SOUTH BAYLO UNIVERSITY

The Effects of Acupuncture in Treating People with Insomnia

A Literature Review

by

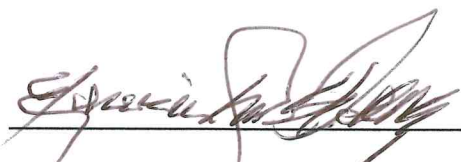Hung Vien

A RESEARCH PROJECT SUBMITTED

IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE

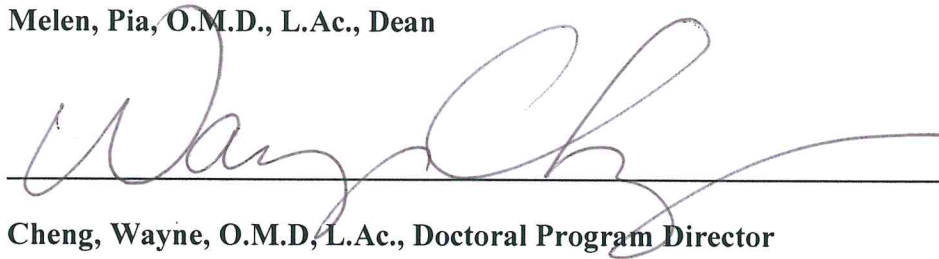Doctor of Acupuncture and Oriental Medicine

ANAHEIM, CALIFORNIA

MARCH 2017

THE RESEARCH PROJECT OF HUNG VIEN
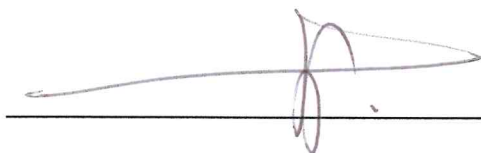## APPROVED BY RESEARCH PROJECT COMMITTEE

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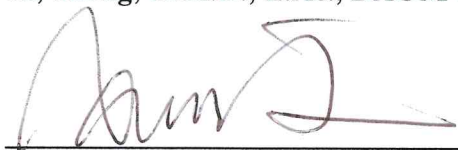
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MARCH 28, 2017

ACKNOWLEDGEMENTS

The Effects of Acupuncture in Treating People with Insomnia

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SOUTH BAYLO UNIVERISTY AT ANAHEIM, 2017

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ABSTRACT

The **objective** of this literature review is to find the effects of acupuncture in treating people with insomnia, a very common sleep disorder that affects millions of people every year. Inadequate quality or quantity of sleep can lead to fatigue, short temper, decreased focus, impaired social and occupational functioning, and can affect overall health in a number of ways. The prevalence of insomnia continues to increase and has become a major concern for many people. There are many treatments for insomnia such as improving sleep habits, relaxation exercises, identifying and treating underlying causes, taking sleeping pills for a short time, and nowadays, even acupuncture is on the list of options. Acupuncture is commonly used in treating insomnia in Asian countries such as China and Taiwan, and recently being used more often in the U.S. The National Institutes of Health (NIH) recommends acupuncture as a beneficial alternate treatment for insomnia.

Method: The clinical research of this literature review is conducted by using databases such as MEDLINE, PubMed, WebMD, Mayo Clinic, MNT, and sleepfoundation.org

through searching on Google, and books. The articles are selected based on the inclusion and exclusion criteria. The outcome of the studies are critically evaluated, interpreted and synthesized with summarization of the major finding and description in variation across the studies, the strength and weakness of improving the future studies.

Results: In conclusion, the evidence of clinical studies suggested that the effects of acupuncture at selected acupoints stimulation significantly reduce insomnia symptoms. However, further large and high quality designed trials with highly objective methodlogy are needed to validate the effects of acupuncture as an alternative treatment for insomnia.

The **key words**: acupuncture and insomnia.

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I. INTRODUCTION

Insomnia is perhaps the most common sleep disorder in the modern world today. Insomnia is considered as a symptom, not a stand-alone diagnosis or a disease. For most people, the symptom of insomnia can be described as difficulty or unable to fall asleep, waking throughout the night, restless sleep, waking in the early morning with the inability to fall back asleep, and sometimes dream-disturbed sleep. The lack of sleep can have a negative impact on energy, mood, concentration, and overall health[1].

Incidence: An estimated of about 30 - 35% of adults have brief symptoms of insomnia; 15 - 20% have a short-term insomnia disorder, which lasts less than three months; and 10% have a chronic insomnia disorder, which occurs at least three times per week for at least three months[2]. Insomnia affects all age groups. Among adults, insomnia affects women more often than men. The incidence tends to increase with age. It is typically more common in travelers, shift workers with frequent changes in shifts, the elderly, drug users, pregnant and menopause women, adolescent or young adult students, chronic alcoholics, and mental health patients[3].

Etiology: Most cases of insomnia are usually related to unhealthy lifestyles, bad sleep habits, personal circumstances, medical conditions, and certain substances such as caffeine, alcohol, or some western medications[4]. According to the National Institutes of Health (NIH), insomnia can lead to daytime sleepiness, lethargy and a general feeling of being unwell both mentally and physically. Getting too little sleep on a regular basis can weaken the immune system and is believed to be a contributing factor in many car accidents. In addition, the National Sleep Foundation states that those with insomnia miss

work more often, have an elevated risk of depression, and have higher overall rates of illness and poorer health in general[5]. There are serious health risks for people who suffer insomnia for a long time. Clinical studies have shown diabetes, cardiovascular disease, hypertension, obesity, and mood disorders have all been linked to insomnia.

Pathophysiology of Insomnia

In western medical theory, insomnia is thought to be a disorder of hyperarousal of the nervous system, a state or condition of muscular and emotional tension a person experienced during the day making it difficult to fall asleep or maintain sleep at night[7]. Some researches also shown evidence that there is an overactivity of the hypothalamic pituitary adrenal (HPA) axis in people with insomnia. The HPA axis access may cause elevated of corticotrophin releasing factor (CRF), which then causes the pituitary to release adreno corticotropic hormone (ACTH). This causes the adrenal glands to secrete excessive amounts of cortisol. Increased cortisol, CRF and ACTH levels have been found in people with chronic insomnia. It is suggested that there seems to be a strong correlation between cortisol levels and sleep disruption. Some researches also suggest that chemical events in the brain associated with the HPA access also cause release of norepinephrine, which may also disrupting sleep. Other researches have found people with chronic insomnia have lower nocturnal levels of melatonin, a hormone that is a part of circadian rhythm. When melatonin levels increase, sleepiness occurs. Not only people with insomnia have lower melatonin levels, the levels are more disturbed the longer the people have trouble sleeping[7].

