

行政院國家科學委員會專題研究計畫 成果報告

耳穴按壓治療於睡眠困擾成年人之 melatonin, 自主神經系統, 與睡眠品質之成效探討(第 2 年)
研究成果報告(完整版)

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共同主持人：羅琦

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行政院國家科學委員會補助專題研究計畫 成果報告
 期中進度報告

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與睡眠品質之成效探討

Effects of auricular therapies on melatonin, autonomic
nervous system, and sleep quality in middle age adults with sleep
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共同主持人：羅琦、丁化

計畫參與人員：林芸如、楊佩菁

成果報告類型(依經費核定清單規定繳交)： 精簡報告 完整報告

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中文摘要

睡眠是一項重要且能恢復人體能量的活動，然而在現代社會，失眠的發生率越來越高，約有11.7%-32.5%的成年人承受失眠之苦。研究顯示失眠者其副交感神經活動減少、而交感神經活動增加。傳統中醫之耳穴按壓治療結合中醫臟腑調和理論與神經學中耳穴區域佈滿副交感神經，可能可以調和自主神經功能而促進睡眠。本研究為二年期研究計畫，使用隨機分派實驗性研究設計，檢測耳穴按壓對有睡眠困難之成人之自主神經功能、melatonin 分泌、與睡眠品質之成效。研究個案從海報招募而來，並隨機分成控制組(CG)與耳穴按壓治療組(APT)。每一位研究個案依據其組別接受3星期的耳穴按壓治療措施。30位參與個案中22位(年齡25-47歲)完成本研究(CG=11, APT=11)，其中一位個案因actiwatch機器泡水而使睡眠資料喪失。研究結果發現睡眠潛伏期與醒來的時間在耳穴按壓7天後減少，而主觀睡眠品質有改善，包括減輕入睡困難之嚴重度、促進睡眠品質、與減少睡眠困擾。Melatonin 之分泌則兩組之間並無顯著差異。研究結果提供中醫耳穴治療之實證資料，並發展非侵入性的睡眠處置。研究結果可提供處置成人睡眠障礙的參考。

關鍵詞：成人，睡眠，耳穴按壓治療，心律變異，褪黑激素

英文摘要

Sleep is a vital and restorative human function. However, the prevalence of sleep difficulties is increasing in current society that accounts for 11.7%~32.5% of adults involved. Studies showed that insomnia is associated with decreased parasympathetic nervous activity and increased sympathetic nervous activities. Chinese auricular therapy that combines the Meridian theory and nerve distributions in the auriculae may have effects on melatonin secretion and balance in autonomic nervous system, hence to improve sleep quality in adults.

This two-year study uses a three-group, randomized controlled experimental design to examine the effect of auricular therapy on autonomic nervous function, melatonin secretion, and sleep quality in adults with sleep disturbances. Subjects recruited from flyers were randomly assigned to the control group (CG) or the auricular pressure therapy (APT) group. Subject in APT group received a 3-week intervention. Outcomes of melatonin, autonomic nervous function of heart rate variability, and sleep quality were compared before, during and after intervention. Thirty subjects enrolled for this study, twenty-two of them (ages 25-47 years) completed (CG=11, APT=11). Actigraph data of one subject was missing due to actiwatch machine immersing in water. Results showed that actigraph sleep of sleep latency and actual wake percentage were decreased after 7-days of intervention. The severity in difficulty initiating sleep was decreased, sleep quality was improved, and status of worrying about sleep was dismissed in APT group. There was no significant change in melatonin secretion between control and APT groups. Study results provide evidence for Chinese medicine auricular therapy as well as developing non-invasive sleep interventions for those who suffer from poor sleep.

