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CASE REPORT

Acupuncture treatment of a male patient suffering from long-term schizophrenia and sleep disorders

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Abstract

OBJECTIVE: To investigate the effectiveness of acupuncture in the treatment of chronic schizophrenia and co-morbid sleep disorders.

METHODS: A 42-year-old German male outpatient, suffering from long-term schizophrenia and sleep disorders, entered the study. Acupuncture was used as a non-pharmacological intervention. In addition to his ongoing Western Medicine (pharmacological) treatment, the patient received 12 weekly (non-standardized) acupuncture treatments in the clinic. The Traditional Chinese Medicine (TCM) diagnosis, the psychological assessment and the actiwatch data were compared before and after the acupuncture treatment.

RESULTS: The TCM diagnosis revealed a Liver Fire pattern before the acupuncture treatment, which was still present, although to a lesser degree, after the treatment. The psychological assessment revealed no change in the positive symptoms, but a small decrease in the negative symptoms and the general psychopathology of the patient. This was further illustrated by the small decrease in the number of depressive symptoms. The subjective sleep disorders improved markedly after acupuncture treatment, but the daytime sleepiness did not. The actiwatch results showed that after acupuncture treatment, the patient was moving less during sleep, but no significant results were found for the other sleep parameters.

CONCLUSION: Acupuncture was found to be an effective non-pharmacological add-on method for treating subjective sleep disorders, and, to a lesser degree, objective sleep disorders and the negative symptoms of chronic schizophrenia. Future larger clinical trials with follow-up measurements are needed in order to replicate the present preliminary beneficial acupuncture findings and in order to determine whether the observed effects can be sustained.

Keywords: Actigraphy; Acupuncture; Schizophrenia; Sleep weak disorders

INTRODUCTION

In Traditional Chinese Medicine (TCM), schizophre-

nia is seen in the context of manic depressive psychosis. Patients suffering from schizophrenia often show both symptoms of manic depressive psychosis.[1] In Western Medicine, the disorder is referred to as "schizophrenia" in the Diagnostic and Statistical Manual of Mental Disorders-V (DSM-V)[2] and as "F20-F29, schizophrenia" in the International Classification of Diseases-10 (ICD-10).[3] It is characterized by delusions, hallucinations, disorganized speech, disorganized or catatonic behavior, and negative symptoms.[2] The prevalence of schizophrenia is estimated to be between 0.4% and 0.7% of the world population.[4]

One of the TCM methods that is used to treat patients with schizophrenia is acupuncture.[5] Particularly in Asia, it has been used widely for a long time in order to treat psychotic symptoms.[6,7] It was found to be a relatively safe clinical intervention technique for use in the treatment of patients with schizophrenia and to have few adverse effects.[8] Recently, it has also been used in the West as an add-on technique for treating such patients.[9] To date, small beneficial effects have been reported in the literature for acupuncture treatment of the symptoms of schizophrenia;[10] however, research on the use of acupuncture particularly in the treatment of patients suffering from chronic schizophrenia is scarce.[11]

A high prevalence of sleep disorders in patients with schizophrenia has been found in the literature.[12] Of the patients with schizophrenia, 30%-80% suffer from disturbed sleep.[13] The large variability in the percentage scores seems to be a result of differences in the severities of the psychotic symptomatology.[13] Acupuncture has been used in the treatment of people suffering from sleep disorders as well.[14] Previous research has shown a beneficial treatment effect of acupuncture on sleep,[15] but the effects were generally found to be small.[16] So far, almost no research has been conducted on the effects of acupuncture in treating the sleep disorders of patients suffering from a severe chronic psychiatric disease: schizophrenia.

The aim of the present study was, therefore, to investigate the effect of acupuncture in the treatment of a patient with chronic schizophrenia and co-morbid sleep disorders. We hypothesized that acupuncture would have a positive effect on the positive and the negative symptoms of a patient with chronic schizophrenia and on the subjective and the objective co-morbid sleep disorders that were afflicting the patient.