Biomedical Mechanism of Acupuncture on insomnia

A number of studies have shown Acupuncture, a part of Traditional Chinese Medicine (TCM), has some clinical effects on the nervous system and can modulate the activities of various neurotransmitters and hormonal factors known to be involved in sleep regulation[8]. Li et al. conducted an investigation and determined that acupuncture increases biochemical concentrations that benefit sleep. Acupuncture increases the concentration of gama-aminobutyric acid (GABA) in cerebrospinal fluid and increases bodily serotonin (5-HT) levels. Serotonin is involved in the regulation of many bodily functions including appetite, cognitive function, mood, and sleep. GABA is a major inhibitory neurotransmitter that dampens nerve activity in the brain, which leads to feelings of calm and relaxation. GABA also helps neutralize the effects of glutamate, a brain chemical that causes excitement. When there is too little GABA, it causes those racing thoughts that characterize anxiety, which may wake people up easily and often throughout the night [8].

Theory of Insomnia in TCM

According to TCM theory, insomnia is associated with agitation of the shen (the spirit/mind). Shen is a fundamental substance that is light and subtle, therefore it must be anchored by the yin aspect of qi (jing) and the blood or else it is possible it could "float away". The shen must be calm at night and is housed by the heart during sleep. If this is disturbed then insomnia will occur. According to TCM experience, difficulty in falling asleep means the body has accumulated heat or fire pathogens; restless sleep means the body has both pathogen accumulation and certain aspects of deficiency; easily arousal

from sleep and difficulty falling back to sleep are simply deficiency usually seen in a weakened spleen and heart. When associated with signs like abdominal distension, gastric discomfort, belching and poor appetite, the insomnia is usually due to spleen and stomach disorders. Heart disorders may also appear with symptoms such as dream-disturbed sleep, palpitation and forgetfulness; frequent fearful awakening, timidity, irritability and sighing are associated with disorders in the liver and gallbladder[9]. In TCM, the most common pattern differentiations of insomnia are Liver Qi Stagnation leading to Heat or Fire, Stomach disharmony and Phlegm Heat, Heart Blood and Spleen Deficiency, Yin Deficiency with Heat, and Heart and Gallbladder Qi Deficiency. Since TCM regards insomnia as one of the signs of an internal disharmony, the principle treatment always aims at restoring normal function of the diseased organs, ensuring normal supply of the fundamental substances in order to rebalance and harmonize the body. Theoretically in TCM, acupuncture works on meridians and internal organs to achieve a general regulating effect to the overly active body system, make it shift to more quiet state and prepare for sleep.

Treatment: In general, the treatment for insomnia usually focuses on determining the cause of the sleeping problems. Once identified, the underlying cause can be properly treated or corrected. Treatment for insomnia often consists of improving sleep habits (maintain a regular sleep schedule, avoid naps and late meal, limit caffeine, alcohol, and nicotine...), behavior therapy (a talk therapy that focuses on changing a person's thoughts about their behaviors and feelings), and relaxation exercises (meditation, yoga, and deep breathing)[6]. Prescription sleep medications may provide temporary relief, but can have

serious side effects and make insomnia worse in the long run. It's best to use medication only as a last option, and then, only on a very limited, as-needed basis.

There are many advertisements and various health care options to help with insomnia. Supplement, Pillows, Mattresses, Sleeping Pills, Relaxing music and exercise, Behavior therapy, and now acupuncture to reduce insomnia and improve sleep. In the USA, the National Institutes of Health (NIH) recommends acupuncture as a beneficial alternate treatment for insomnia. There are many discussions about whether any of these treatments including acupuncture work and has a lasting effect. Thus, the purpose of this literature review is to focus on studies about acupuncture (in different forms) treatment for insomnia to find out its effects and possibly some potential mechanism on insomnia.

II. MATERIALS & METHODS

The research study is conducted by firstly collecting the databases such as MEDLINE, PubMed, WebMD, Mayo Clinic, MNT, and sleepfoundation.org through searching Google with key words: 'Acupuncture" and "insomnia" and the text books, and then selecting the research articles in full text, limited in English language only. The selection process based on:

Inclusion criteria:

This literature review was restricted to randomized controlled trials (RCTs) clinical studies that compared acupuncture (in different forms) with a control group. Studies with clear hypotheses, objectives, setting, participants (inclusion or exclusion criteria), assessments, interventions, results and conclusion are included. The results are analyzed statically with significant values if $p < 0.05$ or less.

Clinical trials evaluating all forms of acupuncture (classical body, auricular acupuncture, electro-acupuncture, acupressure, Chinese Tuina, and moxibustion). Studies with co-interventions, such as lifestyle modification, physical exercise, or behavior therapy were included if they were given to both groups.

Exclusion criteria

Databases other than English language and non relevant to the topic were excluded. Exclusions also included clinical trials and studies that have no indication of methods and statistics of information regarding TCM patterns. Trials with effective acupuncture treatment on animals but no indication as to using this on human were excluded. Trials that compared acupuncture (in different forms) without a control group or a non-acupuncture comparative arm were excluded.

From the search, there are 15 clinical human studies concerning the effects of acupuncture at certain acupoints on insomnia [10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24]. Among them which do not meet the inclusion criteria are excluded and the research studies which are selected as the best available relevant studies are, namely 4 human clinical studies[11, 12, 13, 14].

In these review of evidences, the statistical aspects of research studies are not evaluated through meta analysis.

Search and selection process of research articles were listed in figure 1.

Figure 1. Exclusion and Inclusion Criteria of selecting research articles

Records identified through MEDLINE using "Acupuncture" and "Insomnia"
(n = 309)

Free Full Text pubished in English language
(n = 85)

Records screened
(n = 15)

Records excluded with reasons
(n = 11)

Relevant RCT Studies included in literature review
(n = 4)
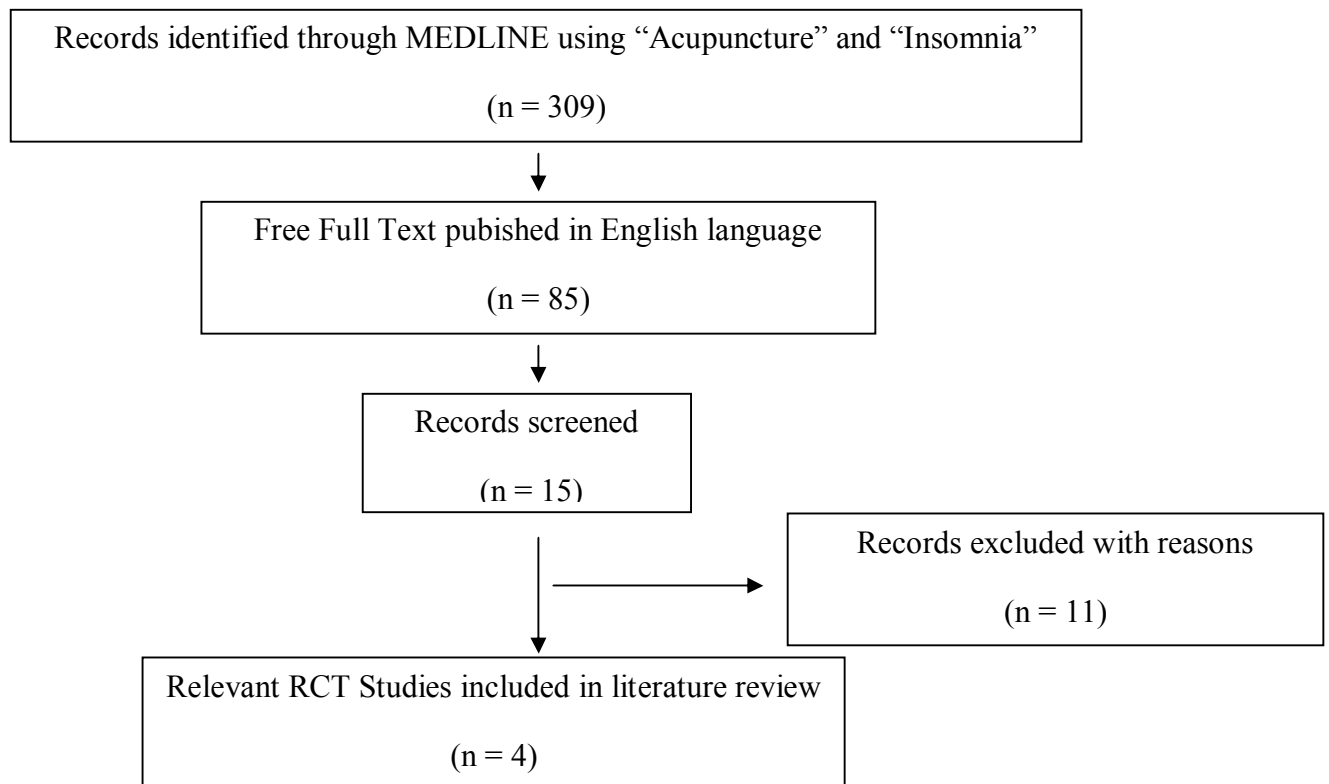
III. RESULTS