關鍵詞 : adult, sleep, auricular pressure therapy, heart rate variability, melatonin

Introduction

Sleep is a vital function in humans. It restores energy as well as maintaining homeostasis of our body (Krueger & Obal Jr., 2002). However, the prevalence of sleep difficulties is increasing in current society. The overall prevalence of insomnia in adults ranged from 11.7% to 27.6% in Europe (Leger, Guilleminault, Dreyfus, Delahaye, & Paillard, 2000; M. M. Ohayon, Caulet, & Guilleminault, 1997; M. M. Ohayon & Roth, 2001; Maurice M. Ohayon & Smirne, 2002; M. M. Ohayon & Zulley, 2001; M. M. Ohayon, Zulley, Guilleminault, Smirne, & Priest, 2001; Olson, 1996; Pallesen et al., 2001), 21.4% in Japan and Hong Kong (Chiu et al., 1999; Doi, Minowa, Uchiyama, & Okawa, 2001; Kim, Uchiyama, Okawa, Liu, & Ogihara, 2000) and 9% to 32.5% in North America (Ancoli-Israel & Roth, 1999; Foley et al., 1995; Ganguli, Reynolds, & Gilby, 1996; Hatoum, Kania, Kong, Wong, & Mendelson, 1998; Newman, Enright, Manolio, Haponik, & Wahl, 1997; M. M. Ohayon et al., 1997; Sutton, Moldofsky, & Badley, 2001). Global sleep dissatisfaction was 7.0 ~ 10.1% in Europe and 17.8% in Canada. Over one forth of people in the world had ever experienced at least one of insomnia symptoms occasionally to routinely. About one-third to two-third of adults were not satisfied with their sleep.

Sleep generating is associated with parasympathetic activity (A. Culebras, 2002).

Wakefulness and arousal, in the opposite, is associated with the sympathetic nervous system (A. Culebras, 2002). Insomniacs during sleep had significantly increased physiological activation including increased rectal and finger temperatures, heart rate, basal skin resistance, metabolic rate, and increased secretion of corticosteroids and adrenaline (Adam et al., 1986;

Davidson et al., 1987), which were indicative of higher sympathetic nervous activities during sleep. Results of heart rate variability spectral analysis also showed significantly increased LF power (sympathetic activity) and decreased HF power (parasympathetic activity) in insomniacs as compared to matched normal sleepers (M. H. Bonnet, Arand, Bonnet, & Arand, 1997; M. H. P. Bonnet & Arand, 1998). This implied that insomnia is associated with unbalanced ANS function in increased sympathetic nervous system activity or decreased parasympathetic nervous system activity (M. H. P. Bonnet & Arand, 1998; Hall et al., 2004; Zhong et al., 2005). Intervention to balance sympathetic and parasympathetic nervous function may benefit those who suffer from poor sleep. Surface of the auriculae is fulfilled with an abundant distribution of parasympathetic nerves, such as the combined branches of glossopharyngeal and vagus nerves in the central part of the auricular. Auricular therapy through stimulating particular points in auriculae (Suen, Wong, & Leung, 2002) can be an intervention to modulate autonomic sympathetic and parasympathetic nervous systems to improve sleep. This study examines the effects of two auricular therapies (auricular pressure therapy and auricular massage exercise) on melatonin, autonomic nervous function, and sleep in a population of middle age adults (30-50 years of age) with sleep difficulties.

Specific aims

The specific aims of this study are to examine and compare the effects of auricular pressure therapy and auricular massage exercise on:

1. Urine melatonin during sleep time
2. Autonomic nervous function- Heart rate variability (HRV) of parasympathetic modulation (HF power), sympathetic modulation (LF power), and sympathovagal balance (LF/HF

power of R-R variability)

3. Polysomnography sleep latency (SL), number and duration of nocturnal awakenings, arousal, duration and percentage of slow wave sleep, and sleep efficiency (SE).
4. Actigraphy sleep latency (SL), number and duration of nocturnal awakenings, and sleep efficiency (SE).
5. Perceived sleep quality (restoration, satisfaction, overall).

Methods

Design and Procedure

Three groups, randomized controlled experimental design, is used to examine the effects of two auricular therapies (auricular pressure therapy and auricular massage exercise) on autonomic nervous function, melatonin, and sleep quality. Adults aged 25-55 years old with sleep disturbances (PSQI >5) are recruited from flyers and randomly assigned to three groups: the control group (CG), the auricular pressure therapy (APT), and the auricular massage exercise (AME). Each subject receives a 3-week intervention according to their groups.

Control group: Subjects in the control group (CG) are taped with Junci Medullae on sham auricular points for 21 days. No additional pressure is applied to the Junci Medulla.

APT group: Subjects in the APT group are taped with magnetic pearls on auricular points for 21 days by the researchers. Subjects follows a structured auditory instruction to apply an additional pressure on magnetic pearls three times per day. The force of the auricular pressure is to press 6 second and relax 2 second as a total of 2 min on each point and a total of 20 min of the whole auricular pressure. Researcher gives subjects a comprehensive explanation and follows them up by telephone and on the date of magnetic pearl replacement.