CASE PRESENTATION

A 42-year-old male outpatient from a large German clinic, who was suffering from long-term schizophrenia (i.e., his length of illness was > 12 years) and sleep disorders, entered the study. His Western Medicine diagnosis was "schizophrenia" according to the DSM-V[2] and F20.0 (paranoid schizophrenia) according to the ICD-10.[3] The patient was on pharmacotherapy throughout the entire study and was using the following medications: Nipolept 25 mg in the morning and 75 mg in the evening, and Risperdal-consta 25 mg every two weeks. The patient had normal intelligence (IQ = 92, as measured with the MWTB test).[17] With respect to the level of education, our patient had finished "Hauptschule" education, which is secondary school in Germany. Finally, the present clinical case study was approved by the local ethics committee (Ärztekammer Nordrhein, No. 2008331) and is part of a larger project that has officially been registered under number NTR3132 at the Dutch Trial Register.

METHODS

TCM diagnostics

Careful individual TCM diagnoses were conducted by a licensed TCM practitioner who had more than five years of clinical experience.[18] Weekly TCM diagnoses (directly before treatment), including pulse diagnoses and diagnoses based on inspections of the tongue,[19] of the outpatient suffering from long-term schizophrenia and sleep disorders were conducted in the present study.

Acupuncture intervention

Acupuncture was used as a non-pharmacological clinical intervention technique. The patient received 12 weekly acupuncture treatments of about 60 min each in the clinic. Single-use stainless-steel needles (AcuPro C, Wujiang City Cloud & Dragon Medical Device Co., Ltd., China) were used for the acupuncture treatment, and the needles had a size of either 0.25 mm × 25 mm or 0.20 mm × 15 mm, depending on the location on the body.[20]

Psychological assessment tools

The following psychological assessment tools were used in the present study: the Positive and Negative Syndrome Scale (PANSS),[21] which was completed by the patient's psychiatrist, was used in order to monitor the positive and the negative symptoms of our patient. In addition, the Pittsburgh Sleep Quality Index (PSQI)[22] was used in order to measure the subjective quality of the patient's sleep. In order to measure his general level of daytime sleepiness, we implemented the Epworth Sleepiness Scale (ESS)[23] in this study. The Beck Depression Inventory-Ⅱ (BDI-Ⅱ)[24] was used in order to measure the severity of the depressive symptoms of our patient.

Actiwatch data recordings

An actiwatch (Type: Actiwatch Spectrum Plus, http://www.actigraphy.com/devices/actiwatch/actiwatch-plus.html) was used, making it possible to collect data on the following eight sleep parameters: "sleep efficiency", "sleep latency", "absolute actual sleep time", "absolute actual wake time", "relative actual sleep time", "relative actual wake time", "assumed sleep" (meaning the differ-

ence between sleep end and sleep start), and "moving". The patient wore the actiwatch 24 h a day for 5 d before the acupuncture treatment and 24 h a day for 5 d after finishing the acupuncture treatment. In Figure 1, we present the actual actogram for the five d of recordings for our outpatient before acupuncture.

Statistical analyses

IBM SPSS Statistics 23.0 (Armonk, NY, USA) was used for all statistical analyses. In order to compare the actiwatch data, a paired sample *t*-test was conducted between the conditions before and after acupuncture. For the following 3 actiwatch sleep parameters mean percentage scores ± standard deviations for the 5 data recordings before and after acupuncture were used in the analyses: "sleep efficiency", "relative actual sleep time", and "relative actual wake time". Moreover, for the following 5 actiwatch sleep parameters mean time (in minutes) ± standard deviations for the 5 data recordings before and after acupuncture were used in the analyses: "sleep latency", "absolute actual sleep time", "absolute actual wake time", "assumed sleep", and "moving". A difference of ($P < 0.05$) was considered statistically significant.

RESULTS

TCM diagnosis results

The TCM diagnosis of the outpatient suffering from long-term schizophrenia and sleep disorders revealed a Liver Fire pattern before the acupuncture treatment, which continued throughout the treatment period and was still present, although to a lesser degree, after the acupuncture treatment. The patient presented with a red face and eyes and a bitter taste. He smoked heavily, drank two liters of coffee a day, and had a yearning for hot, fatty, and spicy foods. The pulse diagnosis showed a wiry/overflowing and rapid pulse that continued to be so during treatment. Finally, the inspection of the tongue showed a thick dark-yellow coating that was especially thick and dark at the back of the tongue and a red tongue body (Figure 2). After the treatment period, the coating was less pronounced at the tip and the sides and was less dark.

