Jurnal Keterapian Fisik
Vol. 9, No. 2, November 2024
https://doi.org/10.37341/jkf.v9i2.446

Original Research

The Effect of Acupuncture Therapy on the Concentration Level of Health Students

Ida Ayu Anom Rastiti[1*], Ida Ayu Suptika Strisanti[2], Komang Rosa Tri Anggaraeni[3], Putu Indrayoni[4]

[1,2,3] Department of Bachelor of Acupuncture and Herbal Medicine, Faculty of Health, Institute of Technology and Health Bali, Indonesia
[4] Department of Bachelor of Clinical and Community Pharmacy, Faculty of Health, Institute of Technology and Health Bali, Indonesia

ABSTRACT

Background: *Health students face various challenges during their studies. The demands of mastering clinical skills and the ability to build therapeutic relationships with patients require high concentration from health students. So it is important for health students to have good concentration during the learning process so that students' mastery of clinical skills can be achieved optimally. Acupuncture is a therapeutic modality that has been proven to have a function to improve individual cognitive abilities. This study aims to identify the effectiveness of acupuncture therapy in improving the concentration of health students.*

Methods: *The research sample in this study is 60 undergraduate nursing students of the Institute of Technology and Health Bali who are divided into an intervention group (n = 30) and a control group (n = 30). The instrument that will be used in this study is the Grid Concentration test to assess the level of student concentration.*

Results: *There was a significant increase (p < 0.05) in the concentration score in the treatment group, where before acupuncture the concentration score was (median = 14) and after acupuncture, the concentration score became (median = 20.50).*

Conclusion: *According to the results above, it proves that acupuncture therapy is effective in improving student concentration and can directly optimize working memory capacity.*

ARTICLE HISTORY
Received: September 21st, 2024
Accepted: December 31st, 2024

KEYWORDS
acupuncture, brain, concentration level, health students, working memory;

CONTACT
Ida Ayu Anom Rastiti
✉
rastitiida@gmail.com
Department of Bachelor of Acupuncture and Herbal Medicine, Faculty of Health, Institute of Technology and Health Bali. Jln. Tukad Balian No. 180, Renon, Denpasar, Indonesia.

Cite this as: Ayu Anom Rastiti, I. ., Ayu Suptika Strisanti, I., Rosa Tri Anggaraeni, K., & Indrayoni, P. (2024). The Effect of Acupuncture Therapy on the Concentration Level of Health Students. *Jurnal Keterapian Fisik*, *9*(2), 110–117. https://doi.org/10.37341/jkf.v9i2.446

INTRODUCTION

The shift from the structured and instructional environment of high school to university-level study as a student can be challenging. It is often said that the study skills that make students successful in high school are not sufficient and efficient for success in university. Student academic achievement is one of the primary indicators

used to determine the quality of education in higher education (Lawrence, 2014; Odiri, 2015). Academic achievement is a multifaceted process influenced by various factors, including study habits (Odiri, 2015).

Study habits are many kinds of individual behavior related to learning and are a combination of learning methods and skills (Arora, 2016; Kamoru & Ramon, 2017). Study habits encompass behaviors and skills that can enhance motivation and make learning an effective process with high outcomes, ultimately leading to improved learning (Hashemian & Hashemian, 2014). These skills are also described as activities that aid in the learning process of a subject, solving problems, or memorizing some or all of the material that is presented (Arora, 2016).

Students recognize that the vast amount of information they encounter must be managed and that they need specific coping strategies. Individuals who have difficulty coping are subject to significant academic pressure, leading to unsatisfactory academic performance. Learning and retaining a substantial amount of current and specific information during an academic year is challenging and time-consuming. It is evident that a lack of study skills and habits not only leads to wasted time and energy and encourages poor study practices but also results in setbacks that contribute to confusion and anxiety (Seyfoori, 2012).

Concentration is the capacity to concentrate fully on a single task while disregarding any distractions. According to Hartley and Davis, the typical attention span of an adult ranges from 10 to 15 minutes. Immediate concentration allows for observation of the environment, while extended concentration is necessary for reading, learning, and critical thinking (Pearl & Arunfred, 2019).

Concentration will help students complete tasks in less time and help reduce errors (Monsma et al., 2017). Concentration is an early aspect of information processing. Concentration is described as a determining gate in the initial processing of information with the next stage. Concentration determines a person's effectiveness in learning activities. During learning, someone with a full level of concentration will get maximum results compared to a low level of concentration.

