symptom of anxiety over the past week, with total possible scores ranging from 0 to 63 and higher scores associated with more severe levels of anxiety. BAI scores between 0 and 7, 8 and 15, 16 and 25, and 26 and 63 were interpreted in this study to represent “minimal,” “mild,” “moderate,” and “severe” levels of anxiety, respectively. The original BAI showed high internal consistency ($\alpha = .92$) and high test–retest reliability ($r = .75$; Beck, Epstein, Brown, & Steer, 1988). The Cronbach’s $\alpha$ of the BAI in this study was .95.

Depressed mood
The Chinese version of the BDI-II was employed to measure level of depression. The BDI-II has 21 items, each of which is composed of four self-evaluative statements that are scored from 0 to 3, with higher scores associated with higher levels of depression. Responses are summed to yield a range of total possible scores between 0 and 63. BDI-II scores between 0 and 13, 14 and 19, 20 and 28, and 29 and 63 were interpreted in this study to represent “normal,” “mild,” “moderate,” and “severe” levels of depression, respectively. The original BDI-II showed high internal consistency ($\alpha = .91$) and high test–retest reliability ($r = .93$; Beck, Steer, Ball, & Ranieri, 1996). The Cronbach’s $\alpha$ of the BDI-II in this study was .97.

Demographics
Demographics including age, length of service, and BMI as well as information on sleep disturbance and psychological distress factors, including self-aware workload, physical health, regular exercise, life stress, daily smoking, and alcohol and coffee consumption, were self-reported before the start of invention. The abovementioned factors were scored using visual analog scales (VAS; 100-mm horizontal line; Wewers & Lowe, 1990), with higher VAS scores associated with poorer situations or conditions for the related sleep disturbance or psychological distress factor. Factors were scored as follows: workload, 0 (no) to 10 (heavy); physical health, 0 (not healthy) to 10 (totally healthy); daily exercise, 0 (not regular) to 10 (totally regular); stress in daily life, 0 (no) to 10 (heavy); daily smoking, 0 (no) to 10 (heavy); daily alcohol consumption, 0 (no) to 10 (high); and daily coffee consumption, 0 (no) to 10 (high). The participants marked their scores on linear VASs.

Data Analysis
Data analysis was carried out using IBM SPSS 20.0 software for Windows. Demographics were all metric data. Descriptive statistical analysis was conducted on the PSQI, BAI, and BDI-II scores as well as on demographics and on the rates of improvement. Afterward, inferential statistical analysis, including the Spearman rho correlation, verified the respective relationships between the PSQI, BAI, and BDI-II scores with demographics at baseline. Finally, the differences in weekly intervention effect for PSQI, BAI, or BDI-II scores were analyzed using generalized estimating equation after controlling for the confounding factors of demographics.

Results
Table 1 shows the distribution and relationship of the 36 participants at baseline. All of the participants were women, with an average age of $32.0 (\pm 5.5)$ years, ranging from 23 to 48 years. Their average BMI was $23.4 (\pm 6.5)$ kg/m$^2$, and their mean length of service was $10.0 (\pm 5.0)$ years. The average PSQI score was $10.1 (\pm 3.1)$. The mean BAI score
was 9.2 (± 8.9), with 22 (61.1%), 6 (16.7%), 7 (19.4%), and 1 (2.8%) participants having a “minimal,” “mild,” “moderate,” and “severe” levels of anxiety mood, respectively. The average BDI-II score was 14.0 (± 9.0), with 22 (61.1%), 4 (11.1%), 6 (16.7%), and 4 (11.1%) participants having “normal,” “mild,” “moderate,” and “severe” levels of depressed mood, respectively. In addition, the PSQI score was associated positively with the BAI score (p < .001), the BDI-II score (p < .001), and the amount of coffee consumed (p < .05). The BAI score was associated positively with the BDI-II score (p < .001) and negatively with physical health status (p < .05). Furthermore, the BDI-II score was associated negatively with physical health status (p < .01). Age, BMI, length of service, workload, regular exercise, life

