Clinical study on Transcranial magnetoelectric depression treatment instrument treatmenting depression

Wei Zou [1] Qiang Tang [2] Zuodong Sun [3*] Kang Li [4] Wuyi Sun [5] Wenhua Wang [5]
Xueping Yu [1] Yanli Xing [2] Xiuying Teng [1] Li Zhang [2] Yan Hou [4]

[1](First Affiliated Hospital,Heilongjiang University of Chinese Medicine，Harbin, 150000, China)
[2] (Second Affiliated Hospital,Heilongjiang University of Chinese Medicine，Harbin, 150000, China)
[3] (Ya'ou Brain Science Institute of Heilongjiang province，Harbin , 150090, China)
[4] (School of public health,Harbin Medical University，Harbin, 150000, China)
[5] (Harbin Aobo Medical Apparatus Co.,Ltd, Harbin, 150090, China)

Abstract：

[Objective] Evaluate on the treatment efficacy and safety for transcranial magnetoelectric depression(insomnia) treatment instrument (brand name：AOBO BAIYOUDU) treatmenting depression.

[Methods] Methods 80 patients with mild to moderate depression were double center,randomized, double-blind, placebo controlled clinical trial for 4 weeks, including treatment group and control group, each of 40 case. The patients of treatment group were treated with Transcranial magnetoelectric depression(insomnia) treatment instrument，The patients of control group were simulated treated（music comfort）with Transcranial magnetoelectric depression(insomnia) treatment instrument, The course of treatment was 4 weeks. Hamilton Depression Scale (HAMD24) was used to evaluate the efficacy and safety evaluation.

[Results] After treated for 4 weeks, the total efficiency rate and total effective rate of the control group were 5% (2/40) and 35% (14/40) respectively, the total efficiency rate and total effective rate of the control group were 65.00%（26/40）and 80.00%（32/40） respectively; The performance test of total efficiency rate and total effective rate for each group was $P<0.0001$, and the treatment group was higher than the control group, it prove the treatment group was better than the control group. There was no adverse reaction in the two groups.

[Conclusions] Transcranial magnetoelectric depression(insomnia) treatment instrument (brand name：AOBO BAIYOUDU) is safe and effective for the treatment of depression，especially in the depression, guilt, sleep disorders, work and interest, retardation, irritability, anxiety and other major symptoms have been significantly improved.

Keywords：Transcranial magnetoelectric；Depression treatment instrument；Depression

Depression is a group of clinical symptoms that focus on experience depression or emotional disorders. The clinical symptoms are low emotion, mental retardation, physical discomfort and sleep disturbance. Severe patients can have suicidal thoughts and actions, Some patients suffer from hallucinations and

* Corresponding author: Zuodong Sun (E-mail: sunzuodong@pai314.com).

delusions. According to statistics, the lifetime prevalence rate of depression is 6.1% to 9.5%, there are about 340 million people with depressive symptoms worldwide. Focusing on the treatment of depression is not just a biomedical problem, but also a social issue that is attracting increasing attention.

Transcranial Magnetoelectric Depression Treatment Instrument[1] is a product of endogenous neurotransmitter regulation technology，It is the patented product (Patent No.: ZL2009I0071876.4) developed by Harbin Aobo Medical Apparatus co.,ltd. on the basis of the *brain cell activation development theory*, it bases on the core technology of transcranial electric brain function rehabilitation therapy instrument. It applies pulsating currents, biological, magnetic, and audio signals to the head and auditory system of the human body, it is a non intrusive physical therapy for rehabilitation of patients with depression. The efficacy and safety of transcranial magnetoelectric depression therapy apparatus for depression is reported as follows. The relevant data is approved by the State Drug Administration in 2011 and is partial clinical basis for Transcranial Magnetoelectric Depression Treatment Instrument, the registration number: hei shi yao jian xie(zhun)zi 2011 No. 226002th.