Acupuncture

The following acupuncture points were selected (with the absolute and the relative frequencies of use in parentheses) for use during the 12 weekly acupuncture treatments of the outpatient suffering from long-term schizophrenia and sleep disorders: Lidui (ST 45) (12 = 100%); Sishencong (EX-HN 1) (11 = 92%); Zhaohai (KI 6) (10 = 83%); Shencang (KI 25) (7 = 58%); Baihui (DU 20) (5 = 42%); Guanyuan (CV 4) (4 = 33%); Zhiyin (BL 67) (3 = 25%); Yutang (CV 18) (3 = 25%); Wenliu (LI 7) (2 = 17%); Taixi (KI 3) (1 = 8%); Lieque (LU 7) (1 = 8%); Taiyang (EX-HN 5) (1 = 8%); Tianshu (ST 25) (1 = 8%); Yingu (KI 10) (1 = 8%); Xiyan (eye of the knee) (1 = 8%); Shaofu (HT 8) (1 = 8%).

The psychological assessment results revealed that the PANSS positive score was not changed after acupuncture treatment and had remained stable at 10; however, the PANSS negative score showed a small decrease from 33 before to 29 after acupuncture treatment, indicating that our patient suffered less from negative symptoms. The PANSS psychopathology subscore showed a similar pattern; i.e., a small decrease from 51 before to 45 after acupuncture treatment was observed, meaning that our patient suffered less from general psychopathology after acupuncture treatment. As a result, the PANSS total score also slightly decreased from 94 before to 84 after acupuncture treatment. In addition, the PSQI total score showed a large decrease from 8 before to 1 after acupuncture treatment, indicating that the patient fell far below the clinical cut-off score of 5.[25] However, the ESS score did not change and remained relatively stable at a value above the clinical cut-off score of 11.[26] The patient scored 12 before the acupuncture treatment and scored 13 after finishing the acupuncture treatment. Finally, the BDI-Ⅱ score revealed a decrease from 10 before acupuncture treatment to 6 after finishing the acupuncture treatment (Table 1).

Actiwatch results

The actiwatch results before acupuncture treatment versus those after acupuncture treatment revealed a significant change in the number of minutes the patient moved during sleep ($t = 3.22$, $P = 0.032$). More specifi-

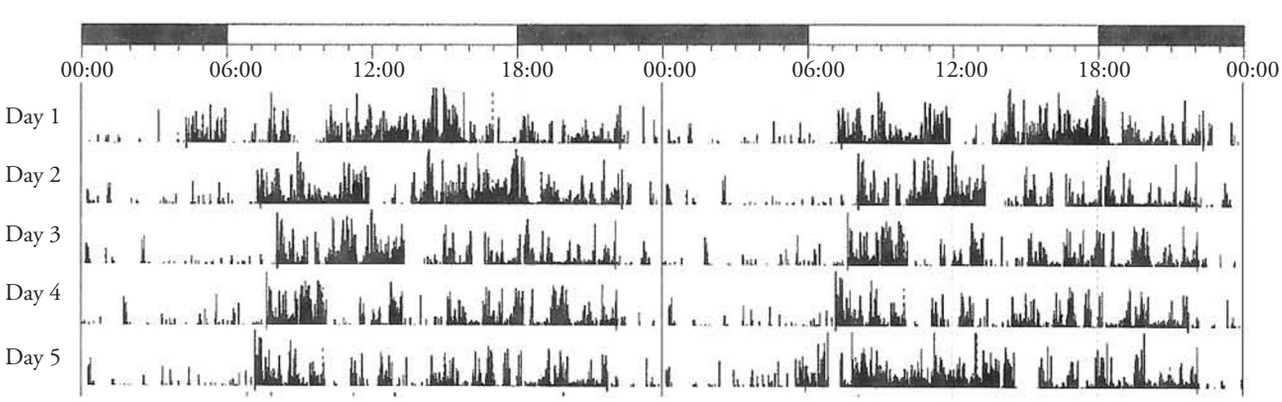

Figure 1 Actogram for the five days of recordings before acupuncture for a 42-year-old male outpatient suffering from long-term schizophrenia and sleep disorders