### TABLE 1.
Distributions and Relationships at Baseline (N = 36)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>M</th>
<th>SD</th>
<th>PSQI</th>
<th>BAI</th>
<th>BDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSQI (score)</td>
<td>10.1</td>
<td>3.1</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>BAI (score)</td>
<td>9.2</td>
<td>8.9</td>
<td>.70***</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>BDI-II (score)</td>
<td>14.0</td>
<td>9.0</td>
<td>.76***</td>
<td>.91***</td>
<td>–</td>
</tr>
<tr>
<td>Age (years)</td>
<td>32.0</td>
<td>5.5</td>
<td>.10</td>
<td>−.15</td>
<td>−.15</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>23.4</td>
<td>6.5</td>
<td>.24</td>
<td>.07</td>
<td>.21</td>
</tr>
<tr>
<td>Length of service (years)</td>
<td>10.0</td>
<td>5.0</td>
<td>.04</td>
<td>−.04</td>
<td>−.10</td>
</tr>
<tr>
<td>Workload (score)</td>
<td>6.2</td>
<td>2.3</td>
<td>.11</td>
<td>.31</td>
<td>.25</td>
</tr>
<tr>
<td>Physical health (score)</td>
<td>4.6</td>
<td>2.0</td>
<td>−.25</td>
<td>−.42*</td>
<td>−.51**</td>
</tr>
<tr>
<td>Regular exercise (score)</td>
<td>2.8</td>
<td>2.3</td>
<td>−.09</td>
<td>.23</td>
<td>.16</td>
</tr>
<tr>
<td>Life stress (score)</td>
<td>7.1</td>
<td>1.8</td>
<td>−.01</td>
<td>.28</td>
<td>.22</td>
</tr>
<tr>
<td>Smoking (score)</td>
<td>0.3</td>
<td>1.0</td>
<td>−.19</td>
<td>−.06</td>
<td>−.06</td>
</tr>
<tr>
<td>Alcohol consumption (score)</td>
<td>0.6</td>
<td>1.1</td>
<td>−.16</td>
<td>−.04</td>
<td>−.00</td>
</tr>
<tr>
<td>Coffee consumption (score)</td>
<td>4.5</td>
<td>3.3</td>
<td>.34*</td>
<td>.20</td>
<td>.22</td>
</tr>
</tbody>
</table>

Note. Higher scores for sleep disturbance and psychological distress factors were associated with worse situations/conditions. p Value was tested using the Spearman’s rho correlation. PSQI = Pittsburgh Sleep Quality Index; BAI = Chinese version of the Beck Anxiety Inventory; BDI-II = Chinese version of the Beck Depression Inventory-II. *p < .05. **p < .01. ***p < .001.

### TABLE 2.
Results of the Generalized Estimating Equation for Outcome Measures (N = 36)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate</th>
<th>SE</th>
<th>z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pittsburgh Sleep Quality Index (PSQI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>10.11</td>
<td>0.55</td>
<td>336.13</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Posttest I</td>
<td>−0.89</td>
<td>0.47</td>
<td>3.66</td>
<td>.060</td>
</tr>
<tr>
<td>Posttest II</td>
<td>−1.67</td>
<td>0.47</td>
<td>12.85</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Posttest III</td>
<td>−2.03</td>
<td>0.47</td>
<td>19.02</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Posttest IV</td>
<td>−2.70</td>
<td>0.47</td>
<td>35.58</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Beck Anxiety Inventory (BAI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>9.17</td>
<td>1.43</td>
<td>6.40</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Posttest I</td>
<td>−1.94</td>
<td>0.83</td>
<td>5.55</td>
<td>.020</td>
</tr>
<tr>
<td>Posttest II</td>
<td>−2.17</td>
<td>0.83</td>
<td>6.89</td>
<td>.009</td>
</tr>
<tr>
<td>Posttest III</td>
<td>−3.58</td>
<td>0.83</td>
<td>18.85</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Posttest IV</td>
<td>−4.00</td>
<td>0.83</td>
<td>23.49</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Beck Depression Inventory-II (BDI-II)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>14.03</td>
<td>1.60</td>
<td>76.58</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Posttest I</td>
<td>−2.03</td>
<td>0.90</td>
<td>5.06</td>
<td>.030</td>
</tr>
<tr>
<td>Posttest II</td>
<td>−2.72</td>
<td>0.90</td>
<td>9.12</td>
<td>.003</td>
</tr>
<tr>
<td>Posttest III</td>
<td>−4.08</td>
<td>0.90</td>
<td>20.51</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Posttest IV</td>
<td>−3.56</td>
<td>0.90</td>
<td>15.55</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Note. Adjusted according to significantly related factors at baseline, including PSQI, BAI, BDI-II, coffee consumption, and physical health. Reference group: baseline.
stress, smoking, and alcohol consumption showed no significant association with the PSQI, BAI, or BDI-II score.