AME group: Subjects in the AME group gives massage to their auriculae three times a day for 21 days according to a structured auditory instruction. Nothing is adhered to the surface of the auriculae. Frequency of auricular massage is same as the APT that press 6 second and relax 2 second as a total of 2 min on each point and a total of 20 min for the whole auricular massage, which is equivalent to the process of APT. Researcher gives subjects a comprehensive

explanation and follows them up by telephone and on the date of HRV measures.

Surface of the auriculae is sterilized with 75% alcohol before CG and APT taping. The magnetic peals, Junci Medulla and adhesive plaster are replaced every 3-4 day to avoid local irritation or ulceration on the auricular points. Both ears will be taped alternately. To avoid the masking effect on sleep, all subjects are free from any hypnotics 2 weeks prior to and during the study period.

Outcomes of melatonin, HRV, and sleep quality will be compared before, during, and after intervention.

Participants

Twenty-two healthy adults completed this study. They were aged 25 years old and above with a mean age of 32.5 years (SD=7.4). None of them had sleep apnea (AI < 10/hr).

Measures

Screening tools:

Screening tools of anxiety and depression, sleep disturbance and sleep apnea are described below.

Anxiety and depression. The Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983) is used to assess patients' anxiety and depression. The HADS contains 7 items of anxiety and 7 items of depression subscales with a score of 0 (not at all) to 3 (Most of the time) for each question. The two subscales are aggregated to overall anxiety and overall depression scores with a total of 21, respectively. A subscale score of 7 and below is interpreted as normal, 8-10 indicates a doubtful case. The HADS is originated from UK and is available in all languages including Chinese. The reliability and validity of the HADS Chinese version are well documented in Taiwan's populations (Chen, Chang, & Yeh, 2000; Wang, Fuh, Lu, & Juang, 2001).

Sleep disturbance. The Pittsburgh Sleep Quality Index (PSQI)(Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) and the Diagnostic and Statistical Manual of Mental Disorders Forth Edition (DSM-IV) defined insomnia (American Psychiatric Association, (APA, 1994) are used to assess sleep disturbance.

The PSQI assessed habitual sleep of adults over a 1-month time interval with consists of nineteen self-rated questions that generates seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. A global PSQI score is summed from each component to have a range of 0-21. Higher score indicates worse sleep quality. A post hoc cutoff score of 5 is the cut point to discriminate “good” and “poor” sleeper. The overall Cronbach’s alpha values of the global PSQI for examining internal consistency reliability ranged from 0.77-0.83 (Buysse et al., 1989; Carpenter & Andrykowski, 1998; Doi et al., 2000). Sensitivity and specificity of the PSQI ranged from 80 to 89.6% and 86.5-86.6%, respectively (Buysse et al., 1989; Doi et al., 2000).

A DSM-IV insomnia screen questionnaire is developed based on the following criteria and is used to screen older adult group with sleep disturbance. Difficulty initiating sleep (DIS) is defined as perceived sleep latency greater than 30 min, more than twice a week, and last for at least 1 month. Difficulty maintaining sleep (DMS) is defined as perceived nocturnal waking over 30 min or more than two times per night, more than twice a week, and last for at least 1 month.

Sleep apnea. Sleep apnea is screened from the PSG in the first sleeping night based on the Report of American Academy of Sleep Medicine Task Force (AASMTF, 1999). The criteria of sleep apnea event are periods of absent airflow for 10 second and more, and SO₂ de-saturation greater than 3%. Subject who has apnea event per hour (apnea/ hypopnea index, AHI) greater than 15 is excluded.

Outcome Measures

Melatonin, heart rate variability, sleep, and perceived sleep quality are measured at baseline, during intervention, and after intervention.

Melatonin

6-sulfatoxymelatonin is a major metabolite of melatonin in urine and a good surrogate

measurement of plasma melatonin secretion. Whole night urine is collected and 10 ml of centrifugation urine from the whole is analyzed by a Buehlmann Laboratories ELISA kit (EK-M6S), which is an antibody immunoassay technique. Analytic sensitivity is 0.2 ng/ml. Intra-assay precision and Inter-assay precision is 7.1% and 11.9%, respectively. Urine melatonin is collected and measured at baseline, in the middle of intervention, and after intervention.