Clinical Study # 1

The study was conducted by Guo, J., Wang, L.-P., Liu, C.-Z., et al., at Beijing TCM hospital in August 2009.

This trial was randomized, double-dummy, single-blinded, and placebo-controlled. It compared the efficacy of verum acupuncture, estazolam, and sham acupuncture for insomnia. Outcome measurements were assessed at baseline, posttreatment (6 weeks) period, and 2-month follow-up.

Verum group: patients were needled at the points of DU-24, Sishencong, DU-20, SP-6, and HT-7. Needles retention was 30 minutes after obtaining De Qi sensation such as sore, numb, full, burning, heavy, or achy. The acupuncture was performed every other day for 6 weeks. One estazolam placebo tablet was taken 30 min prior to bedtime in the day without acupuncture intervention.

Estazolam group: patients were treated with estazolam and sham acupuncture. Estazolam (1 mg) was given 30 min prior to bedtime every other day. In the day without estazolam intervention, sham acupuncture was conducted by needling the acupoints of LI-14, LI-10, LU-10, and GB-31. Needles retention was 30 minutes. Manual stimulation and De qi were avoided.

Sham group: patients were treated with sham acupuncture and estazolam placebo tablet. Sham acupuncture treatment was the same as in the estazolam group. In the day without acupuncture intervention one estazolam placebo tablet was given 30 min prior to bedtime.

The results

Table 1. General characteristic of study group[11]

Variables	Verum (n=60)	Estazolam (n=60)	Sham (n=60)
Age, years	47.5 ± 13.3	50.1 ± 15.6	49.2 ± 12.0
Male / Female	19 / 41	21 / 39	18 / 42
Insomnia duration (Years)	6.3 ± 2.1	5.7 ± 3.9	6.2 ± 4.8
Married	40	39	42
Widowed	9	10	9
S / SE / D *	11	11	9
Chronic medical Illness	7	4	9

*S – Single / SE – Separated / D - Divorced

Figure 2. Change in Pittsburgh Sleep Quality Index and subscale scores at different times in 3 groups[11].
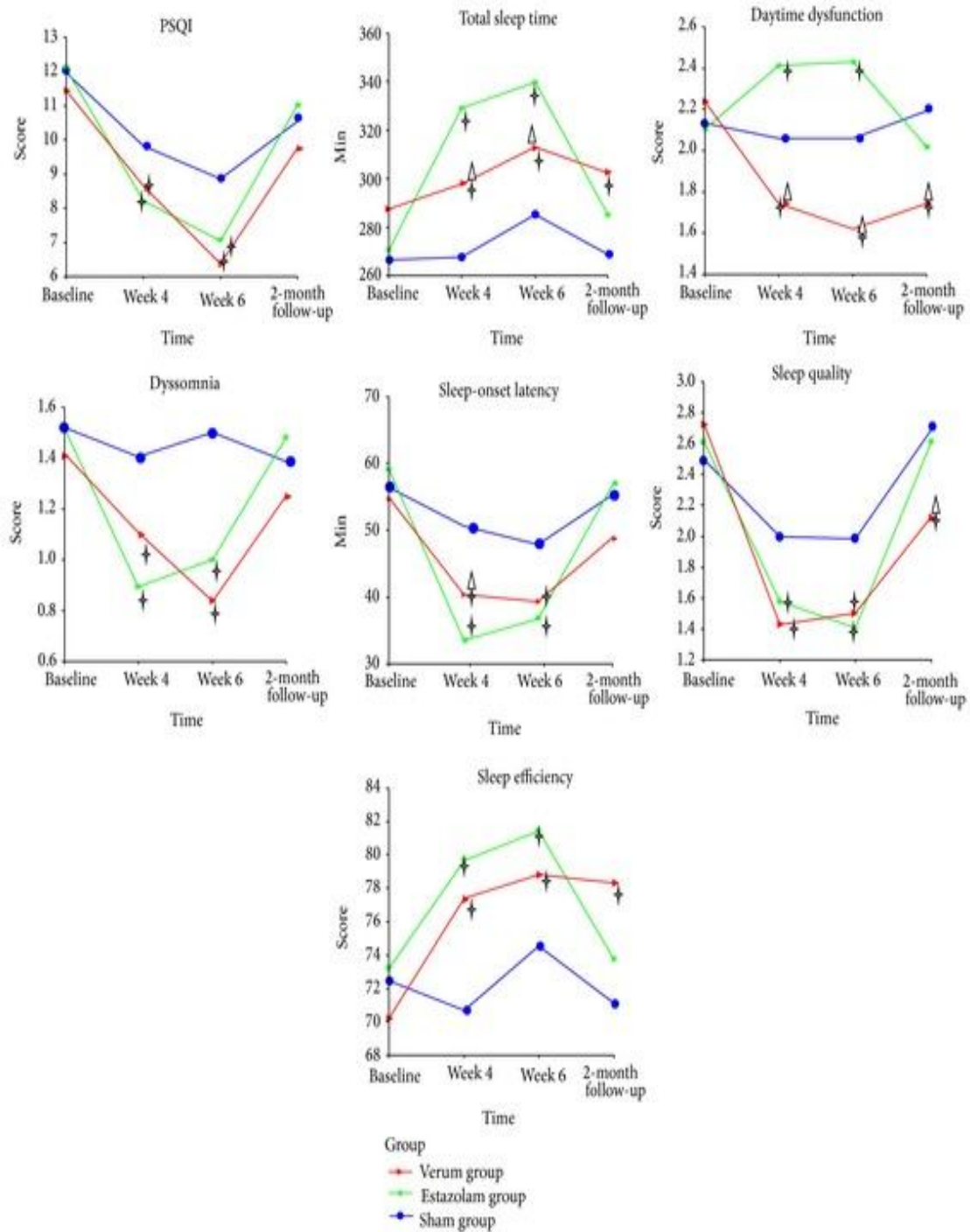
Figure 2 presents changes of PSQI and subscales among the three groups. Compared with baseline, the verum, estazolam, and sham groups had better global score of PSQI and sleep quality, decreased sleep-onset latency and dyssomnia, longer sleep duration (only in the estazolam group), and higher sleep efficiency (not obvious in the sham group) ($P < 0.05$). Daytime dysfunction score increased in the estazolam group while decreased in the verum group ($P < 0.05$). However, most of the variables returned to baseline level at follow-up in the sham and estazolam groups. The significant differences in Sleep Quality (SQ), Total Sleep Time (TST), Sleep Efficiency (SE) and Daytime Dysfunction (DD) were well maintained to follow-up period in the verum group ($P < 0.05$). Subjects in verum group had lower DD and higher SQ scores than those receiving estazolam and sham acupuncture ($P < 0.05$). Both the verum and estazolam groups had significantly reduction in most of PSQI subscale scores at posttreatment compared with the sham group ($P < 0.05$). Whereas the difference in PSQI total score and sleep-onset latency (SOL) was not significant among the three groups at the 2-month follow-up.