1 Clinical data

1.1 General data

The selected cases were from the First Affiliated Hospital,Heilongjiang University of Chinese Medicine and Second Affiliated Hospital,Heilongjiang University of Chinese Medicine. The 80 patients were randomly divided into treatment group and control group according to the principle of double center, random, double blind, parallel and placebo control.There were 40 cases in the treatment group, including 10 males and 30 females, aged 21~65 (44.88 + 12.38) years old, 40 patients in the control group, 12 males and 28 females, with an age of 20~65 (42.90 + 14.24) years. The two groups were enrolled, compared in age, gender, height and body weight index and blood pressure, respiration, heart rate and other vital signs checks and disease and prior treatment or allergy situation, there were no significant differences (P>0.05) were compared between the two groups; HAMD scale of each single index, in addition to somatic anxiety and diurnal variation (late) there are differences, other differences were not statistically significant (P>0.05), two patients were basically balanced, comparable.

1.2 Diagnostic criteria

The diagnostic criteria for depression are referred to in the third edition of the *Chinese psychiatric classification program and diagnostic criteria* (CCMD - 3): with low mood, and the situation does not match, from depression to grief, and even stupor.

Symptom standard: mainly depressed, and at least 4 of the following:

(1) Loss of interest and pleasure;

(2) Loss of energy or tiredness;

(3) Mental retardation or agitation;

(4) Self evaluation is too low, self reproach, or guilt;

(5) The difficulty of association or the ability to think consciously;

(6) Repeated the idea to die or Dutch act, self injurious behavior;

(7) Sleep disorders, such as insomnia, early awakening, or excessive sleep;

(8) Loss of appetite or loss of weight;

(9) Loss of libido.

Serious criteria: damage to social function, causing pain or adverse consequences to me.

Course standard:

(1) Compliance with symptom criteria and severity criteria has continued for at least 2 weeks;

(2) Tere may be some mitotic symptoms, but it does not conform to the diagnosis of schizophrenia. At the same time meet the criteria for schizophrenia, after the relief of symptoms, meet the standard of depression for at least 2 weeks.

1.3 Tandard for admission

(1) Met the diagnostic criteria for depression;

(2) Age 18 to 65 years (including 18 years, 65 years old);

(3) Mild and moderate depression (HAMD score 20 - 35);

(4) No other antidepressants were taken for 2 weeks;

(5) Participants volunteered to participate in the study and signed informed consent.

1.4 Exclusion criteria (including indications and rejection criteria)

(1) Pregnant women or lactating women younger than 18 or above 65 years of age;

(2) Organic mental disorder or depression caused by psychoactive substances or non addictive substances;

(3) Complicated with somatic diseases such as heart, brain, kidney and blood;

(4) Alcohol and drug addicts;

(5) Failure to treat or fail to visit can not determine the efficacy; or incomplete data affect the efficacy of patients who do not comply with the design program.

2 Research method

2.1 Test participation

Research center : Second Affiliated Hospital,Heilongjiang University of Chinese Medicine，Clinical research unit First Affiliated Hospital,Heilongjiang University of Chinese Medicine，Statistical analysis unit School of public health,Harbin Medical University.

2.2 Test method

Transcranial Magnetoelectric Depression Treatment Instrument is provided by Harbin Aobo Medical Apparatus co.,ltd.

Treatment group: the patients were treated by Transcranial Magnetoelectric Depression(insomnia) Treatment Instrument, including transcranial magnetoelectric and audio therapy. The patients were treated 1 times a day for 30 minutes, 7 days for a course of treatment, and 4 courses for continuous treatment.

Control group: the patients were treated by model of Transcranial Magnetoelectric Depression(insomnia) Treatment Instrument, without transcranial magnetoelectric, and only audio therapy was given. The patients were treated 1 times a day for 30 minutes, 7 days for a course of treatment, and 4 courses for continuous treatment.

2.3 Medication regulation

Other drugs for the treatment of depression are forbidden during the trial. If the patients with disease must take the drugs or other treatment must be carried out, the doctor must record the name of the drug in the case report form (name, dosage, or therapy) using reason, use frequency and time etc, so as to summarize, analyze and report. The doctor should keep a detailed account of the condition of the disease before the start of the study, At the start of the study, patients with any combination of diseases should be treated by doctors as adverse events and recorded in the adverse events table.