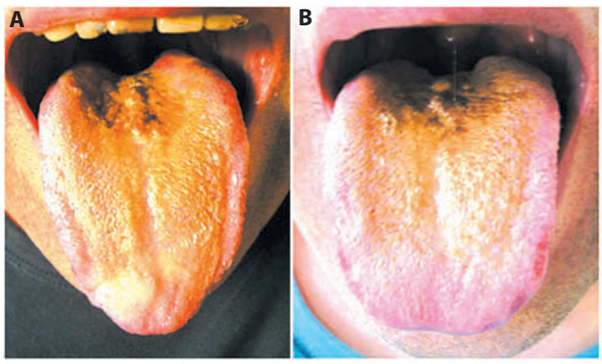

Figure 2 Tongue diagnosis of a 42-year-old male outpatient suffering from long-term schizophrenia and sleep disorder
A: before acupuncture; B: after acupuncture.

Table 1 Psychological PANSS, PSQI, ESS, and the BDI-Ⅱ assessment results before and after 12 weeks of acupuncture treatment for a patient suffering from long-term schizophrenia (scores)

Test	Before acupuncture	After acupuncture
PANSS positive	10	10
PANSS negative	33	29
PANSS psychopathology	51	45
PANSS total	94	84
PSQI	8	1
ESS	12	13
BDI-Ⅱ	10	6

Notes: PANSS: Positive and Negative Syndrome Scale; PSQI: Pittsburgh Sleep Quality Index; ESS: Epworth Sleepiness Scale; BDI-Ⅱ: Beck Depression Inventory-Ⅱ.

Table 2 Actiwatch results before and after 12 weeks of acupuncture treatment for a patient suffering from long-term schizophrenia ($\bar{x} \pm s$)

Actiwatch sleep parameter	Before acupuncture	After acupuncture
Sleep efficiency (%)	84.1±1.6	84.3±1.7
Sleep latency (min)	4.4±3.3	6.4±4.3
Absolute actual sleep time (min)	457.0±45.3	413.0±40.4
Absolute actual wake time (min)	81.1±4.3	69.2±10.2
Relative actual sleep (%)	84.8±1.9	85.6±1.7
Relative actual wake (%)	15.2±1.9	14.4±1.7
Assumed sleep (min)	538.1±43.5	482.2±45.5
Moving (min)	77.5±9.4	56.4±11.5[a]

Notes: $\bar{x} \pm s$: mean ± standard deviation. [a]$P < 0.05$ in the score on the paired sample *t*-test between before and after acupuncture.

cally, the duration of movement during sleep decreased from 77.5 min before the acupuncture treatment to 56.4 min after finishing the acupuncture treatment. In addition, no statistically significant changes in the actiwatch scores on the other sleep parameters were found: "sleep efficiency" ($t = -0.27$, $P = 0.080$), "sleep latency" ($t = -0.75$, $P = 0.50$), "absolute actual sleep time" ($t = 1.37$, $P = 0.24$), "relative actual sleep"/"relative actual wake" ($t = 0.67$, $P = 0.54$), and "assumed sleep" ($t = 1.64$, $P = 0.18$). Only a small trend towards significance was found for the sleep parameter "absolute actual wake time" ($t = 2.13$, $P = 0.10$), meaning that the patient was awake for less time during the night after acupuncture (69.2 min) than he was before acupuncture (81.1 min) (Table 2).

DISCUSSION

In this study, the effect of acupuncture in the treatment of chronic schizophrenia and co-morbid sleep disorders was investigated in a 42-year-old male outpatient with long-term schizophrenia and sleep disorders. Acupuncture was expected to have a positive effect on the positive and the negative symptoms of the patient and on the subjective and the objective co-morbid sleep disorders that were afflicting the patient.

The TCM diagnoses of the patient before and after acupuncture treatment revealed the following results: a Liver Fire pattern was found continuously throughout treatment. The patient presented with a red face and eyes and a bitter taste and showed a wiry/overflowing and rapid pulse that continued to be so during treatment. The inspection of the tongue showed a thick dark-yellow coating that was especially thick and dark at the back of the tongue and a red tongue body. After the treatment period, the coating was less pronounced at the tip and the sides and was less dark.