As shown in Table 2, the average score of PSQI was 9.2 (± 3.2), 8.4 (± 3.9), 8.1 (± 3.3), and 7.4 (± 3.0) at Posttests I–IV, respectively. The relationship between the mean PSQI score and time interaction was analyzed after controlling for BAI, BDI-II, and coffee consumption at baseline. The results showed a significant decrease in the PSQI score at Posttest II versus baseline (1.67 points lower, p < .001), Posttest III versus baseline (2.03 points lower, p < .001), and Posttest IV versus baseline (2.70 points lower, p < .001). The total PSQI score increased 26.7% between baseline and Posttest IV.

As also shown in Table 2, the average score of BAI was 7.2 (± 8.9), 7.0 (± 7.9), 5.6 (± 8.1), and 5.2 (± 8.4) at Posttests I–IV, respectively. The relationship between the mean BAI score and time interaction was analyzed after controlling for PSQI, BDI-II, and physical health status at baseline. The results show a significant decrease in the BAI score at Posttest I versus baseline (1.94 points lower, p = .020), Posttest II versus baseline (2.17 points lower, p = .009), Posttest III versus baseline (3.58 points lower, p < .001), and Posttest IV versus baseline (4.00 points lower, p < .001). Furthermore, the BAI score increased by 43.5% between baseline and Posttest IV.

Moreover, as shown in Table 2, the average score of BDI-II was 12.0 (± 10.2), 11.3 (± 9.7), 9.9 (± 9.0), and 10.5 (± 10.2) at Posttests I–IV, respectively. Next, the relationship between the mean BDI-II score and time interaction was analyzed after controlling for PSQI, BAI, and physical health status at baseline. The results showed significant decreases in the BDI-II score at Posttest I versus baseline (2.03 points lower, p = .030), Posttest II versus baseline (2.72 points lower, p = .003), Posttest III versus baseline (4.08 points lower, p < .001), and Posttest IV versus baseline (3.56 points lower, p < .001). Furthermore, the BDI-II score increased by 25.0% between baseline and Posttest IV.

Discussion

The 2-year RN-BSN students with sleep disturbance who participated in this study averaged 32 years old. The average score of sleep quality at baseline was 10.1 (± 3.1), which is similar with a score of 9.8 (± 3.2) for a similar population that was obtained by Chueh and Chang (2014). The 38.9% that were identified in this study as experiencing at least a mild level of anxiety mood is lower than the percentage of female nurses diagnosed with sleep disturbances in Taiwan (56.9%; Lin et al., 2015) and of female medical students in Pakistan (43.7%; Rab, Mamdou, & Nasir, 2008). However, the anxiety rate in this study is higher than that among female medical students in Saudi Arabia (34.9%; Ibrahim, Al-Kharboush, El-Khatib, Al-Habib, & Asali, 2013). Moreover, 38.9% of the participants in this study had a level of depression greater than “mild.” This prevalence is higher than that among general female workers (20%; Cho et al., 2013). Furthermore, participants with higher coffee consumption had worse sleep quality, and those with poor physical health exhibited more severe anxiety and depressed moods. These results are similar to findings in other studies (Lin et al., 2015; Sawah et al., 2015). As reported, sleep disturbance coexists with psychotic symptoms (Freeman et al., 2015), which may account for the high correlation between sleep disturbances and anxiety and depressed moods.