2.4 Curative effect observation

(1) Observation index

Hamilton Depression Scale (item HAMD24).

(2) Curative effect determination

The curative effect was evaluated according to the reduction rate of the HAMD score after treatment, Reduction rate = (before treatment total score - total score after treatment) / total score before treatment * 100%. Cure: the symptoms disappeared completely, work life is not affected, the reduction rate of HAMD is more than or equal to 75%; Effect: the symptoms disappeared, but the ability to work, work life is not up to the level before the disease, the reduction rate of HAMD is more than or equal to 50%; Effect: the symptoms relieved or disappeared, but the ability of working life is poor, the reduction rate of HAMD is more than or equal to 25%; Ineffective: no improvement or improvement in symptoms, and HAMD reduction rate was less than 25%; Total efficiency = (number of cured + significant number + effective number) / total number.

(3) Safety evaluation

Before the treatment (0 weeks) and at the end of treatment (4 weeks), the examinations were performed every time:

a. Vital signs: blood pressure, respiration, heart rate, etc. (before and after the test);

b. Laboratory examination: blood routine, urine routine, liver function (ALT, AST), renal function (BUN, Cr) and so on (before and after the test);

c. Electrophysiological examination: electrocardiogram (before and after test);

d. Any adverse reactions that may occur (real time observation).

2.5 Statistical analysis

SAS9.1.3 statistical analysis software was adopted to evaluate the main curative effects. At the same time, the two data sets of FAS and PPS were calculated, and the safety evaluation was carried out to analyze the SAS data .

3 Result

3.1 Efficacy analysis of primary end-point index

After treated for 4 weeks, the total efficiency rate and total effective rate of the control group were 5% (2/40) and 35% (14/40) respectively, its 95% confidence intervals were (0 - 11.75) and (20.22 - 49.78); The total effective rate and total effective rate of the treatment group were 65% (26/40) and 80% (32/40) respectively, and the 95% confidence intervals were (50.22 ~ 79.78) and (67.60 ~ 92.40), there were differences in central effects (P=0.0009), the total effective rate and total effective rate of the two groups were examined by P<0.0001, and the treatment group was higher than that of the control group, indicating that the treatment group was better than the control group. See Table 1, table 2.

After treated for 2 weeks, the total efficiency rate and total effective rate of the control group were 0% (0/40) and 12.5% (5/40) respectively, its 95% confidence intervals were (0) and (2.25 – 22.75); The total effective rate and total effective rate of the treatment group were 0% (0/40) and 52.50% (21/40) respectively, and the 95% confidence intervals were (0) and (37.02 ~ 67.98), there were differences in central effects (P=0.0009), the Superiority test of the total effective rate of the two groups was P=0.0001, and the treatment group was higher than that of the control group; But the total effective rate of the two groups was 0, the two groups were compared with P=1, the control group and the treatment group were not different. 2 weeks after treatment, the two groups had no significant effect, but the effective case group was better than the control group. See Table 3, table 4.

Table 1 Distribution of clinical efficacy after 4 weeks of treatment (PPS and FAS)

Grouping	Cases	Recovery	Excellent	Effective	Invalid	*Z*	*P*
Control group	40	0	2	12	26	-5.2538	<0.0001

Treatment group	40	2	24	6	8	-5.2538	<0.0001

Note: # Wilcoxon rank test; P value: up PPS analysis,down FAS analysis.

Table 2 After 4 weeks, the clinical efficacy, total effective rate and total effective rate were compared (PPS and FAS)

Grouping	Cases	Total apparent efficiency (%)	Total effective rate (%)	P_1	P_2
Control group	40	5.00	35.00	<0.0001	<0.0001
Treatment group	40	65.00	80.00	<0.0001	<0.0001

Note: P1: Chi square test of total apparent efficiency; P2: Chi square test of total efficiency; P value: up PPS analysis,down FAS analysis.