Autonomic Nervous Function- Heart Rate Variability (HRV)

The frequency of electrical discharge by sinus node is controlled by the autonomic nervous system. Heart rate variability (HRV) is sensitive to the activity of autonomic nervous system (ANS). HRV has become a popular noninvasive approach to measure ANS function. It records and analyzes the beat to beat variation (R-R) of heart rate on the cardiac electrical signal. There are two methods to analyze HRV: time domain analysis and frequency domain analysis (spectral analysis). Time domain analysis is statistical interpretation for RR intervals associated with variance of the heart signals, including the mean, standard deviation, square root of the mean squared differences, and coefficient of variation of RR intervals. These indexes in a 5-min measure provide a good estimate of parasympathetic nervous system activity (McMillan, 2002). The frequency domain analysis, or spectral analysis, provides information of how the variance (power) of heart signals are distributed into different frequency components. There are two major spectral components in HRV data: high frequency (HF) component and low frequency (LF) component. The HF component, usually from 0.15 to 0.40 Hz, is considered to reflect para-sympathetic nervous system activity. The LF component, usually from 0.04 to 0.15 Hz, is related to a combined effect of sympathetic and parasympathetic activity. The ratio of LF component to HF component is the balance between sympathetic and parasympathetic activities (Anonymous, 1996; M. H. Bonnet et al., 1997; McMillan & McMillan, 2002). The frequency domain analysis is stronger to reflect the balance or imbalance of the activity of ANS than that of the time domain analysis.

HRV is measured at 8-10 pm 1-2 hours before bedtime at baseline, during, and after intervention. Subjects lay down and take a rest for 10min and start to record 5-min lead II ECG.

Data are converted to computer and analyzed by the HRV software. Parameters of the mean and standard deviation of heart rate, total power, LF component, HF component, and LF/HF ratio are calculated.

Sleep measures

Sleep measures include Polysomnography and actigraphy. Polysomnography is measured overnight at baseline and after intervention. Actigraphy is measured 24 hours at baseline and throughout the whole period of the intervention.

1. Polysomnography (PSG)

Polysomnography (PSG) is the gold standard for measuring sleep. PSG is composed of the electroencephalogram (EEG), electro-oculogram (EOG), and electromyogram (EMG) (Rechtschaffen & Kales, 1968). Three EEG signals will be used to record cerebral electrogenesis from the right central region (C3-A1 or C3-A2), left central region (C4-A2 or C4-A1), and occipital region (O1-O2). The EOG is used to gather rapid eye movements of the alert state and REM sleep, and also slow rolling eye movements of early stage 1 sleep. Electrodes are placed 1 cm lateral and slightly superior to the lateral canthus of the left eye (E1), and 1 cm lateral and slightly inferior to the lateral canthus of the right eye (E2). The EMG is used for recognizing resting muscle tone changes in different sleep stages, especially in atonia of REM sleep. Electrodes are placed over the masseter and submental muscle (chin) to record muscle tone. A sensitivity of $5\mu\text{V}$ per mm or $7\mu\text{V}$ per mm, an impedance of less than $5,000\Omega$, and 70 Hz filters are used for electrode recording.

Two consecutive overnight PSGs are performed at baseline and at the end of the 3-week study. PSG results obtained on the second night is analyzed. Total sleep time (TST), sleep period, sleep efficiency (SE), sleep latency (SL), sleep stages (stage 1 & 2, SWS (slow wave sleep), REM, REM latency), awakening within sleep period (WASO), and arousal are the sleep indicators estimated via PSG. Total sleep time is the total time in sleep including NREM and REM sleep. Sleep efficiency is the ratio of total sleep time to time in bed for sleep. Sleep latency is the time it takes for falling asleep, which is the period from wake trying sleep to stage 1 sleep.

Intermittent awakenings are the numbers of times wake occurs.