Health students face various challenges during their studies. The demands of mastering clinical skills and the ability to build therapeutic relationships with patients require high concentration from health students. So it is important for health students to have good concentration during the learning process so that students' mastery of clinical skills can be achieved optimally.

Acupuncture is a therapeutic modality that has been proven to have a function to improve individual cognitive abilities. Many studies have found that acupuncture has an effect on improving the cognitive abilities of patients with several neurological disorders (Ji et al., 2021; Lin et al., 2022). Based on this, this study was conducted to see whether there is a possibility that acupuncture therapy can improve cognitive abilities, which in this case is the concentration of health students. Currently, there are several studies [U1] related to the utilization of traditional medicine in increasing study concentration (Dua et al., 2009; Jatwa et al., 2014; Shojaii et al., 2016).

However, those researchers only focus on the application of herbal medicine. A study related to the application of acupuncture to improve students' concentration in learning has never been done before; therefore, this research is very worthy of being conducted. The purpose of the research is to identify the effectiveness of acupuncture therapy in improving the concentration of health students. This study was conducted on health students at the Institute of Technology and Health Bali.

MATERIALS AND METHOD

This study is a true experimental design, pre-test-post-test with a control group that involves second-year students of the undergraduate nursing program at the Institute of Technology and Health Bali. The inclusion criteria of the participants were that they were willing to be subjects of the study by filling out informed consent and cooperating during the research process. The subjects who withdraw during the research will be excluded from the study.

The sample was divided into two groups. The intervention group (n=30) was given acupuncture treatment for 15 minutes while the control group (n=30) was given sham acupuncture. At first, both intervention and control groups were given a pretest (grid concentration test) to measure the level of focus before the intervention. Henceforth, the intervention group received a single session of acupuncture treatment for 15 minutes while the control group received a single session of sham acupuncture for 15 minutes. After that, both of the groups were given a post-test (grid concentration test) to identify the differences in the concentration scores.

The acupuncture points used were Baihui (GV20), located 5 cun from the anterior hairline; Sishencong (Ex-HN1), four points at the top of the scalp, grouped around Baihui and located 1 cun anterior, posterior, and lateral to it; and Yintang (GV29), located at the glabella, midpoint between the eyebrows. Disposable needles, size 0.18 x 13 mm, were used. The skin disinfection was done before the insertion of the acupuncture needle. The acupuncture needles were retained for 20 minutes. The acupuncture was done by a certified acupuncturist with two years of experience in clinical practice.

The instrument used to determine the level of concentration was the Grid Concentration test. This test consists of 100 boxes (10 x 10), each box containing two numbers starting from 00 to 99 that are arranged randomly. Instruct the research subject to find the pair of numbers 00, 01, 02, 03, and so on as quickly as possible in sequence from smallest to largest and must not be skipped. Give a cross on each number found. The time for the test is one minute.

Data were analyzed using SPSS (IBM, version 22). The analysis was conducted to determine the percentage and frequency of age and gender of the subjects. Furthermore, an independent t-test was conducted to compare the post-test scores of concentration levels between the experimental group and the control group. This study was approved by the Committee of Research of the Institute of Technology and Health Bali with an ethical approval letter number (No. 03.0317/KEPITEKES-BALI/V/2023). The subjects were asked to give consent to be participants in the study before the research began.

RESULTS

A total of 60 subjects were divided into two groups, in the intervention group (n=30) and in the control group (n=30). As shown in Table 1, the average age of subjects in the treatment group was 19.73 years, with the majority female (80%) and male (20%). Meanwhile, in the control group, the average age of the subjects was 20.40 years, with the majority being female (80%) and male (20%).

[U1] Several studies? Give the evidence and sources.

Table 1. Characteristics of Participants

Characteristics of Participants	Intervention Group (n = 30)	Control Group (n = 30)
Age	19.73 ± 0.69	20.40 ± 1.16
Gender		
Female	24 (80,00%)	24 (80,00%)
Male	6 (20,00%)	6 (20,00%)
Bianzheng (symptom and signs)		
Forgetfulness		
Excessive sleepiness	30 (100%)	30 (100%)
Lassitude		

As shown in Table 2, the results of the study showed that there was a significant increase in the concentration score in the intervention group, where before acupuncture the concentration score was (median = 14) and after acupuncture, the concentration score became (median = 20.50), p-value < 0.05. In the control group, the results were not significant in increasing the concentration score, where the initial concentration score was (median = 14) and the final concentration score was (median = 15), p-value > 0.05.