Table 3 Distribution of clinical efficacy after 2 weeks of treatment (PPS and FAS)

Grouping	Cases	Recovery	Excellent	Effective	Invalid	*Z*	*P*
Control group	40	0	0	5	35	-3.7894	0.0002
Treatment group	40	0	0	21	19	-3.7894	0.0002

Note: # Wilcoxon rank test; P value: up PPS analysis,down FAS analysis

Table 4 After 2 weeks, the clinical efficacy, total effective rate and total effective rate were compared (PPS and FAS)

Grouping	Cases	Total apparent efficiency (%)	Total effective rate (%)	P_1	P_2
Control group	40	0.00	12.50	1.000	0.0001
Treatment group	40	0.00	52.50	1.000	0.0001

Note: P1: Chi square test of total apparent efficiency; P2: Chi square test of total efficiency; P value: up PPS analysis,down FAS analysis

3.2 Analysis of curative effect of various indexes

After 2 weeks of treatment and 4 weeks after treatment, the two groups of patients with HAMD scale indicators (PPS and FAS) showed: After 2 weeks of treatment, the two groups had no significant difference except for " Insight " (P>0.05); After 4 weeks of treatment, there was no significant difference in the ‘Suicide, gastrointestinal symptoms, systemic symptoms, sexual symptoms, day and night changes (early or late), disorganization or derealization, compulsion, loss of capacity, despair, inferiority complex’ change between the two groups, and the other indexes were significantly different (P<0.05).

Table 5 recovery of HAMD scale in two groups after 2 weeks and 4 weeks treatment (PPS and FAS)

Item		After 2 weeks of treatment				After 2 weeks of treatment			
		Control group	Treatment group	Test statistic	*P*	Control group	Treatment group	Test statistic	*P*
Depressive mood	Invalid	40(100.00%)	39(97.50%)	Exact probability method	1.0000	38(95.00%)	28(70.00%)	8.658 (Chi-square)	0.0033
	Effective	0(0.00%)	1(2.50%)			2(5.00%)	12(30.00%)		
	Total	40	40			40	40		

Item		After 2 weeks of treatment				After 2 weeks of treatment			
		Control group	Treatment group	Test statistic	*P*	Control group	Treatment group	Test statistic	*P*
Feelings of guilt	Invalid	38(95.00%)	36(90.00%)	0.721 (Chi-square)	0.3959	32(80.00%)	20(50.00%)	7.912 (Chi-square)	0.0049
	Effective	2(5.00%)	4(10.00%)			8(20.00%)	20(50.00%)		
	Total	40	40			40	40		
Commit suicide	Invalid	36(90.00%)	33(82.50%)	0.949 (Chi-square)	0.3301	32(80.00%)	26(65.00%)	2.257 (Chi-square)	0.1330
	Effective	4(10.00%)	7(17.50%)			8(20.00%)	14(35.00%)		
	Total	40	40			40	40		
Difficulty falling asleep	Invalid	40(100.00%)	38(95.00%)	2.051 (Chi-square)	0.1521	36(90.00%)	21(52.50%)	13.730 (Chi-square)	0.0002
	Effective	0(0.00%)	2(5.00%)			4(10.00%)	19(47.50%)		
	Total	40	40			40	40		
Sleep not deep	Invalid	40(100.00%)	38(95.00%)	2.051 (Chi-square)	0.1521	39(97.50%)	32(80.00%)	6.135 (Chi-square)	0.0133
	Effective	0(0.00%)	2(5.00%)			1(2.50%)	8(20.00%)		
	Total	40	40			40	40		
Wake up early	Invalid	39(97.50%)	39(97.50%)	0.000 (Chi square)	1.0000	38(95.00%)	29(72.50%)	7.440 (Chi square)	0.0064
	Effective	1(2.50%)	1(2.50%)			2(5.00%)	11(27.50%)		
	Total	40	40			40	40		
Jobs and interests	Invalid	39(97.50%)	38(95.00%)	0.346 (Chi-square)	0.5562	35(87.50%)	25(62.50%)	6.667 (Chi-square)	0.0098
	Effective	1(2.50%)	2(5.00%)			5(12.50%)	15(37.50%)		
	Total	40	40			40	40		
Slow	Invalid	36(90.00%)	33(82.50%)	0.949 (Chi-square)	0.3301	33(82.50%)	22(55.00%)	7.040 (Chi-square)	0.0080
	Effective	4(10.00%)	7(17.50%)			7(17.50%)	18(45.00%)		
	Total	40	40			40	40		
Intense	Invalid	40(100.00%)	39(97.50%)	Exact probability method	1.0000	39(97.50%)	25(62.50%)	15.313 (Chi-square)	0.0001
	Effective	0(0.00%)	1(2.50%)			1(2.50%)	15(37.50%)		
	Total	40	40			40	40		
Mental anxiety	Invalid	38(95.00%)	39(97.50%)	0.346 (Chi-square)	0.5562	38(95.00%)	27(67.50%)	9.928 (Chi-square)	0.0016