2. Actigraphy

Actigraphy that records body motion is used to detect activity level and estimate sleep or wake state. Actiwatch (Mini Mitter Co., Inc. Oregon), a watch-like device for measuring non-dominant wrist activity, is used for this study. Raw activity data are downloaded to computer for display, analysis and interpretation by using Actiware-Sleep software. Sleep latency, sleep duration, sleep efficiency, and awakening are estimated. A correlation of 0.73 ~ 0.8 between Actiwatch estimated and polysomnography sleep in patients with sleep disorder was reported for this Actiwatch device (Kushida et al., 2001), which indicates an acceptable validity.

Actigraphy is a non-invasive, least bothering measure for observing more than 24-hour sleep-wake pattern. Participants wear Actiwatch 24 hours continuously at each study time points except taking showers and also keep sleep diary for reference of activity. Activity level is detected and recorded every 30 seconds. Participants will wear the Actiwatch device at baseline and throughout the whole period of intervention for 21 days.

Perceived Sleep Quality

Perceived sleep quality is assessed by the Morning Questionnaire (MQ) and the Insomnia Severity Index (ISI) in the morning after awake.

1. Morning Questionnaire (MQ)

The Morning Questionnaire (MQ) is used to assess sleep quality. The MQ is developed for the subjective aspects of a preceding sleep period. It consists three questions regarding self-perceived sleep latency, sleep duration, and awakening, and seven self-administered descriptors with 0 to 10 visual analog scale (VAS) regarding sleep quality and satisfaction. The higher score is associated with better sleep. Participants fill out this questionnaire every morning after awake. It takes about 5-10 minutes to fill out.

2. Insomnia Severity Index (ISI)

Insomnia Severity Index (ISI) is an instrument to measure patient's perception of his/her insomnia as a brief screening and outcome measure (Bastien, Vallieres, & Morin, 2001; Savard,

Savard, Simard, & Ivers, 2005). The ISI targets on the subjective symptoms and consequence as well as the extent of distress of insomnia. It is composed of five question: (1)severity of insomnia problem; (2)satisfaction for sleep; (3)the extent of intervening daily functioning by sleep problem; (4)how to impair quality of life; (5)how distress you are about sleep problem. The answer to each question is scored 0 (none) to 4 (very much). The internal consistency of the ISI estimated by Cronback alpha coefficient was 0.74. Concurrent validity of the ISI individual items corresponding to sleep diary were 0.35~0.38 (Pearson correlation, $p<.001$) (Bastien et al., 2001). The ISI is sensitive to detect changes to treatment and a good convergence between the patient and clinician's evaluation of insomnia (Bastien et al., 2001)(Savard et al., 2005). Participants fill out this questionnaire every morning after awake. It takes about 5-10 minutes to fill out.

Demographic data

Age, gender, education, marriage, occupation, religion, health history, and medications are collected as well as history in insomnia and treatments they used.

Data analysis

Descriptive statistics including frequency, percentage, range, mean, and standard deviation are used to investigate sample distributions of urine melatonin, ANS-HRV parameters, actigraphy and PSG sleep parameters, and perceived sleep quality indicators. Inferential statistics including paired t-test, repeated measure ANOVA or appropriate nonparametric equivalent will be used to compare pre-post differences and to compare differences among groups. Significance level was set at $p<.05$, two tailed.

Results

Personal characteristics

Twenty-two participants aged 25 ~ 47 years old completed this study. Table 1 shows their personal characteristics.

Table 1. Participants' Characteristics

	Control group (n=11)				APT group (n=11)			
	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
Age, years	31.4	6.4	25	42	33.5	8.3	25	47
Depression ^a	4.4	2.9	1	11	3.2	2.0	1	7
Anxiety ^a	7.1	4.6	0	14	6.5	4.3	0	13

PSQI ^b	22.5	3.9	17	31	20.8	6.7	15	33
	<i>n</i>	%			<i>n</i>	%		
Gender								
Male	3	27.3			1	9.1		
Female	8	72.7			10	90.9		
Marriage								
Single	7	63.6			8	72.7		
Married	4	36.4			3	27.3		
Education								
12 years	1	9.1			1	9.1		
14-16 years	6	54.5			5	45.5		
> 16 years	4	36.4			5	45.5		

^a Hospital Anxiety and Depression Scale

^b Pittsburg Sleep Quality Index

Perceived habitual sleep

Participants were interviewed by the PSQI to assess their habitual sleep quality (Table 2). In both groups, most of them had less than 6 hours of sleep, about 15~30 minutes of sleep latency, and varied sleep efficiency. All of them experienced fair to poor sleep quality. Total sleep time and sleep efficiency were not significantly different between control and APT groups.