Figure 3. Change in Epworth Sleepiness Scale score from baseline to 2-month follow-up[11].
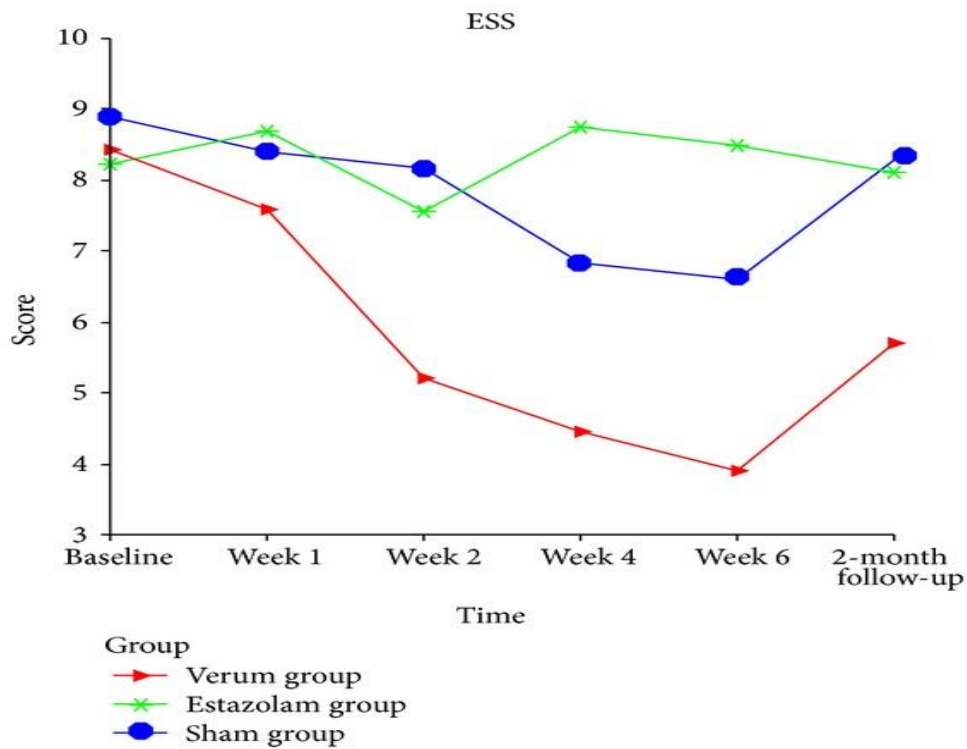
There was significant decrease compared with baseline in the verum and sham groups. In the estazolam group, ESS score increased at the treatment phase and returned to baseline at follow-up. Compared with estazolam and sham groups, verum acupuncture group showed significant reduction in ESS score at the treatment and follow-up period ($P < 0.05$).

Clinical Study # 2

Conducted by Feng, Yu, Xin-Yu Wang, Shao-Dan Li, et al., at TCM Department of Chinese PLA General Hospital in October 2008.

This trial was randomized controlled study to observe the effect of acupuncture on depression and insomnia in malignant tumor patients.

Eighty cases of cancer related depression and sleep disorders were randomly divided into a treatment group and a control group. All patients were assessed by Self-rating Depression Scale (SDS), Hamilton Depression Rating Scale (HAMD) and Pittsburgh Sleep Quality Index (PSQI) after treatment for 30 days.

Control group: patients received Fluoxetine Hydrochloride Capsule 20 mg per day.

Treatment group: patients were treated with acupuncture on the acupoints of ST 40, SP 9, SP 10, SP 6, Yintang, DU 20, Sishencong, PC 6 and Shenmen. The patients were treated one time per day for 20–30 min, and the acupuncturist did needling manipulation at the interval of 5–10 min.

The results

Table 2. General characteristic of study group[12].

	Treatment Group	**Control Group**
Cases	40	40
Male / Female	26 / 14	27 / 13
Median Age (year)	63.80±5.47	63.60±4.26
Pulmonary cancer	14	16
Gastric cancer	8	8
Breast cancer	3	4
Colorectal cancer	9	5
Lymphoma	3	1
Cervical carcinoma	1	1
Ovarian cancer	2	2

*Between the two groups, there was no statistical difference in gender, age, and tumor type ($P > 0.05$).

Table 3. Self-rating Depression Scale (SDS) scores before and after treatment of malignant tumor patients in the 2 groups[12].

Group	Before Treatment	After treatment
Treatment	64.12±5.34	43.64±5.28*#
Control	64.24±4.98	50.76±5.42**

Notes: *compared with score before treatment P<0.05, #compared with the control group P<0.05; **compared with score before treatment P<0.05.

Table 4. Hamilton Depression Rating Scale (HAMD) scores before and after treatment of malignant tumor patients in the two groups[12].

Group	Before Treatment	After treatment
Treatment	20.92±2.38	9.88±1.27*#
Control	20.72±2.74	13.72±2.05**

Notes: *compared with score before treatment P<0.05, #compared with the control group P<0.05; **compared with score before treatment P<0.05.

Table 5. Pittsburgh Sleep Quality Index (PSQI) total scores before and after treatment of malignant tumor patients in the two groups[12].

Group	Before Treatment	After treatment
Treatment	14.48±1.71	7.92±1.22*#
Control	13.92±2.59	11.44±1.89

Notes: *compared with score before treatment P<0.05, #compared with the control group P<0.01.