With respect to the positive and the negative symptoms of our patient, the PANSS[21] results indicate that our patient's positive symptoms had not improve, but he did suffer less from negative symptoms, such as the inability to experience pleasure,[27] lack of motivation,[28] etc., after acupuncture treatment. Moreover, this improvement in number of negative symptoms was further illustrated by the decrease in score from 10 to 6 on the BDI-Ⅱ, meaning that the patient reported that he was suffering less from depressive symptoms. However, here, we must point out that the BDI-Ⅱ score for our patient had already indicated that he did not clinically suffer from depression (i.e., a score between 0 and 13 indicates minimal depression).[29]

The subjective sleep disorders showed a large decrease on the PSQI[22] from 8 before to 1 after acupuncture treatment, indicating that the patient fell far below the clinical cut-off score of 5 (i.e., > 5 = sleep disorders versus < 5 = no sleep disorders)[25] and that the patient reported that he was not suffering from sleep disorders after the acupuncture treatment. The patient clearly reported that he slept better after acupuncture treatment, but the daytime sleepiness results showed a different pattern. The score on the ESS[23] did not change and remained relatively stable. More precisely, the patient scored 12 before the acupuncture treatment and 13 af-

ter finishing the acupuncture treatment, showing that the patient suffered from "mild sleepiness" (note that a score between 11-14 is considered as mild sleepiness).[26] In sum, the subjective sleep-disorder results showed that after the acupuncture treatment, the patient was sleeping better during the night, but still experienced about the same level of sleepiness during the day.

The objective sleep-disorder treatment revealed a significant change in the number of minutes that the patient moved while asleep. More specifically, the total duration of the patient's movement during sleep decreased from 77.5 min before the acupuncture treatment to 56.4 min after finishing the acupuncture treatment; i. e., the acupuncture intervention seems to have decreased physical restlessness during sleep.

Although most sleep parameters (e.g., "sleep efficiency", "sleep latency", "absolute actual sleep time", "relative actual sleep"/"relative actual wake", "assumed sleep", and "absolute actual wake time") showed results in the direction of improved sleep after acupuncture treatment in our patient suffering from long-term schizophrenia, none of those results reached statistical significance. However, here, we must stress that the present study is a case study (n = 1) and in a larger clinical trial, more sleep parameters will most likely change and those changes may reach statistical significance because of the increase in statistical power.[30] To illustrate this point further, the sleep parameter "absolute actual wake time", for instance, showed that the patient was awake less during the night after finishing the acupuncture treatment (69.2 min) than he had been before the acupuncture treatment (81.1 min), which is, in absolute terms, a large effect of 11.5 min, but based on only one person, this possibly beneficial acupuncture effect was associated with a statistically non-significant P value of 0.10.

One limitation of the present study is that we are not able to say anything about the long-term clinical effects of acupuncture treatment for patients with chronic schizophrenia and co-morbid sleep disorders. Therefore, in future research, one or two follow-up measurements (i.e., of the TCM diagnoses, the psychological assessments, and the actiwatch recordings), for instance, three and six months after finishing acupuncture treatment, need to be implemented. In sum, the objective sleep-disorder results in this study showed that the patient moved less while asleep. However, replication studies with larger samples are warranted because in larger clinical trials, more sleep parameters are expected to show statistically significant changes as a result of the acupuncture treatment. Another limitation of the present study is, as we have already briefly discussed above, the fact that the present study is a case study (n = 1). Although case studies are important and have their strengths in clinical research, especially when the research field is relatively unexplored, if new hypotheses and theories are to be generated,[31] especially for the statistical analyses of objective sleep-disorder (actiwatch) data, future clinical studies with larger populations are needed in order to have more statistical power.[30] Moreover, such studies would allow us to analyze statistically the psychological assessment results.

To conclude, acupuncture was found to be an effective, non-pharmacological, add-on treatment for subjective sleep disorders and, to a lesser degree, for objective sleep disorders, as well as the negative symptoms of chronic schizophrenia. Future larger clinical trials with follow-up measurements are needed in order to replicate the present preliminary beneficial acupuncture findings and in order to determine whether the observed benefits are long-term clinical effects or not.

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