Table 2. The Effect of Acupuncture on Concentration Test Score

Group	Pre-test Score	Post-test Score	Z	P-value
	Median	Median		
Intervention	14	20,50	-4,14	0,00*
Control	14	15,00	-1,89	0,06
Z	-0,23	-4,16		
P-value	0,81	0,00*		

Note: * (p<0.05)

DISCUSSION

According to the findings of this study, it is evident that given acupuncture therapy experienced a significant increase in concentration scores (p < 0.05) compared to the control group. Recent neuroimaging studies in humans reveal that acupuncture can modulate activity in several cortical and subcortical areas of the brain. Acupuncture modulates several cortical areas, namely the Pre-frontal Cortex (PFC), Anterior Cingulate Cortex (ACC), and insula (Dhond et al., 2007). These areas have also been shown to support high-level cognitive abilities, including attention or focus (Smith & Jonides, 1999).

In this study, acupuncture stimulation at Baihui (GV20), Sishenchong (Ex-HN1), and Yintang (GV29) was believed to activate the frontal lobe area of the brain in participants. This is supported by previous studies on cerebral activity after acupuncture on Yintang and GV20, where the results obtained after acupuncture at these points showed activation in the frontal lobe and cingulate gyrus areas in the research subjects (Zheng et al., 2012). The anterior cingulate is classically part of the limbic system, which is also an important part of the frontal lobe.

The frontal lobe plays a role in many processes, such as cognition and neuropsychiatric function. There are five frontal lobe pathways, each consisting of a specific region. These pathways have specific functions, namely the pathway involving

the motor area, the oculomotor pathway involving the frontal eye field, and cognitive and also affective pathways that consist of three parts, namely the dorsolateral prefrontal, lateral orbital, and cingulate (medio-dorsal) pathways (Chayer & Freedman, 2001).

Concentration is the ability to maintain attention appropriately (Reigal et al., 2020). A study shows that attention and concentration are very important in cognitive performance (Ruiz-Ariza et al., 2017). The results of other studies also state that good concentration improves student achievement in academic exams (J. C. Lee & Klugman, 2013). Concentration ability is part of the brain's executive process. The executive process is mediated by the prefrontal cortex (PFC) and is involved in the operation of working memory in the brain. Working memory capacity is a limited-capacity system in the brain that retains and processes temporary information, including thinking, reasoning, memory, and problem-solving in areas such as arithmetic, language, and reading comprehension activities; following instructions; concentrating (focusing); and completing academic tasks, and a complex construct in the storage process of verbal, spatial, and visual information (Baddeley, 2000, 2003; Bailey et al., 2008).

In this study, it was found that acupuncture at the Baihui (GV20), Yintang (GV29), and Sishenchong (Ex-HN1) points can increase participant concentration. This increase in concentration will also play a role in improving working memory function. Stimulation of the acupuncture points used in this study can result in nerve conduction and improvement of cognitive abilities. A study found that acupuncture at the Baihui (GV20) point can regulate the expression of brain-derived neurotrophic factor (BDNF). BDNF has a significant impact on working memory performance (B. Lee et al., 2014).

So, in other words, stimulation of the Baihui (GV20), Yintang (GV29), and Sishenchong (Ex-HN1) acupuncture points can activate the frontal lobe of the brain, especially the PFC, which can increase individual concentration and directly affect the improvement of working memory performance in the brain. According to traditional Chinese medicine (TCM), the pathogenesis of poor concentration is the depletion of brain marrow. The brain is the heart of the primordial spirit, the sea of essence, the real evidence, and the foundation of nature.

If the supply of marrow is insufficient, one will experience poor concentration and decreased cognitive abilities (Peng & Yang, 2022). TCM shares the same perspective with conventional medicine, where in Western medicine theory, poor memory is often attributed to brain function, particularly the neural activity in specific regions of the brain. In order to maintain concentration, there are three key components: (1) modality-specific processing performed by primary sensory areas, (2) bottom-up attentional modulation driven by the ascending reticular activating system, and (3) top-down attentional modulation governed by the prefrontal, parietal, and limbic regions of the brain. These components work together to regulate attention, aligning it with the individual's current needs and goals (McDowd, 2007).