Item		After 2 weeks of treatment				After 2 weeks of treatment			
		Control group	Treatment group	Test statistic	*P*	Control group	Treatment group	Test statistic	*P*
	Effective	2(5.00%)	1(2.50%)			2(5.00%)	13(32.50%)		
	Total	40	40			40	40		
Somatic anxiety	Invalid	40(100.00%)	38(95.00%)	2.051 (Chi-square)	0.1521	39(97.50%)	23(57.50%)	18.351 (Chi-square)	0.0001
	Effective	0(0.00%)	2(5.00%)			1(2.50%)	17(42.50%)		
	Total	40	40			40	40		
Gastrointestinal symptoms	Invalid	38(95.00%)	33(82.50%)	3.130 (Chi-square)	0.0769	33(82.50%)	27(67.50%)	2.400 (Chi-square)	0.1213
	Effective	2(5.00%)	7(17.50%)			7(17.50%)	13(32.50%)		
	Total	40	40			40	40		
Systemic symptom	Invalid	38(95.00%)	40(100.00%)	2.051 (Chi-square)	0.1521	37(92.50%)	33(82.50%)	1.829 (Chi-square)	0.1763
	Effective	2(5.00%)	0(0.00%)			3(7.50%)	7(17.50%)		
	Total	40	40			40	40		
Sexual symptoms	Invalid	40(100.00%)	37(92.50%)	3.117 (Chi-square)	0.0775	38(95.00%)	34(85.00%)	2.222 (Chi-square)	0.1360
	Effective	0(0.00%)	3(7.50%)			2(5.00%)	6(15.00%)		
	Total	40	40			40	40		
Hypochondria	Invalid	39(97.50%)	37(92.50%)	1.053 (Chi-square)	0.3049	37(92.50%)	28(70.00%)	6.646 (Chi-square)	0.0099
	Effective	1(2.50%)	3(7.50%)			3(7.50%)	12(30.00%)		
	Total	40	40			40	40		
Lose weight	Invalid	40(100.00%)	38(95.00%)	2.051 (Chi-square)	0.1521	40(100.00%)	32(80.00%)	8.889 (Chi-square)	0.0029
	Effective	0(0.00%)	2(5.00%)			0(0.00%)	8(20.00%)		
	Total	40	40			40	40		
Insight	Invalid	40(100.00%)	36(90.00%)	4.211 (Chi-square)	0.0402	38(95.00%)	30(75.00%)	6.275 (Chi-square)	0.0122
	Effective	0(0.00%)	4(10.00%)			2(5.00%)	10(25.00%)		
	Total	40	40			40	40		
Day and night change (early)	Invalid	39(97.50%)	38(95.00%)	0.346 (Chi-square)	0.5562	38(95.00%)	36(90.00%)	0.721 (Chi-square)	0.3959
	Effective	1(2.50%)	2(5.00%)			2(5.00%)	4(10.00%)		