Table 2. Perceived habitual sleep (PSQI) before intervention

	Control group (n=11)		APT group (n=11)		<i>X</i> ²	<i>p</i>
	<i>n</i>	%	<i>n</i>	%		
Total sleep time					3.44	0.487
>=7 hours	5	45.5	2	18.2	1	
6~6.9hours	5	45.5	6	54.5	2	
5~5.9hours	1	9.1	3	27.3	2	
<=4.9hours	0		0			
Sleep latency					5.55	0.475
<= 15 min	1	9.1	2	18.2	1	
16-30 min	6	54.5	3	27.3	0	
31-60 min	2	18.2	4	36.4	3	
>= 60min	2	18.2	2	18.2	1	
Wake after sleep onset (min)						

Sleep efficiency (%)						4.10	0.663
> 85%	3	27.3	4	36.4	1		
75~84%	2	18.2	3	27.3	3		
65~74%	4	36.4	2	18.2	1		
<65%	2	18.2	2	18.2	0		
Sleep quality						0.02	0.989
Fair	7	63.6	7	63.6	3		
Poor	4	36.4	4	36.4	2		

Sleep quality

Table 3 shows the results of subjective sleep including PSQI score and ISI (Insomnia Severity Index) between control and APT groups. The decreased PSQI score of post-intervention in APT group demonstrates that sleep quality is slightly improved after auricular therapy. In APT group, the severity in difficulty initiating sleep was decreased, sleep quality was improved, and status of worrying about sleep was dismissed after intervention.

Table 3. Sleep quality

	Control			APT		
	n	Mean	S.D.	n	Mean	S.D.
PSQI						
Baseline	11	7.7	3.0	11	8.4	3.1
Post intervention	10	7.6	4.0	11	6.5	2.4
Insomnia Severity Index (ISI)						
Difficulty initiating sleep						
Baseline	11	0.91	1.04	11	0.73	0.65
During intervention	10	0.80	0.92	11	0.73	0.79
Post intervention	10	0.80	1.23	11	0.64	0.67
Difficulty maintaining sleep						
Baseline	11	0.73	0.90	11	0.73	0.79
During intervention	10	0.80	0.79	11	1.09	1.04
Post intervention	10	0.70	0.82	11	1.18	0.87
Awake too early						
Baseline	11	0.18	0.40	11	0.64	0.67
During intervention	10	0.40	0.97	11	0.91	1.04
Post intervention	10	0.90	0.99	11	1.18	0.75

Sleep satisfaction

Baseline	11	2.18	0.75	11	2.09	0.54
During intervention	10	2.10	0.74	11	1.91	0.83
Post intervention	10	2.10	0.88	11	1.73	0.79

Functional disturbance

Baseline	11	1.91	1.38	11	1.73	1.27
During intervention	10	1.80	1.03	11	1.73	0.90
Post intervention	10	1.60	0.97	11	1.36	0.81

