

# *Observation on the Clinical Effect of Repetitive Transcranial Magnetic Stimulation on the Patients with Parkinson's Concomitant Sleep Disorders*

**Zou Xiumei, Duan Xiaoyan**

*Shaanxi University of Chinese Medicine, Xianyang, 712046, China*

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**Abstract:** Objective Discussion on the clinical effect of transcranial magnetic stimulation on patients with Parkinson's concomitant sleep disorders. Methods Sixty-two patients who were admitted to the Department of Neurology in our hospital from November 2019 to October 2020 and met the inclusion criteria were selected for statistical analysis. The subjects were randomly assigned to the experimental group and the control group, in which the control group was treated with conventional medication therapy, and the experimental group with conventional therapy and repetitive transcranial magnetic stimulation. Based on which, the PDSS and PSQI scores of these two groups were obtained; thereby, an observation is conducted to probe into the clinical effect of repetitive transcranial magnetic stimulation on patients with Parkinson's concomitant sleep disorders. In addition, the scores of these two groups were compared to analyze whether the differences appear to be statistically significant. Results The statistical test shows that the scores of the experimental group are lower than those of the control group,  $P < 0.05$  and the difference is statistically significant. The sleep quality of the experimental group is better than that of the control group.

## **1. Introduction**

Parkinson's disease (PD) is a progressive neurodegenerative disease, which mostly occurs in the elderly, commonly accompanied with non-motor symptoms such as sleep disorders. It brings upon severe influences for health, stability of family relationships, and people's ability to take on social responsibility. Transcranial Magnetic Stimulation (TMS) is a new painless and non-invasive scientific technique, also known as magnetic stimulation, which was first developed in the mid-1980s. Due to the principle of electromagnetic induction, magnetic waves can produce persistent excitement in the cerebral cortex through the skull without attenuation, thereby interfering with the electrical activity of the brain; thus, magnetic waves are often applied to regulate the brain's metabolic function and to treat PD and other diseases. As the aging of Chinese society is becoming more and more apparent, the probability of chronic diseases and senile diseases in the population is increasing, and mental disorders have become one of the major factors that severely threaten the health of middle-aged and the elderly. Therefore, the study of the clinical

effect of TMS in patients with Parkinson's concomitant sleep disorders is rather significant.

## 2. Materials and Methods

The PD patients admitted to the Department of Neurology in our hospital from November 2019 to October 2020 were selected for the study. The inclusion criteria are as follows: (1) Meeting the diagnostic criteria of Parkinson's disease in China, showing the symptoms such as tremor, slow movement and autonomic dysfunction; (2) Being conscious and able to complete the questionnaire independently; (3) Informed consent obtained from patients and their family members.

According to the above criteria, 62 patients were sampled as the research subjects during the two-year period, and were randomly grouped into experimental group and control group. The control group was treated with conventional therapy, and the experimental group was treated with repetitive transcranial magnetic stimulation (rTMS) on top of conventional therapy.<sup>[1]</sup>

### 2.1 Method

Treated with Conventional Therapy, Patients Are Asked to Take Anti-Parkinson's Drug-Madopar-by Prescriptions, One Table/Time, Three Times and a Day, for One Month.

Repetitive transcranial magnetic stimulation was applied based on conventional therapy. The specific operation was as follows: The operating instrument includes CCY-1 device and figure-eight coil. The operating frequency is 1 Hz, 90s per string, with an interval of 30s during the operation, and the implementation time was one month. During the specific implementation, it is necessary to pay attention to confirm that the patient removes metal objects such as watches, rings, etc., to maintain a quiet and relaxed state, and the coil plane should be tangent to the surface of the patient's skull.