The decrease of synaptic plasticity in those brain regions will lead to poor concentration. Concentration is a complex cognitive process that affects almost everything we do. There is a close correlation between traditional Chinese medicine and conventional medicine theory, where both of them agree that the brain is the key organ responsible for regulating concentration. TCM believes the depletion of brain marrow can lead to reduced concentration, while conventional medicine theory believes that a decrease in synaptic plasticity within regions of the brain can result in diminished concentration.

The application of three acupoints, such as GV20, Ex-HN1, and GV29, is appropriate for increasing the concentration level of the subjects. GV20 and GV29 are points situated along the Du Meridian, which governs consciousness regulation. GV20 is positioned at the highest point on the head, where all the Yang meridians converge. According to Traditional Chinese Medicine (TCM) theory, acupuncture on GV20 helps clear the mind, elevate the spirit, and strengthen Yang energy. Meanwhile, GV29 plays a role in nourishing the brain and managing emotional imbalances (Zhang et al., 2021).

Ex-HN1 consists of a star-shaped arrangement of points surrounding GV20 at the top of the head. This acupoint group includes front and rear points aligned with the Du Meridian and left and right points aligned with the Bladder Meridian. The Du Meridian, which travels along the spine, connects to the kidneys and enters the brain, while the Bladder Meridian passes through the forehead and ascends to the brain's apex.

EX-HN1 is widely used to address and regulate various mental and neurological symptoms, including psychological disorders. One of its key applications is improving memory (Peng & Yang, 2022). The acupuncture stimulation in those acupoints shows effective results in increasing focus, making it highly valuable for clinical use.

CONCLUSION

Acupuncture is an effective method used to improve concentration in health students. Needle acupuncture points GV20 (Baihui), GV29 (Yintang), and Ex-HN1 (Sishenchong) are believed to activate the frontal lobe of the brain, especially the prefrontal gyrus (PFC) area, where activation in this area can increase participant concentration, which directly increases working memory capacity.

ACKNOWLEDGEMENT

The researchers express their gratitude to our beloved institution (Institute of Technology and Health Bali) for providing funding for this research, and we also would like to acknowledge their support.

REFERENCES

Arora, R. (2016). Academic achievement of adolescents in relation to study habits. *The International Journal of Indian Psychology*, *3*(2), 47–54.

Baddeley, A. (2000). The episodic buffer: a new component of working memory? *Trends in Cognitive Sciences, 4*(11), 417–423.

Baddeley, A. (2003). Working memory and language: An overview. *Journal of Communication Disorders, 36*(3), 189–208.

Bailey, H., Dunlosky, J., & Kane, M. J. (2008). Why does working memory span predict complex cognition? Testing the strategy affordance hypothesis. *Memory & Cognition, 36,* 1383–1390.

Chayer, C., & Freedman, M. (2001). Frontal lobe functions. *Current Neurology and Neuroscience Reports, 1*(6), 547–552.

Dhond, R. P., Kettner, N., & Napadow, V. (2007). Neuroimaging acupuncture effects in the human brain. *The Journal of Alternative and Complementary Medicine*, *13*(6), 603–616.

Dua, J. S., Prasad, D. N., Tripathi, A. C., & Gupta, R. (2009). Role of traditional medicine in neuropsychopharmacology. *Asian J Pharm Clin Res*, *2*(2), 72–76.

Hashemian, M., & Hashemian, A. (2014). Investigating study habits of library and information sciences students of Isfahan University and Isfahan University of medical sciences. *Iranian Journal of Medical Education*, *14*(9), 751–757.

Jatwa, V., Khirwadkar, P., & Dashora, K. (2014). Indian traditional memory enhancing herbs and their medicinal benefits. *Indian Journal of Research in Pharmacy and Biotechnology*, *2*(1), 1030.

Ji, S., Duan, J., Hou, X., Zhou, L., Qin, W., Niu, H., Luo, S., Zhang, Y., Chan, P., & Jin, X. (2021). The role of acupuncture improving cognitive deficits due to Alzheimer's disease or vascular diseases through regulating neuroplasticity. *Neural Plasticity*, *2021*(1), 8868447.