Clinical study # 3

Conducted by Zou, Chuan, Lihong Yang, Yuchi Wu, et al., at Hemodialysis Center of Guangdong Provincial Hospital of Chinese Medicine in January 2011.

This trial was designed to be a two-arm (allocation ratio 1:1), double-blind, sham-controlled, and randomized trial to observe the effect of Auricular Acupressure on Specific Points for Hemodialysis Patients with Insomnia.

Sixty three (63) eligible patients were randomly assigned into either Auricular Acupressure (AA) group (n=32) and sham Auricular Acupressure (SAA) group (n=31) All participants were treated for 8 weeks and then followed up for 12 weeks after treatments. The primary outcome was clinical response at eight weeks after randomization, defined as a reduction of Pittsburgh Sleep Quality Index (PSQI) global score by 3 points and more.

Auricular acupressure (AA) group: patients received AA on 5 active acupoints including Shen men, Sympathetic autonomic, Subcortex, Heart, and Endocrine. Acupoint areas were disinfected with 75% isopropyl alcohol before attaching an adhesive plaster with one bead imbedded. Participants were instructed to press the beads until a hot sensation and slight soreness on the points were felt. Each acupoint should be manipulated three to five times in the daytime and evening

Sham auricular acupressure (SAA) group: patients received AA on five Helix points (HX 5–9), which were clearly remote from the inner ear area and irrelevant to insomnia treatment.

The results

Table 6. Baseline Characteristic of Participants[13].

	AA group (n=32) Mean (SD)	SAA group (n=31) Mean (SD)
Age (year)	53.28(12.68)	58.55(10.00)
Male sex (n, %)	17 (53.1)	11 (35.5)
Comorbidities (n, %)		
Diabetes	3 (9.4)	6 (19.4)
Hypertension	21 (65.6)	21 (67.7)
No comorbidities	8 (25.0)	4 (12.9)
Taking hypnotic (n, %)	11 (34.4)	14 (45.2)
Dialysis time per week (hour)	11 (1.02)	11.1 (1.01)
Serum creatinine (μmol/L)	1114.22(211.92)	1048.61(297.53)
Blood urine nitrogen (mmol/L)	24.29(5.99)	22.15(6.35)
TCO_2 (mmol/L)	19.95(3.32)	19.90(3.48)
Serum potassium (mmol/L)	4.74(1.14)	5.06(0.67)
Serum calcium (mmol/L)	2.19(0.24)	2.29(0.17)
Serum phosphorus (mmol/L)	2.20(0.60)	2.43(1.16)
PTH (pg/ml)	749.98(607.93)	978.22(666.23)
Albumin (g/L)	40.37(3.20)	39.62(2.89)
Hemoglobin (g/L)	112.47(12.03)	114.42(17.14)
KT/V	1.47(0.27)	1.44(0.28)

Abbreviations: TCO2: Total carbon dioxide content, PTH: Parathyroid hormone, KT/V: urea clearance index.

Table 6. PSQI global score and its components and number of patients taking sleeping medications over time in each group[13].

Outcome measures		AA (n =32)	SAA (n=31)
PSQI global score	Baseline	11.94 (3.15)	12.00 (3.62)
	Week 8	8.19 (3.60)*	9.74 (4.49)
	End of Follow-up	10.38 (3.88)	10.74 (3.82)
Sleep quality	Baseline	1.88 (0.79)	1.84 (0.69)
	Week 8	1.34 (0.60)	1.29 (0.59)
	End of Follow-up	1.66 (0.60)	1.58 (0.62)
Sleep Disturbance	Baseline	1.09 (0.30)	1.00 (0.00)
	Week 8	1.00 (0.25)	1.03 (0.18)
	End of Follow-up	1.00 (0.00)	1.00 (0.00)
Daytime	Baseline	1.97 (0.86)	1.81 (0.87)
Dysfunction	Week 8	1.25 (0.92)	1.23 (0.99)
	End of Follow-up	1.44 (1.08)	1.23 (1.02)
Number of patients	Baseline	11	14
Taking sleeping	Week 8	4*	15
medications	End of Follow-up	4	11

* PSQI global score had significantly decreased by > 3 points after treatment ($P < 0.01$).

Number of patients taking sleep medications reduced from 11 (34.4%) to 4 (12.5%) after eight weeks of treatment which maintained to the end of follow-up ($P < 0.01$).

Clinical study # 4

The study was conducted by Yeung, W.-F., Chung, K.-F., Zhang, S.-P., et al., at a university-based sleep clinic in August 2009.

This was a randomized, single-blind, parallel-group study designed to compare the effects of electroacupuncture and placebo acupuncture for the treatment of primary insomnia. Self-reported questionnaires, 1-week sleep diaries, and 3-day actigraphy were collected at baseline and 1 week after treatment. The Insomnia Severity Index was used as the primary outcome measure.

60 patients were randomly divided into Electroacupuncture group (n = 30, 6 M and 20 F), and Placebo acupuncture group (n= 30, 3 M and 23 F).

Study design consisted of 3 weeks treatment, 3 times per week for each patient.

Electroacupuncture group: patients were needled at Yintang, Du 20, bilateral Ear Shenmen, Sishencong, and Anmian. De Qi sensation was achieved if possible. An electric stimulator was connected to the needles and delivered a constant-current, 0.45-ms, square-wave, and brief-pulse stimulus of 4-Hz frequency to the subjects. The needles were left for 30 minutes and then removed.

Placebo group: patients were treated at the same acupoints using placebo needles. Similar to the technique used in the electroacupuncture group, the needles were held by surgical tape or hair pins and connected to the same electric stimulator but with zero frequency and amplitude.

The results

Table 7. General Characteristic of study group[14]

Variables	Electro (n = 30)	Placebo (n = 30)
Age, year	48.3 ± 9.5	47.8 ± 8.6
Sex, male/female	8 / 22	6/ 24
Insomnia duration, year	7.7 (8.1)	10.8 (16.7)
Martial Status		
Never married	10 (33.3)	9 (30.0)
Married / cohabiting	16 (53.3)	18 (60.0)
Divorced / widowed	4 (13.3)	3 (10.0)
Occupation		
Professional or associate	10 (33.3)	5 (16.7)
Coffee use ≥ 1 cup/d	11 (36.7)	6 (20.0)
Alcohol use ≥ 3 times/wk	3 (10.0)	2 (6.7)
Chronic medical illness	6 (20.0)	2 (6.7)

Data are presented as mean ± SD or number (%).

Table 8. Subjective Sleep Measures at Baseline and 1-week Posttreatment[14]

Outcomes	Electro (n = 30)		Placebo (n = 30)	
	Baseline	Post treatment	Baseline	Post treatment
ISI total score	18.8 (2.8)	12.9 (5.6)	17.4 (2.5)	13.8 (3.5)
PSQI total score	12.0 (2.8)	9.9 (3.2)	11.9 (2.1)	9.7 (2.6)
TST in min	292.9 (80.6)	329.5 (62.3)	307.9 (61.3)	332.5 (51.8)
SOL in min	50.2 (66.2)	34.4 (33.7)	45.7 (37.1)	36.9 (26.8)
WASO in min**	79.0 (60.7)	55.5 (72.8)	87.4 (52.8)	89.1 (82.9)
SE in %**	69.8 (17.9)	81.2 (10.7)	70.2 (12.9)	73.7 (12.7)
sleep quality*	2.83 (0.5)	2.42 (0.5)	2.73 (0.4)	2.39 (0.4)

Data are presented as mean ± SD or number (%).