This study provides evidence that the 4-week AA with a magnetic pellet on the shenmen acupoint is an effective alternative intervention for improving sleep quality. During the 4-week AA intervention, the sleep quality, anxiety, and depression of participants were generally ameliorated, with overall improvement rates of 26.7%, 43.5%, and 25%, respectively. This supports the finding of a previous systematic review that AA improves the clinical effective rate, including increased total sleep time, increased sleep efficiency, lower PSQI scores, shortened sleep-onset latency, and reduced number of awakenings in comparison with placebo or sham interventions (Lan et al., 2015). However, as the participants in this study had experienced sleep disturbance for an extended period, sudden and drastic improvement in their sleep quality would be difficult to achieve under any circumstances. Therefore, future research may measure not only sleep quality but also other sleep status variables such as total sleep time, time in bed, and sleep efficiency. This study further suggests that school nurses should encourage students with sleep disturbance to complete the entire 4-week AA to achieve a significant improvement in sleep.

At the end of the first-week intervention, both anxiety and depressed moods had improved significantly over baseline. The shenmen acupoint is generally effective in reducing arousal (Cheung et al., 2015) and in calming the mind (Arai et al., 2013). Furthermore, the literature indicates that applying AA on the shenmen acupoint (HT7, MA-TF1) effectively relieved anxiety in healthy female students before an anatomy examination (Klausenitz, Hesse, Hacker, Hahnenkamp, & Usichenko, 2016). AA on the shenmen acupoint (HT7, MA-TF1) is used mainly to treat diseases of the nervous system, including insomnia, depression, anxiety, and dementia (Feng, Zeng, Ren, & Liang, 2014). This study revealed a similar finding. Moreover, AA applied on the shenmen point (HT7, MA-TF1) for 1 week only reduced negative emotional states, especially anxiety. These findings thus support that AA is a faster and more effective intervention for alleviating anxiety and depressed moods than for enhancing sleep quality.

This study has several limitations. First, students who were absent were not included, whereas highly motivated students were not excluded. This selection bias may undermine the generalizability of the findings. Therefore, future studies that use probability approaches for sampling should be designed to ensure external validity. Second, the lack of a control group reduces the rigor of the obtained evidence. Factors that affect sleep quality in nursing students are complicated. Therefore, a control group design should be used in future evidence-based
studies of this topic. Third, although sleep quality, anxiety, and depressed moods improved under the AA intervention, whether effects persisted beyond the 4-week intervention is unknown. Thus, we recommend conducting a longitudinal study to determine whether the improvement is short-term or sustained over the long term.

Conclusions

AA offers an efficient and noninvasive intervention for relieving sleep disturbance. The findings of this study support the effectiveness of a 4-week AA that applies a magnetic pellet on the MA-TF1 in terms of improving sleep quality and alleviating anxiety and depressed moods in 2-year RN-BSN students with sleep disturbance. The improvement rates between the first and fourth weeks of the AA intervention were 26.7% for sleep quality, 43.5% for anxiety, and 25% for depression.

Relevance to Clinical Practice

Two-year RN-BSN students with sleep disturbance often experience both anxiety and depressed moods. Therefore, school nurses and other health professionals should encourage students with sleep disturbance to undertake this 4-week AA because of the potential benefit of this intervention on sleep quality, anxiety, and depression. To obtain a high rate of improvement, an AA intervention of at least 4 weeks is recommended.

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