Noticed by others

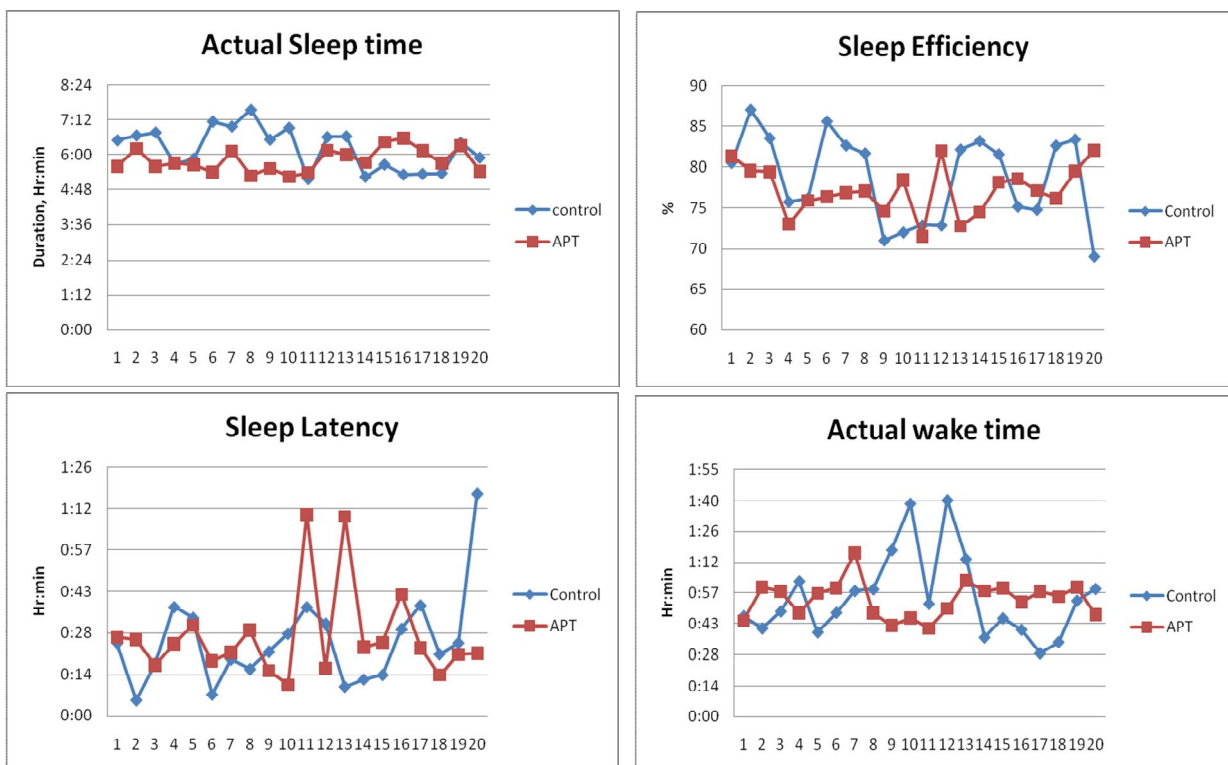
Baseline	11	0.36	0.67	11	0.64	0.92
During intervention	10	0.80	1.03	11	0.73	0.79
Post intervention	10	1.10	0.99	11	0.82	0.75

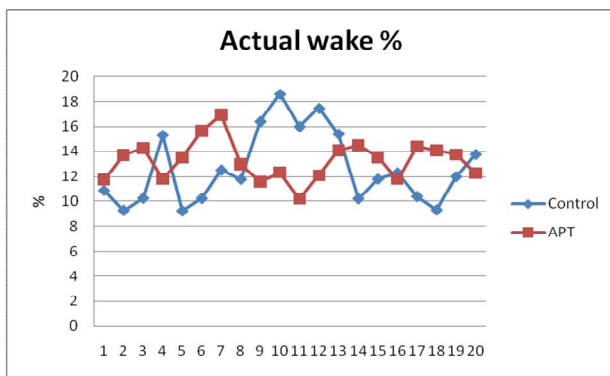
Worry about sleep

Baseline	11	1.27	1.10	11	1.55	1.29
During intervention	10	1.20	0.92	11	1.18	1.08
Post intervention	10	1.40	0.84	11	1.00	0.77

Actigraph sleep

Fig 1~ Fig 5 demonstrate the trends of sleep status between control and APT groups. Sleep latency and actual wake percentage were decreased after 7-days of intervention.





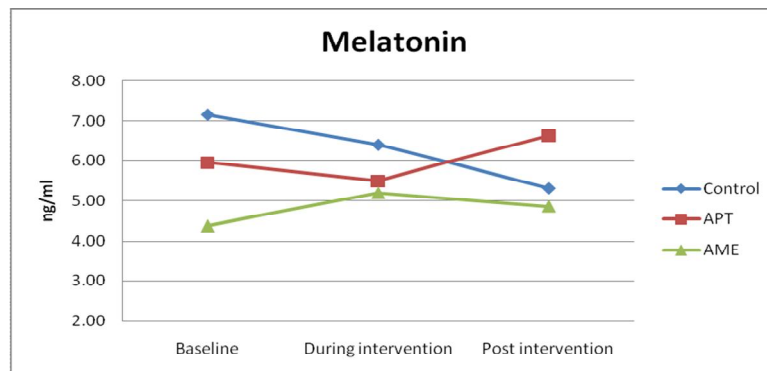
Melatonin

Table 4 and Fig. 6 show the results of melatonin secretion between control and APT groups. Result of repeated measure shows no significant difference between these two groups.