ISI refers to Insomnia Severity Index, PSQI refers to Pittsburgh Sleep Quality Index, SOL refers to sleep-onset latency, TST refers to total sleep time.

*Sleep quality: a lower score represents better sleep quality.

No significant difference between groups in ISI, PSQI, SOL, TST, and Sleep quality.

**SE refers to sleep efficiency, electroacupuncture group significantly differed from the placebo group (p = 0.001). WASO refers to wake after sleep onset, electroacupuncture group significantly differed from the placebo group (p = 0.007).

Table 9. Actigraphy Measures of Sleep at Baseline and 1-week Posttreatment[14]

Actigraphy	Electro (n = 30)		Placebo (n = 30)	
	Baseline	**Post treatment**	**Baseline**	**Post treatment**
TST in min	408.4 (64.5)	412.3 (53.4)	422.0 (51.9)	417.8 (47.1)
SOL in min	21.6 (23.1)	12.2 (15.6)	15.8 (13.0)	14.1 (11.7)
WASO in min	28.7 (32.9)	17.0 (20.1)	19.2 (19.1)	19.7 (18.9)
SE in %	89.4 (8.8)	93.2 (6.5)	92.6 (4.6)	92.4 (4.8)

*(SE) sleep efficiency; (SOL) sleep-onset latency; (TST) total sleep time; (WASO) wake after sleep on

Table 9 presents the summary data for actigraphy measures. There was a significant between-group difference in actigraphy derived SE at posttreatment (P = 0.04), with greater improvement for the electroacupuncture group from baseline to 1 week after treatment. No other significant between-group differences between the electroacupuncture and placebo acupuncture groups were found.

Table 10. Other clinical Outcome measures at baseline and 1 week Post treatment[14].

	Electro (n = 30)		Placebo (n = 30)	
	Baseline	Post treatment	Baseline	Post treatment
HADS - Anxiety	7.5 (4.2)	6.3 (4.3)	7.0 (3.3)	5.8 (3.8)
HADS - Depression	6.3 (3.8)	4.8 (3.3)	5.9 (3.0)	5.3 (3.8)
SDI - Work	4.3 (2.9)	3.2 (2.1)	3.6 (2.3)	2.3 (2.0)
SDI - social	3.6 (2.4)	2.8 (2.0)	2.6 (2.2)	2.5 (1.8)
SDI - family	3.2 (2.2)	2.8 (2.0)	1.9 (2.0)	2.3 (1.7)

*(HADS) Hospital Anxiety and Depression Scale; (SDI) Sheehan Disability Index

Table 10 presents the data for HADS and SDI. There were no significant between-group differences in HADS and SDI scores at 1 week after treatment.

Table 11. Selected acupoints of acupuncture treatment in clinical studies

Clinical study	Acupuncture with stimulation			
	Acupoitns	**Stimulation**	**Needle Retention**	**Length of Treatment**
# 1	Du 24, 20, Sp 6 Ht 7, Sishencong	until De Qi sensation	30 min.	every other day for 6 weeks
# 2	St40, Sp9, 10, 6 Yin Tang, Du20 Pc6, Shenmen Sishencong	manual at the interval of 5-10 min	20-30 min.	1x/day for 30 days
#3	Shenmen, subcortex Endocrine, Heart Sympathetic automic	acupressure 3-5x until hot sensation and slight soreness	plasters changed 2-3 days	8 weeks
#4	Shenmen, Anmian DU20, Yin Tang Sishencong	until De Qi with electric	30 min.	3x/week for 3 weeks

Table 12. Summarization of the effects of acupuncture at selected acupoints stimulation in clinical studies.

	Clinical studies			
Outcome measures	#1	#2	#3	#4
	(Post Treatment / Pre Treatment)			
ISI score	NE	NE	NE	12.9 / 18.8
PSQI score	6.4 / 11.5	7.92 / 14.48	8.19 / 11.94	9.9 / 12.0
TST in min	316 / 285	NE	NE	329.5 / 292.9
Dyssomnia	0.81 / 1.4	NE	NE	NE
SOL in min	40 / 55.5	NE	NE	34.4 / 50.2
SQ	1.5 / 2.8	NE	1.34 / 1.88	2.42 / 2.83
SE in %	78.1 / 70.2	NE	NE	81.2 / 69.8
WASO in min	NE	NE	NE	55.5 / 79.0
Sleep disturbance	NE	NE	1.25 / 1.97	NE
DD	1.62 / 2.2	NE	1.25 / 1.97	NE
ESS score	3.9 / 8.4	NE	NE	NE
SDS	NE	43.64 / 64.12	NE	NE
HAMD	NE	9.88 / 20.92	NE	NE
Number of patients	NE	NE	4 / 11	NE
Taking sleeping medications				

*Insomnia Severity Index (ISI), lower score after treatment indicates improvement.

*Pittsburgh Sleep Quality Index (PSQI), lower score after treatment indicates improvement.

*Total sleep time (TST), higher score after treatment indicates improvement.

*Dyssomnia, lower score after treatment indicates improvement.

*Sleep-onset latency (SOL); lower score after treatment indicates improvement.

*Sleep quality (SQ); lower score after treatment indicates improvement.

*Sleep efficiency (SE); higher score after treatment indicates improvement.

*Wake after sleep onset (WASO); lower score after treatment indicates improvement.

*Sleep disturbances, lower score after treatment indicates improvement.

*Daytime dysfunction (DD); lower score after treatment indicates improvement.

*Epworth Sleepiness Scale (ESS), lower score after treatment indicates improvement.

*Self-rating Depression Scale (SDS), lower score after treatment indicates improvement.

*Hamilton Depression Rating Scale (HAMD); lower score after treatment indicates improvement.

*Not Evaluated (NE).

IV. DISCUSSION

Insomnia is perhaps the most common sleep disorder in the modern world today and has been affected millions of people every year. In general, individuals with insomnia find it difficult to fall asleep and/or stay asleep. Sleep plays a vital role in good health and well-being throughout our life. Getting enough quality sleep at the right times can help protect the mental health, physical health, quality of life, and safety [25]. Sleeping pills (Estazolam, Temazepam, Ambien CR...) are one common treatment option for insomnia, but often include side effects such as dizziness, headache, gastrointestinal problems, drowsiness, severe allergic reaction, sleep behaviors, daytime memory and performance problems. Recently Acupuncture has been used as a helpful alternative and relatively safe treatment for insomnia with fewer or no side effects compared to western medications.