Item		After 2 weeks of treatment				After 2 weeks of treatment			
		Control group	Treatment group	Test statistic	*P*	Control group	Treatment group	Test statistic	*P*
	Total	40	40			40	40		
Day and night change (night)	Invalid	39(97.50%)	39(97.50%)	0.000 (Chi-square)	1.0000	39(97.50%)	35(87.50%)	2.883 (Chi-square)	0.0895
	Effective	1(2.50%)	1(2.50%)			1(2.50%)	5(12.50%)		
	Total	40	40			40	40		
Depersonalization or disintegration	Invalid	40(100.00%)	39(97.50%)	Exact probability method	1.0000	36(90.00%)	37(92.50%)	0.157 (Chi-square)	0.6923
	Effective	0(0.00%)	1(2.50%)			4(10.00%)	3(7.50%)		
	Total	40	40			40	40		
Paranoid symptoms	Invalid	39(97.50%)	36(90.00%)	1.920 (Chi-square)	0.1659	36(90.00%)	26(65.00%)	7.168 (Chi-square)	0.0074
	Effective	1(2.50%)	4(10.00%)			4(10.00%)	14(35.00%)		
	Total	40	40			40	40		
Obsessive symptoms	Invalid	38(95.00%)	38(95.00%)	0.000 (Chi-square)	1.0000	37(92.50%)	32(80.00%)	2.635 (Chi-square)	0.1045
	Effective	2(5.00%)	2(5.00%)			3(7.50%)	8(20.00%)		
	Total	40	40			40	40		
Diminished sense of ability	Invalid	37(92.50%)	39(97.50%)	1.053 (Chi-square)	0.3049	35(87.50%)	33(82.50%)	0.392 (Chi-square)	0.5312
	Effective	3(7.50%)	1(2.50%)			5(12.50%)	7(17.50%)		
	Total	40	40			40	40		
Despair	Invalid	38(95.00%)	37(92.50%)	0.213 (Chi-square)	0.6442	37(92.50%)	31(77.50%)	3.529 (Chi-square)	0.0603
	Effective	2(5.00%)	3(7.50%)			3(7.50%)	9(22.50%)		
	Total	40	40			40	40		
Inferiority complex	Invalid	38(95.00%)	29(72.50%)	7.440 (Chi-square)	0.0064	31(77.50%)	24(60.00%)	2.851 (Chi-square)	0.0913
	Effective	2(5.00%)	11(27.50%)			9(22.50%)	16(40.00%)		
	Total	40	40			40	40		

3.3 Safety evaluation

In the treatment group (40 cases) and control group (40 cases), each of 1 patients had adverse events, they were mild and did not take treatment measures, did not stop the test, the adverse event has nothing to

do with this instrument, does not belong to the adverse reaction. In the useing of transcranial magnetoelectric depression (insomnia) treatment instrument, all patients had stable vital signs, their blood routine, urine routine and blood biochemical tests did not change significantly before and after treatment ($P > 0.05$).

4 Discuss

Depression is an emotional disorder, affective disorder is bidirectional, bipolar disorder is similar to the pathogenesis of schizophrenia, and the latter has a more pronounced brain structure and neurophysiological abnormalities. Affective disorder, also called manic depression, It has two kinds of symptoms: positive symptoms of mania, depression or negative symptoms. The biochemical pathological hypothesis of bipolar disorder mainly includes catecholamine transmitter hypothesis, 5- serotonin hypothesis and the interaction hypothesis of the two, GABA hypothesis and so on[6]. An increase in catecholamine transmitters can lead to mania and it is a "positive" transmitter; GABA (GABA) has inhibitory effect on the nerve and it is a negative transmitter. When the total content of two neurotransmitters in the synaptic gap of the brain is relatively balanced, one can be in a normal physiological state. All endogenous neurotransmitters are released by presynaptic terminal vesicles and they are accomplished by Ca2+ dependent rapid regulation of vesicular exocytosis. There are three possible states of synaptic gap negative and positive transmitters: balance, normal; positive, manic; negative depressive. Depression is associated with neurotransmitters, ion channels, and so on.

Transcranial Magnetoelectric Depression(insomnia) Treatment Instrument acts on the head of the patient, the patient has a flashing sensation when he shuts his eyes, consistent with *the special nerve energy law* proposed by physiologist Muller of germany. The constant magnetic therapy object of Transcranial Magnetoelectric Depression Treatment Instrument produce Lorentz force on charged matter of motion, It affects the ionic permeability of cell membranes and the potential on both sides of the membrane, resulting in changes in the ionic channel configuration of the cell membrane, it interferes with and inhibits the occurrence and transmission of abnormal brain electricity, brain magnetism, and then achieves the functions of sedation, tranquilizing the mind, resisting depression and resisting anxiety. Data confirm that the effects of moderate intensity magnetic fields on the ion channels are related to the charge motion associated with ion channels in the cell membrane[7]. The constant magnetic field given by this instrument is about 100mT.