### 2.2 Observation Indicators

2.2.1 Sleep Quality Evaluation. The modified Parkinson's disease Sleep Scale (PDSS) is a commonly used scale to assess the sleep quality of PD patients. It includes 15 sleep-related tasks, each rated on a score of 0-4. The lower the score, the better the sleep quality, and vice versa.<sup>[2]</sup>

2.2.2 Pittsburgh Sleep Quality Index. The Pittsburgh sleep quality index (PSQI) was developed by Dr. Buysse of the University of Pittsburgh in 1989 to assess the sleep quality of patients with sleep disorders during the most recent month. 18 items are included in the PSQI scale, which are roughly divided into 7 components, each of which is graded on a scale of 0 to 3, and the cumulative score is the total PSQI score, ranging from 0 to 21; a higher score indicates poorer sleep quality. When a patient's PSQI score  $\geq 8$ , it indicates relatively poor sleep quality.<sup>[3]</sup>

### 2.3 Statistics and Analysis

The data of 62 patients were collected and analysed based on SPSS 16.0 software. If the distribution is approximately normal, the t test can be applied for calculation. In the case that the measured index does not fall to the category of normal distribution, or is not approximating normal distribution, the rank sum test is employed, and the  $\chi^2$  test is used for comparing the data. Generally, the value of  $\alpha$  is 0.05. If the tested P value  $< 0.05$ , it indicates that the difference between the two groups is statistically significant.

### 3. Results

#### 3.1 Comparison Study of the Pdss Scores

The PDSS score of the experimental group is significantly lower than that of the control group ( $P \leq 0.05$ ), showing a statistically significant difference, as shown in Table 1.

Table 1: Comparison Of the Pdss Scores of the Two Subject Groups

groups	n	Scores	t	P
Control group	31	20.03±11.03	8.751	<0.05
Experimental group	31	12.87±06.28		

#### 3.2 Comparison of the Pittsburgh Sleep Quality Index (Psqi) Scores

The PSQI scores of the seven components obtained by the experimental group were all lower than those of the control group without repetitive transcranial magnetic stimulation ( $P \leq 0.05$ ), and the difference was statistically significant, as shown in Table 2.

Table 2: Comparison Of (Psqi Scores between the Two Groups of Subjects

N=62								
Groups	Sleep Quality	Sleep Time	Sleep Efficiency	Sleep Duration	Sleep Disorder	Hypnotics	Daily Work Barriers	PSQI total core
Control Group	0.52±0.12	2.36±0.31	0.87±0.23	1.3±0.38	1.89±0.47	0.42±0.02	0.71±0.20	6.70±1.23
Experimental Group	0.28±0.37	2.11±0.31	0.58±0.49	1.06±0.79	1.41±0.01	0.21±0.01	0.38±0.18	4.49±1.01
T Value	9.901	5.385	5.408	5.401	5.612	11.055	8.507	5.706
P Value	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

### 4. Discussion

With the development of the aging population in China, the population disease spectrum has experienced subtle changes, seeing chronic diseases becoming the second major risk factor that threatens health.

In this study, based on the routine treatment of patients, the TMS technique was employed to observe the improvement of the clinical outcomes in patients with Parkinson's concomitant sleep disorders. The scores of the experimental group appeared to be lower than those of the control group. Experiments based on both PDSS and PSQI scores all concluded the consistent findings with no significant differences.

In summary, for patients with Parkinson's disease syndrome, especially for those with sleep disorders, the treatment scheme combining rTMS and conventional medications has significantly positive effect on the quality of sleep, which is evidenced by ideal clinical effect.

There are not many studies looking into the application of rTMS in terms of the alleviation of the symptoms of the patients with Parkinson's concomitant sleep disorder. Therefore, it is necessary to carry out more in-depth research on the application of rTMS. And it is worthwhile to further study the safety, adverse reactions and other issues that may be attached to it, so as to provide a scientific basis for the standardized, safe and efficient application of repetitive transcranial magnetic stimulation in the future.

Conclusion Repetitive transcranial magnetic stimulation therapy, after carried out for a period of time, has a positive effect on the treatment of the sleep disorders of Parkinson's patients.

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