The clinical study # 1 with the objective to observe the effect of acupuncture in patients with primary insomnia. The results showed that acupuncture was effective in improving sleep quality, total sleep time, sleep efficiency, and daytime functioning. The effect of acupuncture treatment was well maintained during follow-up, whereas the effect of sham acupuncture and estazolam was not significant when the intervention ended. The results also showed that acupuncture was better than sham acupuncture and estazolam in improving sleep quality (at 2-month follow up). One of the most notable results of the trial was that acupuncture could significantly improve daytime functioning. Subjects in acupuncture group achieved lower Daytime dysfunction (DD) and Epworth Sleepiness Scale (ESS) scores compared with the other two groups.

Point's selection is crucial for the outcomes of treatment. Based on literature review and TCM clinical experiences, DU-24, Sishencong, DU-20, and HT-7 are common in the treatment of insomnia, depression, anxiety, and so forth. Du 20, DU 24, and Sishencong are located on the head which are often used to clam the mind and relax the patients. While Ht 7 (Shenmen – Spirit Gate) is the Yuan source point of the heart channel which is often used to soothe, nourish, and inspire the Spirit (mind). In practical terms, HT 7 is used to calm the emotions, to relieve anxiety, and to soothe the worries of a troubled mind so that one can get some sleep. Lastly SP-6 is important to induce sedation and tranquilization. The points of sham group are mainly for local disease, having no relationship with treatment for insomnia[11]. Thus, the trial implied that verum acupuncture was superior in improving sleep quality and daytime functioning of primary insomnia compared with estazolam and sham acupuncture. Further research could be conducted with additional objective measures such as multiple sleep latency test (MSLT), polysomnography or actigraph, subgroup design (difficulty initiating and maintaining sleep or nonrestorative sleep), and assessment of cognitive abilities problems (attention, concentration, and memory).

The study # 2 with the objective to study the effects of acupuncture on depression and insomnia in malignant tumor patients. The results indicated that acupuncture and Fluoxetine Hydrochloride capsule were both effective in relieving depression mood and sleep quality of patients suffering from malignant tumor; however the effectiveness of acupuncture was obviously higher and better.

Studies show that depression is related to hypofunction of noreepinephrine and serotonin in the brain. Acupuncture has unique effect on treating depression and insomnia because it can promote the release of noreepinephrine and serotonin, extend blood vessel, and increase cerebral blood flow. For malignant tumor or cancer, pattern of phlegm-stasis accumulation is the most common type in TCM. In the treatment group, the patients were treated with acupuncture at acupoints St 40, Sp 9, Sp 10, Sp 6, Yintang, Du 20, Sishencong, PC 6, and Ht 7. This combination was effective in reducing insomnia and depression symptoms because it helped dissolving phlegm, dispelling stasis, quitting the heart and calming the mind[12]. In summary, the results suggested that acupuncture has a lot of advantages in treating depression of tumor patients; and it is favorable to relieving depression mood and improving sleep quality.

In the study # 3 with the objective to observe the effect of Auricular Acupressure on specific points for hemodialysis patients with insomnia. The results showed Auricular Acupressure was effective on improving sleep quality and daytime dysfunction. Besides, fewer participants in Auricular Acupressure group than in Sham Auricular Acupressure group were taking sleeping medications (estazolam) (12.5% vs. 48.4%) after treatment, as well as at the end of follow-up (12.5% vs. 35.5%).

According to TCM theory, sleep problems are mainly due to dysfunction of the heart. The acupoints (Shen men, Sympathetic autonomic, Subcortex, Heart, and Endocrine) selected are closely related to this basic consensus. Shenmen is related to the heart and is able to calm the spirit. Stimulation of shen men relaxes patients. The heart acupoint has mostly the same function as shen men but directly relates to the heart organ.

The other acupoints (Sympathetic autonomic, subcortex, and endocrine) help with self-modulation of internal organs. Anatomically, these points are mainly located at the triangular fossa and cavum conchae of the ear, where the auriculotemporal nerve and the auricular branch of the vagus nerve distribute. These nerves play an important role in regulating the autonomic nervous system. In addition, the role of the autonomic nervous system in insomnia has long been recognized. Several investigations have shown that stimulation at the shenmen or heart points or a combination with some other points regulated vagal activity by increasing parasympathetic activities and reducing sympathetic activities (researches showed insomnia seemed to be associated with sympathetic hyperactivity)[13]. PSQI was the sole outcome measurement applied in this trial. Combination with more specific insomnia questionnaire and measurements, such as insomnia Severity Index (ISI), and sleeping diary could promote the reliability of the results.

In The study # 4, compared with noninvasive placebo acupuncture, electroacupuncture showed statistically significant improvements in subjective and objective measures of Sleep Efficiency (SE). The proportions of subjects having less than 30 minutes of wake after sleep onset and a sleep efficiency of at least 85% at the posttreatment visit were significantly higher in the electroacupuncture group. However, there were no differences between group in Insomnia Severity Index (ISI) total score, the primary outcome measure, and other secondary measures at the posttreatment visit. Improved efficacy might be achieved by increasing session frequency and having individually tailored acupuncture regimens.

Like other, point's selection is also crucial for the outcomes of treatment in this study. The patients in treatment group were treated at the acupoints Yintang, Du 20, bilateral Ear Shenmen, Sishencong, and Anmian. This combination was effective in reducing insomnia symptoms because it helped calming the mind and relaxing the patients[14]. The results showed a slight advantage of electroacupuncture over placebo acupuncture in the short-term treatment of primary insomnia and suggested that electroacupuncture can be considered as a safe, well-tolerated, and potentially useful nonpharmacologic intervention for primary insomnia.

The limitations that exist in this literature review: limited resources of recruited articles in which a number of relevant articles might have been missed or the current clinical studies on the focused reviewed topic is not available, the reviews restricted to studies published in English language might exclude a relevant number of studies published in other languages, the reviews also restricted to free full text articles due to economic constrain which might exclude a number of relevant studies, small sample size, limited amount of time, and the mechanism of acupuncture on insomnia still need to be further evaluated.

The downside: For the case of chronic insomnia, the treatment may take longer times to see the effect and not many people have the motivation to keep up with schedule of the treatment. Even though acupuncture is commonly used in china and recently has gained popularity in the western countries, its concept and mechanism is still new and till now there are not many clinical studies about acupuncture for insomnia has been done.

The upside of using acupuncture compared to other methods: In the hand of well trained practitioners, acupuncture is relatively safe and less invasive. Studies have shown that acupuncture has so many positive effects on the body with minimal incidence of side effects. For the treatment of insomnia, acupuncture is simple to employ and when used appropriately may reduce any need for medications.

Future clinical studies can be improved by conducting further research studies with some modified methods in synthesizing the standardized methodology including highly objective outcome measurements such as multiple sleep latency test (MSLT), polysomnography, and actigraphy and by repeating the reasonable acupuncture treatment with electrical or manual stimulation at the same acupoints or combination or variability in frequency and duration of treatment or studies, etc. In the future, the effect of acupuncture may prospectively be validated as an alternate treatment for insomnia.

V. CONCLUSION

The evidences from clinical studies in this literature review suggested that the effects of acupuncture at selected acupoints stimulation significantly reduce insomnia symptoms. Besides an improvement in total sleep time, sleep quality and daytime functioning, acupuncture seems to affect the nervous system and can modulate the activities of various neurotransmitters and hormonal factors known to be involved in sleep regulation.