Table 4. Melatonin secretion at baseline, during and after intervention between control and APT groups.

	Control			APT			F ¹	Sig
	n	Mean	S.D.	n	Mean	S.D.		
Baseline	6	7.16	3.23	10	5.95	1.28	1.98	0.173
During intervention	6	6.40	0.81	12	5.50	0.81		
Post intervention	5	5.32	1.36	12	6.63	1.53		

¹ Repeated measure



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出席國際會議研究心得報告與發表論文
The 23st annual meeting of the Associated Professional Sleep Societies (APSS).
Seattle, U.S.
廖玟君 Wen-Chun Liao

再次到西雅圖參加全世界最大的睡眠會議，它是我研讀博士學位的地方，也是我學習睡眠相關研究的地方，我特別選擇住在學校附近的旅館，除了參與會議外並再次重遊學校舊地，重溫留學生生活。全世界最大的睡眠會議，報告者來自歐美亞澳非等五大洲，分享各自國家與個人在睡眠不同領域上的努力，議題涵括睡眠從出生到老年、婦女、健康者與有疾病者的睡眠議題。有好幾場的 speaker 都是睡眠各領域的大師，他們分享了他們在數年的睡眠研究領域中的成果，包括失眠議題、睡眠剝奪對人類思考對兒童發展的影響等等，除了在內容上收穫充分外，也給我很大的啟發，他們如何設計一個又一個的研究，解決一個又一個的疑問，以最大的好奇與無與倫比耐心與毅力，投注於睡眠議題的研究，這也是值得大家學習的地方。而 Poster 也一如往常都非常值得看，作者也都在固定的時間為大家講解。一連數天我除了聽演講就是去看 poster，由於 poster 每天換，所以整個行程排的滿滿的，每天都有新刺激，大略了解目前睡眠領域的趨勢，收穫滿囊。在我的 poster session 有一位來自澳洲做相同領域的學者，我們交換了不少研究心得，而我的博士指導教授也年年與會，對我的研究結果提供不少的指導，每次的與會都有很大的收穫。這個會議已是我需要定期朝聖的會議，每一次都有令我驚豔的收穫與成長。

這次我也帶了我的研究生一起與會，並一起參與護理界的睡眠餐會，感受到傳承的重要，之前是指導教授帶著我，而現在我又帶著我的研究生，溫馨與任重道遠同時並行。而重遊母校，那種感受真的是時間一直在走，人一直在變，但學校永遠在那裡屹立著。

發表論文:

Title: Warm Footbath before Sleep Increased Foot Temperature but Not Altered Sleep in Older Adults with and without Sleep Complains

Wen-Chun Liao*, Chyi Lo, Hua Din, Ming-Jang Chiu
Chun Shan Medical University, Taichung, Taiwan
*wcl@csmu.edu.tw

Introduction: The fall in core body temperature before sleep onset and during sleep is associated with dilation of peripheral blood vessels that permits heat dissipation from the body core to the periphery. Observational studies have shown that a lower core (rectal) temperature coupled with a higher distal (hands and feet) temperature *before sleep* are associated with short sleep latency and better sleep quality. A warm foot bath was thought to facilitate heat dissipation to lower core (rectal) body and raise foot temperatures to improve sleep outcomes.

Method: This study used a randomized crossover design to examine the effect of a warm footbath with 40°C water temperature, 20 minute duration on body temperatures and sleep in older adults (≥ 55 years) with and without self-reported sleep disturbances.

Results: Forty-three subjects responded to our flyer and 25 participants (with sleep complain=17, without sleep complain = 8) completed this study. Footbath before sleep did not increase core temperature but significantly increased foot temperature (complainer vs non-complainer = 6.0°C vs. 5.6°C) and retained during sleeping in both sleep complainers and non-complainers. However, there were no significant sleep changes in polysomnography, actigraphy-estimated sleep, and perceived sleep quality between non-bathing and bathing nights in both groups.

Conclusion: Footbath of 40°C water temperature, 20 minute duration before sleep onset does not increase core temperature to provide heat load but elevates foot temperature to facilitate vessel dilatation. However, this footbath does not alter sleep in older adults with and without sleep complain.

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關鍵詞：Older adult, sleep, body temperature, foot bathing