The Circadian rhythm of ICU Patients with Acute Myocardial Infarction and the Effect of Dynamic Light Therapy: A Preliminary Study

Cheng-An Lee[1,2], Yu-Shu Huang[1,2], Wei-Chih Chin[1,2,3*]

[1] Division of Psychiatry and Sleep Center, Chang Gung Memorial Hospital, Taoyuan, Taiwan

[2] College of Medicine, Chang Gung University, Taoyuan, Taiwan

[3] College of Life Sciences and Medicine, National Tsing Hua University, Hsinchu, Taiwan

*Corresponding author: Wei-Chih Chin

Study objectives: Patients with myocardial infarction (MI) can have disturbed sleep, which impacts their prognosis, but little is known about the efficacy of light therapy on the circadian rhythm of these patients. Thus, we conducted a randomized controlled study to investigate its efficacy and assessed these patients' sleep and circadian rhythm by actigraphy.

Methods: This is a preliminary study with randomized placebo-controlled design. Twenty-four patients with MI, Killip I to III, were randomized into two study groups, the blue light group and the white light group during their stay in the intensive care unit (ICU). Fifteen age and gender matched healthy controls were enrolled as the control group. Actigraphy and heart rate variability were used as objective measurements. Mental condition was evaluated by delirium questionnaires. We use Mann-Whitney U tests to compare the difference between the experimental group and the control group before light therapy. We use Mann-Whitney U tests or Wilcoxon signed-rank test to compare the group difference after receiving light therapy, and Spearman correlation coefficient to detest the association between variables.

Results: No significant difference was found between the blue light and white light groups before and after the light therapy. Total serum vitamin D level was significantly lower in the MI group than in the healthy control group ($p=0.000$), but the healthy control group also had a low vitamin D level. The analysis of actigraphy showed significant differences in wake after sleep onset ($p=0.011$) and the awake times ($p=0.040$).

Conclusions: The efficacy of light therapy can't be confirmed in patients with mild MI, and it may attribute to short stay in ICU. The vitamin D levels of these patients was significantly lower than those of healthy controls. Besides, compared to healthy controls, they had poorer sleep and disrupted circadian rhythm. Future studies of treatments to improve their sleep prognosis are needed.

Keywords: myocardial infarction, light therapy, sleep, circadian rhythm, vitamin D.

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作　　者：李承安*，黃玉書，金韋志

(報告者請以*表示， 如許美鈴*　)

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