Further large and high quality designed trials with highly objective methodology are needed to validate the effects of acupuncture as an alternative treatment for insomnia.

VI. REFERENCES

1. www.nhs.uk. "Why lack of sleep is bad for your health." June 15, 2015.

   Http://www.nhs.uk/Livewell/tiredness-and-fatigue/Pages/lack-of-sleep-health-risks.aspx.

2. Heffron, Thomas. "Insomnia Awareness Day facts and stats." Mar 10, 2014

   Http://www.sleepeducation.org/news/2014/03/10/insomnia-awareness-day-facts-and-stats.

3. www.sleepmanagement.md. Sleep Management Institute. "Insomnia." 2010

   Http://www.sleepmanagement.md/sleepdisorders/Insomnia.aspx.

4. www.sleepfoudation.org. National Sleep Foundation, What Causes Insomnia?

   https://sleepfoundation.org/insomnia/content/what-causes-insomnia

5. www.nih.gov. "Insomnia" June 11, 2014

   Http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0063022.

6. Pigeon, Wilfred R. "Diagnosis, Prevalence, Pathways, Consequences &
   Treatment of Insomnia." The Indian journal of medical research 131 (2010): 321–
   332. Http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4324320.

7. Levenson, Jessica C., Daniel B. Kay, and Daniel J. Buysse. "The Pathophysiology
   of Insomnia." Chest 147.4 (2015): 1179–1192. PMC. Web. 20 July 2016.
   http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4388122.

8. Huang, Wei, Nancy Kutner, and Donald L. Bliwise. "Autonomic Activation in
   Insomnia: The Case for Acupuncture." Journal of Clinical Sleep Medicine :
   JCSM : Official Publication of the American Academy of Sleep Medicine 7.1

(2011): 95–102. Http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3041619.

9. Michael, Christopher. "Sleep Better – TCM for Insomnia."

    http://vitalitymagazine.com/article/sleep-better-tcm-for-insomnia.

10. Zhang, Yue-Feng, Gui-Fang Ren, and Xiu-Chun Zhang. "Acupuncture plus
    Cupping for Treating Insomnia in Collage Students." *Journal of Traditional
    ChineseMedicine* 30.3 (2010): 185-89.
    Http://www.ncbi.nlm.nih.gov/pubmed/21053624.

11. Guo, J., Wang, L.-P., Liu, C.-Z., et al. (2013). Efficacy of Acupuncture for
    Primary Insomnia: A Randomized Controlled Clinical Trial. *Evidence-Based
    Complementary and Alternative Medicine : eCAM*, *2013*, 163850.
    Https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3789397.

12. Feng, Yu, Xin-Yu Wang, Shao-Dan Li, et al. "Clinical Research of Acupuncture
    on Malignant Tumor Patients for Improving Depression and Sleep Quality."
    Journal of Traditional Chinese Medicine 31.3 (2011): 199-202.
    Http://www.ncbi.nlm.nih.gov/pubmed/21977863.

13. Zou, Chuan, Lihong Yang, Yuchi Wu, et al. "Auricular Acupressure on Specific
    Points for Hemodialysis Patients with Insomnia: A Pilot Randomized Controlled
    Trial." *PLOS ONE PLoS ONE* 10.4(2015): n. pag.
    Http://www.ncbi.nlm.nih.gov/pubmed/25874938.

14. Yeung, W.-F., Chung, K.-F., Zhang, S.-P., et al. (2009). Electroacupuncture for
    Primary Insomnia: A Randomized Controlled Trial. *Sleep*, *32*(8), 1039–1047.
    https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2717194.

15. Cui R, Zhou D. "Treatment of phlegm- and heat-induced insomnia by acupuncture in 120 cases." Journal of Traditional Chinese Medicine 23 (1):57-58, 2003. Https://www.ncbi.nlm.nih.gov/pubmed/12747205.

16. Gao, Xiyan, Cuixiang Xu, Peiyu Wang, et al. "Curative Effect of Acupuncture and Moxibustion on Insomnia: a Randomized Clinical Trail." *Journal of Traditional Chinese Medicine* 33.4 (2013): 428-32. Http://www.ncbi.nlm.nih.gov/pubmed/24187860.

17. Ju, Yan-Li, Xu Chi, and Jian-Xin Liu. "Forty Cases of Insomnia Treated by Suspended Moxibustion at Baihui (GV20)." *Journal of Traditional Chinese Medicine* 29.2 (2009): 95-96. Http://www.ncbi.nlm.nih.gov/pubmed/19663092.

18. Ming, Lu, and Liu Xiaoyan. "Insomnia due to Deficiency of both the Heart and Spleen Treated by Acupuncture-Moxibustion and Chinese *Tuina*." *Journal of Traditional Chinese Medicine* 28.1 (2008): 10-12. Http://www.ncbi.nlm.nih.gov/pubmed/18416075.

19. Li, Ling-Feng, and Jian-Hua Lu. "Clinical Observation on Acupuncture Treatment of Intractable Insomnia." *Journal of Traditional Chinese Medicine* 30.1 (2010): 21-22. Http://www.ncbi.nlm.nih.gov/pubmed/20397457.

20. Silvia, J. B. Guerreiro Da, M. U. Nakamura, J. A. Cordeiro, et al. "Acupuncture for Insomnia in Pregnancy- a Prospective, Quasi-randomized, Controlled Study." *Acupuncture in Medicine* 23.2(2005): 47-51. Http://www.ncbi.nlm.nih.gov/pubmed/16025784.

21. Huang, Li-Sha, Dan-Lin Wang, Cheng-Wei Wang, et al. "The Needle-Rolling Therapy for Treatment of Non-organic Chronic Insomnia in 90 Cases." *Journal of*

Traditional Chinese Medicine 29.1 (2009): 19-23.

Http://www.ncbi.nlm.nih.gov/pubmed/19514183.

22. Ling, Li, Xin-Mei Jiang, Jin-Wei Xue, et al. "Clinical Study on the Visceral Differentiation-Based Acupuncture Therapy for Insomnia." *Journal of Traditional Chinese Medicine* 28.4 (2008): 270-73.

Http://www.ncbi.nlm.nih.gov/pubmed/19226897.

23. Zhang Q. "Clinical observation on intractable insomnia treated by point pressure in 42 cases." Journal of Traditional Chinese Medicine 22 (4):276-277, 2002.

https://www.ncbi.nlm.nih.gov/pubmed/16579091.

24. Ahlberg, R., Skårberg, K., Brus, O., et al. (2016). Auricular acupuncture for substance use: a randomized controlled trial of effects on anxiety, sleep, drug use and use of addiction treatment services. *Substance Abuse Treatment, Prevention, and Policy*, *11*, 24. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4959048.

25. www.nhlbi.nih.gov. "Why Is Sleep Important?" February 22, 2012.

https://www.nhlbi.nih.gov/health/health-topics/topics/sdd/why.