Audio signal of Transcranial Magnetoelectric Depression Treatment Instrument in the auditory system, is a kind of special "audio prescription", can shield the outside interference, The mechanical energy of sound vibration can be converted into neural signals through the cochlea. The conversion of mechanical and electrical energy occurs on cilia of hair cells, and these channels are mechanically gated channels, the potassium ion of the ciliary bundle flows into the hair cell through a mechanical gating channel, the potassium ions inflowed into the cell produces a depolarizing effect that opens the voltage-gated Ca2 + channel on the cell body of hair cells. The auditory nerve can accept both the stimulation and suppression of hair cells. Human and animal experience changes in internal and external environments through sensory organs, all receptors are stimulated by electricity, the electric current activates the neurotransmitter neurons, this gives the neurotransmitter a new balance in the synaptic gap in the brain, these actions enable the neurotransmitter to strike a new balance in the synaptic gap in the brain.

The test results confirm that, 2 weeks after treatment, the two groups had no significant effect, only the effective case, the treatment group was better than the control group; After 4 weeks treatment, the total effective rate and total effective rate of the treatment group were higher than those of the control group, it

showed that the treatment was effective for 4 weeks, the treatment group was better than the control group, and it was safe to use and no adverse events caused by the use of the instrument. The patients in the treatment group were relieved after 4 weeks of treatment, especially in the depression, guilt, sleep disorders, work and interest, retardation, irritability, anxiety and other major symptoms have been significantly improved.

Depression, this ‘unhappy’ is also referred to as ‘mental cold’, higher vocational, higher salary, higher education successful people and adolescents are high risk groups. In the past, depression was mostly treated with drugs, the advent of Transcranial Magnetoelectric Depression Treatment Instrument means that human "unhappiness" has a new therapeutic approach, Transcranial Magnetoelectric Depression Treatment Instrument has the advantages of accurate curative effect, safe use, convenient operation, and can be used in hospitals and clinics, and is especially suitable for popularization in families.

Reference：

1. The world's first depression therapy instrument developed successfully in Kazakhstan[J]. Technology and publishing, 2011,6:127.
2. Sun Zuodong. Theory of brain cell activation [M]. Harbin: Heilongjiang science and Technology Press, 2016.
3. Sun Zuodong. Transcranial magnetoelectric depression therapeutic apparatus[P], China, ZL200910071876.42011-08-24.
4. Jiao Mingde, Sun Zuodong. Aobo brain rehabilitation therapy in the treatment of cerebral circulation and the function of the [J]. Medical health care appliance, 1998,03:251-252.
5. Tian Ningning. application of Aobo brain function rehabilitation instrument in post-troke hemiplegia patients [J]. Medical equipment, 2009,09:68
6. Han Jisheng. Neuro Science (The third edition) [M] .Beijing: Peking university medical press, 2009:1148-1157.
7. Cheng Lijun, Li Gang, Lin Ling, et al. Characteristics of neuron sodium channel under moderate intensity magnetic field [J]. Nano technology and precision engineering, 2010, 8 (6) 559-564

Author contribution statement:

Wei Zou, Qiang Tang: Proposed research ideas, clinical trial program master design;
Zuodong Sun: Put forward the research ideas and clinical trial design participants, transcranial magnetic therapy instrument computer disease inventor, the "preface" and "discussion" part of the main author, responsible for the drafting and revision of the final version;
Wuyi Sun, Wenhua Wang: One of the authors of "preface" and "discussion" in this article;
Xueping Yu, Yanli Xing: Clinical trial design the main participants and the implementation of clinical trials led;
Xiuying Teng, Li Zhang, : Clinical trial program implementer;
Kang Li: Principal participant in the design of clinical trial programs and head of mathematical statistical analysis;
Yan Hou: Statistical analysis of clinical trial data.