Kamoru, U., & Ramon, O. G. (2017). Influence of Self-Concept, Study Habit and Gender on Attitude and Achievement of Secondary School Students in Mathematics. *Journal for Leadership and Instruction*, *16*(1), 49–52.

Lawrence, A. S. (2014). Relationship between study habits and academic achievement of higher secondary school students. *Online Submission*, *4*(6), 143–145.

Lee, B., Sur, B., Shim, J., Hahm, D.-H., & Lee, H. (2014). Acupuncture stimulation improves scopolamine-induced cognitive impairment via activation of cholinergic system and regulation of BDNF and CREB expressions in rats. *BMC Complementary and Alternative Medicine*, *14*, 1–14.

Lee, J. C., & Klugman, J. (2013). Latino school concentration and academic performance among Latino children. *Social Science Quarterly*, *94*(4), 977–1015.

Lin, C.-J., Yeh, M.-L., Wu, S.-F., Chung, Y.-C., & Lee, J. C.-H. (2022). Acupuncture-related treatments improve cognitive and physical functions in Alzheimer's disease: a systematic review and meta-analysis of randomized controlled trials. *Clinical Rehabilitation*, *36*(5), 609–635.

McDowd, J. M. (2007). An Overview of Attention: Behavior and Brain. *Journal of Neurologic Physical Therapy*, *31*(3). https://journals.lww.com/jnpt/fulltext/2007/09000/an_overview_of_attention__behavior_and_brain.3.aspx

Monsma, E., Perreault, M., & Doan, R. (2017). Focus! Keys to developing concentration skills in open-skill sports. *Journal of Physical Education, Recreation & Dance*, *88*(7), 51–55.

Odiri, O. E. (2015). Relationship of Study Habits with Mathematics Achievement. *Journal of Education and Practice*, *6*(10), 168–170.

Pearl, J. B., & Arunfred, N. (2019). A Comparative Study on the Concentration Skill between E-Learning Methods and Traditional Learning Methods among Higher Education Students. *Asia Pacific Journal of Multidisciplinary Research*, *7*(4), 67–73.

Peng, X., & Yang, G. (2022). Effectiveness of electroacupuncture for the treatment of long covid brain fog. *Medical & Clinical Research 7 (11): 01*, *6*.

Reigal, R. E., Moral-Campillo, L., Mier, R. J.-R. de, Morillo-Baro, J. P., Morales-Sánchez, V., Pastrana, J. L., & Hernández-Mendo, A. (2020). Physical fitness level is related to attention and concentration in adolescents. *Frontiers in Psychology*, *11*, 110.

Ruiz-Ariza, A., Grao-Cruces, A., de Loureiro, N. E. M., & Martinez-Lopez, E. J. (2017). Influence of physical fitness on cognitive and academic performance in adolescents: A systematic review from 2005–2015. *International Review of Sport and Exercise Psychology*, *10*(1), 108–133.

Seyfoori, V. (2012). Assessment of skills and study habits in student of Community Sciences faculty of Kermanshah Razi university. *The Quarterly Journal of Iran Public Libraries Foundation*, *18*(1), 89–100.

Shojaii, A., Ghods, R., & abdollahi Fard, M. (2016). Medicinal herbs in Iranian traditional medicine for learning and memory. *African Journal of Traditional, Complementary and Alternative Medicines*, *13*(2), 199–209. https://doi.org/https://doi.org/10.4314/ajtcam.v13i2.24

Smith, E. E., & Jonides, J. (1999). Storage and executive processes in the frontal lobes. *Science*, *283*(5408), 1657–1661.

Zhang, J., Wu, X., Nie, D., Zhuo, Y., Li, J., Hu, Q., Xu, J., & Yu, H. (2021). Magnetic resonance imaging studies on acupuncture therapy in depression: a systematic review. *Frontiers in Psychiatry*, *12*, 670739.

Zheng, Y., Qu, S., Wang, N., Liu, L., Zhang, G., Jiang, X., Chen, J., Huang, Y., & Zhang, Z. (2012). Post-stimulation effect of electroacupuncture at Yintang (EX-HN3) and GV20 on cerebral functional regions in healthy volunteers: a resting functional MRI study. *Acupuncture in Medicine*, *30*(4), 307–315.